VEGETABLE MARKET CHAIN ANALYSIS IN AMHARA NATIONAL REGIONAL STATE: THE CASE OF FOGERA WOREDA, SOUTH GONDAR ZONE

M.Sc. Thesis

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October 2007

Haramaya University

VEGETABLE MARKET CHAIN ANALYSIS IN AMHARA NATIONAL REGIONAL STATE: THE CASE OF FOGERA WOREDA, SOUTH GONDAR

A Thesis Submitted to the Department of Agricultural Economics,
School of Graduate Studies
HARAMAYA UNIVERSITY

In Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL ECONOMICS)

BY
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October 2007
Haramaya University

APPROVAL SHEET

SCHOOL OF GRADUATE STUDIES

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As Thesis research advisors, we here by certify that we have read and evaluated this Thesis prepared, under our guidance, by Abay Akalu Weldeslassie entitled "Vegetable Market Chain Analysis in Amhara National Regional State: the Case of Fogera Woreda, South Gondar Zone". We recommend that it be submitted as fulfilling the thesis requirement.

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DEDICATION

I dedicate this piece of work to my father, *Memhir* Akalu Weldeslassie, and my wife, Yeshiwork Yalew, together with our kids, for all their contribution.

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my solely work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced MSc degree at the Haramaya University and is deposited at the University Library to be available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born on July 18, 1973 in Gondar. He attended his elementary school at Amba Giorigis Primary and Junior Secondary School and Secondary school at Fasiledes Comprehensive High School at Gondar. Joined the then Alemaya University of Agriculture in 1988/89, he graduated with B.Sc. degree in Agricultural Economics on 5th of September 1992.

Working latest five years for Amhara National Regional State Cooperatives Promotion Bureau until he joined Haramaya University for postgraduate studies in October 2005, the author was working at different levels for Bureau of Agriculture and Rural Development from 1993-98.

ACKNOWLEDGEMENTS

I thank professor Belay Kassa for all his support in the course of my work. His motive to share knowledge (a reflection of modern knowledge management principles) by providing me those interesting books, which would only be able to get unless, went to Europe or America, in fact an illusion for me are unforgettable.

My equal appreciation, without repeating similar words, also goes to my co-advisor Dirk Hoekstra and equally grateful to Dr Berhanu Gebremedhin for their advice, guidance, constructive, critical comments since the inception of the proposal until the final date of submission. Both individuals were with me in all the assignment. Dirk has strictly followed me the whole period through reviewing the manuscript and giving me fruitful comments on both the substance as well as the English. Dr Berhanu on the other hand supported me much on research methodology and econometric analysis. His critical comments and suggestions on the econometric analysis was very much above the required that helped me develop to some extent standard Thesis.

I want to remind readers of this Thesis on the quality of the write up that the gap that might be observed would be fully attributable to my failure to write what I have been guided not to anyone of the advisors or Dr Berhanu.

Other members of the IPMS-ILRI are also acknowledged namely Muluhiwot (IPMS Administrator), Birkie (IPMS-Secretary), Teshome and Tilahun (Fogera IPMS-ILRI pilot learning site staff) for their at ease facilitation of all logistical matters. Improving Productivity and Market Success (IPMS) for Ethiopian Farmers Project- International Livestock Research Institute (ILRI) is also impassable without giving thanks for granting fund.

Other friends like Demelash Seifu were also with me. Hence, I would like to convey my heartfelt thanks to every body who has a hand on my achievements.

Finally, more than every body, equally to my advisors, I am obliged to extend my gratitude to my family /my wife Yeshiwork Yalew, son Natnael and daughter Hilina/ for their invaluable sacrifice in every perspective until I returned. Without their support, completion would have not been real. All honors associated with this degree (if appear) belong to them, more than me.

ABBREVIATIONS

ANRS	Amhara National Regional State
BOFED	Bureau of Finance and Economic Development
CSA	Central Statistical Authority
EARO	Ethiopian Agricultural Research Organization
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
ha	Hectare
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
IPMS	Improving Productivity for Market Success Ethiopian Farmers' Project
kms	Kilometres
m.a.s.l	meters above sea level
MEDAC	Ministry of Economic Development and Cooperation
MOI	Ministry of Information
MoARD	Ministry of Agriculture and Rural Development
MSU	Michigan State University
OLS	Ordinary Least Squares
SCP	Structure Conduct performance
SPSS	Statistical Package for Social Sciences
TGMM	Total Gross Marketing Margin
VIF	Variance Inflation Factor
WHO	World Health Organization

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VEGETABLE MARKET CHAIN ANALYSIS IN AMHARA NATIONAL REGIONAL STATE: THE CASE OF FOGERA WOREDA, SOUTH GONDAR ZONE

ABSTRACT

Vegetable as a group of crops from the horticulture category has a very wide importance both as a source of food and health care. On the contrary, the level of consumption is very low for reasons of unavailability and market imperfection. Even with limited pocket areas of production, the product suffered low price and lack of market. As a result, glut and spoilage are common. Measures to solve the problem were limited partly for reasons of little research and lack of attention. Hence, this study was initiated to partially fill the gap.

The overall objective of the study was to analyze vegetable market chain with a focus on onion and tomato. The specific objectives were to assess structure-conduct-performance of vegetable marketing, analyze market supply determinants, identify problems and opportunities in vegetable production and marketing For the purpose of completeness demand analysis was also conducted.

Formal and informal data collection tools of both primary and secondary data were used. Econometric models like Heckman two stages (for market supply analysis) and double-log linear model (for consumption analysis) were the tools used for the analysis.

The cost-revenue calculation results indicated that on the average a farmer profited 8,191ETB from shallot, 13,141ETB from onion, and 5,111ETB from tomato per hectare production (Assuming an average price of 1.75 ETB, 1.65 ETB and 0.75ETB per kg prices in that order). However, this potential benefit is under challenges of imperfect marketing. The market conduct is characterized by unethical practices of cheating and information collusion that led to uncompetitive market behavior even though the calculated concentration ratio did not indicate oligoposony market behavior (26.15%).

With an estimated volume of annual production of 324,412Ql of onion and 40,402Ql of tomato the estimated marketed proportion according to the respondents was (95 percent of onion and 86 percent of tomato). This showed that Fogera is entering to commercialization albeit the challenge in marketing. For success of the started race, measures to improve marketing like correcting the malpractices, implementation of defined standard and grades, provision of market information, networking with the central potential buyers like urban cooperatives or groups at Addis Ababa seem important. Capacity building for all actors in the chain and strong extension service on product handling and marketing to farmers should get focus.

Volume supplied to market were also analyzed and the same variables in the case of land allocation for onion also came up significant for onion supply but un the case of tomato it were experience and number of oxen owned by the respondent that came up with significant coefficients.

The average monthly level of consumption was assessed when the Fogera produce was at the market and was used to see some properties of consumers. Based on the 91 sampled consumers from Gondar, Bahir Dar and Woreta towns it had been revealed that the

average monthly income per household was 1,372.21 ETB. Average family size was 5.7 where the monthly average consumption of tomato per household per month was obtained to be 5.11 kg of tomato and onion 7.34 kg onion. A household spent on the average about 44 percent (603.10ETB) of their monthly income on food from which 7.62 percent (45.96 ETB) was spent on vegetables.

For assessing accessibility, the average distance a certain consumer measured per single feet trip was taken and the average was estimated from the respondents to be 0.485 hours. More than 97 percent of respondents reflected a strong interest on quality. According to the survey data, on the average respondents expressed their willingness to add 0.046 ETB per kg for tomato and 0.05 ETB for a kg of onion.

Econometric analyses of demand revealed that from the proposed determinants it was income, purchase frequency, distance, own price and single purchase lot that were identified to be significant for both vegetables.

1. INTRODUCTION

1.1. Background

Vegetable is the designation given to that group of horticultural plants grown for human consumption either for their roots, tubers, shoots, stems, leaves, flower buds, flowers, fruit or seed (immature or mature) (Nonnecke, 1989). About two-thirds of the world's population relies on a largely vegetarian diet. In addition to the contribution of valuable nutrients, vegetables add variety, taste, color, and texture to diets (Rubatzky and Yamaguchi, 1997).

As Lumpkin et al (2005) pointed out world wide production of fruit and vegetable crops has grown faster than that of cereal crops. Between 1960 and 2000, the area under horticultural crops worldwide has more than doubled. Among the main reasons attributable to the growth, high return from horticulture as compared to cereals was the prime one. Per capita farm income from horticulture has been reported up to five times higher.

Given the above worldwide development, horticultural production in Ethiopia is very much limited albeit ecological advantages. According to Dawit et al (2004), vegetable crops are produced in the country through commercial and small farmers. The type is limited to few crops and production was concentrated to some pocket areas. Production varied from cultivating a few plants in the backyards for home consumption up to a large-scale production for domestic and export markets.

From the total 1.1 million square kilometers size of the country 10.18 million ha of land was under cultivation by the year 2005/06 from which vegetable covered 0.29 million ha. An annual production of 18.9 million quintal was estimated by the same year through employment of 9.03 million smallholder farmers for its production. Onion and tomato covered about 16.6 and 4.8 thousands ha of land CSA (2006).

In Amhara National Regional State, where this study was conducted, agriculture contributed about 55.8 percent of the total regional GDP accounting for employment of 88.7 percent of the total population (BOFED, 2006). The total land size of the region was 3.396 million ha from which about 2.9 million ha was under cultivation as of 2006. Vegetables covered about 69.8 thousands of ha of land from which 3.5 million quintal production was estimated. Onion covered 5,338 and tomato 319 ha of land.

Potato, onion, tomato, garlic, shallot, pepper, are among the leading vegetable crops grown in the region. Based on the data set out by CSA (2006), Alefa, Fogera, Achefer, Jabi Tehinan, Burei, Merawi, and Bahir Dar Zuria *Woredas* are the leading vegetable producing areas in the region. Even though, the region has an ample production potential and market access even to the nearby Sudan, it had never reaped the opportunity as it would supposed to be.

Fogera *Woreda* endowed with beautiful diverse natural resource has the capacity to grow different annual and perennial crops. Two major rivers are of great importance to the *Woreda*, Gumara and Rib. They are used for irrigation during the dry season mainly for vegetables. Major types of vegetable crops growing in the area include potato, onion, tomato, garlic, green peppers and some leafy vegetables.

Vegetable production in the *Woreda* is mainly for market except potato, which is utilized much for home consumption. The production is very fragmented and uncoordinated where all growers produce similar type of crop resulting in glut (mainly onion and tomato) typically in harvest seasons.

1.2. Statement of the Problem

According to the Rural Development Policy and Strategy Document (MOI, 2002) the agricultural sector is encouraged to meet the national food and industrial raw material demand. The sector is expected to generate surplus primarily for the producer to secure better purchasing capacity, secondly for the development of other sectors as a source of raw materials, and thirdly as source of hard currency for importing technology. This called for the improvement in both the organization and efficiency of marketing system. That is why a market oriented production system set in the strategy.

Vegetable production has a significant role in reducing poverty through employment generation, improving the feeding behavior of the people, and creating new opportunities for poor farmers. Cultivation of vegetable allows productive employment as the labor/land ratio is high. Depending on the crop, production of horticulture crops require at least twice the labor, and up to five times the labor days per ha as compared to cereal crops. Increasing horticultural productions thus contribute to commercialization of the rural economy and create many off-farm jobs (Lumpkin et al., 2005).

Abundant intake of fruit and vegetables is clearly a positive solution for problems of poor diet quality in the developing world. Fruit and vegetables are relatively cheap sources of essential micronutrients. They are a cost effective way to prevent micronutrient deficiencies and protect against chronic diseases, the main killers in the world today. Although FAO/WHO recommends minimum fruit and vegetable intakes of 146 Kg/person/year, few countries achieved this level. The level ranges from 27 to 114 in most Sub Saharan Africa countries, and 26.7 Kg/person/year specifically in Ethiopia (Ruel et al., 2005).

To improve the poor feeding behavior and benefit advantages from consumption of the crops problems associated with production, marketing and consumption has to be addressed. Market chain analysis is a better approach for studies of such type. Analysis of the system in terms of vegetable market structure, conduct and performance taking in to account product and location specificity identify the bottlenecks and come up with specific workable solutions.

Vegetable production in Fogera is characterized by relatively subsistence mode limited to few types. On the other hand, area advantages defined in terms of proximity to urban centers like Bahir Dar and Gondar and developed infrastructures were good opportunities. However, studies conducted elsewhere in Ethiopia indicated that the product marketing is imperfect due to intermediaries' malpractices and other reasons. The situation in Fogera might be similar or different. The motive of the study was therefore to investigate the marketing system with a commodity approach, understand the system, and come up with recommendations.

1.3. Objectives of the Study

The overall objective of the study was to analyze the vegetable marketing chain in Fogera *Woreda* with the following specific objectives -

- To identify problems and opportunities in vegetable production and marketing
- To analyze the structure, conduct and performance of the market
- To analyze determinants of market supply
- To analyze determinants of demand
- To analyze crop choice, buyer selection behavior of vegetable growing farmers

1.4. Scope of the Study

Attempting to analyze the entire food system is an impossible action given the limited resources and human skill. Thus, the research was narrowed down to concentrate on the production area (Fogera) and major receivers (Gondar and Bahir Dar). The types of crops was limited to onion and tomato for their increasing coverage vis-à-vis the marketing problem they used to face.

Moreover, these crops accounted for the major proportion of vegetable production and passed through a number of marketing stages. Other vegetable crop types are left, because either their production is limited, or they did not pass through a number of stages.

Different market levels, role of actors in the channel, market direction, price discovery and bargaining characteristics of producers, buying and selling strategies, and traders' behavior in the whole marketing process were seen.

1.5. Significance of the Study

The primary significance of the study is to all actors in the marketing system. Analysis of the whole system and identifying clearly the challenges will benefit policy makers and implementers in indicating the area of advantage for what should be done to improve vegetable marketing.

Apart from this, some time ago ANRS had commissioned one relatively comprehensive marketing system study covering a number of commodities. The study was comprehensive but missed vegetables. Hence, this study was supposed to partially fill the gap. The other benefit that could be anticipated is its significance as a source for further studies.

1.6. Limitations of the Study

This study being the first in the *Woreda* (probably second in the region) lack many detail investigations which could have reinforced understanding of the whole system especially in relation to production and consumption studies. The time limit as a factor squeezed the chance to exclude other areas of vegetable production and marketing away from Fogera.

1.7. Organization of the Study

With the above brief introduction of the research paper, the remaining part of the thesis is organized as follows. The next main section reviews detailed literature on relevant topics on the study of production, marketing, and consumption of vegetables. The successor deals

with the research methodology starting with description of the study *Woreda* and end up with definition of econometric variables. The second from the last section explains results and discussions, including data presentation on respondents' socio economic characteristics, and econometric analysis of supply and demand. The final section obviously summarizes the findings of the study with some recommendations.

2. LITERATURE REVIEW

2.1. Definitions

Markets- The term market has got a variety of meanings. In some cases the market may mean the place where buying and selling takes place, an arena in which a good is sold, a group of people carrying on buying or selling, or the commodity traded, such as the corn market, or time market (Larson, 1957).

Kohl and Uhl (1985) put their definition of market in reference to giving answers to questions of: what to produce, how much to produce, how to produce, and how to distribute?

Still another scholar, Saccomandi (1998), defined market as "the exchange, circulation and distribution of commodities between people and places." By agricultural market, Saccomandi (1998) added refers to the economic 'place' in which agricultural producers sell the products obtained in their firms with the degree of form-, space-, and time-related utility required by the buyers.

Marketing-in its simplest form is defined as the process of satisfying human needs by bringing products to people in the proper form, time and place (Branson and Norvel, 1983).

Marketing has an intrinsic productive value, in that it adds time, form, place and possession utilities to products and commodities. Through the technical functions of storage, processing and transportation, and through exchange, marketing increases consumer satisfaction from any given quantity of output (Mendoza, 1995).

Kotler (2003) also stated shortly marketing as the task of creating, promoting, and delivering goods and services to consumers and businesses.

Agricultural marketing - is defined as agriculturally oriented marketing. It embraces all operations and institutions involved in moving farm products from farm to consumers (Pritchard, 1969).

It covers all the activities associated with the agricultural production and food, feed, and fiber assembly, processing, and distribution to final consumers, including analysis of consumers' needs, motivations, and purchasing and consumption behavior (Branson and Norvell, 1983).

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

As expressed by FAO (1986) food and agricultural marketing not only means the movement of agricultural produce from the farm where it is produced to the consumer or manufacturer but also includes the marketing of production supplies to farmers like fertilizer, pesticide, chemicals, machinery, animal feed, tools and equipments.

Marketing Systems- is defined as the sequential set of kinds or types of business firms through which a product passes during the marketing process. It is the interrelationship of firms (Branson and Norvell, 1983).

It is usually seen as a "system" because it comprises several, usually stable, interrelated structures that, along with production, distribution, and consumption, underpin the economic process (Mendoza, 1995).

Agricultural and food marketing system- includes the primary collection system; the inland and port terminal system; the transformation system, which mills, process, and packages; and the transformation system that moves between the functions. There are also other additional elements like set of policies, institutions which facilitate functioning of the system and the public policy environment (McCalla and Schmitz, 1979).

It refers to business activities leading to the production of agricultural produce on the farm and associated with its movement to the consumer or manufacturer. It includes the marketing of agricultural inputs (e.g. fertilizer) to farmers, as well as initial processing and packaging, handling, transporting, assembling, storing, wholesaling and retailing agricultural products. In addition to the physical dimension of the marketing system, there is also an intangible dimension, which includes trade finance, marketing infrastructure, administrative and macroeconomic policy framework (FAO, 1999).

2.2. Markets and Development

It is generally believed that small farm agriculture plays a central role in economic development, both in supplying a significant portion of the domestic food crop supplies and in generating income for low-income families, (Minot, 1986).

Markets can serve as potential agents of development in two ways. Firstly, they can provide a way to allocate resources ensuring the highest value production and maximum consumer satisfaction. Secondly, they may stimulate growth by promoting technological innovation and increased supply and demand. Economic development normally requires increased resource productivity that directly demand specialization in production and technological innovation. Specialization requires coordination between producers, distributors and consumers, or between supply and demand. Markets provide one means of such coordination (Scarborough and Kydd, 1992).

Markets aggregate demand and supply across actors at different spatial and temporal scales. Well-functioning markets ensure that macro and sectoral policies change the incentives and constraints faced by micro-level decision makers. Macro policy commonly becomes ineffective without market transmission of the signals sent by central governments. Similarly, well-functioning markets underpin important opportunities at the micro level for welfare improvements that aggregate into sustainable macro-level growth. For example, without good access to distant markets that can absorb excess local supply, the adoption of more productive agricultural technologies typically leads to a drop in farm-gate product prices, erasing all or many of the gains to producers from technological change and thereby dampening incentives for farmers to adopt new technologies that can stimulate economic growth. Markets also play a fundamental role in managing risk associated with demand and supply shocks by facilitating adjustment in net export flows across space and in storage over time, thereby reducing the price variability faced by

consumers and producers. Markets thus perform multiple valuable functions: distribution of inputs (such as fertilizer, seed) and outputs (such as crops, animal products) across space and time, transformation of raw commodities into value-added products, and transmission of information and risk (Barrett and Mutambatsere, 2005).

In competitive markets, consumers can express their preferences, subject to the constraints of their incomes, by paying a certain price for particular qualities and quantities of goods. Producers can then attempt to maximize their profits by supplying the relevant quantity and quality of goods at least cost (Scarborough and Kydd, 1992).

When markets work, the automatic adjustment processes perform an awesome task of coordination with a minimum of fuss, and economic resources are allocated efficiently. When markets fail, participants with inside information and economic power are able to exploit both producers and consumers, to the special detriment of the poor at each end (Timmer *et al.*, 1983).

As also put by Scarborough and Kydd (1992) if markets are perfectly competitive, and prices reflect the real costs of production, and if consumption does not have any external effects (positive or negative) on society, it can be shown that, through their influence on economic decision making, markets will lead to an optimal allocation of resources.

Through their influence on incomes, prices and commodity flows, markets play a crucial role in determining national levels of production of and consumers' access to food. The development and expansion of markets can provide a source of productive employment and income generation; transfer resources to non-agricultural sectors leading to the development of a home-market and hence the demand for agricultural commodities by the non-agricultural sectors and vice-versa, and the profit maximization objectives of entrepreneurs may lead to the development of new products.

The micro-level realities of agricultural markets in much of the developing world, however, include poor communications and transport infrastructure, limited rule of law, and restricted access to commercial finance, all of which make markets function much less effectively than textbook models typically assume. A long-standing empirical literature documents considerable commodity price variability across space and seasons in developing countries, with various empirical tests of market integration suggesting significant and puzzling forgone arbitrage opportunities, significant entry and mobility barriers, and highly personalized exchange (Barrett and Mutambatsere, 2005).

Barrett and Mutambatsere (2005) also added causes for widespread inefficiencies as incomplete or unclear property rights, imperfect contract monitoring and enforcement, high transactions costs, and binding liquidity constraints. Such failures often motivate government intervention in markets, although interventions have often done more harm than good, either by distorting incentives or by creating public sector market power. The history of agricultural markets in developing countries reflects evolving thinking on the appropriate role for government in trying to address the inefficiencies created by incomplete institutional and physical infrastructure and imperfect competition.

Many scholars reason out the lack of shift from subsistence to commercial farming for different reasons like high risks, high transaction costs, limited food markets, limited insurance options and limited access to credit. Neway (2006) noted that integration of a

household into a market economy involves forging new links deepening existing relationships between the household, on one side, and traders, micro finance institutions, and other farmers willing to supply labor and rent land, on the other.

Though markets are indispensable in the process of agricultural commercialization, as many people argued, transaction costs and other causes of market imperfections could limit the participation of farm households in different markets. This implies that markets may be physically available but not accessible to some of the farm households. Under such circumstances, farm households may tend to choose crops that can easily be sold at the accessible markets. Such tendency is much stronger for households producing perishable crops like vegetables (Moti, 2007).

