ANALYSIS OF RED PEPPER MARKETING: THE CASE OF ALABA AND SILTIE IN SNNPRS OF ETHIOPIA

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ANALYSIS OF RED PEPPER MARKETING: THE CASE OF ALABA AND SILTIE IN SNNPRS OF ETHIOPIA

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As *Thesis* Research advisor, I hereby certify that I have read and evaluated this thesis prepared, under my guidance, by Rehima Mussema entitled "Analysis of Red Pepper Marketing: The Case of Alaba and Siltie in SNNPRS of Ethiopia". I recommend that it be submitted as fulfilling the thesis requirement.

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DEDICATION

I dedicate this thesis to my beloved brother Esmael Musema.

STATEMENT OF AUTHOR

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ASTA	American Spice Trade Association
BOA	Bureau of Agriculture
CRATES	Center for Regional Agricultural Trade Expansion Support
CSA	Central Statistics Authority
CR	Concentration Ratio
CC	Contingency Coefficient
CDF	Cumulative Distribution Function
DA	Development Agent
DF	Dickey Fuller
ECM	Error Correction Model
EEPA	Ethiopian Export Promotion Agency
ESEF	Ethiopian Spice Extraction Factory
GMM_{Balt}	Gross Marketing Margin for Baltina Shop
GMM_{ESEF}	Gross Marketing Margin for ESEF
GMM_{mill}	Gross Marketing Margin for Millers
GMM_{P}	Gross Marketing Margin for Producer
GMM_{RWS}	Gross Marketing Margin for Reagional wholesaler
GMM_{Rt}	Gross Marketing Margin for Retailer
GMM_{UA}	Gross Marketing Margin for Urban Assembler
GMM_{UWS}	Gross Marketing Margin for Urban wholesaler
HHI	Hirschman-Herfindahl Index
IPMS	Improving Productivity and Market Success
IID	Independently and Identically Distributed
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
MARC	Melkasa Agricultural Research Center
MASL	Meters Above Sea Level
NMM_{Balt}	Net Marketing Margin for Baltina Shop

LIST OF ABBREVIATIONS *(Continued)*

NMM_{ESEF}	Net Marketing Margin for ESEF
NMM_{mill}	Net Marketing Margin for Millers
NMM_{RWS}	Net Marketing Margin for Regional wholesaler
NMM_{Rt}	Net Marketing Margin for Retailer
NMM_{UA}	Net Marketing Margin for Urban Assembler
NMM_{UWS}	Net Marketing Margin for Urban wholesaler
OLS	Ordinary Least Square
PAs	Peasant Administrations
RMA	Rapid Market Appraisal
SNNPRS	Southern Nation Nationalities and Peoples Regional State
SCP	Structure Conduct Performance
VAT	Value Added Tax
VIF	Variance Inflation Factor

BIOGRAPHIC SKETCH

The author was born on December 30, 1967 in SNNPRS**,** Butajira. She attended from elementary to junior school in the same town and secondary school at Entoto Technical and Vocational school and obtained diploma in Accounting in Addis Ababa. Then she joined Addis Ababa University in 1995 in the Extension program and graduated with B.Sc. degree in Economics in July 2000. She has served at Institute of Agricultural Research (IAR) currently renamed *Ethiopian Institute of Agricultural Research* since 1988 at different research centers as a cashier. Since 2000 she served as a project plan expert in the same institution. Finally, she joined the School of Graduate Studies of the Haramaya University in 2004/05.

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ABSTRACT

This research attempts to examine red pepper marketing in Alaba and Siltie with the specific objectives of identifying marketing channels, and the role and linkage of marketing agents; quantifying costs and margins for key marketing channels; identifying factors affecting volume of pepper supply in Alaba and Siltie and examining integration between regional markets and the terminal market. Red pepper marketing channels, and the role and linkage of marketing agents has been evaluated using structure, conduct and performance approach. This study also attempts to investigate the performance of pepper marketing channel by analyzing marketing costs and margins, and examines the integration of pepper markets over the 2001/02-2004/05 period by using Cointegration and Error Correction Model. Moreover Tobit and Heckman two stage econometric models were used to investigate factors affecting pepper market participation decision and quantity supply of pepper. According to the results of the study, in 2004/05 regional wholesaler and urban assemblers purchased about 44% and 28% of farmers production, respectively. Sample markets were inefficient, characterized by oligopolistic market structure in Addis Ababa, Alaba and Tora markets. Research findings suggest that an improvement in producers bargaining power through cooperatives is necessary to reduce the olgopolistic market structure. In Alaba Kulito market, traders set purchase price after the mid nigh. Based on this price setting strategy, there is an urgent need for government intervention. Structure of the markets indicates that licensing and years of pepper trade experience did not hinder entry into pepper market, but education and capital were barriers. Market information is the main problem. Markets also are characterized by low producers' share and high marketing cost. Based on the Heckman two-stage model, the study has identified the main determinants of pepper market participation decision and its effect on the quantity supply. One of the most important variables influencing the decision to participate in pepper market is pepper production. Consequently, extension work should focus on encouraging farmers to participate in pepper production especially, there is a need to increase new varieties that are disease resistant variety and disseminate these technologies to potential areas. The other factors that adversely affects market participation is crop yield of the households. Keeping their

specialization and social role in pepper production potential areas is necessary. Moreover, pepper production and extension contacts are the determinant factors of the quantity of pepper supplied. Therefore, policies that would improve pepper production capacity by identifying new technologies and create stable demand for surplus production would enhance farmers' decisions on marketable surplus. Non farming income and number of livestock affected the quantity of pepper supplied negatively. Thus, stakeholders have to make further investigations on cost and benefit of non-farm income and livestock production of farmers and let them know the result to make their decision. Further, the result shows that Siltie zone pair markets (Tora – Silti, Tora - Alem Gebeya, Tora – Dalocha, Silti – Alem Gebeya, Silti – Dalocha and Alem Gebeya - Dalocha) are integrated. However, the terminal market (Addis Ababa) is not integrated with the regional markets (Alaba Kulito, Silti, Dalaocha, Tora, and Alem Gebeya) even though, the regional markets are the major pepper supplier to Addis Ababa market. This implies that there is poor market information system, limited bargaining power of farmers, oligopolistic market structure in the pepper market. The findings suggests that, effective market information service has to be established to provide accurate and timely information to farmers and traders on current supply of pepper output, demand and prices at national and regional levels. Market structure of pepper (strong oligopoly market) also influenced market integration, implying the need for creating competitive market structure.

1. INTRODUCTION

1.1. Background

There are many names for pepper in different countries of Asia. Chilli peppers are called "ema" in Bhutan, "la-jiao" in China "cabe" in Indonesia, "prik" in Thailand, and "chilli" in India. The early Aztecs of Mexico also called them "chilli", and this term is the most commonly used today around the world, with some variant spellings: chile, chili, chilly, etc (Berke, 2002). According to American Spice Trade Association (ASTA), 'red pepper' is preferred name for all hot red pepper (EEPA, 2003).

Pepper is produced in all the continents except Antarctica. In Antarctica there are stories about pepper being kept in flower pots to spice up their food (Boseland and Votava, 2000). It is believed to have originated in Central and South America. Peru and Mexico might have been the second centers of origin, after which it spread into the New World Tropics before its subsequent introduction into Asia and Africa in 1493 (Bosland and Votava, 2000). Tropical Asia (India, Malaysia, Thailand, Indonesia and Philippines), tropical Africa (North Africa, Senegal, Nigeria, Ghana, and Kenya) and South America (Mexico) and the Caribbean are the main producers. Over 48% of the world pepper is produced in Asia, China being the leading country. The production in China alone exceeds the entire production of European countries (Rubatzky and Yamguchi, 1997). India is the major exporter of dry chilli peppers, followed by China, and the major importing countries are the U.S.A. and Germany (Berke, 2002).