2.3. Peculiarities of Agricultural Production and Marketing

Five common characteristics distinguish agricultural production from production in general. These include: agricultural production is tied to specific locations because ether the soils or the climate do not encourage or permit cultivation at other locations; the scale of agricultural production tends to be small; agricultural production is seasonal; nearly all agricultural products are perishable; and agricultural products exhibit natural variation (Van der Laan, 1999).

These characteristics as put by Van der Laan (1999) demand marketing activities to be performed separately. Location specificity demand collection followed by distribution, small-scale activity urges assembling, collecting and bulking. Seasonality forced storage and stock holding. The perishable nature request on-farm or near off-farm preservation and the natural variation of products creates the need for sorting and standardization.

Yet, by virtue of the spatial dispersion of producers and consumers, the temporal lags between input application and harvest, the variable perishable nature and storability of commodities, and the political sensitivity of basic food staples, agricultural markets are prone to high transactions costs, significant risks and frequent government interference. The fundamental functions of input and output distribution, post-harvest processing and storage, as well as the persistent challenges of liquidity constraints, contract enforcement and imperfect information; have characterized agricultural markets in developing countries under all forms of organization (Barrett and Mutambatsere, 2005).

The bargaining position of farmers is usually weak, particularly for perishable vegetable products. This could be due to the existence of large numbers of farmers (sellers) and limited number of merchants (buyers) in these markets. Besides the market structure, farmers and merchants may not have equal price information from central transactions (Moti, 2007).

With a long run objective of promoting participation of small-scale farmers in the production of non-traditional agricultural commodities, agricultural development policies need to focus on re-orienting the household use from usual subsistence or semi-subsistence production towards more market oriented production and consumption decisions. The achievement would be easily addressed through correcting sources of market imperfection.

2.4. History of Agricultural Marketing Research

Agricultural marketing research like all other applied studies has its own history. Scarborough and Kydd (1992) analyzed the history as follows.

The internal productive efficiency of marketing enterprises- In the 1940's and 50's the main emphasis in marketing economics was on the internal and operational efficiency of marketing firms. In this intra-firm organization, management structures, motivations and incentive arrangements, and decision-making rules and processes, were seen as important influences on the efficiency of operations. Descriptive analysis of accounting data, statistical analysis of same data using econometrics, and analysis, which combine both physical product and cost relationships, were used to analyze the internal efficiency of the marketing enterprise. However, today marketing is not a single isolated phenomenon that a certain enterprise can separate itself and only depend on its efficiency, rather, a number of factors influence its performance that demands to take into consideration when a decision is made. As a result, this approach became less important than its mathematical beauty.

The structure-conduct-performance school- Since the 1960, this characteristic of markets has increasingly been emphasized in defining means of analyzing their efficiency. The so-called S-C-P school focuses on the behavior of groups of similar rather than individual firms. This approach provides a broadly descriptive model of the nature of various sets of market attributes, and the relationship between them and performance. The emphasis is not on the internal organization of firms, but on relationships between functionally similar firms, and their market behavior as a group. Its basic tenet is that, given certain 'basic conditions' the performance of particular industries depends on the conduct of the sellers and buyers, which in turn is influenced by the structure of the relevant market. Two most common weakness of this approach are; the degree of inference concerning behavioral and performance characteristics, and the type of indicator used to assess the latter.

The food systems framework- It is based on the concepts of structure, conduct and performance, but attempts to broaden and inject a more dynamic aspect into the model. To this end, it goes beyond industry boundaries and assumes structure and conduct vertically over the entire commodity flow from input supplier to ultimate consumer. The rationale behind this extension is that structure and behavior at one level in the system, influences those in others. By analyzing the structure of the whole sub sector, hypothesis concerning the effects of the nature of vertical coordination between different, but related, industries, on market and economic performance, can be developed. Here economic, infrastructural and institutional environments in which markets are operating are not taken as given, but are studied in terms of their impact on market performance, and the constraints and opportunities for markets to contribute to improved economic performance.

These discussions of history of study do not contradict the usual; functional, commodity, institutional and systems approach rather reinforce. Development of one over the other does not indicate an exclusively dropping of the earlier and substitute the incumbent rather a combination of one with the other for figuring out more.

Many developing countries need improvement in their agricultural marketing systems to keep pace with expansion in agriculture and industry. The change in technology, consumer demand for farm supplies, and the growing interdependence of farming and marketing

during development are other stimuli for modernization. Accordingly, many developing countries are eager to hasten expansion and change in their agricultural marketing systems. But to formulate effective improvement programs comprehensive analysis of agricultural marketing is crucial. A total-system research approach as put by Pritchard (1969) can help policy and program officials to identify present and emerging marketing problems and to understand the intricate, changing linkages binding agriculture and marketing together.

Timmer *et al.,* (1983) advised to follow indirect approaches that rely on normative competitive models that often used to provide additional weight because direct approaches are frequently constrained by unreliable data.

In the functional approach one looks at the basic activities /functions/ that have to be performed in marketing agricultural commodities, and at the marketing of inputs into agricultural production. The systems approach is concerned with the number and kinds of business firms that perform the marketing task. How firms are interrelated is called the structure of the marketing system. The third approach, commodity approach, entails an analysis of marketing functions, system, and structure from the viewpoint of an individual product. Two other additional approaches, the post harvest and mixed systems approach, which analyze all harmful, or loss provoking elements and other causes in the transfer of products are also included (Mendoza, 1995).

During the initial design stages of applied food systems research, one way to increase the likelihood that research issues are correctly identified and prioritized is to use a conceptual framework that permits systematic consideration of potential topics. The sub sector approach is one of such consideration (Morris, 1995).

The original sub sector paradigm was proposed by Shaffer (1973) as the study of "vertical set of economic activities in the production and distribution of a closely related set of commodities." The vertical set of activities by which a commodity's value is increased includes input provision (including research), extension, farm production, processing, storage, assembly, transportation, wholesaling, retailing, financing, and consumption. (Martel *et al.*, 2000).

Sub sector is an economic unit of analysis specific to a particular commodity or commodity group (e.g. maize, feed grains, cereals). It encompasses a meaningful grouping of economic activities linked horizontally and vertically by market relationships (for e.g. assembly, transportation and storage). Inclusion of the vertical dimension is important, because problems in the food system can frequently be attributed to poor coordination between successive stages of economic activity (Morris, 1995).

A growing body of literature exists on topics related to food production, consumption, and nutrition. In most developing countries, collection and analysis of statistics on output and use of locally produced agricultural commodities has become routine. However, the growth is low as data on agricultural marketing – with the possible exception of prices for urban staples and export crops-are not so regularly monitored. Even, in some instances, data that may exist are hard to get access for political or property reasons. Furthermore, those studies on domestic agricultural marketing that are completed; often suffer from restricted publication and dissemination. The shortage of research on domestic agricultural marketing in developing countries is also partly attributable to the scarcity of methodological materials (Scott, 1995).

Seeing, marketing as a "system" and evaluating based on the three approaches- commodity, institutional, and functional- the coverage in research so far in Africa seems good in case of export and durable food crops while poor in perishable staple crops as put by Van der Laan (1999). Institutionally, producers and traders are well covered while processing, standardization, financing, risk bearing and market intelligence are poorly covered when evaluated functionally.

Coming down to specific situations of Ethiopia the possible reasons that could be hypothesized for the weakly performance of agricultural marketing research as compared to production research might include limited number of professionals and the impacts of the passed command economy. In fact, there are some pieces of works done here and there by ministerial offices, the Grain Market Research Project of MeDAC, the market study project of ANRS, the International Food Policy Research Institute (IFPRI), postgraduate academic fulfillment works and Ethiopian Research Organization (EARO).

2.5. Market Chain Analysis

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

An agricultural marketing system consists of a series of activities that feature sequentially or functional integration. Operational sequentially is a characteristic of all activities that use agricultural products and for this reason the first economic analysis of the agricultural markets also attributed greater importance to the study of filiére, or the marketing or distribution channel (Saccomandi, 1998). Filiére is defined as a structure composed of distinct and separable technological stages of production that are associated with the use of specific resources and/or with the making of a specific product. It can be explosive as in the case of milk and implosive in the case of cake. The filiére analysis takes in to account both products and technology.

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

According to Hobbs *et al.* (2000), the term supply chain refers to the entire vertical chain of activities: from production on the farm, through processing, distribution, and retailing to the consumer. In other words, it is the entire spectrum, from gate to plate, regardless of how it is organized or how it functions.

Kotler (2003) defined supply chain as a longer channel stretching from raw materials to final products that are carried to final buyers. He shortly put as value-delivery network. He

also separated supply chain from demand chain in that the later starts from thinking first the target market and move back words from that point, as a backward orientation.

Under a free market, supply chains for a commodity develop to reflect its production, marketing and processing characteristics. Some of these are the spatial concentration of production, the extent of the commodity perishable nature, the extent of spatial concentration of consumption, economies of scale, weight loss in processing, the ease with which grades and standards can be assessed at points in the supply chain, and storability of the product and how this is changed by processing. Every stage is linked to and dependent upon activities at other points in the chain. Aspects of activities at one point interact with and affect other points. Consequently, it is possible for a problem experienced at one point to be the result of a change or an event experienced at some other point or some combination of such changes and events that have interacted to cause the observed problem (FAO, 2005).

Value chain on the other hand refers to the vertical alliance or strategic network between a numbers of independent business organizations within a supply chain, as it is a particular form of supply chain. Organizations have a shared vision and common goals. It is formed to meet specific market objectives through satisfying the needs of consumers. Besides, it allows for the mutual decision making as well as the sharing of risks and benefits. Value chain is not a vertical integration as vertical integration occurs when a single firm owns several stages in the supply chain. Rather, it is strategic network of independent organization/business who recognize their mutual need for one another working together to identify strategic objectives through sharing the associated risks and benefits by investing time, energy, and resources to make the relationship work (Hobbs *et al.*, 2000).

Marketing channel is a sequence of enterprises and markets by which a produce is moved from producer to consumer (FAO, 1986). In passing, it should be noted that many marketing channels might exist, as there are separate sources and/or destinations for each item.

To find out how many traders are operating in the marketing system, and at what points a commodity changes hands, it is helpful to sketch its flow through the marketing chain. The competitiveness of a market and the structure of the marketing chain are obviously related. If at some point in the chain only a single buyer or seller exists, then non-competitive behavior is likely. Alternatively, the presence of many active buyers and sellers all along the chain carries a strong presumption of competitive behavior and efficient market performance. Estimating volumes and percentages of commodity transformations, at each link in the chain provides an overview of the marketing systems (Timmer *et al.*, 1983).

All these reviewed literatures explain the thinking that grew up in studying and development of effective marketing system. For a clear application and understanding, definitions in this study are framed to mean as follows. Market chain is taken to encompass from input supply to consumption. Supply chain if expressed mean the chain of delivering product; market channel mean specific series of actors through which product changes hand until it reaches the final consumer; and value chain mean as exactly put above by Hobbs et al., (2000).

Market chain analysis, therefore, identifies and describes all points in the chain (producers, traders, transporters, processors, consumers), prices in and out at each point, functions

performed at each point /who does what?/, market demand /rising, constant, declining, approximate total demand in the channel/, market constraints and opportunities for the products.

2.6. Marketing Functions

Marketing function is a fundamental or basic physical process or service required to give a product form, time, place, and possession utility a consumer desires. According to Saccomandi (1998), functions can be classified based on objectives: logistical, marketing and economic functions. Logistical functions are related to the concentration, transport and preservation of products. Marketing functions are dedicated to classification, packaging, development of demand and market information. Economic functions include financing, risk bearing and facilitation of exchange.

The most important characteristics of a marketing function is that it is a physical process or facilitating service which must be performed one or more times within the marketing system. Eight general accepted functions are assembling, grading, storing, processing, packaging, storing processed products, distributing and transporting. There are also facilitating functions (market research, product research and development, demand development, exchange services, finance and risk bearing, market information) (Branson and Norvell, 1983).

Marketing functions can be seen as essential link between producers and consumers in two different and yet simultaneous and connected ways. First, the marketing agents link producers and consumers physically, by actually buying, storing, transporting, processing, and selling commodities. Simultaneously, however, because exchange of commodities is taking place, open or implicit price signals are being generated and transmitted to the active economic agents in the food system, influencing their production and consumption decisions (Timmer *et al.*, 1983).

Goetz and Weber (1986) stated dimensions before a commodity be available to the urban consumer to include: the temporal, spatial and form dimensions. The temporal dimension is regarding the storage and providing reliable supply, the spatial dimension regards the transport of the produce from point of production to urban centers, and the form dimension discloses the processing, labeling, packaging, sorting and cleaning activities before the product arrive at the final consumer.

The level of functions could differ from product to product. A clear understanding of marketing function with an exploration of strengths and weakness help where to improve the marketing system.

2.7. Transaction Costs

The costs analyzed in economics are either private or social. There are three types of private costs: production, opportunity and transaction costs. Production cost is an expense required to purchase commodities, services and information. Opportunity cost is the benefits that could have been drawn from making a different choice. Transaction cost implies the costs sustained by carrying out the exchange in an imperfect market, or costs related to using the market (Saccomandi, 1998).

A transaction cost consists of tangible and intangible costs. The former include marketing costs such as transport, storage, handling, commercialization and bank loans, while the latter would typically arise from lack of contract enforcement, information and coordination, and are expressions of missing markets and market failures (Neway, 2006).

Transaction costs could also be explained alternatively to include costs of obtaining information, establishing one's bargaining position arriving at a group decision, and enforcing the decision made. It can be separated into (a) search and information costs, (b) bargaining and decision costs, and (c) policing and enforcement costs. These costs represent resource losses due to lack of information (Griffen, 1991).

Chowdhury *et al.* (2005) also put definition of transaction costs in terms of the various components. It include costs of searching for exchange opportunities and partners, searching information about the goods and services, bargaining over the terms of trade, transferring the goods, services, cash, etc; monitoring the exchange to assess whether the agreed terms are compiled with, and enforcing the contract. The clearer we are on the sources and levels of transaction costs the higher the chance to correct the problem. It is for this purpose understanding of transaction costs become important.

2.8. Market Supply and Demand

Agricultural products differ from manufactured goods in terms of supply and demand. Supply is peculiar because of the seasonal biological nature while their demand is relatively stable through out a year.

2.8.1. Supply

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

The study of market supply help filling the gap for success of commercialization. The analysis can identify factors that determine market supply. Knowing the determinants mean knowing where to focus to boost production. The point is to improve marketable surplus based on the capacity of potential market. However, how much can be increased is a question of supply determinants and demand. A vivid review of the basic principles and applications, therefore, help reveal all these.

Market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements where as the market surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source (Wolday, 1994). In order to describe market supply words like marketable surplus and marketed surplus are usually used.

Marketable surplus is the quantity of produce left out after meeting the farmer's consumption and utilization requirements for kind payments and other obligations such as gifts, donation, charity, etc. This marketable surplus shows the quantity available for sale in the market. The marketed surplus shows the quantity actually sold after accounting for

losses and retention by the farmers, if any and adding the previous stock left out for sale (Thakur *et al.*, 1997).

Taking the then specific conditions of India, Harris (1982) defined marketed surplus (volume sold) in agrarian economy to constitute the basic wage good for those in the economy not controlling grain (even if they were used for its production). In the process of commercialization of which the marketed surplus is an indicator, not only sets up physical flows of commodities, it is instrumental in monetizing the economy.

The surplus product supply stands for what the household brings to the market, but this does not necessarily imply an excess over his "subsistence requirement". It includes parts of the product needed for consumption by the farm household when the farmer is forced to sell to pay rents, buy inputs, cancel debts, buy non-farm staples, to meet socio-cultural obligations, and to cover other immediate expenses. As a result, marketed surplus represents actual surplus and the quantity sold in the form of forced selling (ANRS-BOARD, 2004).

Neway (2006) sited two options for commercialization. The most common form in which commercialization could occur in peasant agriculture is through production of marketable surplus of staple food over what is needed for own consumption. Another form of commercialization involves production of cash crops in addition to staples or even exclusively.

At the farm household level, commercialization is measured simply by the value of sales as proportion of the total value of agricultural out put. At the lower end, there would always be some amount of output that even a subsistence farmer would sale in the market to buy basic essential goods and services. For this reason, the ratio of marketed out put up to a certain minimum level cannot be taken as a measure of commercialization. Neway (2006) proposed the proportion to be 20 percent of marketable surplus in the Ethiopia as a cut of rate for commercialization.

Marketed surplus is defined as the proportion of output that is marketed (Harris, 1982). Marketed surplus may be equal to marketable surplus, it may be less if the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during the transit (Thakur *et al.*, 1997). In the case of crops that are wholly or almost wholly marketed, the output and marketed surplus will be the same (Reddy *et al.*, 1995).

Empirical studies of supply relationships for farm products indicate that changes in product prices typically (but not always) explain a relatively small proportion of the total variation in output that has occurred over a period of years. The weather and pest influence short run changes in output, while the long run changes in supply are attributable to factors like improvement in technology, which results in higher yields. The principal causes of shifts in the supply are changes in input prices, and changes in returns from commodities that compete for the same resources. Changes in technology that influence both yields and costs of production /efficiency/, changes in the prices of joint products, changes in the level of price/yield risk faced by producer, and institutional constraints such as acreage control programs also shift (Tomek and Robinson, 1990).

Askarie and Cummings (1974) found out that soil fertility, average size of holdings, cultivator's income, literacy, extent of irrigation facilities, availability of unused cultivated land, risk, and relative importance of the crop in question as determining factors for market responsiveness (expressed in terms of supply elasticity).

Harris (1982) also verified empirically the relationship between marketed surplus and output and income. She obtained negative relationship between marketed surplus and variables like family size, and distance to market. Farm size was not found as a direct causal variable rather production as Harris (1982) put.

The behavior of marketed surplus to changes in prices and non price factors like irrigation, acreage and productivity is of critical importance. The most important factor, which increases marketed surplus significantly, is the increased production or output followed by consumption and payments in kind which should be reduced to keep up the quantity of marketed surplus of food grains (Thakur *et al.,* 1997).

Reviewed literatures revealed some realities on supply determinants specific to Ethiopia. For instance, Wolday (1994) used about four variables to determine grain market surplus at his study in Alaba Siraro. The variables included were size of output, access to market center, household size, and cash income from other crops. In his analysis, factors that were affecting market supply of food grains (teff, maize and wheat) for that specific location include volume produced, accessibility (with negative and positive coefficients), were found significant for the three crops while household size in the case of teff and maize still with negative and positive coefficients. Cash income from other crops was insignificant.

A similar study on sesame at Metema by Kindei (2007) also pointed out six variables that affect sesame marketable supply. Yield, oxen number, foreign language spoken, modern input use, area, time of selling were the variables affecting positively sesame supply and unit cost of production was found to be negatively influencing the supply. Similarly, Rehima (2007) in her study of pepper marketing chain analysis identified variables that affect marketable supply. According to her access to market, production level, extension contact, and access to market information were among the variables that were influencing.

Another study by Gizachew (2006) on dairy marketing also captured some variables that influence dairy supply. The variables were household demographic characteristics like sex and household size, transaction cost, physical and financial wealth, education level, and extension visits. Household size affects positively, household education negatively, spouse education positively, extension contact positively and transaction cost positively.

From all these reviews, what one can learn is that a number of economic and socioeconomic variables determine the marketable supply of agricultural products. Since the level of market supply for food crops might not be 100 percent for different reasons, determining factors both in-house and external should be considered.

The decision to supply market is one big question but usually is taken after the produce is at hand or if decided earlier some other decisions have to be considered. Among many, the choice of crop to grow, land size to allocate, and to which buyer to sell are some. These choices crop and market outlet choices are household specific and depend on several attributes like household characteristics, farm resource endowments and access to market.

Specifically, the choice of crop depends on a number of factors ranging from land availability to labor supply, market access, extension service and experience. The farmer's decision to choose which outlet bases a number of factors.

According to Moti (2007) a farm gate transaction usually happens when crops are scarce in their supply and highly demanded by merchants or when the harvest is bulk in quantity and inconvenient for farmers to handle and transport to local markets without losing product quality. For crops like tomato, farm gate transactions are important as grading and packing are done on the farm under the supervision of the farmer. Therefore, households are expected to base their crop choice on their production capacity, their ability to transport the harvest themselves and their preferred market outlet.

2.8.2. Demand

In explaining behavior of consumers, Stigler (2005) advised one approach to put in place. One must view the consumer as an enterprise. This enterprise obtains income from the sale of labor services or from hiring out capital, uses the income to purchase commodities, and services, which will efficiently serve the desires of the household. This description revealed that consumption decisions similarity with production decisions. Unless a consumer profit from consumption, he would not invest on purchase.

Consumer demand is defined as the various quantities of a particular commodity that an individual consumer is willing and able to buy as the price of that commodity varies, with all other factors that affect demand are held constant (Tomek and Robinson, 1990).

Stigler (2005) put three characteristics of a rational consumer: consistent tastes, correct cost calculations, and decision making to maximize utility. Purchase of a commodity depends upon factors like money income and taste and preference in addition to price.

Kotler (2003) identified factors that influence buying behavior. These include; cultural, social, personal, and psychological factors. The cultural factors include values, perceptions, preferences, social class; social factors include reference group, family, roles and statuses; personal factors include age and lifecycle stage, occupation; psychological factors include motivation, perception, learning, beliefs and attitudes.

Similarly, other literatures put factors that influence food choice and consumption to be of three types: properties of the food, person-related factors and environmental factors. Properties of the food include chemical and physical properties, nutrient content, energy value, fiber and also physical appearance. Person-related factors include biological factors, related with innate characteristics, body weight, age, etc and psychological factors (exploratory buying behavior tendencies, quality-consciousness, lifestyles, and socio-demographic elements). Environmental factors include cultural, economic and marketing factors.

Tomek and Robinson (1990) also indicated major factors influencing level of demand grouped under four headings as population size and its distribution by age, and geographic area; consumer income and its distribution; prices and availability of other commodities and services and consumer tastes and preferences.

Other group of scholars, Ruel *et al.*, (2005), identified determinants of consumption patterns to be combination of three main factors: the income level, preferences of the household, and market prices. Preferences are in turn, affected by the composition of household, its member's knowledge and education, habits and cultural norms, personal experiences, and , in the case of food, the biological factors that affect hunger. They listed factors like household income, price and availability of fruits and vegetables, household members' preference, the decision making power of women relatively to men in the household. Consumer preference is assumed to be determined by nutrition education, cultural beliefs and norms, and biological aspects of hunger. The factors described above- income, prices, and availability- affect what consumers are able to purchase or consume. Consumer preference on the other hand, shapes the decisions that consumers make regarding what they choose to purchase or consume.

For most agricultural commodities, income and demand are positively related. But for few commodities, the reverse is true. Changes in tastes and preferences obviously contribute to shifts in the demand for agricultural products. Tastes and preferences of individual consumers may change for a variety of reasons such as age, education, experience, and advertising. Long run trends in per capita consumption are sometimes used as indicators of change in preferences (Tomek and Robinson, 1990).

Another study conducted by Fuller *et al.* (2004) also pointed out parameters to determine purchasing behavior include location of purchase, package size, preferred brand, and frequency of purchase in their study of demand analysis for dairy products in China.

In their finding (Reul *et al.*, 2005) argued demand for fruit and vegetables increases with higher incomes, although the share of the total expenditure allocated to fruits and vegetables tends to decline. This is largely because low income-households must prioritize the fulfillment of their basic energy requirement to avoid hunger, and the fruits and vegetables tend to be an expensive source of energy.

Hence, they identified the following variables as the determinants for the consumption variable: consumed amount, budget shares, household demographic characteristics, education and area of residence. They identified that income elasticity of fruit and vegetable demand is 0.60-0.70 in most African and South Asian countries /low income countries/, 0.30-0.44 in most Latin American countries /middle income countries/, and 0.20-0.37 in industrialized countries. Thus, rises in income are associated with greater increases in the demand for fruit and vegetables in poorer compared to wealthier countries; and income increases are generally associated with larger increases in the demand for fruits than vegetables (0.60 versus 0.70 income elasticity).

Own price elasticity of demand for fruits and vegetables in most African and south Asian countries ranges from, -0.35 to -0.50. It ranges from -0.35 to -0.45 in most Latin American countries, and between -0.10 and -0.30 in the industrialized nations. This confirms the conventional wisdom that low-income households are more sensitive to prices than higher income households are. It also suggest that policies to reduce the market price of fruit and vegetables can have a significant impact on fruit and vegetable consumption, particularly for low income households (Ruel *et al.*, 2005).

2.9. Status of Vegetable Production in Ethiopia

Ethiopia has a variety of vegetable crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as food. The production of vegetables varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets. According to CSA (2003) the area under these crops (vegetables and root crops) was estimated to be 356,338.82 hectares with a total production of 12.5 million tons in the year 2001/2.

The productivity of crops is very low compared to the potential yield obtained in the research centers and on farmers' field technology verification studies. For instance, the productivity of onion and tomatoes was about 90 and 70 quintals per hectare compared to the potential yield of 400 and 350 quintal per hectare in research centers (EARO 2002 as cited in *Dawit et al.,* 2004).

Tomatoes- The cultivated tomato (*Lycopersicon esculuntum* Mill) is the most important and widely grown vegetable in the world. To date, its importance is increasing in Ethiopia. It is widely accepted and commonly used in a variety of dishes as raw, cooked or processed products more than any other vegetables (Lemma, 2002).

Lemma (2002) added absence of definite time recorded regarding the introduction of cultivated tomato to Ethiopia. However, he added, cherry type has been growing for long around big cities and in small gardens. The bulk of fresh market tomatoes are produced by small-scale farmers. Farmers are interested in tomato production more than any other vegetables for its multiple harvests, which result in high profit per unit area.

Tomatoes vary in visible fruit characteristics important for fresh market and processing values. These include shape, size, color, flesh thickness, number of locules, blossom end shape and fruit quality. The fruits may be globe shaped (Marglobe), oval or flattened (Marmande), and pear shaped (Roma VF), which differ in acceptability in the local market, quality, and storability.

Onion- Onion, the principal Alliums, ranks second in value after tomatoes on list of cultivated vegetable crops worldwide (Robinwith and Currah, 2002). These people also reminded that all plant parts of alliums may be consumed by humans (except perhaps the seeds), and many wild species are exploited by local inhabitants. Careful handling and the choice of suitable storage method for the cultivar type in question are vital to ensure that the product retains its quality until it reaches the consumer. "Cosmetic quality' is of increasing importance in competitive markets.

The product is produced for both consumption and market. According to CSA (2003) out of a yearly production, 48.2 percent was utilized for sale, 39.9 per cent for household consumption in contrast to tomatoes where 66.7 per cent of the total production is send for market.

2.10. Properties of Vegetables Marketing

Being produced both by commercial and smallholder farmers vegetable marketing is influenced by a number of factors that can be attributed to production, product, and market characteristics. Kohl and Uhl (1985) identified these attributes as-

Perishability-as vegetables are highly perishable, they start to loose their quality right after harvest and continued through out the process until it is consumed. For this purpose elaborated and extensive marketing channels, facilities and equipments are vital.

This behavior of vegetables exposed the commodity not to be held for long periods and fresh produce from one area is often sent to distant markets without a firm buyer or price. Prices may be negotiated while the commodities are en route, and they are frequently diverted from their original destination if a better price can be found. Sellers might have little market power in determining a price. As a result, a great deal of trust and informal agreements are involved in marketing fresh vegetables. There could not always be time to write every thing down and negotiate the fine details of a trade. The urgent, informal marketing processes often leads to disputes between buyers and sellers of fresh fruits and vegetables. Producers are normally price takers and are frequently exposed for cheating by any intermediary.

Price /Quantity Risks- Due to perishable nature and biological nature of production process there is a difficulty of scheduling the supply of vegetables to market demand. The crops are subjected to high price and quantity risks with changing consumer demands and production conditions. Unusual production or harvesting weather or a major crop disease can influence badly the marketing system. While food-marketing system demands stable price and supply, a number of marketing arrangements like contract farming provide stability.

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.

Alternative product forms and markets- While different varieties and qualities could be grown for the fresh and processed markets, there could also be often alternative markets. These include form markets (fresh, frozen, dried, canned), time markets (winter, summer,), and place markets (different towns, foreign market).

Product bulkiness- Since water is the major components of the product, it makes them bulky and low value per unit that is expensive to transport in fresh form every time. This, therefore, exposed farmers to loose large amount of product in the farm unsold.

These listed characteristics of the product require a special complex system of supportive inputs. It demands a regular marketing preparation process like washing, cooling, proper management from the time of harvest until the produce is put on display. It is frequently believed a vegetable not only remain attractive to the consumer it must also have a shelf life of few days after having purchased by the consumer (Nonnecke, 1989).

Nonneck (1989) added that series minded vegetable producers do not simply decide to get into production without first taking stock of resources; the size of the land base; proximity to potential markets; and facilities for holding, washing, grading, packaging, and transportation. Growers must then decide at what level they want to penetrate the market, and determine their products and in what volume, and the acceptable levels of quality and quantity, taking in to account the cost of packaging and costing as well.

Improving vegetables marketing in developing countries is vital for a number of reasons: rapid increase in demand from growing domestic urban populations, opportunities to earn foreign exchange by exporting high value-off-season produce; the income raising opportunities it offer to small farmers and the contribution to employment made by its labor intensive production, handling and sales requirement are some to mention (FAO, 1986).

Horticulture production is profitable. Farmers involved in horticulture production usually earn much higher farm income as compared to cereal producers. Cultivation of fruits and vegetables allows for productive employment where the labor/land ratio is high, since horticultural production is usually labor intensive. Increasing horticulture production contributes commercialization of the rural economy and creates many off-farm jobs. However, expanding the scale of horticulture production is often hindered by lack of market access, market information, and many biological factors (Weinberger and Lumpkin, 2005).

Ideally, measures commonly recommended for the improvement of vegetables marketing are better packaging, handling, and transport; sorting by quality; extending the market season and leveling out gluts and shortages by market delivery planning and storage; developing new markets; installation of refrigerated transport and processing equipment: and establishing marketing enterprises .

The vast majority of growers obviously must know how to grow crops to attain maximum productivity. To meet this basic requirement they must have astute business skills. In finding markets, they must decide in advance which route to take, size of operation, and select the crops.

However, in our case these rationalities do not seem to be considered and farmers grew and sell with some spontaneity. Bezabih and Hadera (2007) explored this reality in their study of constraints and opportunities of horticulture production in Eastern Ethiopia. They argued that production is seasonal and price is inversely related to supply. During the peak supply period, the prices decline. The situation is worsened by the perishability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled.

From these reviewed literatures on the status of vegetable production in Ethiopia lack of adapted varieties, pest and diseases, extreme production seasonality, seasonal price fluctuations, poor pre- and post harvest handling, lack of storage are among the cited realties.

2.10. Review of Empirical Studies in Ethiopia

Dawit and Hailemariam (n.d) stated the importance of horticultural crops for both domestic and international markets as it was at an increasing rate from time to time associated with the expansion of small-and large-scale irrigation facilities compounded by national and regional extension service on the production of horticultural crops. In their paper, these researchers analyzed opportunities and constraints of vegetables marketing in the rift valley. They reported three options for selling horticultural crops similar to Fogera; right in the field (common for onion and tomato), sell at nearby markets, and least proportion

option to access distance markets. They added that in terms of volume about 93 percent of the total produce was sold to wholesalers.

Basing farmers report, these guys also added the major production and marketing constraints to include shortage of chemicals, shortage of commercial fertilizer, shortage of irrigation water, shortage of quality seeds, low product prices, intensive influence of speculators and brokers in reducing the bargaining power of farmers, poor market access, poor access to transportation, and intensive competition among producers.

Similarly, Bezabih and Hadera (2007) explore use of low level of improved agricultural technologies, risks associated with weather conditions, diseases and pests, as the main reasons for low productivity. Moreover, due to the increasing population pressure the land holding per household is declining leading to low level of production to meet the consumption requirement of the household. As a result, intensive production is becoming a means of promoting agro-enterprise development in order to increase the land productivity. Horticultural production gives an opportunity for intensive production and increases small holders' farmers' participation in the market.

The above scholars, Bezabih and Hadera (2007), further identified pest, drought, shortage of fertilizer, and price of fuel for pumping water as the major constraints of horticulture production in Eastern Ethiopia. Other problems which they reported also include poor know how in product sorting, grading, packing, and traditional transporting affecting quality. Many of these findings also hold true for other parts of the country like Fogera.

Another interesting property that Bezabih and Hadera (2007) found out and actually also holds for this research site, is the flow of products is dictated by seasonal deficit where at times surplus producing site might also be receiver from the earlier receiving area at times of deficit.

They added absence of direct transaction or linkage between the producer and the large buyer as another property that characterized horticulture marketing. Buyers follow contact persons who identify vegetables to be purchased, negotiate the price, and purchase and deliver the products. Bezabih and Hadera (2007) categorized actors in the marketing channel as producers, intermediaries/ brokers, traders and consumers.

Brokers play a decisive role in the marketing system and determine the benefit reaching the producer. Onion and tomato are quite often purchased in the field with brokers. According to these people, Bezabih and Hadera (2007), three types of brokers: the farm level broker, local broker and urban broker exist. Each has their one separate task where the farmer level broker identifies plots with good produces and links the producer with a local broker. The local broker in turn communicates with the farmer and conveys the decisions made to the urban broker or collector. In this process the producer have contact with local agents and do not have direct contact with the other intermediaries. The third broker, urban broker, gets the information from ultimate buyers and sets the price. Here neither the farmer nor the traders set actual prices for the products. If the farmer insists on negotiating the price, the brokers gang up and boycott purchasing of the product leaving the product to rot. The farm level and local brokers get Br 5 while the urban broker gets 10 Br per quintal. If there are several brokers in an area, they negotiate not to compete on the price offered by the broker. The changes in the value of products as they move away from production along the

marketing channel to the consumer is the increased utility by making the goods available rather than adding value in terms of increased shelf life or safety.

Moti (2007) also found out interesting research findings in his study of econometric analysis of horticulture production in central and eastern Ethiopia. In his wide research report, he documented findings of the role of horticulture for export earning stability, farm resource allocation between food crops and cash crops, household decision making in crop choice-land allocation and market out let choice, and the influence of asymmetric price information on bargaining power of horticulture farmers.

According to Moti (2007) horticulture could be way out for agricultural commercialization of small-scale farmers with relatively better agricultural resource potential. If small-scale farm household have to move towards the production of horticultural crops for agricultural commercialization, factors influencing household decisions behavior in resource use should be studied.

He reported that diversifying the export base towards non-traditional agricultural commodities, as horticulture is important. He added linking small-scale farm household horticultural production with export could help both in reducing export earning instability and enhancing farm household's income. In addition, he pointed out that the production of high value and labor-intensive horticulture products contributes to poverty reduction and rural development through generating higher income and better employment opportunities for landless households.

Moti (2007) did not end his finding on role of export only he added the role of well functioning markets for Ethiopia where cooling and storage facilities are none for perishable crops. He advised improvement in market information and availability of alternative market outlets for subsistence farming to commercialize.

3. METHODOLOGY

3.1. The Study Setting

Amhara National Regional State is one of the regional states in Ethiopia. According to BOFED (2006), the estimated total land size of the region is 152.6 thousand square Kms. It is subdivided in to 11 zones. Vegetable producing *Woredas* located in the north western part of the region include, Bahir Dar Zuria, Achefer, Mecha, Adet, Libo Kemkem, Fogera, Dera, Gondar Zuria, and Chiliga. From all these, Fogera was selected as it was a high onion and tomato producing *Woreda*. Located in South Gondar zone, it is one of the 126 Woredas in the region. According to IPMS (2005) it has an area of 117,405 hectares divided administratively in to 30 *Kebeles* (25 rural and 5 urban). The population size was 233,529. The total number of households who engaged in agriculture was 42,746. The capital is Woreta located at the North East on the main road to Gondar from Bahir Dar.

The *Woreda* is known for its plain nature where flat land accounted nearly 76 percent. The mean annual rainfall is 1216.3 mm, with Belg and Meher cropping seasons. Its altitude ranges from 1774 up to 2410 masl allowing a favorable opportunity for wider crop production and better livestock rearing (IPMS, 2005). The current land use pattern includes 43.8 percent cultivated land, 23 percent pastureland, 19.9 percent water bodies and the rest for others (IPMS, 2005). The major crops growing in the area include tef, maize, finger millet and rice in order of area coverage. According to IPMS (2005), average land holding was about 1.4 ha with minimum and maximum of 0.5 and 3.0 ha, respectively.

For purposes of research and development activities, the *Woreda* was classified by farming systems. As it is well known, a farming system is defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (FAO, 2001). Basing this definition, IPMS (2005) classified the Woreda in to two basic farming systems, rice-based and cereal-based. The rice based farming system is that part of the Woreda where rice shared wider coverage, plain land, better livestock, and silt as result of flooding in the uplands. The altitude is lower than the cereal based. The cereal based farming system is that part of the Woreda to the west of Woreta, the capital, relatively with wider coverage in cereals other than rice, rugged topography, low fertility and limited livestock population. From the 30 Kebeles eight are under the rice based farming system and the rest seventeen from cereal based.

Agricultural production in the Woreda is mainly rain fed far from its wide irrigation potential. Being one of the eight Woredas bordering Lake Tana, Fogera shared a water body of 23,354 hectares from the total lake size. Its plain topography created the opportunity for a good size of irrigation potential. Actually, farm field water lodging in the rainy months (July up to half of September) is the common phenomena in the plain areas.

Bahir Dar and Gondar are the two big vegetable receivers in the area. These two towns are at 55 and 130 Kms from Woreta. Gondar is found to the north of Woreta while Baih Dar is to the south.

3.2. Methods of Data Collection

The data for this study was collected both from primary and secondary sources. Primary data included the whole situations of the marketing system from the producing farmer up to the end consumer. It was through questionnaire-administered survey as well as informal and unstructured approaches the data were collected.

The main data types collected include production, buying and selling, pricing, input delivery and distribution, market participation, problem and opportunities, etc characteristics of the market. Besides, secondary data on total land size and population types were consulted.

3.3. Sampling Procedures

A multi-stage random sampling technique was employed. The sampling covered, farmers, retailers and consumers on propionate to size basis.

3.3.1. Farmers' sampling

A two stages sampling technique made by selection of vegetable growing *Kebeles* at the first stage followed by random selection of vegetable growing farmers. *Kebele* identification was through secondary data based on production coverage of the two vegetables. Thirteen *Kebeles* from the two farming systems were selected; seven from rice and six from cereal based farming systems. Respondent sample size per each *Kebele* was determined proportionally to the number of total onion and/or tomato growing farmers per a *Kebele* (Annex Table-1).

3.3.2. Rural assemblers, wholesalers, and brokers sampling

Researchers do not agree on sample size and procedure that should be used in each segment of the marketing chain (Mendoza, 1995). The decisions involved were partly a function of information currently known, time and resources available, accessibility to and openness of the marketing participants as well as the estimated size of the trading population.

It is estimated that about 38 rural assemblers, 50 brokers, and 54 wholesalers used to participate in the marketing of the product. However, it was arbitrarily belived to take five from each for detail interviewing. In fact, frequent rapid informal and observational surveys were also followed.

3.3.3. Retailers' sampling

The sample frame was developed by taking a count of vegetable retailers in the three main retail markets; Gondar, Bahir Dar and Woreta. It is estimated that 148 retailers are found at Bahir Dar, 102 at Gondar and 24 at Woreta central markets. After estimating the number of retailers, a proportion to size was taken and 27 from Bahir Dar, 18 from Gondar and 5 from Woreta were randomly selected. Fifty retailers from the three towns were interviewed (Annex Table-2).

3.3.4. Consumers' sampling

The consumers' survey was meant to understand the demand for the products. The survey was taken from three major receiving towns namely, Gondar, Woreta and Bahir Dar. Ninety-one respondents were interviewed in the three towns through proportionate to size sampling technique based on the Amhara Regional Bureau of Finance and Economic Development population projection data. Accordingly, 48 respondents from Gondar, 39 from Bahir Dar and 6 from Woreta were interviewed (Annex –Table-3).

3.4. Methods of Data Analysis

Study of agricultural marketing based on market chain analysis demands both descriptive and econometric analysis. For this specific paper, data collected from a cross-section of samples was first analyzed with descriptive statistics followed by determinant analysis of supply, crop and buyer choice, and finally demand.

3.4.1. Analysis of market structure

Examining the nature of horizontal relationships between similar enterprises is analogous to analyzing the structure of the market as defined by the industrial organizational school. Analyzing market structure entails understanding of those characteristics of the organization of the market influencing the nature of competition and pricing (Scarborough and Kydd, 1992).

The structure of the market refers to characteristics of the organization of the markets that seem to exercise strategic influence on the nature of competition and pricing within the market (Pomeroy and Trinidad, 1995).

In food marketing, very large number of producers and consumers at each end of the marketing chain is suggestive of competitive conditions and, therefore, the focus in analyzing market structure is on the numbers and sizes of enterprises within the system, and the potential access of additional participants to it. A high number of buyers and sellers along the marketing chain, ease of entry into all functions, and widely available market information, together carry a strong presumption of competitive conditions (Timmer *et al.,* 1983).

Estimating the numbers, size and spatial distributions of each category of intermediary provides an indication of both the local structure of the market, and the range of alternatives faced by participants in the marketing chain in their buying, selling and hiring functions (Scarborough and Kydd, 1992). The following tools were employed to study the market structure.

Concentration ratio- Market concentration is defined as the number and size distribution of sellers and buyers in the market. It is felt to play a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms. The greater the degree of concentration the greater the possibility of non-competitive behavior, such as collusion would be (Pomeroy and Trinidad, 1995).

The commonly used measure of market power, or seller concentration, is given by the proportion of total industry sales accounted for by the four large enterprises in the industry.

Kohls and Uhl (1985) suggest that, as a rule of thumb, a four enterprise concentration ratios of 50 percent or more is indicative of strongly oligopolistic industry, of 33-50 percent a weak oligopoly, and less than that, an un-concentrated industry. This is the number and size distribution of sellers and buyers in the market. The greater the degree of concentration, the greater will be the possibility of non-competitive behavior, such as collusion, existing in the market.

$$S_i = \frac{V_i}{\sum V_i}$$ ----------Equation (1)

Where Si –market share of buyer i

Vi- amount of product handled by buyer i

ΣVi=Total amount of product handle

$$C = \sum S_i$$ ----------Equation (2)

Where C- concentration ratio

Si- percentage share of the i^{th} firm

r- Number of largest firms for which the ratio is going to be calculated

However, this approach is not without limitations. Some of the limitations include lack of reliable data on firm basis for its application, the incapability of a single measure to reveal distribution of sales between the numbers of largest enterprises, and failure to take account product differentiation or other possible monopoly elements. Besides, the index falls prey to inferential problems of forming hypotheses about conduct from structural characterization. For example, a large number of similar-sized enterprises may result in a low concentration index, but the possibility that these enterprises to collude, to form effective oligopolistic conditions is a chance (Scarborough and Kydd, 1992). Nevertheless, supported by other methods it is the common used tool.

Barriers to entry- The ease with which potential participants can enter various functions is commonly used as a means of assessing the degree of competition in an industry (Scarborough and Kydd, 1992). Stigler (2005) suggests about four points that can create barriers to entry: legal barriers (franchise and patents), economies of scale, superior resources, and pace of entry.

The modes of entry into trade, means of building capital, means of acquiring marketing skills and contacts, periods of apprenticeship, trader's perceptions of barriers, the origins and levels of initial capital required for traders of different sizes (functions, or commodities), and the degree of mobility between functions and commodities can be used as centre of data to see the barriers to entry (Timmer *et al.,* 1983).

In fact, interviewing traders about barriers to entry might be difficult since all have entered the market. Rather, observation of the age, gender, and ethnic distributions of owners, an employees of different sizes of enterprises and the extent to which fluctuations in the number of active traders follow rises and falls in profitability can be considered. Market structure is most commonly evaluated by examining trends in the numbers and sizes of firms relative to each other, and to number of consumers and producer, in particular times and places (Scarborough and Kydd, 1992).