Chili peppers are important in almost every Asian country. They are the number one vegetable in Malaysia and Bhutan, and rank at or near to the top in terms of growing area in most Asian countries (Berke, 2002). India is the world leader in growing area devoted to chilli pepper with 881,290 hectare in 2001-2002, which produced 1,113,090 metric tones. China and Indonesia are ranked second and third among the world leaders in area of production. China had 206,000 hectare of chilli pepper in 1993, which produced 2.98 million metric tones with an average yield 14.4 tones per hectare (Berke, 2002).

Ethiopia also cultivates pepper but her share in the world is insignificant. Compared to India that produced 4 million metric tones from 891,800 hectare in 1992, Ethiopia's production in 2001/02 was only 77962.4 metric tones harvested on 55,381 hectares (CSA, 2003). Productivity is also incomparable, where China 15 metric tone per hectare in 2001/02, whose production is about 1.4 metric tones per hectare.

Peppers is the world's second important vegetable ranking after tomatoes and it is the most produced type of spice flavoring and color to food while providing essential vitamins and minerals. The nutritional value of hot pepper merits special attention. It is a rich source of vitamin A and E. Both hot and sweet peppers contain more vitamin C to prevent flu colds than any other vegetable crop (Boselad and Votava, 2000). The color and flavor extracts from pepper are used in both the food and feed industries, e.g., ginger beer, hot sauces and poultry feed. In some countries, the shoot tips are cooked as herb or as vegetable (Rubatzky and Yomaguchi, 1997).

In many households, pepper provides the only needed flavor to enhance intake of otherwise bland diets. The range of food products that contain pepper or its chemical constituent is broad, and it includes ethnic foods, meat, salad dressings, mayonnaise, dairy products, and candies, packed foods, slack foods, salsa, and hot sauces. Rubatzky and Yomaguchi (1997) pointed out in addition to their uses as food, uses for cosmetic production, condiment and medicine, and ornamentals in the garden.

The history of pepper in Ethiopia is perhaps the most ancient than the history of any other vegetable product (EEPA, 2003). Ethiopians have strong attachment to dark red pepper, which has high value principally for its high pungency. The fine powdered pungent product is an indispensable flavoring and coloring ingredient in the common traditional sauce "*Wot*" whereas; the green pod is consumed as a vegetable with other food items. There is a general belief among Ethiopians that a person who frequently consumes hot pepper has resistance to various diseases. It is in the daily diet of most Ethiopians. The average daily consumption of hot pepper by Ethiopian adult is estimated 15 gram, which is higher than tomatoes and most other vegetables (MARC, 2004).

In addition to having major role in Ethiopians daily dish it also plays an important role in the national economy. It is an important cash crop today; on average 79% of pepper production is for market in SNNPRS (CSA, 2003). It is a crop of high value in both domestic and export markets. Since it is a commercial and industrial crop, it generates employment to urban and rural workers.

Oleoresin (coloring) and capsaicin (hot) are extracted from red pepper (capsicum) for export purpose. The deep red colored and large podded cultivars (sweet/hot) have a very high processing demand in the country. The main processed product, oleoresin, is exported to different countries and the spiced ground is supplied to local market. From 1992/93 to 2003/04, a total of 616.16 tones of oleoresin, which worth 106.6 million Birr, was exported to different countries by Ethiopian Spices Extracting Factory (ESEF, 2005).

1.2. Pepper Production in the Country

Production of pepper is well known in Ethiopia. Pepper (capsicum) is an 'annual' plant which grows at altitude ranging from 1400 up to 2100 meter above sea level (m.a.s.l.). Growing pepper requires soil that is well-drained and rich in organic matter, as well as 600-650 mm rainfall. It grows well on well prepared soil that is free from perennial weed. Pepper is propagated by raising seedlings in a nursery.

Seedlings are raised starting April and transplanted as the main rainy seasons begins, which is June/July. Depending on the area, harvesting starts 4 to 5 months from transplanting. The seedlings are transplanted 40–50 days after planting. Planting is carried out in the beginning of the main rain season (Roukens, 2005). In areas where rainfall is inadequate, supplementary irrigation is required. About three weeding sessions are recommended during the growth period. The red pepper is harvested when it is fully red and starts to dry. After harvesting, pepper is dried. Shade drying is recommended for high quality oleoresin (Roukens, 2005).