3.4.2. Analysis of market conduct

If horizontal relationships between similar marketing enterprises are the basis for examining the structure of the market, the nature of vertical relationships of exchange shades light on the conduct of market participants. Conduct refers to firm behavior like pricing and selling policies and tactics; overt and tacit inter-firm cooperation, or rivalry and research and development activities (Scarborough and Kydd, 1992). It is the pattern of behavior of enterprises in determining prices, sales promotion, and coordination policies and the extent of predatory or exclusionary tactics directed against established rivals or potential entrants (Pomeroy and Trinidad, 1995/.

There are no agreed up on procedures for analyzing the elements of market conduct. Rather, few points are considered to systematically detect indications of unfair price setting practices and conditions under which such practices are likely to prevail. The points include checking the existence of formal and informal producing and marketing groups; the availability of price information and its impact on prevailing prices; and the feasibility of utilizing alternative market outlets (Scarborough and Kydd, 1992). Accordingly, discussions and observations have been employed to investigate the market conduct prevailing in the marketing system.

3.4.3. Analysis of market performance

Market performance refers to the impact of structure and conduct on prices, costs, and volume of output (Pomeroy and Trinidad, 1995). Investigations of market efficiency is one approach to evaluate the degree of market performance.

Marketing efficiency has the following two major components: (i) effectiveness with which a marketing service would be performed and (ii) the effect on the costs and the method of performing the service on production and consumption. These are most important because the satisfaction of the consumer at the lowest possible cost must go hand in hand with maintenance of a high volume of farm output (Ramakumar, 2001).

Marketing Margin- In a commodity subsystem approach, the institutional analysis is based on the identification of the marketing channels. This approach includes the analysis of marketing costs and margins (Mendoza, 1995). A marketing margin can be defined as a difference between the price paid by consumers and that obtained by producers; or as the price of a collection of marketing services that is the outcome of the demand for and supply of such services (Tomek and Robinson, 1990). It measures the share of the final selling price that is captured by a particular agent in the marketing chain (Mendoza, 1995).

It, in its simplest form, can be defined as the difference between prices paid for a commodity (e.g. bread) by consumers at a retail level, and prices received by farmers when they sell their commodity (e.g. wheat) to assemblers or other first handlers. Measured in this form, the margins reflect the amount of services added to a commodity once it leaves the farm and sits on a shelf in a retail outlet in a form that is acceptable, useful, and appealing to consumers (Goetz and Weber, 1986).

Marketing margin is most commonly used to refer to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example

between producer and wholesale, wholesale and retail, prices (Scarborough and kydd,1992).

The size of marketing margins is largely dependent upon a combination of; the quality and quantity of marketing services, and the efficiency with which they are undertaken and priced. The quality and quantity of marketing services depends on supply and demand of marketing services and/or the degree of competition in the market place. The costs of service provision depend on both exogenous and endogenous factors and the efficiency is determined by the extent of competition between marketing enterprises at each stage.

According to Trotter (1992), the benchmarks to which results of marketing margin to be compared with are, the assumption of the margin to be equivalent to transfer cost as well as the constancy of margin per unit of product.

Large gross margins may not express high profit but rather; increased qualities and quantities of service; low labor, capital and management productivity. Conversely, small gross margins may co-exist with inefficient use of resource; poor coordination and consumer satisfaction; and disproportionate profit elements. Thus, higher marketing margins resulting from increased services, including better coordination, may leave producers and consumers better off, and low margins may be due to low productivity. Therefore, in using market margin analyses to assess the economic performance of markets, it is always preferable to deconstruct them in to their cost and return elements (Scarborough and Kydd, 1992). However, the challenges of data availability on costs make impossible the deconstruction though marketing margins are still good indicators of market performance.

Notwithstanding the considerable variation between markets, if a high proportion of sale price is attributed to purchase cost, it indicates that traders add relatively little value, in terms of transport, storage, or transportation of a commodity in question. Traders undertake only spatial arbitrage and not temporal or form arbitrage (Eleni, 2001). So the computation and use of margins need critical attention.

The scope for government interventions in markets is determined by the efficiency and costs of performing the basic marketing functions. In addition to a concern for lowering the real costs of marketing, governments need to focus on the efficiency with which marketing services are provided. If high costs exist, government investments can lower them. In market economies, inefficiency means excess profits, and excess profits mean monopolistic intermediaries or collusion in price formation. If serious inefficiency exists, therefore, government policies might improve competitiveness or provide direct competitive standards (Timmer *et al.*, 1983).

All these reviewed literatures advised not to exclusively depend on marketing margin for decision making but to support with other tools. Hence, in this study four parameters are included to judge an overall market performance.

When there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer. Consumer price is the base or common denominator for all marketing margins (Mendoza, 1995). The relative size of various market participants'

gross margins can indicate where in the marketing chain value is added and/or profits are made.

The total marketing margin is given by the following formula

$$TGMM = \frac{Consumerpr\,ice - Farmer's price}{Consumerpr\,ice} \times 100$$ ----------Equation (3)

Where TGMM-Total gross marketing margin

Producers' participation or producers' gross margin is the proportion of the price paid by the end consumer that belongs to the farmer as a producer.

$$GMM_p = \frac{Consumer\ \Pr ice - MarketingGrossM\ \arg in}{Consumer\ \Pr ice} \times 100$$ ----Equation (4)

Where

GMMp- Producers' participation (farmers' portion)

$$PS = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r}$$ ----------Equation (5)

Where

PS- Producer's share
Px- Producer's price of vegetables
Pr-Retail price of vegetables, and
MM – Marketing margin

Studies have found out that estimating marketing margin quite accurately through price surveys at all levels in the distribution channel during one week under normal conditions is normally recommended. In the case of perishable products, estimating the margin depends largely on primary data collection in the form of surveys carried out over time intervals relevant market cycle occurs. Recording prices at different levels of the marketing chain during a two-to-three-week period is sufficient to calculate quite accurately the relevant marketing margin (Mendoza, 1995).

Limitations are apparent in using marketing margin. These are; the failure to allow for the temporal realities of storage or the spatial implications of in terms of market transfers. They are often calculated by noting price differences between different levels of the market in the same town and at the same market. They are static in nature. The other weakness raised is the inability to account differences in product perishable nature and in the number of services necessary (actually rendered).

In using marketing margins cares are suggested by Saccomandi (1998) as the interpretations are largely incorrect because each agricultural marketing system has its own historical and social context, which is reflected in the means used to organize the marketing, processing and distribution of food products. Since these means also depend on various factors, there could be identical margins for different economic situations and different margins for homogenous economic situations, without offering the possibility of expressing any judgment on the comparative efficiency of one or the other. The greater or lesser importance of these margins is an index of equity in the performance of agricultural marketing activities, meaning that higher margins would correspond to low returns and monopolistic exploitation of agricultural producer, and vice versa. This interpretation is also incorrect, since monopolistic exploitation depends on the market power of the various

components of an agri-marketing system. Such power cannot be evaluated through margins but requires a deeper analysis of the existence of workable competition in the various phases.

Tomek and Robinson (1990) warned shortly as marketing margins provide only one point of reference in the evaluation of performance and should be compared with measures of profits earned by marketing firms to determine whether the margins are excessive.

Marketing channels -The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to final destinations (consumers) (Mendoza, 1995). This is acquired through studying the participants, with the first step to determine what and which final markets are. While the source and destinations are clearly identified the study of participants within the channels, the activities they perform and the overall actions can easily be investigated.

Ramakumar (2001) identified the different marketing channels based on different performance indicators from which rank was computed. The indicators included were producer's share in the consumer's money, marketing cost of intermediaries, marketing margin of intermediaries and returns per unit money of investment. In this study, volume passed, producer's share, marketing margin of intermediaries and rate of return were taken to evaluate the efficiency.

$$R = R_i \Big/ N_i \quad \text{----------Equation(6)}$$

R- An overall rank of a channel (all performance indicators)
R_i- Rank of a channel per a single indicator
N_i- Number of performance indicators and
i- Performance indicators (volume handled, rate of return, producers' share, and marketing margin).

3.4.4. Econometric analysis

This part of the analysis dealt with the analysis of understanding determining variables to for production participation, land allocation and volume of the vegetable supplied to market. For managing this, proposed methodology was probit estimation for participation probability and Heckman two-stages for the rest two.

3.4.4.1 Factors affecting production participation

To investigate factors embedded in deciding participation, eleven variables were proposed for each crop.

$$Y_i^* = \beta' X_i + U_i$$

Y_i – Is unobservable latent variable

Y=1 when Y_i^* >0 (Participated)

Y =0 Otherwise (Not participated)

Where Y_i^* is dependent variable- Participated or not participated

X_i is the explanatory variables listed under.

Age (AGE) - Age of the household, a continuous variable, was taken as one of the explanatory variables to influence participation to production. The expected sign was positive as age one of the parameters of human capital. As an individual stays long, he will have better knowledge and will decide to participate.

Sex of the respondent (SEX_RES) - a dummy variable taking zero if female and 1 if male was one variable to be considered. No sign could not be attached with the variable.

Total size of land owned (TOT_LAND) - Total size of land a respondent owned, continuous variable, taken as anther variable to influence participation decision. The expected sign was positive. The more land owned the more will be the probability to participate in the decision.

Family size (FAM_SIZ) - Family size of a respondent was one variable (continuous variable) proposed to influence participation decision. The more number of family members an individual had the more probable to participate production participation. This is because he will have a labor source.

Distance from main road (DIS_ROAD) – this was another continuous variable suggested to be included in the model. Measured in single feet hours, the more time needed to reach a main road the lesser would be the probability to participate in production. Hence the expected sign was negative.

Number of oxen owned (OXEN) - being a power for plowing, participation probability would increase as farmers increased their number of oxen ownership. The expected influence is positive. It was discrete continuous variable.

Distance from Development Agent (DIS_DA) - This variable was considered to see the intensity of extension service. The nearer a farmer is to a development agent the more frequent would be his chance to get an advice. Hence, the expected sign for this continuous

variable measured in single feet hours was negative. As a farmer dwelled far the lesser would be the probability to participate in production.

Lagged price (last year price) (LAG_PR) – This is the price of the crop in 1997 EC and is continuous variable. The sign for the coefficient was expected to be positive. As the farmer saw higher price a year before the probability to produce and participate in the market would be high.

Extension service (EXT_SER) - this was a dummy variable indicating extension service farmers were getting. This variable was expected to influence participation positively. Obviously, as farmers learned more and knew much it would be direct obvious to participate in production.

Distance from Input supplier (DIS_IN)- This was also another continuous variable proposed to be included in the model measured in single feet hours from the farmer's home to inputs supplier. The expected sign was positive. The farther a farmer lived from input supplier the lesser would be the probability to participate in production.

Experience (EXP) – This continuous variable measured by number of years was expected to influence production participation positively. As farmers got more experience in production and marketing, the probability of to participate would be higher.

Market information (MIS) – This was a variable proposed to influence decision to participation positively. If a farmer could get historical data, he would be able to participate. The variable was considered dummy. Assigning zero if a farmer got information and zero if not.

3.4.4.2. Land allocation and market supply analysis

For commercialization to success, farmers need to produce and supply market a considerable volume. For this purpose, farmers need to allocate more size of land and produce larger quantities of the vegetable crops. A number of factors could influence both size of land allocated for a specific crop and the volume of vegetable to be supplied to a market. As a result, about the eleven variables were proposed to be included in the model.

Among the different variables that would explain market supply the most important variables, according to the reviewed literature, include family size, educational level, sex of household head, extension service, cash income from other crops, oxen number, livestock ownership, and the relative importance of the crop in question. Among production and market related variables production level, total size of land holding, distance to market, product prices, and market information were found to be important determinants (See for instance Askarie and Cummings, 1974; Harris,1982; Tomek and Robinson, 1990; Wolday, 1994); Reddy et al., 1995; Atteri and Bisaria, 2003; Gizachew, 2006; Kindei, 2007; and Rehima, 2007).

However, it must be noted that the importance of these variables in explaining market supply level could be different depending on the crop type, region/area of production and degree of commercialization. As a result, taking into account specific situations at Fogera (better degree of farmers commercialization, high marketable proportion) it was decided to include age, sex of respondent, total size of land owned, family size, experience, distance from road, oxen ownership, distance from development agent as determinants for size of land allocated for a crop. Similarly, the same variables were included for volume supplied to market.

Three basic variables common in other marketing studies viz, selling price and produced quantity were not included in the model. The specific situations in Fogera indicate that quantity did not influence supply because as far as the crop is produced the whole quantity would be supplied to market. In the area, there is very limited custom of consuming both crops. As a result, including quantity as determining variable has no any role to express. With regard to selling price, again it was excluded because farmers have no any bargaining power they are price takers. So it was not selling price but product maturity and availability and presence of a buyer that matters selling.

In order to analyze the collected data it would have been easy if simple ordinary list squares was used. However, in the course of sampling it is customary to face problem of sample selection. This was faced in this research and a method that took into account for such problem was hence considered. Sample selection is a generic problem in social research that arose when an investigator did not observe a random sample of a population of interest. Specifically, when observations are selected so that they are not independent of

the outcome variables in the study, this sample selection leads to biased inferences. To rely exclusively on observational schemes that are free from selection bias is to rule out a vast portion of fruitful social research. Selectivity is not only a bias in research, but also the subject of substantive research (Winship and Mare, 1992).

The two versions of selection bias problem are the standard selection bias, where information on the dependent variable for part of the respondents is missing. In the other version, information on the dependent variable is available for all respondents, but the distribution of respondents over categories of the independent variable one might have been interested taken place in a selective way (Smits, 2003).

Heckman two stages models of estimation would be appropriate with its relevant procedure: estimating first the probability of farmer's participation in a market for obtaining Inverse Mills Ratio which would be incorporated in the second stage OLS estimation of market supply level.

The Heckman two stage model is estimated using the following equation

$$Y_{1i}^{*} = Z_i\alpha + v_i \text{ ----------Equation (7)}$$

$$Y_{1i} = 1 \text{ If } Y_{2i}^{*} > 0$$

$$Y_{1i} = 0 \text{ If } Y_{1i}^{*} \le 0 \text{ ----------Equation (8)}$$

Where , Z_i –explanatory variables

Y_{1i}^{*} - is the estimated market participation probability

V_i - random term for the selection equation

The Heckman procedures assumes that the error term of the selection equation to be normally distributed and the expected value of the substantial equation error term given the error term of the selection equation is linear.

Y_{1i} =1 (if a farmer participated)

Y_{1i} =0 (if a farmer did not participate)

In the second stage of estimation, OLS estimation procedure would be used to identify determinants of market supply level (quantity of supply) by taking those farmers who participated in the market. The estimation model is given as follows.

$$Q_j = \beta + \beta_{1j} X_{1j} + \beta_{2j} X_{2j} + \beta_{3j} X_{3j} + \beta_{nj} X_{nj} + \rho_{nj} \lambda_{nj} (X_{nj} \beta)_j + \varepsilon_j$$ --Equation (9)

Where

Q_j= volume of market supply; size of land allocated for a specific crop (Onion or tomato)

(ji= onion or tomato),

X_{nj} = exogenous variables per tomato or onion

b_{ij} = coefficients; (j= onion or tomato)

n =running from 1….n.

$\lambda_{nj}(X_{nj}\beta)_j$ - Inverse Mill's Ratio

j= farmer

X_i –X_n –explanatory variables

$\in_i$- random term for substantial equation

Explanatory variables:

Age (AGE) - Age of the household, a continuous variable, was taken as one of the explanatory variables. The expected sign was positive as age one of the parameters of human capital. As an individual stays long, he will have better knowledge and will decide to allocate more size of land, produce more and supply more.

Sex of the respondent (SEX_RES) - a dummy variable taking zero if female and 1 if male was one variable to be considered. No sign could not be attached with the variable.

Total size of land owned (TOT_LAND) - Total size of land a respondent owned, continuous variable, taken as anther variable to influence. The expected sign was positive. The more land owned the more will be the probability to allocate fro each vegetable crop and more to supply.

Family size (FAM_SIZ) - Family size of a respondent was one variable (continuous variable) proposed to influence. The more number of family members an individual had the more size of land allocated to the two vegetables and more to supply. This is because he will have a labor source.

Distance from main road (DIS_ROAD) – this was another continuous variable suggested to be included in the model. Measured in single feet hours, the more time needed to reach a main road the lesser would be the size of land allocated and volume supplied to market. Hence, the expected sign was negative.

Number of oxen owned (OXEN) - being a power for plowing, more land allocation and product supply probability would be as farmers increased their number of oxen ownership. The expected influence is positive. It was discrete continuous variable.

Distance from Development Agent (DIS_DA) - This variable was considered to see the intensity of extension service. The nearer a farmer is to a development agent the more frequent would be his chance to get an advice. Hence, the expected sign for this continuous variable measured in single feet hours was negative. As a farmer dwelled far the lesser would be the chance for extension contact and hence less knowledge, less land allocation and less market supply.

Experience (EXP) – This continuous variable measured by number of years expected to influence positively. As farmers got more experience in production and marketing, the larger land would be allocated and more would be supplied.

Market information (MIS) – This was a variable proposed to influence market supply and land allocation positively. If a farmer could get historical data he would be able to participate. The variable was considered dummy. Assigning zero if a farmer got information and zero if not.

3.4.4.3. Demand analysis

Different kinds of models are used to analyze demand or consumption. These include both single and systems of demand equations (FAO, 2003). The single equation models specify uncompensated demand equations. The prices of the goods omitted from the specification may then cause problems because any change in either of them causes changes in demand for the commodity in question through changes in expenditure. In empirical work, this

problem may not be too serious, as the effect is small if the particular good represents small portion of the budget (Asche *et al.,* 2005).

The general demand functions can be generalized for a consumer buying n goods as:

$Q_i = Q_i(P_1, P_2 ..... P_n, I)$ ----------Equation (17)

Where Q_i is quantity demanded;

P is price;

i denotes commodities, and I income.

Extending the demand function for individual consumers to that for a group of consumers in most empirical applications requires the inclusion of demographic variables besides prices and income (FAO, 2003).

It is generally acknowledged that income and price are by no means the sole determinants of food consumption, although they are normally the easiest to measure. Additional factors influencing food consumption may be grouped under five: physical need, availability, changes in services, tastes and changes in geographical distribution of the population (Saxon, 1975).

The relationship between individual independent variables in a demand equation and the demand variable can be classified as elasticities, flexibilities, and impact multipliers. Elasticity applies to demand equations in which the dependent variable is quantity purchased (or specific use such as consumption) (Ferris, 2005).

Double logarithm models were used by Saxon (1975) for its linearity in the logarithms and results of constant elasticities that are to equal coefficients. The log-log demand models enjoys a long history in empirical work. Its coefficients are elasticities (Asche et al., 2005; Durham and Eales, 2006).

The parameters of the linear model have an interpretation of marginal effects. The elasticity will vary depending on the data. As put by Ferris (2005), for a linear demand relationship the slope and inverse slope are constant through out. Nevertheless, for every point on the line, the price and quantity will differ. Therefore, the elasticity will differ at

each point on the line. In contrast, the parameters of the log-log model have an interpretation as elasticity. Therefore, the log-log model assumes a constant elasticity over all values of the data set. Such demand equations are functional forms of that are homogenous of degree zero in all prices and income (Binger and Hoffman, 1998). In equations of log-log functional form the coefficients are elasticities if the dependent variable is quantity purchased or consumed (Ferris, 2005).

$$\ln Y_i = \alpha + \beta_2 \ln X_i + U_i$$ ----------Equation (18)

Where,

$\ln Y_i$ - natural logarithm of vegetable i consumed

$\ln X_i$ –natural logarithm of explanatory variable

B_2 – vector of explanatory variables, α -intercept term, U_i- random term

In this model, the advantage of elasticities is that they represent relationships between percentages and the specific units involved do not have to be known. The sign on own price elasticity would be expected to be negative. The sign on income elasticity is either positive or negative (Ferris, 2005).

The double log model is theoretically consistent when demand is independent of expenditure. Even though this violates Engle's law, which claims the propensity to consume a particular group of good varies with total expenditure. It should be noted that it is sometimes argued that in the analysis of a single commodity, where the functional form of the other goods in the system remains unspecified, the double-log specification may give a satisfactory local approximation, in particular if there is not too much variation in total expenditure (Asch et al., 2005).

Monthly average consumption (QTY)- This is the dependent variable expressed as an average kilogram of onion or tomato consumed per household taking *Miazia*'s month as a representative.

Family size (FAM) – This is the total number of family members under a household. It is a continuous variable expected to take positive coefficient. The higher number of family a household had the more quantity they would consume.

Income (INC) – This is an average monthly income of a household. It is continuous variable expected to influence consumption level positively.

Purchase frequency (PURCHFRQ)- This is a categorical dummy, expected with positive coefficients. The more frequent a household purchased, the more quantity would consume.

Distance from market (DIS) – This is a continuous variable measured in travel hours from a household to market center. The farther distance from its home the lesser quantity would be consumed. Hence, it is expected to take positive coefficients.

Amount vegetable bought per single trip (SIN) – This is the quantity of a vegetable, onion or tomato, a household purchased per single purchase. It is a continuous variable measured in kilograms. The expected sign was positive assuming that more a household purchase lot the higher quantity he would produce.

4. RESULT AND DISCUSSION

The result and discussion part of this thesis is classified into three major sections: production, marketing and consumption. Each of them are discussed separately.

4.1. Production

A random selection of 120 farmers from the two farming systems encompassing 9 female and 111 male farmers were taken. The number of onion growers were 103 and that of tomato were 50. No farmer reported as a grower of tomato in cereal based farming system that can be associated with distance to market, Woreta or main roadsides.

Table 1 Sampled growers by farming system

Grower by type	Farming system category		Total	X^2-value
	Rice based	Cereal based		
Onion only	15	55	70	23.41***
Tomato only	17	0	17	40.30***
Both	23	10	33	10.44***
Total	55	65	120	

*** Significant at 1 percent level of significance

Source: survey result, 2007

4.1.1. Household characteristics

Household is the primary unit of analysis. From the collected sample data, household characteristics, namely sex, age, family size, labor power, and education level were believed to influence decision-making. These were assessed and the following result was obtained.

Table 2 Respondents' demographic characteristics

List	Farming system		X^2 /t-value
	Rice based	Cereal based	
Sex			
Male	50	59	
Female	5	6	
Total	55	65	0.979
Educational level			
Illiterate	13	20	
Grade 1-4	36	40	
Grade 5-8	6	5	0.619
Family size			
Mean	5.35	5.05	0.387
Standard deviation	2.06	1.91	
Average Family member			
Male	2.87	2.66	0.421
Standard deviation	1.49	1.43	
Female	2.49	2.42	0.681
Standard deviation	1.20	1.21	
Active Labor			
Average labor	3.53	3.26	0.342
Standard deviation	1.66	1.38	

All are insignificant

Source: Survey result, 2007

The age of respondents ranged from 23 to 80 with a median of 43 and modal of 45 years (about 10 respondents). The average family size was 5.18 (5.35 in rice and 5.05 in cereal based farming systems). The average labor force was 3.38 with no significant difference between the two farming systems. All the household characteristics showed no significant difference between the two farming systems.

The level of education for the majority of respondents (63.3 percent) was 1-4. Even though the older an individual the more probable illiterate he might be, in Fogera people were found literate to a certain level, primary level (1-4).

4.1.2. Farm size and allocation

The respondents' farm size ranged from 0.13 to 3.75 with a median land size of 1.5 ha. The average farm size was 1.63 ha, with significant difference between the two farming systems, 1.42 and 1.87 ha in rice and cereal based farming systems respectively. The largest proportion, 68 percent, of respondents owned a land size between one and two hectares of land.

In terms of allocation, the largest land allocated was to rice 0.73ha (52.2 percent), millet 0.52 ha (46.8 percent), grass pea 0.49ha (37.8 percent), and teff 0.43ha (36.4 percent) put in order. Maize and millet seemed to have a cross farming system coverage planted by 100 and 89 respondents of the 120.

Table 3 Major crops' land share

Crop list	Farming systems			t-value
	Rice	Cereal	Total	
Total farm land (Average)				
N	55	65	120	
Average land size	1.87	1.42	1.63	0.000***
Standard deviation	0.65	0.63	0.67	
Teff				
N	33	18	51	
Average land size	0.39	0.48	0.43	0.330
Standard deviation	0.34	0.28	0.32	
Millet				
N	26	58	84	
Average land size	0.42	0.55	0.51	0.041**
Standard deviation	0.33	0.26	0.29	
Rice				
N	39	9	48	
Average land size	0.73	0.81	0.74	0.633
Standard deviation	0.39	0.51	0.42	
Maize				
N	40	56	96	
Average land size	0.28	0.36	0.33	0.042**
Standard deviation	0.23	0.17	0.20	
Grass pea				
N	30	15	45	
Average land size	0.57	0.39	0.51	0.192
Standard deviation	0.47	0.34	0.44	
Chick pea				
N	15	10	25	
Average land size	0.27	0.31	0.29	0.591
Standard deviation	0.15	0.18	0.16	
Pepper				
N	12	42	44	
Average land size	0.11	0.20	0.18	0.001***
Standard deviation	0.08	0.08	0.09	
Onion				
N	38	65	103	
Average land size	0.32	0.28	0.29	0.420
Standard deviation	0.31	0.24	0.27	
Tomato				
N	40	10	50	
Average land size	0.16	0.10	0.15	0.020**
Standard deviation	0.10	0.10	0.10	
Oxen ownership				
N	55	65	120	
Average holding	2.20	2.00	2.12	1.623
Standard deviation	0.91	0.81	0.86	

, * significant at 5 and 10 percent

Source: survey result, 2007

The average land allocated for tomato was 0.16 ha and 0.10 ha in rice and cereal based farming systems respectively. The modal land size was 0.125 ha (16 farmers). The minimum land size was 0.005 ha found in cereal based farming system and the maximum was in rice based farming systems with a size of 0.5ha.

Respondents also reported that the average land size allocated to onion was 0.32 ha in the rice based and 0.28ha in the cereal based farming system. The modal land size was 0.25 ha (32 farmers) and median of 0.25. The minimum land size was 0.01 in the cereal based farming system and maximum 1.50 hectare at the rice based farming systems.

Based on the proportion from the average farmland, onion shared on the average 20.2 percent and the corresponding figure for tomato was 10.12. The proportion of tomato, as reported by respondents, showed no significant difference between the two farming systems ranging from 3 to 38 percent. The proportion of land allocated for onion was also from 1 percent to 80 percent with no significant difference between the two farming systems.

Farm power- As critical sources of farm power 51.6 percent of the respondents owned two, 20.83 percent owned one, 16.67 percent owned three, 9.11 percent owned four and above, and 1.67 percent owned zero oxen. The oxen ownership showed no significant difference between the two farming systems.

Labor availability was also seen in both farming systems where an average of 3.38 active labor force (3.53 in rice and 3.26 in cereal), with a minimum of 1 and a maximum of 8 per household prevailed. However, no significant relation ship (correlation) was seen with production pointing out their experience of accessing labor from other possibilities like *Debo*.

4.1.3. Access

It is well understood that access to different services contribute affirmatively to crop production. In this study farmer's distance to the *Woreda* capital, Woreta; and to main road was considered. Accordingly, it was revealed from the sampled farmers' response that the average distance to Woreta for a farmer to travel was 2.14 hours in single feet trip i.e.,

(1.65 hours in rice based and 2.57 in cereal based farming systems). Forty eight percent of the sampled farmers reported as they used to travel four hours single feet trip to reach Woreta, 30.8 percent travel one up to two and 20.8 percent travel less than one with a significant difference between the two farming systems at 1 percent level of significance.

Table 4 Access to market and road

Distance in feet hours of single trip	Farming system			t-value
	Rice based	Cereal based	Total	
From Woreta				
Mean	1.62	2.57	2.14	-6.64***
Standard deviation	0.76	0.80	0.92	
From main road				
Mean	0.62	1.04	0.85	-4.10***
Standard deviation	0.48	0.60	0.58	
From development center				
Mean	0.69	0.60	0.64	1.213
Standard deviation	0.40	0.40	0.40	

*** Significant at 1 percent

Source: survey result, 2007

The average distance from main road was reported 0.85 hours single feet trip (0.62 hours in rice based and 1.04 in cereal based). From the sampled farmer respondents 77.5 percent traveled up to one hour, 19.2 percent from 1-2 hours, and 3.3 percent greater than 2 hours per single feet trip with significant difference between the two farming systems at 1 percent level of significance.

Extension services- Extension service was delivered by the *Woreda* office of agriculture and rural development. Respondent farmers reported an average distance to development center was 0.6 hours of single trip travel in rice, and 0.69 hours in cereal based farming systems.

Under encouraging support to strengthen the extension service each sampled *Kebeles* had three development agents assigned to work; natural resource, animal science and crop production. Respondents were asked how frequently they were getting an extension service from development agents. Accordingly, from all respondents 27 were visited more than once in a week, 19 weekly, 43 biweekly, 14 monthly, and 17 none with a significant difference between the two farming systems.

Table 5 Extension contact frequency and type

List	Farming system		X^2 -test
	Rice based	Cereal based	
Extension frequency			
Totally no	14	3	
Monthly	2	10	
Biweekly	12	31	
Weekly	8	11	20.47***
Any time needed	17	10	

*** Significant at 1 percent

Source: survey result, 2007

Inputs- The types of inputs utilized for production of the two crops include; land, labor, seed, chemicals, irrigation generators, pedal pumps, and to a limited extent fertilizer. Tomato and onion were produced with seedlings developed in a small plot of backyard nursery while shallot was produced with direct planting of the bulb on a farm field. Seed for onion and tomato were supplied from market through private dealers. There was actually a good development in delivering onion seed from farmers' production since two years with the strong support of IPMS.

As pointed out by sampled farmers, the cost per kg of shallot was around 2 Br while onion was 180-200 per kg. The common seed types were Adama Red and Bombay Red in the case of onion and local for shallot. The common tomato seed types included Marglobe and

Roma VF. The cost was about 600 per Kg. Few respondent farmers also pointed out their use of pesticide (malathion) (thirteen onion and two tomato farmers).

Disclosed by respondents, irrigation of onion and tomato was with pump (generator or pedal), if a farmer had no diverted natural water flow. As a result, those who had no capacity to purchase pump generators, rented or farmed by partnership. From the 120 farmers about 12 of them owned pump generators, 4 owned pedal pumps and the rest rented or farmed in partnership apart from those who used natural gravity flowing water.

Farmers applied urea fertilizer on their tomato and onion to a limited extent at nursery. The source was open market as it was very little. From the whole grower respondents about 22 responded as they applied on their nursery field.

Credit-The nature of production system at the harvest period opened an opportunity for farmers not to request credit. Moreover, the steady growth in rice production kept farmers at a promising financial liquidity. The advantage of silt on the farmlands due to plainness also relieved from use of fertilizer. For this fact, no farmer reported credit except 9 onion growers.

Infrastructure- Fogera is relatively with better facilities. It has about 17 km asphalt road, 30 Kms all weather gravel road, and much dry weather road. In the harvest season, there was no need to use a bulldozer for paving a road. Lorries could travel to the direction they wish. All rural *Kebeles* had telephone line, one bank service at Woreta, mobile telephone worked in all onion and tomato growing plains. There was also credit giving institution, ACSI, with wider service coverage.

Markets- Sampled farmers reported that two products were sold on the farm field, roadside and to a minimal share at Woreta and Bahir Dar. As the crops are very perishable and bulky, it was natural to sell the products there in the farm. The plain, Fogera, has a natural advantage for this.

The common roadsides where tomato was sold were Kuhar Michalel, Gumara, and Woreta Zuria primary cooperatives office compound. The retail market places include Hod Gebiya, and Woreta though Hod Gebiya was very small.

Farmers were also asked whether the numbers of vegetable market days were sufficient to sell their vegetables. Seemingly, 67.5 percent of the sample pointed out the numbers of market days was two and more. About 13.3 and 16.7 percent of the respondents replied the absence of specific day and no need to have specific days as they used to sell at farm gate. It could be deduced from this that the numbers of market days was not a limiting factor to sell their produce.

Farmers' experience- From the survey, farmers' experience in onion and tomato production was understood to be 2.87 and 5.17 years respectively. A significant difference between the two farming systems in tomato experience existed at 1 percent level of significance.

Table 6 Farmers experience for onion and tomato

Particulars	Average experience /in yrs/		
	Total farming	Onion farming	Tomato farming
Farming system			
Rice based	28.33	3.13	5.5
Cereal based	27.63	2.72	3.8
Whole	27.95	2.87	5.17
Standard deviation	12.7	2.29	3.52
t-value	0.912	0.276	0.000***

*** Significant at 1 percent

Source: survey result, 2007

4.1.4. Farm practice and crop calendar

Farm Practice- The land covered with vegetables was by far lower than the potential. The main reasons attributed to this could be the limited knowledge about the vegetable types, their use and the market opportunities. The famous vegetable crops grown in the area were onion and tomato.

With short years of development, onion and tomato are steadily increasing. Of the total respondents about 69 for tomato and 94 percent for onion, replied production has increased

for the last five years. The quality of the product to command market and the period of production with irrigation when a farmer was relatively free speeded up the rate.

Different modalities of farming were identified. Among the different types one was the allocation of a plot of land from self-owned, the second was, renting with a pre-determined and-paid cost on annual basis or production season. The third was farming in partnership by sharing all expenses equally. The fourth and common modality is a kind of partnership where a rich farmer with pump generator provided only his pump generator with fuel, shared seed while the partner farmers provided their labor, land, and shared seed for an equal output share at harvest. The fifth modality was similar to the fourth but the difference is in the counter parts were but civil servants or other urban dwellers (onion traders, etc).

Repeated rounds of plowing, stirring and other farm practices in farming onion and tomato were also reported. From the survey, it was disclosed that the average round of tillage was 5.6 times for onion and 4.5 times for tomato. Weeding for onion was on the average 2.6 times while for tomato 2.14. The average harvesting rounds of tomato was from 6-7 rounds. No significant difference seen between the two farming systems in tilling, weeding and tomato harvesting practices.

Table 7 Tillage and weeding practice by farming system

List	Farming system			t-test
	Rice based	Cereal Based	Total	
Onion				
Tilling				
Mean	5.42	5.75	5.63	0.622
Standard deviation	2.32	1.79	1.99	
Weeding				
Mean	2.40	2.58	2.52	1.208
Standard deviation	0.79	0.79	0.79	
Tomato				
Tilling				
Mean	4.50	4.70	4.54	0.135
Standard deviation	1.54	1.57	1.53	
Weeding				
Mean	2.08	2.40	2.14	1.492
Standard deviation	0.75	0.70	0.74	

Source: survey result, 2007 All have insignificant difference

Crop calendar- There seemed some difference in the cropping periods of onion and tomato. Tomato covered from August to May while onion covered from November to late May. The *Kebeles* that were relatively drained and nearest to Woreta & the asphalt road like Kuhar Abo, Khar Michalel, Awa kokit, Woreta Zuria, and to some extent Bebekis *Kebeles* started farming tomato early in August and supplied from November onwards. Other growing *Kebeles* farmed late in October and November and used irrigation to supply up to May. In fact, those *Kebeles* that sow early August also sow in these months too. With this wider period of tomato production supply of tomato was relatively longer, from November up to May. Onion on the other hand being grown with bulb as well as seedling started its farm practice from October and November and continued to supply the market from February up to late May.

4.1.5. Seed type, preference and use

The onion types grown are Red Bombay and Adam Red. The shallot was local. The tomatoes were Marglobe and Roma VF. Almost all of the farmers knew which type of seed they sow as it is usually written on the packaging can. A survey result indicated that majority of the farmers grew Bombay Red for its short gestation period and high productivity. Similarly, many of the tomato growers sow Roma VF for its relative storability.

4.1.6. Cost of production

The average productivity for shallot, onion and tomato reported as 96, 110 and 129.7 quintals per hectare respectively. The estimated per hectare production cost on the average ranged from 7031 up to 9475.63 ETB for shallot, 3646.85 up to 5938.87 for onion, and 3022.02 up to 4571.15 ETB for tomato. From these total production costs, labor cost covered about 26 to 25 percent in the case of shallot, 43 up to 70 percent in onion, and 60 up to 88 percent in tomato (Table-8). The bulb cost for shallot covered from 45 up to 59 percent indicating the need to find technologies that could reduce this ample cost. Farmers also reported that the price they received for a kg of tomato on the average was 0.75 ETB and 1.75 ETB for shallot and 1.65 ETB for onion. Shallot was sold from 1.00 to 2.20 ETB per Kg, onion from 1.00 to 1.90 ETB, and tomato from 0.30 to 1.00 ETB per kg. With an elementary calculation of average productivity by the average price they received it was arrived on an average net income from a hectare production to be 8,191 ETB for shallot, 13,141.50 ETB for onion and 5926.70 ETB for tomato.

Table 8 Per hectare cost of production

Cost list by vegetable type	Cost								
	Labor	Seed cost	Chemical	Fertilizer	Fuel	Maintenance	Pump rent	Others	Sum
Shallot									
With own pump	2466.13	4182.54	109.34	116.83	1793	498.93	--	156.71	9322.94
With rented pump	2466.13	4182.54	109.34	116.83	1793	--	651.62	156.17	9475.63
With out pump	2466.13	4182.54	109.34	116.83	--	--	--	156.17	7030.97
Onion									
With own pump	2574.51	690	109.34	116.83	1793	498.93	--	156.71	5938.78
With rented pump	2574.51	690	109.34	116.83	1793	--	--	156.17	5439.85
With out pump	2574.51	690	109.34	116.83	--	--	--	156.17	3646.85
Tomato									
With own pump	2748.88	360	--	--	1182.27	--	--	--	4291.15
With rented pump	2748.88	360	--	--	1182.27	--	280	--	4571.15
With out pump	2748.88	360	--	--	--	--	--	--	3108.88
With rain fed	2662.02	360	--	--	--	--	--	--	3022.02

Source: own computation, 2007

4.1.7. Production and marketing problems and opportunities

The steady growth in the production and marketing of onion/shallot and tomato was not with out problem. Problems stretched from input supply late to marketing. Understanding problems and opportunities with priorities was very important for both research and development initiatives. A number of frequent rapid field survey supported with group discussion and key informant survey were undertaken and the following problems were identified in order of importance. For sake of clear understanding problems are divided into marketing and production problems.

Production problems

Poor product handling- Absence of appropriate post harvest handling practice. Onion farm field watering one or two days prior uprooting was the usual practice that resulted in poor quality, easily damageable onion and eventually low price.

Pest and disease- Problem of pest and disease like root rot in the case of onion/ shallot and problem of African ball warm, cutworm, and fruit disease in the case of tomato.

Surface water shortage- Relative scarcity of surface water in most of rice based farming system *Kebeles*.

Limited production and marketing extension support- Even though there seem sufficient number of development agents deployed in each *Kebele* they lacked the competence on pre-and post harvest handling practices. It was for this fact that farmers applied much seed rate above the recommendation, watered the field at harvest, and did not store.

Unorganized input delivery- farmers used to get seeds from open market. There were no certification, quality test, and failure guarantees. As a result, farmers faced problems of seed viability. For instance in 2005 about 7.6 quintals of onion seed after distributed to farmers and sown, failed to grow and a large number of farmers lost.

Marketing problems

Imperfect pricing system- Frequent low price at peak supply periods that based not the real supply and demand interaction but the information collusion and gang up between buying participants. The intermediaries used to decide on the price of onion/shallot products. Wholesalers were mostly the beneficiaries and they controlled and regulated the chain.

Absence of law enforcement on standards- The prevalence of strong and wide market cheating by wholesalers and brokers like mis-weighing, collusion (low price quotation, price information). There were no identified and applied quality standards that resulted in absence of discriminatory pricing accounting for quality and grades.

Lack of coordination among producers - Farmers were not coordinated to increase their bargaining power. There was no any marketing institution to safeguard farmer's interest and rights over their marketable produces. Even the existing few irrigation cooperatives lacked skill and capacity on how to go about. Rather, competition among farmers was the usual phenomenon.

Market research and information- Inadequate availability of market research and marketing information that resulted in uninformed planting and marketing decisions. Most farmers obtained information on the local market from their neighbors and brokers. Many decisions were made following the leading farmers. Leading farmers can speed up technology replication but could also result in planting duplication and ultimately lower prices for crops of very perishable type.

Lack of improvement for other actors in the channel- Limited attention was given to other parts of the channel, like lack of attention for retailers in improving the stalls that had a very right effect on the shelf life of the products.

Opportunities

The *Woreda* was not only with problems but it had also opportunities. Among the different opportunities that prevailed, the trend in the growth of production and marketing tradition

in the area was one that drew attention. Experience (learning effect) and neighborhood effect are much more important in technology adoption. The start of on farm onion seed production was one to due attention.

The natural advantage of proximity to main road, Gondar and Bahir Dar, plainness, and proximity to Lake Tana are still the opportunities, which could facilitate commercialization in the *Woreda*.

The existence of good policy framework in agricultural development manifested by deploying development agents at each *Kebele,* and infrastructure development could facilitate vegetable production and marketing. The increasing use of mobile telephone and development of wireless telephone are also the other infrastructural advantages to improve the system.

The other opportunity is the started marketing system where different buyers come from different areas of the country creating a confidence to farmers. The existence of some development projects like IPMS-ILRI to create a link between buyers and farmers is impassable without mentioning. Moreover, the contemporary practice to store knowledge and facilitate knowledge sharing by IPMS is another opportunity. The research and development practices on post graduate and undergraduate studies focusing on marketing are here to mention.

4.2. Marketing

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. For a critical understanding and identification of the inefficiencies the following section is spent for some investigation of the prevailing marketing system.

4.2.1. Market structure

Market structure in food marketing is analyzed based on the numbers and sizes of enterprises within the system, and the potential access of additional participants to it (licensing procedure, lack of capital and know how, and policy barriers) and the degree of transparency (Pender *et al.*, 2004). Accordingly the structure of the market was analyzed as follows.

4.2.1.1. Market participants

The main actors involved in the system were producers, rural assemblers, wholesalers, retailers, transporters, brokers and consumers.

Large number of supplying farmers characterized markets at the farm level. The wholesale buyers were estimated to be fifty-four, each of which handled almost equivalent amount of product (Annex Table-4). Based on the group discussion and development agents report the numbers of rural assemblers working on tomato and to a limited extent onion were about 38. Almost all the rural assemblers had equal capacity of volume bought. The retailing market at the three towns was characterized by large number of equivalent capacities in the volume of product they were handling.

Calculation of the concentration indices by considering an average load a wholesaler took per day in peak production season basing the four firm criteria indicated no oligopsonistic market power. Even relaxing to six the number of largest buyers, the concentration index was 26.15 percent indicating no oligopsonistic market (Annex Table-4).

Producers-These are those types of the actors who farm and sale onion/tomato. They would either have their own land or rented to produce both or one of the two crops. These farmers after they produced they sold on either farm field or roadside. According to the study 96 percent of the respondents sold at farm field. Obviously, the rest sold in Addis Zemen, Yifag and/or Woreta. Selling onion was through farmer brokers and/or partners if any with a very limited volume by themselves.

The process of onion selling had some kind of steps. First farmers informed a rural broker for buyer. In the mean time, they watered the farm field (commonly 1-2 days earlier before uprooting) for a weight advantage though they justified for ease of up rooting. A broker searching and agreeing with a wholesaler came back for arrangements (pulling out and get ready). Leaves and root tips would be cut, bulbs heaped on an open field. The buyer, then, come, checked the quality and 'negotiate' price. As soon as they agreed, weighing and loading would start. This time a mischief usually appear (cheat in weighing). Farmers explained their grievance of being cheated up to 30 percent product volume apart from low price.