Red pepper and chilli are the leading vegetable and spices grown in the country. The central (eastern and southern Shoa), western, north western (Wollega, Gojjam) and the southern part

of the country are the potential pepper producing areas. Currently most of the produce comes from Alaba, Meskanina Mareko and Siltie zone (CSA, 2003). Birr Sheleko and Didessa valleies also produce a good amount of it. Chili is well adapted in Gambella, Mizan Teferi and Tepi as a rain fed crop and in Gode as an irrigated crop (MARC, 2004).

Pepper is widely cultivated in different regions of Ethiopia. The Ethiopian Export Promotion Agency (EEPA, 2003) has carried out a Spice Potential Market Study in Amhara, Oromiya and SNNPRS, and it identified that the land coverage for pepper in the three regions. According to the Ethiopian Export Promotion Agency, (2003) pepper production accounts for 34% of the total spices production in the three regions.

The total production of pepper in the country for the year 2005/06 Ethiopian main cropping season (*Meher*) was estimated at 1790283 quintals. In SNNPRS's rain fed pepper production for 2003/04, 2004/05 and 2005/06 production year, were 213113, 178264 and 777602 quintals, respectively. These accounted for 32%, 25% and 43 % of the country's production in the respective years (Table 1).

Table 1. Cultivated area and production of pepper

	Country level		SNNPRS		Siltie		Alaba	
Year	Area (ha)	Production (qt)	Area (ha)	Production (qt)	Area (ha)	Production (qt)	Area (ha)	Production (qt)
2001/02	54376	770349	na	na	na	na	na	na
2002/03	na	na	na	na	na	na	na	na
2003/04	49611	669078	12565	213113	5412	116052	2045	35053
2004/05	56991	724655	11134	178264	5031	107863	1890	32392
2005/06	81544	1790283	16211	777602	7537	550193	1894	na

na= data is not available
Source: CSA

Pepper is a dominant crop in Siltie zone and Alaba special woreda and is mainly grown by rain fed conditions. Pepper is a very important source of income in these areas and covers a significant portion of the production. Pepper produced in Siltie and Alaba is marketed in distant places as Dessie and Mekelle in the North, and Dire Dawa in the east of the country, including the Addis Ababa market. Siltie zone only produced 550193 quintals in the 2005/06 main cropping season (*Meher*) which indicates a radical change from 107863 quintals in the previous year. Its share from the country's production was 31% and its share from SNNPRS was 71% for 2005/06. But the 2004/05 production was less than 2003/04 due to disease and unfavorable weather condition. The same was true for Alaba. However, its share from the total production in SNNPRS was 54% and 61% in 2003/04 and 2004/05, respectively. Alaba also produced 35053 quintals in the 2003/04 main season (*Meher*), which was greater than (32392 quintals) the 2004/05 production season. Alaba contributed 16% and 18% of pepper production to SNNPRS in 2003/04 and 2004/05, respectively.

According to (EEPA, 2003), cultivated area of pepper accounted 62%t of the total area covered by spices in the three regions. As summarized in Table 1, pepper area cover in the country was increased from 49611 to 81544 hectare through 2003/04-2005/06. Regarding the study areas, pepper area cover in Siltie was increased from 5412 to 7537 hectare which accounts 11% to 9% of total area of pepper in the country and 40% of pepper cultivated area in SNNPRS from 2003/04 to 2005/06. However Alaba's pepper area cover deceased from 2045 to 1894 hectares from 2003/2004 to 2005/06. Alaba accounted for 2% to 4% of the total area cultivated of pepper in the country and 12% to 17% of the SNNPRS during the same periods.

The 2005/06 yield of pepper was very high, around 22qt/ha in the country, which was greater than the previous years' yield (13 qt/ha) (Table 2). Though low yield is also caused by the deterioration of the varieties, new improved varieties were not released for more than 20 years (Roukens, 2005). In order to increase the yields, two new varieties have been introduced: *Mareko Fana* and *Bako Local*. Pepper yield can reach 15–20 qt/ha for *Mareko Fana* and 20–25 qt/ha for *Bako Local* under modern practices. However, before 2005/06 yield was only 13 qt/ha, which is far less than under modern practices in the country. These two varieties are old

and are deteriorating (Roukens, 2005). Both the yield and the quality become poor. There is also lack of uniformity in each colour unit. For this reason, the ESEF has introduced two new, well-known varieties, Paprika Queen and Paprika King. Currently, these two varieties are being evaluated and their seeds multiplied.

Table 2. Productivity of pepper (quintal/ hectare)

Year	Country level	SNNPRS	Siltie	Alaba
2001/02	14	na	na	na
2002/03	na	na	na	na
2003/04	13	17	21	17
2004/05	13	16	21	17
2005/06	22	48	73	na

na= data is not available
Source: CSA

Depending on seasonal variability the productivity of pepper, varied from 21 to 73 qt/ha in Siltie through 2003/2004 to 2005/06. However the productivity of pepper in Alaba (17 qt/ha) was less than Siltie (21 qt/ha) (Table 2).

Regarding pepper processing in the country, there were two extraction factories engaged in the production of paprika, capsicum, turmeric, and ginger oleoresin: Ethiopian Spice Extraction Factory (ESEF) and KASSK Spices and Herbs Extraction Factory (KASSK). Ethiopia hosts a number of spices, including paprika. The spice industries were known to be underdeveloped, unorganized, small-scale, and inefficient. As a result, spice exporters are facing various difficulties, which in 2004 even led to the closure of KASSK, one of the two spices and herbs extraction factories in the country (Roukens, 2005).

KASSK is a private factory which was established in 1991 and commenced production in 1997. KASSK has an annual capacity to produce 200 tons of oleoresins. The company produces mainly oleoresin paprika from dried and ground pods of the indigenous variety of red pepper using organic solvents. Subsequently, the crude extract is treated with polar

solvent for further separation of the pungent component (Oleoresin Capsicum) from the color component (Oleoresin paprika). Finally, the solvent left in each faction are recovered under distillation and the product (oleoresin) is packed for shipment.

Kalsec International from Kalamazoo, Michigan built the ESEF, 16 kilometers south of Addis Ababa, in 1971 and has an annual requirement of raw materials amounting to 37-40 thousand quintals. However, the actual raw material availability is averagely about 15-20 thousand quintals per year, which is hardly half of the required amount. Due to obsolete machinery, the repair and maintenance costs are getting higher and higher. The technology is outdated and efficiency is low. To alleviate this problem, the factory has a loan from International Development Fund to rehabilitate the machinery (Roukens, 2005).

The two factories are aware of the international regulations concerning food grade products and good manufacturing practices. Both factories, ESEF and KASSK, were established with the objective to extract different spices and herbs. At the moment, due to shortage of peppers, the factories are working under capacity, and are running only 3-4 months per year. ESEF is planning to have its own farm as a testing field for different varieties. Currently, KASSK is not functional.

The major extracted product for both factories is paprika oleoresin. However the two factories extracted different types of oleoresins from pepper, ginger and turmeric. The raw materials are supplied by local merchants. The local merchants collect pepper mainly from Siltie zone, which is the major growing area for the *Mareko Fana* type of pepper. It contains oleoresin paprika (75%) and oleoresin capsicum (25%). Oleoresin paprika is dark red in colour and is a thick fluid and oleoresin capsicum is a hot (pungent) liquid. The Oleoresin content in pepper is 3.5%, after the removal of the seed and is quite low, compared to the international standard (5-12 percent). Its colour units also have fluctuations (Roukens, 2005).

Raw materials (pepper) costs make up 80% of the total costs for oleoresin production. The types of solvent used in the production process are totally imported from abroad and represent 10% of the total costs. Since pepper is the major ingredient in the daily food of most

Ethiopians, the supply of pepper is well below the demand. Oleoresins are packaged in resin lined steel drums of 50 or 200kg capacity, according to the buyers' preferences. The drums are imported from abroad and are food grade types. Oleoresins should preferably be stored in tight full containers in a cool place protected from light.