On the other hand, tomato farmers used to collect fruit in pieces (every 3-4 days) for months (usually one up to two) and took either to road side, Bahir Dar or Woreta. The common roadsides where farmers used to sell are Gumara, Kuhar Michael, and Woreta multipurpose cooperatives compound. The average distance reported where a farmer went to a road side ranges from 0.62 for the nearest to 1.04 hours for distant per single feet trip.

As the crops are perishable, the sale had to be made as soon as harvested. Members of the family who used to pick tomato were mother and daughters and to a lower extent son and fathers. Early in the morning or late in the night tomato is usually picked, to keep freshness. Farmers used *Kirchat* and wooden boxes for collection as well as product delivery. Buyers delivered boxes early in the afternoon to farmers for collection of good quality tomato.

The selling usually carried out in the morning after buyers' arrived from Woreta, Bahir Dar or Gondar. Buyers' used to collect at roadside through visual inspection. Price discovery followed no scientific measurement rather volume (pricing of a *Kirchat* or a case of tomato). The estimated average weight of *Kirchat* was 15 Kg and box was 55 Kg.

Respondents also pointed out that for both vegetables, there were no any set arrangements to make the marketing based on contract. The modalities were selling to any buyer.

Farmers did not have any technology of creating price advantage over time. It was reckoned from the surveyed data that the average number of days an onion/shallot stayed until clearing was about 8.38 in rice based and 7.41 in cereal based farming systems. Tomato stayed only 2.62 days in rice based and 2 days in cereal based farming systems. Though onion/shallot could stay up to six months with appropriate storage facilities, it was simply disposed with very short periods of low selling price.

Rural assemblers-These market actors are next to farmers along the chain who used to live either at rural *Kebeles*, Woreta or Bahir Dar. Many of them are opportunistic where at times engaged in other business and in other times farming. They used to buy small amounts from surrounding farmers at the roadside and took to Bahir Dar or Woreta for sell. On the average, they handled 10-14 cases of tomato per trip and travelled a maximum of twice per week to Bahir Dar. The rural assemblers for onion are those who loaded an Isuzu or half in every week or more. About 30 male and 8 female rural assemblers were assembling. Upon discussion with some of them, the number of onion rural assemblers was very limited and they used to sell to wholesalers at Addis Ababa.

Rural assemblers follow strict sorting for tomato. Sorting in tomato based big size, pest free, firm and mature green tomato qualities. They buy on Monday and Tuesday and then delivered to buyers on Wednesday at Bahir Dar and then used to come back on Thursday and start assembling up to Friday and back again on Friday and Saturday.

According to respondent farmers, the tomato assembling markets seemed transparent and relatively competitive. Both buyers and sellers practiced negotiating price. Rural assemblers and some growers exercised a kind of mutual agreement in seed delivery and back sell at harvest. This was common in *Kebeles* namely Woreta Zuria, Kuhar Abo, Kuhar michael and Awa. The advantage for rural assemblers was usually quality. The agreement based social bondage and for those farmers who planted smaller land size it was a good opportunity.

Brokers –These participants of the system were those who exist between producers and bulk buyers. They did not handle any product but facilitated the buying and selling activities between farmers and wholesalers. More than 50 brokers were reported working in Fogera. Many of them brokered onion marketing than tomato. These people were not also permanent brokers where their main activity is farming in the farming months of the year. All were male and their age ranged from 18-45 years. Except one, all were literate with grades ranging from one up to tenth. Many of them had a capital of 1000-3000 ETB. From all about ten were above eighth grade. About five to seven had mobile telephones. They are divided in to urban and rural broker. The urban brokers though were brokering onion and tomato some time before they now brokered only vehicle. The rural brokers on the other hand were elite farmers and most of whom own pump generators and/or were leaders of the *Kebele* council. For instance Bebekis and Kuhar Michael *Kebele* chairmen were the prominent brokers. These people had a power to suppress the free selling and buying behavior of the farmers.

Kebeles to the north of Woreta namely, Awa Tihua, Dibana Sifatra, Rib Gebreil and to some extent Shaga and Woreta Zuria, did not use brokers. The reason behind was the variety, shallot; production volume; and relative experience in direct contacting. On the other hand *Kebeles* to the south and southeastern of Woreta used brokers mainly because they planted Bombay red (relatively perishable).

The process of brokering went like this. Initially, brokering farmer took two or three bulbs for display. Buyers sat at two or three central hotels namely; *Shoferoch*, *Menahria* and *Fasika* hotels. The farmer brokers swarmed the hotel each day and used to lobby buyers. In fact, early introduction had some advantage in getting a buyer. As soon as they reached a first price, brokers took them to the farm field.

The main activity brokers usually did was weighing, register amount of each farmer and safeguard wholesalers. They also served in suppressing grievances of selling farmers at the time of weighing, and other mischief. The role of brokers was inclined towards buyers.

Wholesalers based on the information they got from friend at Mekelle, Addis Ababa, Dessei, Bahir Dar and Gondar set the daily price. There seemed slight competition among wholesalers but the collusion outweighs.

The rural brokers were area segmented where one or group of brokers in one *Kebele* would not allow brokers from other *Kebeles'*. Their brokerage cost was a flat rate of 250 ETB per an Isuzu load. Brokering in the case of tomato was very limited due to the measurement limit (box) and the volume produced.

Wholesalers- These were those participants of the marketing system who used to buy onion and/or tomato on the farm field with a larger volume than other actors did. They relatively fully engaged in wholesale buying by wandering to other areas of the countryin the other months of the year. They loaded one or more Isuzu of onion or tomato per day or per week. It was difficult to arrive at the exact number of wholesalers working at Fogera. Nevertheless, the discussion made with some wholesalers explored 54 wholesalers from whom 31 came from Tigray (Annex Table-4). Each wholesaler used to load onion and/or tomato with an Isuzu or FSR. They came on February and used to stay up to half of May every year. In these months, they buy and send to receiving partner at Addis, Dessei, Woldiya, Tigray (Mekelle, Shire, Adigrat, Adwa, Axum and Humera), Gondar (Gondar town, Metema and Dansha). On the average, of the total volume that passed through wholesalers, 27.4 percent went to Addis Ababa, 41 percent to Tigray, 17.8 percent to Dessei and Woldiya, 8.2 percent to Bahir Dar and 5.5 percent onion to Gondar. Similarly, from the total tomato taken by wholesalers about 75 percent went to Tigray, 3.6 percent to Addis Ababa, 10.7 percent Gondar, and 10.7 percent to Bahir Dar.

Some wholesalers supply constantly to institutions (Jail, Bahir Dar university and Military Crew in Tigray) through a bid. The working capital of wholesalers ranged from 30,000 up to 200,000 ETB.

Retailers- These are the final link in the chain that delivered onion and/or tomato to consumers. They are very numerous as compared to wholesalers and rural assemblers and their function were to sell to consumer in pieces after receiving larger volumes from wholesalers or rural assemblers. Eight male and 42 female retailers were interviewed. The majority, 86 percent, were literate. These respondents reported that the average number of years of experience was about 8.3 years: specifically 8.93 years at Bahir Dar, 11.4 at Woreta and 6.5 years at Gondar. The average years of experience for male retailers was 7.75 and for females 8.4 years.

Table 9 Retailers' demographic characteristics

Character	Place			Sum
	Bahir Dar	Gondar	Woreta	
Sex				
Male	8	0	0	8
Female	19	5	18	42
Ethnicity				
Amhara	27	18	5	50
Languages				
Domestic /Amharic/	27	18	5	50
Foreign /English/	5	1	-	6
Educational level				
Illiterate	2	4	1	7
Up to grade 4	8	1	0	9
More than 4	17	13	4	34
Marital Status				
Single	11	7	1	19
Married	14	9	1	24
Divorced	1	1	3	5
Widowed	1	1	0	2
Family Occupation				
Trading	9	12	1	22
Employed	3	0	0	3
Clergy or other social service	2	3	0	5
Farmer	12	3	3	18
Other	1	0	1	2

Source: survey result, 2007

The above table showed that all retailers were Amhara ethnic. Of all the respondents about twenty twos' parents are/were engaged in trading business that might had an impact on the respondents' intention to engage in.

The specific period where Fogera tomato arrived at market was between November and early May and that of onion was between February and end of May. The average holding of a retailer in these periods was 2.95 cases of tomato and 2.03 quintals of onion per week.

Table 10 Weekly average volume handled

List	Town				F-value
	Bahir Dar	Woreta	Gondar	Total	
Onion					
N	17	2	18	37	
Mean	1.97	3.50	1.92	2.03	7.353**
Std Deviation	0.42	2.12	0.44	0.65	
Tomato					
N	26	4	18	48	
Mean	2.97	1.62	3.31	2.95	1.143
Std Deviation	2.19	0.48	1.91	2.03	
Experience /years/					
Mean	8.93	11.4	6.5	8.3	1.68
Std Deviation	6.74	6.32	5.24	6.28	

** Significant at 5 percent

Source: survey result, 2007

The average working capital was 1632.20 ETB ranging from 50 to 4000. Retailers and wholesalers mostly market on credit basis. This was based on long-term established clientele ship. Every week or twice depending on their selling capacity, retailers took an amount they demand. After two or three days, especially on Wednesday and Saturday (Bahir Dar), a wholesaler wander retailers' stall to collect money. If the retailer failed to sell the product (say due to poor quality) s/he immediately report to the wholesaler for consideration (reduce price, write-off, etc). In response, the wholesaler decides. This creates a chance for retailers not to demand capital. Wholesalers' used to sell at a price adding 0.10- 0.25 per Kg (as the wholesalers told the researcher) on the buying price and marketing cost.

Even though holding tomato could be risky, it was necessary to have a certain amount for purpose of buyers' attraction. They had to display different types of vegetables. The common types they handled were potato, onion, tomato, leafy vegetables.

From the survey, it was observed that the retail stalls were very poor made of papyrus, plastic and wood used mainly for sun light protection. It lacked sewerage, not convenient for product display, susceptible to rain and strong sun light and favorable for contamination. Product handling was very spontaneous. No body took any remedies to revert these easy problems. Relatively the Gondar's center was better. The Woreta center works half day and was poor. The Bahir Dar's center was very busy as compared to Gondar and Woreta. In all the three, retailers used to sit on stone beds of about 50 cm height.

The municipality on all the three towns had delineated certain corners of market center. Even though the municipality collected some amount of money at intervals, it lacked attention in improving the market places. The researcher failed to get even a single retailer who got training. At the other end, retailers had no any organized institution, which could speak on behalf of them. Retailers collected money for compound cleaning and guard salary. However, there was no any organized institution in all the three.

The buyers from retailers were obviously final consumers (households, crews, hotels and restaurants). There was a limited sale to other retailers (like corner shops and rural retailers). The type of product sold to rural retailers was of relatively poor quality.

4.2.1.2. Barrier to entry

Licensing procedure: According to the rapid appraisal, almost all of the retailers and rural assemblers had no license. Even the wholesalers did not have. The few wholesalers that were with licensing were those that supplied to institutions on bidding. In fact, all paid some amount of money every year as per the Inland Revenue decision.

As disclosed by a person from ANRS Small Scale and Micro Enterprise Agency retailers were not claimed to have business license, what was done was to register them in commercial registration. Two steps are identified; commercial registration, and business

licensing. These small retailers were obliged to be registered only commercially and pay about 25 Br per year, as the scale is small.

Wholesale market seemed to have no barrier to entry but an indirect blocking by the existing wholesalers to the new entrant not to get buyer (retailing client) especially in Gondar and Bahir Dar. In the case of retailers, entry was free but stall was a limiting factor.

Capital: Capital at retailers' level was not basic though necessary. The scheme of kind credit from wholesalers solved their cash credit demand. Rural assemblers were also able to get credit from both the informal and formal source. In the case of wholesalers, they knew the possibility to take credit from banks especially in Bahir Dar some wholesalers bought vehicle by taking credit from bank. As far as one bought at reasonable price and loyal to farmers, they would not prohibit selling on credit. However, a capital ranging from 50 -200 thousand birr was suggested by respondents to enter the business and be strong wholesalers.

Skill: Almost interviewed traders from all levels strictly underlined the importance of experience. The skill to manage customers, skill of lobbying selling and buying customers, 'skill' of cheating protect any body to enter the business.

4.2.2. Standard and grades

Agronomically, quality and long shelf life starts from production albeit no clear set quality standards found in Fogera. The kind of classification buyer and sellers used to follow are Kochero and Sembersana for tomato, and Baro and Hagerew for onion/shallot.

Almost many of the traders and consumers expressed quality onion based primarily on compact dryness (matured) followed by size and color. The justification was if infested no one would consider, it would be thrown away. On the other hand, consumers suggested quality of '*mamerkat'* as a top parameter.

Tomato was also similar. Buyers need mature green tomato of big size with good flesh content. Buyers did sort tomato in every instance of purchasing. Characters considered in

sorting were color, fruit size, flesh content, firmness, free from pest and taste. Onion sorting based size, compact dry, pest free, sprout free and color.

4.2.3. Packaging

Containers for the two commodities differed, onion collected and packed with a sack, or free disposal on car. The only thing required was to pad walls of a car with polyethylene sacks. In case of tomato, the wooden boxes and different sizes of *Kirchat* were used. The wooden boxes padded with indigenous tree leaves and newspapers.

4.2.4. Transportation

The road network is very good having a natural advantage of plainness. Product transportation took different forms, head load to bus. Tomato was transported from field to market places with head load, animal back, equine pulled cart, and Isuzu. The mini and big bus participated in transporting tomato. Isuzu was the prominent transporter of both. Isuzu and FSR took onion from many places with limited transport of cart and donkey load (Dibana Sifatra and Rib Gebreil *Kebeles)*. Roughly 35 Isuzu, 10 the big ones (FSR), 8 minibuses and 2 large buses participated in product transport per each day at peak production seasons.

4.2.5. Storage

Scientific and practical field reports revealed the possibility of onion to be stored up to 6 months provided proper post and pre-harvest handling practices are made. However, in Fogera there were no significant storage practices. According to the survey, only 19 of the 103 farmers exercised storage from seven up to sixty days. The reasons for this exercise were fetching better price (63.2%). Among the potential types of storage hipping on the field, constructing a hut and disposing on and dry floor, leave on the field without pulling and put on *Kot* were some to mention.

4.2.6. Market information

Market information specifically included information on price, product demand, product supply, market place and buyers and sellers. Out of the 120 of total interviewed 113

respondents had accesses to market information on price and buyers. The sources were friends for about 91.2 percent of the respondents. Apart from current information, there was no historical market information that convinced farmers for planned production.

Respondent farmers evaluated the price trend of last five years whether it had increased or decreased. Accordingly, 93.2 percent of onion growers responded that the last five years price of onion was increasing. In addition, 90 percent of the total tomato growers believed that the trend was increasing. The reason for this price growth attributed to increased demand.

4.2.7 Risk bearing

The common risk types prevailing were spoilage, unsold left over, and defaulting (cheating). A question was raised whether there was unsold onion or tomato from the total amount produced. Few respondents claimed the presence of unsold produce (7 say yes out of the 50 tomato producers and 13 say yes out of 103 for onion). However, the majority sale their product even at lower prices.

Respondents were asked what they did when they failed to sale after made available for market. Forty-two of the fifty tomato producers (84 percent) and 47.6 percent of onion growers took reducing selling price as alternative measure.

The sold onion and tomato money was received in a number of alternatives; some paid as soon as they buy; some took the product and send the money after some time. In this study the majority received as soon as sold 59.22 and 84 percent of the respondents in onion and tomato growers respectively.

Sometimes farmers sold to some wholesalers on credit. However, few wholesalers defaulted. For instance by the year 2006/07 (1999EC) about 12 farmers faced the problem of default from wholesalers amounting about 152,000 ETB.

4.2.8 Market conduct

Market conduct refers to the patterns of behavior of firms. This implies analysis of human behavioral patterns that are not readily identifiable, obtainable, or quantifiable (Pomeroy

and Trinidad, 1995). There are no agreed upon procedures for analyzing the elements of market conduct. Rather, some points are put to detect unfair price setting practices and the conditions under which such practices to prevail. In this report market conduct is analyzed in terms of the existence of formal and informal producer groups, formal and informal marketing groups, and the availability of market information.

Formal and informal groups

Farmers only organized in terms of Kebele or other social associations. With regard to production, every body produced lonely. Even there was a problem of seeing the neighbor to grow onion or tomato. This affected their bargaining capacity. The traders seemed to have some kind of grouping especially in price setting though sometimes rivalry observed if the market at Addis Ababa or Mekelle felt promising. Brokers had some kind of peer grouping in their Kebele. One would never see one broker blaming or betraying another.

Price information and setting

Market information supply was not transparent between levels that created high price variability and difference among selling farmers especially in onion. Buying wholesalers got information from their partners far in Addis or Mekelle while farmers and brokers not. This created the information asymmetry expressed by low prices at times when it was not. The main market information farmers' used were the product selling price, input price and number of buyers coming to the area. Farm gate buyers seemed to have better information attributed to their wide exposure. Wholesalers, either with the help of their commission agents or partners, got quick and readily information. Receiving information they pretended as if the price was not good and even informed some, as they could not sell what they send some day before. This time brokers provided the false information to farmers and forced to clear at the prevailing price, explaining 'the air is not good'. However, some very loyal wholesalers relatively respected truth. These people usually buy at higher price than the pretended based only on the real information. In the over all chain, wholesalers seemed to have the power influencing both backwards and forwards.

The role of brokers in exploring price information was limited because of flat brokerage cost. At whatever the farmer sells, the broker would harvest his 250 ETB per Isuzu. On top

of this, wholesalers agreed prices with farmers keeping the cost of brokerage, 0.05 per kg, in to account. This showed how much producing farmers are disadvantaged.

Onion farmers' ranked purposive collusion among actors as the first reason followed by difference in quality and access to market information for different price received. In the case of tomato, the first reason for price difference attributed to quality followed by market information gap and traders' collusion. The relative comparison between the two crops showed that tomato market seemed very competitive relatively led by market. This could be justified by the opportunity of farmers to sell themselves harvesting piece by piece.

Price decision is a good measure of market transparency. In this study, respondents were asked to comment on who decided buying price. Eighty percent believed negotiation as a tool for price decision in case of tomato. In the case of onion 50.48 percent, expressed price setting was by buyers. Nevertheless, 'negotiation' which was expressed by rest of the respondents was simply a term. Wholesaler was the main source of information, which gave them chance to set a price that deserved them.

Buyer Behavior

The buyers' behavior evaluated based on some selected parameters of loyalty, better price provision, immediate payment behavior, bulk purchase, and production credit revealed that 80 of the respondents believed wholesalers as good buyers with all weaknesses and 31 chose consumers as good buyers.

Mis Behaving

The perishability of the products exposed farmers for a wide range of cheating. The respondent farmers were asked whether they perceived cheating or not and they reported as it was a day-to-day phenomenon. Wholesalers and brokers were the top cheaters. The cheating type included price, weight, defaulting an agreement, and any combination of these.

Even most argued that a full Isuzu load was valued with 35 quintal (especially in onion) than the usual 50-quintal weight indicating the cheat level of 30 percent. Even if a farmer

had knowledge of weighing scale, he was not allowed to see and complain on how the weighing proceeds. If he did, buyers might stop buying. Farmers, on the other hand, exercised cheating by watering onion short before harvest for weight advantage that had an impact on quality and storability. Farmers followed an approach for protecting wholesalers' cheat through allowing a certain kilogram allowance.

Selling strategy

Respondent farmers reported their selling strategy as spontaneous to any buyer brought by brokers. There was no any contract-based marketing. Respondents were asked what issues they took into account to decide for whom to sell. They responded as they offered to any body as far as he offered better price, 55 percent of respondents. However, the intervention of brokers influenced them to get good buyers directly.

4.2.9 Market performance

The techniques employed for analysis of performance were marketing margin and channel comparison. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services from its origin, producer, to final destination, consumers. The estimated volume of production of tomato was about 40,402 quintals and the corresponding figure for onion was 324, 412 quintals from which about 30,000 and 300,000 quintals of tomato and onion were sold. Each followed their own channels, they are treated separately, and the result obtained was the following.

Tomato market channels - Eleven lines of market channel identified for tomato. Three of these went outside the region and the rest seven ran inside. As can be understood from figure 1 the main receivers from farmers were rural assemblers, retailers and wholesalers with an estimated percentage share of 43.29, 33.36 and 22.25 percent in that order. Besides, the volume that passed through each channel was compared and based on the result the channel that stretched from farmer-retailer-consumer hosted the largest followed by channels that went out of region shouldering a volume of 10,038 and 6,301 Ql respectively.

As could be observed from table-16 the largest producer's share obtained through a channel when a direct sale from producer to consumers is made seconded by farmer-rural assembler-consumer channel. Even though these channels were very impressing from the perspective of producers and consumers (better producer share and low buying price for consumers), the volume that passed through them was very insignificant amounting 331 and 651 Qls. Still comparing based on the total marketing margin the channel that stretched from farmer- -consumer is better.

However, using one indicator as sole parameter would not give appropriate result to judge the efficiency of the channel. Hence, following the works of Ramakumar (2001) all the four parameters were taken simultaneously. The four parameters that were included encompassed volume handled, producers share, total marketing margin, and rate of return. From a simple mathematical manipulation, the channel that stretched from farmers-retailers-consumers at Bahir Dar and Woreta found out to be better. These channels hosted the largest volume apart from other parameters that were considered for the analysis.

Channel-1 Farmer ---Consumer = 331 Ql

Channel-2 Farmer – Retailer –Consumers= 10038 Ql

Channel-3 Farmer – Wholesaler – Retailer – Consumer= 2281 Ql

Channel-4 Farmer – Wholesaler – Consumers= 696 Ql

Channel-5 Farmer –Rural assembler- Wholesaler – Consumers= 196 Ql

Channel-6 Farmer – Rural assembler – Wholesaler—Retailer – Consumers= 641 Ql

Channel-7 Farmer – Rural assembler – Wholesaler—Out of region= 1045 Ql

Channel-8 Farmer – Rural assembler—Retailer—Consumer= 5406 Ql

Channel-9 Farmer—Rural assembler—consumer = 651 Ql

Channel-10 Farmer-Wholesaler-Out of region= 3719 Ql

Channel-11 Farmer-Rural assembler-Out of region = 1537 Ql

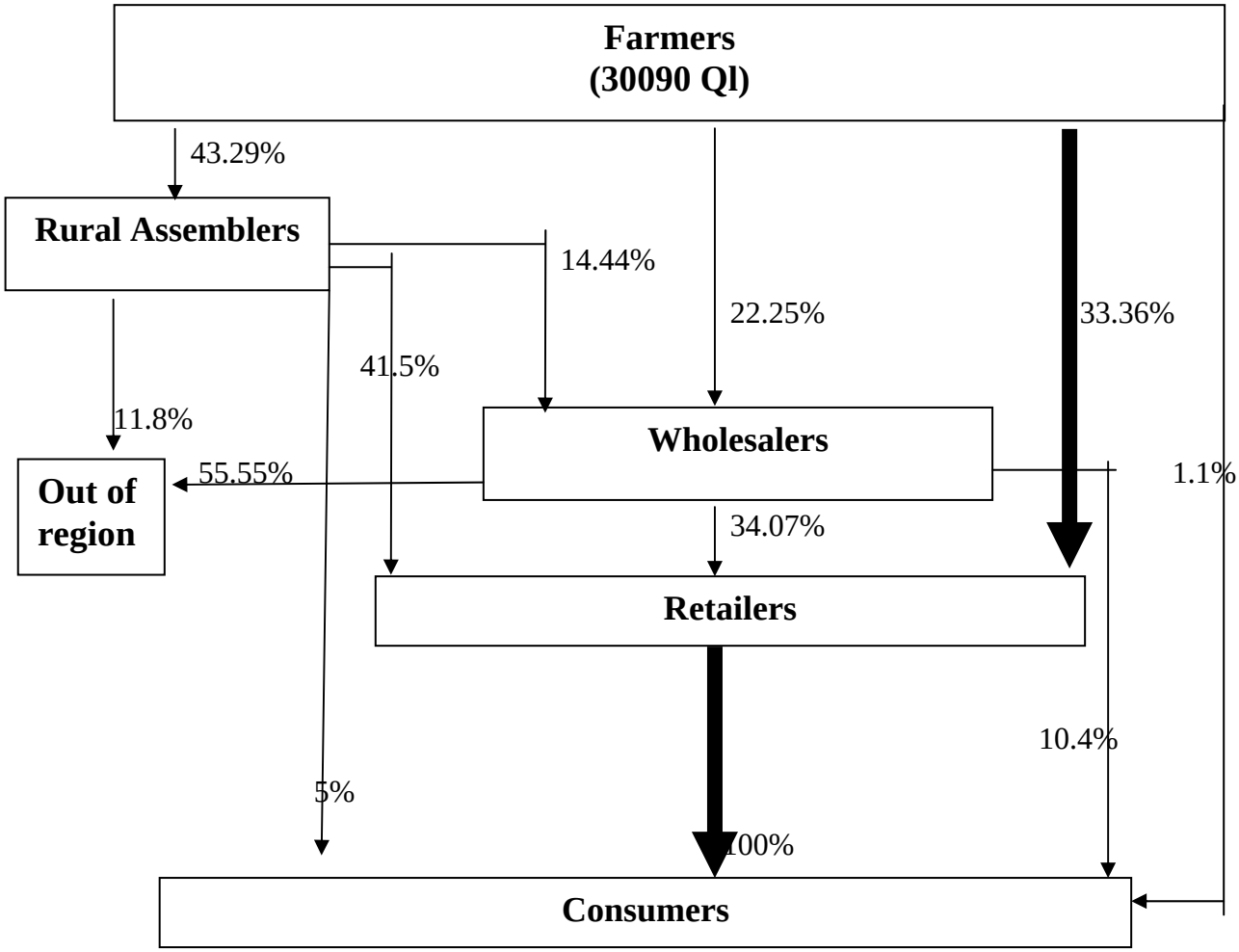

Figure 1 Tomato market channel

Table 11 Tomato market channel, marketing margin analysis

Parameter	Channel									
	1	2-W	2-B	3-G	4-B	5-B	6-B	7, 10, 11 (out of region)	8-B	9-B
1. Volume handled (Ql)	331	10038		2281	696	196	641	6301	5406	651
Rank by volume (R_v)	8	1	1	4	5	9	7	2	3	6
2. Marketing cost- margin										
Farmers'										
Price (Br/Kg)	0.67	0.60	0.93	0.67	0.67	0.64	0.64	0.64	0.64	0.64
Marketing cost	0.17	0.17	0.24	-		0.17	0.17		0.17	0.17
Rural assemblers'										
Price (Br/Kg)						0.87	0.87		0.87	0.87
Marketing cost						0.12	0.12		0.12	0.12
Wholesalers'										
Price (Br/Kg)				1.50	1.25	1.25	1.25			
Marketing cost				0.296	0.246	0.246	0.246			
Retailers'										
Price (Br/Kg)		1.00	1.50	2.00	1.50		1.50		1.50	
Marketing cost		0.12	0.20	0.32	0.23		0.23		0.23	
Consumers' price	0.67	1.00	1.50	2.00	1.50	1.25	1.50		1.50	1.00
Total marketing margin	0.67	0.40	0.57	1.33	0.83	0.61	0.86		0.86	0.36
Total marketing cost	0.17	0.29	0.44	0.616	0.476	0.536	0.77		0.52	0.29
Gross marketing margin	0	40	38	66.5	57.3	48.80	57.3		57.3	36
Rank by GMM	1	4	3	7	6	5	6		6	2
3. Producers' share(P_s)	100	60	62	33.5	44.6	51.2	42.6		42.6	64
Rank by (P_s)	1	4	3	8	6	5	7		7	2
4. Rate of return (margin/cost)	0	1.379	1.295	2.159	1.744	1.14	1.123		1.654	1.241
Rank by rate of return (R_r)	9	4	5	1	2	8	7		3	6
5.Average of all ranks	3.8	2.6	2.4	5	5.2	5.2	5.2		3.8	3.2
Overall rank	4	2	1	5	6	6	6		4	3

Where: W- Woreta, G-Gondar, and B- Bahir Dar

Onion market channels- Onion market channel was reported as it was similar to tomato. About 10 lines of market channel existed for onion marketing from which three went out of region. The largest purchase was by wholesalers accounting for about 90 percent of the total marketed.

The ten channels were separately evaluated based on some efficiency parameters. Accordingly, based on volume passed through, the channel that went out of region was the best for it covered 49 percent of the total marketed. Alternatively taking producer's share as parameter, the channel that directly connected the producer to consumer was the best. With still another parameter, total marketing margin, the channel that stretched as farmer-rural assembler-wholesaler-retailer-consumer at Gondar was the best. Nevertheless, considering the volume, it was very much small compared to produced and supplied volume. Rate of return on marketing was also the other parameter taken to measure the difference between channels and the result showed that the channel presented as farmer-rural assembler-wholesaler-consumer at Bahir Dar was the best though the volume it hosted was inconsiderable.

Overall comparison of the parameters showed that the channel-4 for Gondar and Bahir dar were found out to be the best in the overall parameters. However, the perishable nature of the crop obliged much choice on buyers that could clear the product than other priorities hence the channel that hosted the largest volume, out of region, was felt important. This channel should be improved through designing efficient systems among the sending and receiving regions for further integration.

Channel 1 Farmer – Consumer= 2028 Ql
Channel 2 Farmer- Retailer = 8602 Ql
Channel 3 Farmer –Wholesaler – Retailer – Consumer = 95260 Ql
Channel 4 Farmer – Wholesaler –Consumer = 44991 Ql
Channel 5 Farmer – Wholesaler—Out of region- = 137474 Ql
Channel 6 Farmer – Rural Assembler – Wholesaler – Retailer – Consumer =785 Ql
Channel 7 Farmer – Rural Assembler-Wholesaler – Consumer = 371 Ql
Channel 8 Farmer – Rural Assembler-Wholesaler- Out of Region = 1134 Ql
Channel 9 Farmer – Rural Assembler – Out of Region = 12129 Ql
Channel 10 Farmer – Rural Assembler-Retailer-Consumer = 4452 Ql

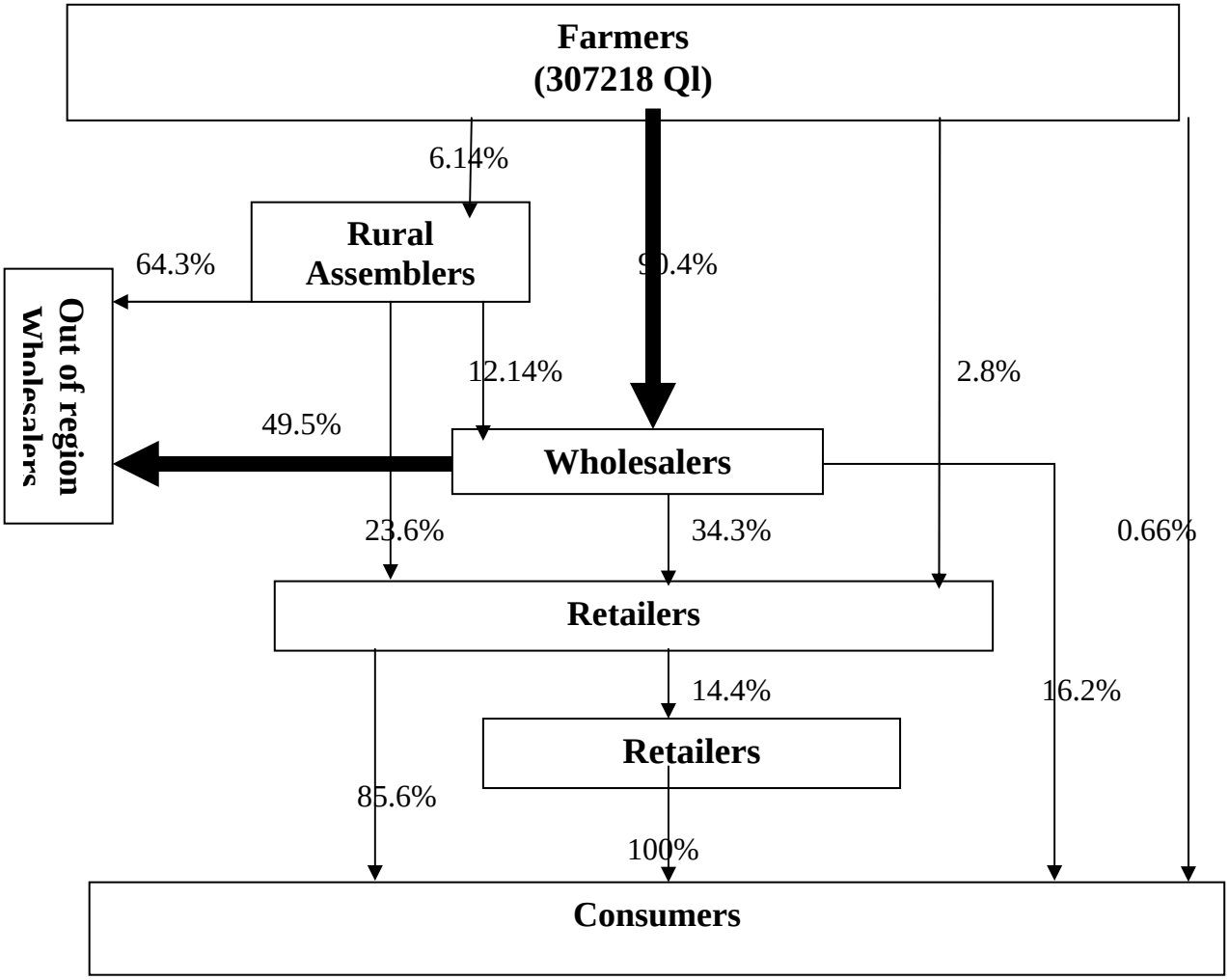

Figure 2 Onion market channel

Table 12 Onion market channel, marketing margin analysis

Parameter	Channel												
	1	2-W	3-G	3-B	4-G	4-B	6-G	6-B	7-G	7-B	10-G	10-B	Out of region
1. Volume handled (Ql)	2028	8602	95260		44991		785		371		4452		150,737
Rank by volume (R_v)	6	4	2	2	3	3	7	7	8	8	5	5	1
2. Marketing cost- margin													
Farmers'													
Price (Br/Kg)	1.40	1.00	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.35	1.35	
Marketing cost	0.17	0.17	-	-	-	-	-	-	-	-	-	-	
Rural assemblers'													
Price (Br/Kg)							1.90	1.70	1.90	1.70	1.90	1.70	
Marketing cost							0.26	0.17	0.26	0.17	0.26	0.17	
Wholesalers'													
Price (Br/Kg)			2.00	1.80	2.00	1.80	2.10	2.00	2.00	2.00			
Marketing cost			0.32	0.20	0.32	0.20	0.05	0.04	0.05	0.04			
Retailers'													
Price (Br/Kg)		1.50	2.50	2.00			2.50	2.25			2.50	2.00	
Marketing cost		0.14	0.16	0.17			0.17	0.17			0.17	0.17	
Consumers' price	1.40	1.50	2.50	2.00	2.00	1.80	2.50	2.25	2.00	2.00	2.50	2.00	
Total marketing margin	-	0.50	0.90	0.60	0.60	0.40	1.15	0.90	0.65	0.65	1.15	0.65	
Total marketing cost	0.17	0.31	0.48	0.37	0.32	0.20	0.48	0.38	0.31	0.21	0.42	0.34	
Gross marketing margin	0	33.3	44	30	30	22.2	46	40	32.5	32.5	46	32.5	
Rank by GMM	1	5	7	3	3	2	8	6	4	4	8	4	
3. Producers' share(P_s)	100	66.67	56	70	70	77.78	54	60	67.5	67.5	54	67.5	
Rank by (P_s)	1	5	7	3	3	2	8	6	4	4	8	4	
4. Rate of return (margin/cost)	0	1.597	1.875	1.608	1.875	1.970	2.416	2.356	2.124	3.037	2.712	1.917	
Rank by rate of return (R_r)	11	10	8	9	8	6	3	4	5	1	2	7	
5.Average of all ranks	4.75	6	6	4.25	4.25	3.25	6.50	5.75	5.25	4.25	5.75	5	
Overall rank	3	7	7	2	2	1	8	6	5	2	6	4	

Where: W- Woreta, G-Gondar, and B- Bahir Dar

4.3. Results of econometric analysis

In this part of the thesis, results and explanations of econometric analysis, production participation, determinants of land allocation and market supply are given. The analysis was done separately. The number of onion farmers were103 and that of tomato were 50.

4.3.1. Production participation

Estimation of production participation decisions was made with probit. Among the potential variables proposed to influence participation in production: market information for both crops and experience in farming for onion was excluded for the simple reason, lack of variability. Those who did not produce did not have any experience. The rest variables have been included in the estimation and it has been found that four variables in the case of onion and two in the case of tomato were found significant.

Onion

Family size (FAM_SIZE) - Family size was one of the significant variables but in contrary to the proposed direction of influence. The reason for turning out of the sign against the expectation might probably be due to larger land demand for food crops like cereals as a household hosted larger family size. As can be understood from the results of the marginal effect, the probability to participate in onion production decreased by 0.02 (or 2 percent) when the number of family increased by one.

Distance from main road (DIS_ROAD) – The second variable that was found significant is distance from main road that came up with positive signs against the expectation. The reason for positive sign in the case of distance is the existence of about 25 percent of respondents from highest producing *Kebele,* Bebekis, being found very far. It can be understood from table 13 that as distance from main road increased by one feet hour the probability to participate in onion production increased by 0.109 (or 10.9%).

Extension service (EXT_SER) – The third variable that was found significant to influence onion production participation was extension service. It was a dummy variable and it sign was as expected.

Number of oxen owned (OXEN) - The fourth variable to influence onion production participation decision from the proposed variables was number of oxen that came out significant with positive sign as expected. As the number of oxen owned increased by one, probability to participate in onion production increased by 0.073 (or 7.3 percent).

Table 13 Probit estimation of participation to produce

Coefficient	Participation		Marginal effect	
	Onion	Tomato	Onion	Tomato
Constant	-3.521	-3.774		
	(-1.20)	(-1.44)		
Age	0.003	-0.016	0.0003	-0.006
	(0.17)	(-0.68)		
Sex	-0.992	-1.379	-0.053	-0.424
	(-1.27)	(-1.49)		
Family size	-0.199	-0.013	-0.020	-0.005
	(-1.68)*	(-0.09)		
Lagged price	2.032	5.849	0.206	2.323
	(1.22)	(1.68)*		
Distance from the main road	1.075	-0.854	0.109	-0.339
	(2.30)**	(-1.40)		
Extension service	0.878	0.899	0.137	0.899
	(2.36)**	(-1.23)		
Total land size	0.0707	-0.086	0.007	-0.086
	(0.21)	(-0.23)		
Number of oxen owned	0.723	0.386	0.073	0.153
	(2.46)**	(1.38)		
Distance from input supplier	0.0844	-0.028	0.008	-0.011
	(0.27)	(-0.08)		
Experience		0.835		0.332
		(5.13)***		
N	120	120		
X^2	30.41	121.79		
Prob> X^2	0.0007	0.0000		
Log likelihood	-33.75	-20.61		

Numbers in the parenthesis are z-ratios

*, **, *** Significant at 10 and 1 percent

Source: own computation, 2007

Tomato

Lagged price (PR_LAG) - This was a lagged price a person sees from his neighbor that probably contributed to decide to participate. According to the econometric result, lagged

price was found significant with the expected sign. As lagged price increased by one Birr per Kilogram, the probability to participate will increase by 5.849 (or 584.9 percent).

Experience (TOM_EXP) - This was also significant for decision to participate. As farmer's experience increased by one year, the probability to participate in tomato production increased by 0.835 (or 83.5%).

4.3.2 Land allocation

In order to understand determinants of land size allocation about ten to eleven variables were proposed for onion and tomato. However, because of sample selection Heckman two stages was used in order to account for the problem. Accordingly, the obtained result foir the two crops separately was as follows. As can be learnt from the above table (table-14), three variables (family size, number of oxen owned, and distance from development agent) in onion and only experience in the case of tomato were found significant.

Onion

Family size (FAM_SIZE)- As has been found out in the case of participation decision family size in the case of land allocation was also came up with negative signs, the reason being the same as given for participation.

Number of oxen owned (OXEN) - Oxen number was also another variable found significant to influence the size of land allocated to onion. It came up with positive sign and it was as expected. As the number of oxen increased by one, the land size allocated for onion increased by 0.078 hectares.

Distance from development agent (DIS_DA) - This variable was taken to see whether the access to extension service have contributed to onion production in terms of intensity of extension service. However, the more distant a farmer is to a development agent the larger land size allocated to onion. The sign was against the expected. This is because the land allocation is determined by irrigabilty of the land. As the distance from the development agent increased by one feet hour, the land allocated for onion increased by 0.13 hectares.

Table 14 Land allocation and volume sold econometric results

List of independent variables	Dependent variables			
	Land allocation		Volume sold	
	Onion	Tomato	Onion	Tomato
Constant	0.094	0.112	-1.784	4.994
	(0.69)	(2.93)	(-0.12)	(0.68)
Age	-0.001	-0.00003	-0.078	-0.034
	(-0.29)	(-0.05)	(-0.40)	(-0.31)
Sex	0.082	-0.009	10.428	-0.121
	(0.96)	(-0.35)	(1.14)	(-0.02)
Total land owned	0.028	-0.004	4.312	0.990
	(0.76)	(-0.31)	(1.08)	(0.45)
Distance from road	-0.022	0.003	0.063	0.180
	(-0.48)	(0.16)	(0.01)	(0.05)
Family size	-0.023	-0.001	-3.071	-0.621
	(-1.69)*	(-0.15)	(-2.07)	(-0.84)
Number of oxen owned	0.078	0.004	8.599	2.662
	(2.39)**	(0.16)	(2.46)**	(1.68)*
Distance from development agent	0.130	-0.007	18.634	-0.351
	(2.20)**	(-0.41)	(2.94)***	(-0.10)
Experience		0.007		1.544
		(2.31)**		(2.61)***
IMR	-0.153	-0.035	-7.807	-2.439
	(-1.45)	(-3.29)***	(-0.69)	(-1.20)
N		120	120	120
F		10.14	3.80	4.56
Prob>F		0.0000	0.0006	0.000
R^2		45.34	21.51	27.16
Adj. R^2		40.87	15.85	21.20

Tomato

Experience (TOM_EXP) – This was significant to decide land allocated to onion. The sign was as expected. As farmer's experience increase by one year, the land allocated for onion increased by 0.007 hectares.

Inverse Mills Ratio (IMR) – The IMR affects land allocation negatively with 10 percent level of significance indicating the selectivity is correct and it successfully controlled the selectivity.

4.3.3 Market supply

A separate analysis of the two crops revealed that about three variables in the case of onion and two variables in the case of tomato were found significant.

Onion

Family size (FAM_SIZE)- This variable came up with negative sign as it did for participation and size of land allocated to the crop. The same logic explained for the two also hold true here. As can be seen from table-14 as the number of family members increased by one the volume of onion supplied to market reduced by 3.07 quintals.

Number of oxen owned (OXEN)- Oxen number was also another variable found significant to influence the volume of onion supplied to market. It came up with positive sign and it was as expected. As the number of oxen increased by one, the land size allocated for onion increased by 8.599 quintals.

Distance from development agent (DIS_DA) - This variable was taken to see whether the access to extension service have contributed to onion production and marketing in terms of intensity of extension service. However, the more distant a farmer is to a development agent the larger volume of onion supplied to market. The sign was against the expected. This is because production and eventually supply is determined by irrigabilty of the land. As the distance from the development agent increased by one feet hour, the volume of onion supplied to market increased by 18.63 quintals.

Tomato

Experience (TOM_EXP) – This was significant to volume supplied to market. The sign was as expected. As farmer's experience increase by one year, the tomato supplied to market increased by 1.54 quintals hectares.