ESEF mainly exports paprika oleoresin. In the last four years, from 2000/01 to 2003/2004, a total of 141 tons were exported. The export of other products like capsicum oleoresin was 6 tons in these years. The principal export product of KASSK was paprika oleoresin. The maximum export in the recent years was 33.2 tons in 2002/03. In 2000/01 and 2003/04 the export was 3.5 and 18.6 tons respectively. There was no export of paprika oleoresin in 2001/02. Capsicum oleoresin was exported only once by KASSK, in 2002/2003, and amounted to 0.6 tons.

Table 3. Ethiopian oleoresins export

	ESEF				KASSK				Total			
Year	Paprika		Capsicum		Paprika		Capsicum		Paprika		Capsicum	
	USD	tons	USD	tons	USD	tons	USD	tons	USD	tons	USD	tons
2001/01	498.8	17.0	0.0	0.0	111.5	3.5	0.0	0.0	609.3	20.5	0.0	0.0
2001/02	1494.0	60.0	9.1	1.7	0.0	0.0	0.0	0.0	1494.0	60.0	9.1	1.7
2002/03	877.4	34.1	10.6	2.0	982.0	33.2	2.1	0.6	1859.4	67.3	12.7	2.6
2003/04	891.8	30.0	11.6	2.2	441.6	18.6	0.0	0.0	1333.4	48.6	11.6	2.2
Total	**3762**	**141**	**31**	**6**	**1535**	**55**	**2**	**1**	**5296**	**196**	**33**	**7**

Source: Roukens, 2005

Paprika oleoresin is the principal export product in the country which accounted for a total of 196 tons and obtained USD 5, 296, 000. There was an increase in exports from year 2000/01 to 2002/03, as shown in Table 3. In 2002/03 another slight increase in exports was observed. However, in 2003/04 there was a decrease in exports. Decreasing exports is usually due to shortage of raw material. The major export destinations are Germany, Spain and Japan.

1.3. Statement of the Problem

Ethiopia's agriculture is largely characterized by subsistence farming. Smallholder farmers operating on by most estimates, an average of one hectare, account for about 95% of agricultural output (Pender et al., 2004). Agricultural production and productivity is very low and the growth in agricultural output has barely kept pace with the growth in population.

The high potential areas of Ethiopia can produce enough pepper to meet the needs of the people in the deficit areas. However, the poor agricultural marketing system, disease, and unstable price of pepper discourage farmers to produce more.

Agricultural marketing is the main driving force for economic development and has a guiding and stimulating impact on production and distribution of agricultural produce. The increasing proportion of the population living in urban centers and rising level of income require more organized channels for processing and distributing agricultural products. Agricultural marketing acts as an agent of rural development. Moreover, agricultural marketing will play a coordinating rule, steering supply and demand with respect to place, time and form utilities. A properly functioning market (such as pricing system) for agricultural products is generally perceived as the best organizational structure to achieve more efficient production, in terms of type, quantity and quality, and consumption decisions (Bradhan, 1990).

Improved information and marketing facilities enable farmers to plan their production more in line with market demand, to schedule their harvests at the most profitable times, to decide which markets to send their produce to and negotiate on a more even footing with traders and also it enables traders to move produce profitably from a surplus to a deficit market and to make decisions about the economics of storage, where technically possible.

The possible increment in output resulting from the introduction of improved technology could not be exploited in the absence of convenient marketing conditions. As efficient, integrated, and responsive market mechanism is of critical importance for optimal area of resources in agriculture and in stimulating farmers to increase their output (Jones 1972, and

cited in Andargachew, 1990). A good marketing system is not limited to stimulation of consumption, but it also increases production by seeking additional output.

However, there is a critical problem that stands in the course of formulating appropriate policies and procedures for the purpose of increasing marketing efficiency. This has to do with lack of pertinent marketing information and other marketing facilities, like storage, transportation, etc.

Red Pepper is a major spice and vegetable crop produced by the majority of farmers in SNNPRS, Oromia, and Amhara regions (EEPA, 2003). Despite the significance of pepper in Ethiopian economy and current income generating capacity of pepper as compared to its magnificent potential in the country it has not been given due attention.

In Ethiopia, the production of pepper is constrained by variable seasonal conditions. As a result, the variation in its supply on rural and urban market is considerable. Further more pepper marketing channels and their characteristics have not yet been studied and analyzed for different parts of the country, especially Alaba and Siltie areas, which specialize in the production of pepper. This study has the purpose of investigating the pepper marketing chains and factors affecting red pepper supply to the market in Alaba and Siltie, and reducing the information gap on the subject and by contributing to work better understanding on improved strategies for reorienting marketing system for the benefit of small farmer development and traders.

1.4. Objectives of the Study

The major objective of this study is to assess the pepper marketing in Alaba and Siltie to draw policy recommendations that improve the performance of pepper markets. The specific objectives of the study are:

1) To identify marketing channels, and the role and linkage of marketing agents;
2) To quantify costs and margins for key marketing channels;

3) To identify factors affecting marketable supply of pepper in Alaba and Siltie and
4) To examine integration between regional markets and terminal (Addis Ababa) market

1.5. Scope of the Study

The study concentrates on factors affecting red pepper supply in Alaba special woreda and Silte zone. The study also focuses mainly on the eight regional markets (Dalocha, Alem Gebya, Tora and Slti from Siltie zone, and Alaba Kulito, Guba, Besheno, and Kobo from Alaba special woreda) and the Addis Ababa terminal market (Merkato). These markets are purposively selected based on their relative importance for pepper market.

1.6. Significance of the Study

This study covers the pepper production in the supply potential areas, and analyzes the performance of the market through the evaluation of the marketing activities along the different marketing channels of the crop and evaluation of market integration, which could be a major input to formulate appropriate marketing policies and procedures. This information could also help to make appropriate decisions by the farmers, consumers, traders, investors, and others, who need the information for their respective purposes. The document also would serve as reference for researchers to embark upon similar or related work in other parts of the country.

1.7. Limitation of the Study

Due to shortage of budget, and logistics, the researcher couldn't cover all pepper producing PAs and pepper markets found in the study areas. And also due to lack of secondary data on all sample markets the study was unable to evaluate the market integration among all markets.

2. LITERATURE REVIEW

In this part of the study the basic concepts of markets, marketing, marketing system and market channel, factors affecting market supply, the approaches and methods to evaluate the efficiency of agricultural markets have been discussed.

2.1. Basic Concepts

2.1.1. Market and marketing concepts

Market is an area in which one or more sellers of given products/services and their close substitutes exchange with and compete for the patronage of a group of buyers. Originally the term *market* stood for the place where buyers and sellers are gathered to exchange their goods, such as village square. A market is a point, or a place or sphere within which price-making force operates and in which exchanges of title tend to be accompanied by the actual movement of the goods affected (Backman and Davidson, 1962). The concept of exchange and relationships lead to the concept of market. It is the set of the actual and potential buyers of a product (Kotler and Armstong, 2003). Conceptually, however, a market can be visualized as a process in which ownership of goods is transferred from sellers to buyers who may be final consumers or intermediaries. Therefore, markets involve sales locations, sellers, buyers, and transactions.

The definition of marketing as a process by which individuals and groups obtain what they need and want by creating and exchange products and values with others involves work. Marketing means different things to different people: to the house wife it means shopping for food; to the farmer it means the sale of his produce; to the fertilizer distributor it means the selling to the farmer (Abbot and Makeham, 1981). According to Kotler and Armstrong

(2003), marketing is managing markets to bring about profitable exchange relationships by creating value and satisfying needs and wants.

Marketing is essentially a process like farming, manufacturing, mining or construction (Backman and Davidson, 1962). As such basically functional in character and may, therefore, be defined as the performance of all activities necessary ability, effecting transfer of ownership of products, providing for their physical distribution, and facilitating the entire marketing process. In addition to those definitions, Lele and Jain (1997) defined the marketing concept, as philosophy of business, which states that customer's want satisfactions, is the economic and social justification for a firm's existence. Consequently all the firms' activities must be devoted to finding out what the customers want, and then satisfying those wants while still making a profit over the long run.