Number of oxen owned (OXEN) - Oxen number was also another variable found significant to influence the volume of tomato supplied to market. It came up with positive sign and it was as expected. As the number of oxen increased by one, tomato supplied to market increased by 2.66 quintals.

4.3.4. Consumption

4.3.4.1 Properties of consumers

Consumers- Consumers for this specific study means those households who bought and consume onion and or tomato. They only bought for their own consumption not for further processing and sell or retailing. They are individual household consumers.

The 91 consumer sample respondents were seen from their demographic perspective. The respondents age range from 20 to 90. The average family size was 5.7 and income was 1,377.21 ETB per household per month. About 79.1 percent of the respondents were Orthodox Christian followed by 18.7 percent Muslim and 0.01 percent Catholic and Protestant each.

Taking the month Miazia as representative of Woreta produce consumption, the average consumption of tomato was 5.11 Kg and that of onion was 7.34 Kg per household/month. Consumption per head per month wais 0.9 Kg of tomato and 1.29 Kg of onion. The average consumer buying price was 2.50 Br/Kg for onion and 1.91 Br/kg for tomato.

Among the relationships observed from the collected data tomato and onion consumption had a certain level of positive correlation, 68.4, indicating a kind of similar direction possibly complementarities. Income and amount consumed had no serious correlation as people used to consume both types without being affected by income difference. It is about 42.9 and 52.2 percent correlation for tomato and onion respectively.

Seasonality seemed to affect volume of consumption, in production periods the level of consumption for onion was 7.33 Kg and 4.01 Kg of tomato while in slack periods it was about 6.18 Kg of onion and 1.27 Kg of tomato per household per month. A significant difference existed on volume consumed among the towns.

The average distance a certain consumer traveled to purchase a vegetable is 0.485 hours for a single feet travel. From the whole respondents about 72.5 percent bought vegetables once and more than once per week. The average volume purchased per single purchase per household was 2.86 Kg in case of onion and 1.86 Kg in the case of tomato. Purchase

decision was made by mother in 87.9 percent of the respondents and the buyer was mother in 65.9 percent followed by daughters in 12.1 percent of the respondents.

The average expenditure per household on food amount 605.16 ETB (43.95%) on food from which vegetables share 46.10 ETB (7.62%). The average expense on tomato was 12.94 ETB where as it was 18.57 ETB on onion per household per month.

The price during production and slack periods differ as it was natural. The average price for a Kg of onion and tomato was 4.02 ETB and 3.97 ETB in slack periods and it was 2.16 ETB and 1.40 ETB in production seasons respectively.

More than ninety seven percent, 97.8, of the total consumer expressed interest for quality. They suggested to pay a premium provided they get quality. According to the survey data on the average they were willing to add 0.46 ETB per Kg to better quality tomato and 0.505 ETB for a Kg of onion.

Different alternatives were taken when price increases. In tomato about 19.8 percent of respondents choose abandoning purchase if price increased, 50.5 percent reduce volume purchased, 18.7 percent purchase whatever increased and only 6.6 percent need to substitute with paste. Where as in the case of onion 49.5 percent responded to continue what they were doing earlier, 46.2 percent choose reducing volume and only 3.3 percent need to abandon. The econometric result following also confirmed this through elasticities.

4.3.4.2. Econometric model result

The consumption analysis based *Miazia* as a representative period. The month was selected for easiness to remember (survey was taken at end of *Miazia*) and wide availability of Woreta onion and tomato in the market and the relative high consumption indicating maximum demand.

The estimated model result showed how sensitive consumption of both vegetables was to different factors. Seemingly, six variables were hypothesized affecting consumption level of tomato. From all the proposed income, purchase frequency and single purchase lot were found significant at 10, 5, and 10 percent level of significance. Similarly, the model estimation for onion demand was also regressed on similar variables. The model result

showed that income, purchase frequency and single purchase lot were found significant here too.

From all the results, interpretation of the result indicated that income elasticity was 0.21 for tomato and 0.27 for onion explaining inelasticity. The reason behind the result is as income increased by one percent the corresponding change for consumption would be 0.21 and 0.27 percent on consumption of tomato and onion respectively. The share of income on the two commodities is small.

The coefficients for purchase frequency and single purchase lot indicated also how we could improve the consumption level by further improving the access to food. In that, if the commodities can be available to consumers they would frequently purchase more volumes and hence improve their consumption level.

Table 15 Demand estimation model result

Variables	Onion	Tomato
Constant	-1.05 (-2.07)***	-0.67 (-1.07)
Ln FAM	0.05 (0.426)	0.16 (1.46)
Ln INC	0.27 (3.31)***	0.21 (2.82)***
Ln PURCHFRQ	0.54 (3.29)***	0.34 (2.26)**
Ln DIS	-0.0002 (-0.01)	-0.0002 (-0.55)
Ln SIN	0.43 (5.30)***	0.24 (3.05)***
N R^2 Adj R^2	91 63 60.05	91 36.96 33.07

, * Significant at 5 and 1 percent

Source: own computation, 2007

5. CONSCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The main theme of this thesis was to analyze the marketing system of vegetables in Fogera Woreda with a specific focus on onion and tomato. The choice of the crops intentionally based their relative importance and marketability. The specific objectives included assessing the structure-conduct and performance of the market and analyzing the determinants of supply and demand. A very wide number of respondents at all stages of the market channel were interviewed. The analysis was made with the help of descriptive and econometric tools employing SPSS and Stata software.

A total of 120 farming respondents' (9 females and 111 males) drawn from 13 *Kebeles* in Fogera, 50 retailers from three towns (Gondar, Bahir Dar and Woreta), 91 consumers from the same towns and 5 brokers, 5 rural assembler and 5 wholesalers at Fogera were interviewed using structured questionnaires. Rapid market appraisal with focus group discussion and key informant interview was conducted. Secondary data on basic agricultural and population was also collected.

Analysis of the collected data showed that average land holding in the area was about 1.63ha. The average family size was about 5.18 of which the active labor force was 3.38. The average land allocated to onion and tomato was 0.296 and 0.146 ha which is 20.2 and 10.13 percent in that order.

Fogera *Woreda* office of Agriculture is the core extension giving institution. Three development agents are deployed in each *Kebele* with the help of whom 10 percent of respondents reported monthly extension service, 35 percent a biweekly extension service and 40.8 percent weekly and more than once in a week. The remaining 14.2 percent reported no extension contact.

The common inputs used were seed and to some extent pesticides. The major onion varieties grown include Bombay Red, Adama Red, and local shallot. Marglobe and Roma VF were tomato varieties. The average seed rate applied was about 600 gm per hectare in the case of tomato, 3.83 kg per hectare in onion and about 20.91 Qt per hectare for shallot.

The maximum production cost that covered labor, seed, fuel, pesticides, fertilizer, pump rent and other small activities per hectare was estimated 9,475.63ETB for shallot, 5,938.78 ETB for onion and 4571.15 ETB for tomato. The lion share from this estimated cost of production was taken by seed (bulb) cost in shallot for about 45 percent of the total. On the contrary, the largest share in the case of onion and tomato was labor for about 43.3 and 88 percent from the total cost, respectively.

An estimated 324,412 Qt of onion and 40,402 Qt tomatoes was produced in the 2005/06 from which about 307,218 Qt of onion and 34,867Qt of tomato was supplied to market. Farmers' average selling price for a kilogram of tomato was 0.75ETB, 1.65ETB for onion, and 1.75 ETB for shallot. The average yield per hectare according to the sampled farmers was 129.7 Qt for tomato, 110 Qt for onion and 96 Qt for shallot. The main market places were the farm gate and roadside. The largest receivers in the case of onion were wholesalers and in tomato rural assemblers and retailers.

From the identified market channels the channel that stretched as Farmers—Retailers--Consumers for tomato and Farmers—Wholesalers—Outside region for onion were the major ones. Even though the result of concentration ratio didn't show any oligoponsitic behavior wholesalers seemed controlling the whole channel as they are major buyers and exercised some a kind of collusion on price information and price setting.

Production and market supply was increasing compared to the short period of development. A number of factors were raised of which increasing demand and quality sited as main ones. Better roads, improving communication facilities and other factors characterizing the infrastructural facilities of the *Woreda* also contributed much.

Onion and tomato in Fogera moved to different parts of the country. From the estimated volume of marketed onion, about 27.4 percent went to Addis Ababa, 41 percent to Tigray, 17.8 percent to Dessei and Woldiya, 8.2 percent to Bahir Dar and 5.5 percent to Gondar. Similarly, from the total marketed tomato about 75 percent went to Tigray, 3.6 percent to Addis Ababa, 10.7 percent to Gondar and 10.7 percent to Bahir Dar.

An interview made with retailers at Gondar, Bahir Dar and Woreta revealed that the average product handled per retailer per week was 1.91 Qt in onion and 2 cases (equivalent to 110 kg) in tomato. Retail stalls are very poor and exposed to rain and sunlight. There were no measures taken to improve the facilities like well-constructed stalls, sewerage, hygiene, parking and so on. Skill of retailers in product handling, business management and related issues is very limited resulting in loss of large volume along the channel.

Farmers and buyers' malpractices were some of the constraints sited in the production and marketing system. Watering farm field at the harvest by farmers and weight cheating and purposive information hide by brokers and wholesalers were some of the major ones. No serious effort had been made to reduce these malpractices and farmers were suffering a lot. The limitation in the quality of extension service was also the other problem apart from pest and disease challenges, price instability and lack of reliable market information.

The calculation of concentration ratios from the 54 wholesalers based on their daily load indicated no oligopsonistic market behavior. The four firm concentration ratios were lower than the standard, 33 percent. However, activities like cheats in weight and information collusion showed uncompetitive market.

The econometric result for production participation explored slightly different variables for each crop. Family size, distance from main road, number of oxen owned, and extension service for onion and experience and lagged price in the case of tomato were found significant. Family size and distance from main road was against the hypothesized sign of influence due to the main reason that as the number of family members increased farmers would be obliged to farm their land with other food crops like cereals. Distance from main road is due to the Kebele, Bebekis, found very from the road that was largest producer.

Determinants of land allocation and volume supplied to market were also analyzed and from the proposed variables only experience and inverse mills ratio in the case of tomato and family size, number of oxen owned, and distance from development agent in the case of onion were found significant for size of land allocated for onion. The sign for family size and distance from development agent were against the proposed due to the explained reason in the case of participation decisions in the above paragraph.

Volume supplied to market were also analyzed and the same variables in the case of land allocation for onion also came up significant for onion supply but un the case of tomato it were experience and number of oxen owned by the respondent that came up with significant coefficients.

The average monthly level of consumption was assessed when the Fogera produce was at the market and was used to see some properties of consumers. Based on the 91 sampled consumers from Gondar, Bahir Dar and Woreta towns it had been revealed that the average monthly income per household was 1,372.21 ETB. Average family size was 5.7 where the monthly average consumption of tomato per household per month was obtained to be 5.11 kg of tomato and onion 7.34 kg onion. A household spent on the average about 44 percent (603.10ETB) of their monthly income on food from which 7.62 percent (45.96 ETB) was spent on vegetables.

For assessing accessibility, the average distance a certain consumer measured per single feet trip was taken and the average was estimated from the respondents to be 0.485 hours. More than 97 percent of respondents reflected a strong interest on quality. According to the survey data, on the average respondents expressed their willingness to add 0.046 ETB per kg for tomato and 0.05 ETB for a kg of onion.

Econometric analyses of demand revealed that from the proposed determinants it was income, purchase frequency, distance, own price and single purchase lot that were identified to be significant for both vegetables.

5.2 Recommendations

Recommendations that are relevant to improve the marketing system in Fogera include production and market oriented. The following explanation tries to put these recommendations accordingly.

Production related: As it was observed from the descriptive statistics and econometric result farmers were basing quantity clear off rather than price offer in selling vegetable. They were price takers. This can be improved if a proper linkage can be created between buyers and farmers through some kind of institutional arrangements like contract etc. In

fact, improving farmers' bargaining power through capacitating market information access should not be missed.

The production of vegetables has to diversify to include other vegetables, which have a production advantage and wider market potential in *Tigray* and Addis Ababa, *Humera* and *Metema* apart from the nearest markets, *Gondar* and *Bahir Dar*. Diversification will improve bargaining power of farmers. Furthermore, there seems to be a need to adjust the composition of planting time from their usual practice (to plant and harvest simultaneously say between February and May) to a smoothened period. An intervention with strong extension service delivery would be imperative.

Period of production at *Bega* period means vegetables were creating a wider employment and income opportunity to the rural households. The largest share of labor cost from production cost indirectly indicates utilization of excess labor existing in the rural areas, which was in line with the government policy, little capital with large labor. On the contrary, larger shares of bulb cost in the case of shallot bulb imply the need to focus on reducing production cost through immediate research and extension. For sure, the within *Woreda* seed production system in the case of onion had relieved a good deal of seed shortage. The seed supply system started with production of onion seeds in the *Woreda* has to be scaled up to include other vegetable varieties on top of diversifying already undergone ones.

Field watering prior onion harvest and failure to store for few weeks are the lacks in pre- and post-harvest handling. Thus, the issue of product handling should be serious. Development agents, model farmers have to be trained on pre- and post harvest handling so that the storability and management of the crops could be improved. This will bring a better income to producers and relatively stable supply for consumers. Demonstrative local made storage facilities especially for onion should be considered.

The increasing participation of farmers in production and marketing of vegetables manifested by increasing land allocation and increasing number of participating market actors could be indicators for commercialization. High labor demand and return earned were driving forces for the growth. This would be an opportunity to replicate in other

potential areas especially those surrounding Lake Tana. Moreover, successful commercialization could be effective if supported with an efficient marketing system.

Market related

According to this study, farmers based quantity than price in marketing. This means either they could not get sufficient number of buyers, much quantity produced, or they produced poor quality Based on the field observation; there seem no problem with quality. The problem is the high production against perishable nature of the product. The best measure would be to increase the number of buyers along with improving post harvest handling practices. Farmers should be get in contact with vegetable shops and supermarkets far in urban towns, urban retailers, wholesalers in well structured institutional arrangements. Laws has to be effective wherever an actor abuses. Probably organizing vegetable farmers may meet markets' demands for quality and better price.

Much of the imperfection prevailed due to the influencing role of wholesalers and existence of single market place in towns. It should be, therefore, the focus of intervention to increase the centers of wholesale distribution and retail markets at urban centers to break up the collusion. Urban market centers have to be increased from the current usual one or two to more. The urban organized groups and markets like those found in Addis Ababa should directly link with farmers so that direct delivery can be practiced.

Individual vegetable retailing activity have to be recognized as a formal job for small scale entrepreneurs of the urban poor and farmers who are earning money for living, especially most of them are women. Therefore, they need to receive direct and indirect supports from the government and other sectors through training on business, upgrading physical retail market infrastructure and market information and promoting establishment of vegetable retailer groups. These activities will result in benefit not only the vegetable retailers but also vegetable consumers, an opportunity to get better quality products.

The practice of brokers in Fogera can be called abusive. Correcting these problems need not only the act of a single institution but also the act of every concerned body like justice, police, trade and industry, *Woreda* and *Kebele* administration, and the farmers themselves.

Training of brokers has to be one component and if possible the flat rate brokerage charge of 5 cents per kg has to be changed to volume and price based brokerage cost.

Tomato has to enter to local processing like to juice making through an intensive advertisement via television in order to create demand. The one shot practice of IPMS should be supported by chemical analysis of the content and an intensive promotion of its use as done by SOS-Sahel on ‘Amar’ honey.

Though the econometric model result did not come up with significant coefficients on market information (due to lack of variability), problems associated with market information seem lead to low price. Hence, market information is the important component for improving the whole system. The availability of timely information on the buyers, through giving their lists, addresses, prices to farmers can increase farmers’ bargaining capacity.

Apart from all these legal back up to charge, those who mis-weigh /standardization of their scale balance should also be taken into consideration by the responsible bodies. Price differentiation by quality should be the rule of the game so that marketing can properly function.

Finally, further studies on marketing system should be conducted in all vegetable growing areas other than Fogera so that a well organized regional and national vegetable production and marketing can be implemented.

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7. APPENDICES

AppendixTable-1 Farmers' sampling distribution

Name of the Kebele	Farming system	Tomato and/or onion Growers			Sample Selected		
		Male	Female	Total	Male	Female	Total
Rib Gebreil	Cereal	95	3	98	4	0	4
Shaga	Rice	41	0	41	2	0	2
Shina	Rice	357	6	363	16	0	16
Diba	Cereal	127	13	140	5	1	6
Awatihua	Rice	377	30	407	16	2	18
Woretazuria	Rice	127	14	141	5	1	6
Kuhar Abo	Cereal	172	15	187	7	1	8
Kuhar Mich	Rice	186	24	210	8	1	9
Wagetera	Rice	47	1	48	2	0	2
Kidistehanna	Rice	56	11	67	2	1	3
Aba kiros	Cereal	149	5	154	6	0	6
Bebekis	Cereal	792	64	856	34	3	37
Guramba	Cereal	68	11	79	2	1	3
Total		2594	197	2791	109	11	120

Appendix Table-2 Retailers Sample size

Town	Total per main market center	Sample selected
Gondar	102	18
Bahir Dar	148	27
Woreta	24	5
Total	274	50

Appendix Table-3 Consumers' sample

List	Population	Sample size
Gondar	215714	48
Arbegnoch	16123	4
Medihanealem	17391	4
Adebabay Eyesus	15036	3
Cherkos	17550	4
Abajale	19550	4
Abiyeegize	19756	4
Gebreil	15030	3
Mehal arada	21207	5
Lideta	21633	5
Maraki	13000	3
Azezo dimaza	17268	4
Azezo Ayer marefia	22170	5
Bahir Dar	168049	39
Hidar 11	12239	3
Shum Abo	25723	6
Gish Abay	20880	5
Belay Zeleke	26828	6
Sefene Selam	21910	5
Fasilo	26165	6
Tana	13377	3
Shimbit	15501	4
Ginbot 20	5426	1
Woreta	22674	6
Kebele 01	5273	1
Kebele 02	6064	2
Kebele 03	6064	2
Kebele 04	5273	1

Appendix Table-4 Onion Wholesalers list per product handled

Name of the wholesaler	Average load in Isuzu (V_i)	Percentage share (S_i)	Concentration indices	Main Destinations
Aba Addis	3/day	3.08		Addis Ababa
Abrham	1/day	1.03		Harar
Abriha Kebede	1/day	1.03		Tigray
Aboy Desta	1/day	1.03		Tigray
Ahimed Mekonnen	1/day	1.03		Dessei
Ahimed Seid	1/day	1.03		Dessei
Alem Berhe	2/day	2.05		Tigray
Alem G/Medhin	1/day	1.03		Tigray
Alemseged Bisrat	1/day	1.03		Tigray
Ali	4/day	4.10	*	Dessei
Anwar	3/week=0.43 /day	0.44		Gondar
Atakilty Berhane	2/day	2.05		Tigray
Belay Alemayehu	2/day	2.05		Tigray
Berhane Araya	1/day	1.03		Tigray
Berhane Teklu	4/day	4.10	*	Tigray
Bitew	2/day	2.05		Addis Ababa
Coka	1/day	1.03		Addis Ababa
Desta Gebre	4/day	4.10	*	Tigray
Equbay G/Hiwot	2/day	2.05		Tigray
Estifanos	1/day	1.03		Tigray
Fisseha Fentaye	1/day	1.03		Dessei
G/Medhin Abrham	4/day	4.10	*	Tigray
G/Senbet	2/day	2.05		Tigray
Getaneh	3/day	3.08		Bahir dar
Gebreegizei	0.28 /day=2/week	0.29		Tigray
Gezae G/Egziabiher	2/day	2.05		Tigray
Gezae Nigussei	2/day	2.05		Tigray
Habtu	3/day	3.08		Tigray
Haile	3/day	3.08		Tigray
Haile Tadesse	2/day	2.05		Tigray
Hailom	2/day	2.05		Tigray
Hiwot Asres	2/day	2.05		Tigray
Kassaw	3/week=0.43 /day	0.44		Tigray
Kedir Mohammed	1/day	1.03		Woldiya
Legesse	3/week=0.43 /day	0.44		Tigray
Mekibib	1/day	1.03		Tigray
Mebiratu Hintsaw	1/day	1.03		Tigray
Mehari Shibeshi	3/day	3.08		Tigray
Michael G/Medhin	3/day	3.08		Tigray
Mohammed	2/day	2.05		Addis Ababa
Molla	3/day	3.08		Woldiya
Mulugeta Beyene and Fistum	1/day	1.03		Tigray
Nigusse	0.28 /day=2/week	0.29		Tigray
Rezene	3/week=0.43 /day	0.44		Tigray
Shiferaw	1/day	1.03		Harar
Tadesse Mebratu	0.5/day	0.51		Tigray
Taeme Kebede	4/day	4.10	*	Tigray
Tewelde Kahisay and Wolday Hailu	3/day	3.08		Tigray
Tilalo	0.28 /day=2/week	0.29		Tigray
Yared	1/day	1.03		Tigray
Yesuf Hassen	1/day	1.03		Dessei
Wale Amare	0.5/day	0.51		Woldiya
W/Gerima	6/day	6.15	*	Tigray
WiGebreil Melesse	2/day	2.05		Tigray
Total product handled ($\sum V_i$)		100.00	$\sum_{i=1}^{6} S_i$ =26.15	

Appendix Table-5 Tomato wholesalers' product handled

List of Wholesaler	Average load in Isuzu	Destination
Anwar	2/week	
Hailom	4/week	
G/Senbet	3/week	
Tadesse	5/day	
Worku	1/day	
Kedir	1/day	
Belay	1/day	
Mehari	1/day	
Hailey	2/day	

Appendix Table- 6 Multi-collinearity test with VIF

Variable	Tolerance	VIF
Age	0.692	1.446
Distance from Woreta	0.527	1.897
Distance from Road	0.563	1.776
Oxen	0.659	1.518
TLU	0.835	1.197
Total farm land	0.558	1.792
Selling price	0.411	2.433
Labor	0.553	1.808
Qty produced	0.734	1.362