2.1.2. Marketing system

The concept of marketing system includes both the physical distribution of economic input and products and the mechanism of process or coordinating production and distribution (cited in Andargachew 1990). Branson and Norvel (1983) define the marketing system in terms of what is otherwise known as marketing channel. In broad terms, marketing system may be defined as the totality of product channels, market participants and business activities involved in the physical and economic transfer of goods and services from producers to consumers. Marketing system operates through a set of intermediaries performing useful commercial functions in chain formations all the way from the producer to the final consumers (Islam et al., 2001).

2.1.3. Marketing channel

The term channel is derived from the Latin word *canalis*, which means canal. A marketing channel can be viewed as a large canal or pipeline through which products, their ownership, communication, financing and payment, and accompanying risk flow to the consumer

(Backman and Davidson, 1962). Formally, a marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstong, 2003). Abbot (1958) also define marketing channel as the sequence of intermediaries through which goods pass from producer to consumer. This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam et al., 2001).

Market channel of food grain trade activities in Alaba Siraro district was studied by Wolday (1994). The food grain marketing channel among different agents from producer to consumer was studied. Village collectors, wholesalers, agents, and millers are the main agent in this market. The study indicates that smaller proportion of the food grain is dishonored to the market center in the district by village collectors.

The volume of maize flows through the various channels, and the relative share of the different market participants were estimated by RATES (2003) in maize market assessment and baseline study for Ethiopia. Maize producers have different market outlets and the study indicates that 40% and 35% of farmers' production flow through rural assemblers and wholesalers, respectively.

2.1.4. Concept of marketing efficiency

The marketing efficiency is measured in terms of price integration of markets. In Ethiopia grain markets are relatively integrated after the reform (Wolday, 1994). The study of Asfaw (1998) indicated that the grain markets in Ethiopia are integrated spatially. However, although the grain markets have become more integrated, there were high spatial price differentials indicating the inefficiency of the entire grain marketing system (Gebremeskel et al., 1998).

Marketing efficiency as measured by composing output and input values are based on consumer valuation of goods, and input values (costs) are determined by the values of

alternative production capabilities (Cramer and Jensen, 1982). Based on this argument, markets are efficient when the ratio of the value of output to the value of input throughout the marketing system is maximized.

The output of marketing is the consumer satisfaction with the goods and service and the inputs are the various resources of labour, capital and management that marketing firms use in the process accomplishing particular job without reducing consumer's satisfaction and with the output of improvement is efficiency (Abbot and Makeham, 1981, and Lele and Jain, 1997). However, a change that reduces costs but also reduces consumer satisfaction with the end product might actually reduce marketing efficiency.

Effective and efficient marketing system is the one that induces the production of those products and quantities which when sold to the consumer results in maximum returns after the deduction of minimum marketing charges and farm production costs (Kohls and Uhl, 1985). However, consumer's satisfaction cannot be measured directly, changes analyzed in terms of "technical" efficiency and "pricing" efficiency.

Technical efficiency: It is concerned with the manner in which physical marketing functions are performed to achieve maximum output per unit of input. Technological changes can be evaluated to determine whether they reduce marketing costs per unit of output. New methods of packing and processing, for example may reduce waste and prevent deterioration in quality (Abbot and Makeham, 1981**)**.

Price efficiency: Pricing efficiency is concerned with the accuracy, precision, and speed with which prices reflect consumers' demands and are passed back through the market channels to producers. Pricing efficiency is, thus, affected by rigidity of marketing costs and the nature and degree of competition in the industry. Activities that may improve pricing efficiency are improvement of market news and information, and competition (Cramer and Jensen, 1982). The objective of pricing efficiency is to improve the operation of buying, selling, and pricing aspect of the marketing process, so that it remains responsive to consumer's preference (Kohls and Uhl, 1985).

2.2. Factors Affecting Market Supply

The market supply refers to the amount actually taken to the markets irrespective of the needs for home consumption and other requirements. Whereas, the marketed surplus is the residual with the producer after meeting the requirement of seed, payment in kind, and consumption by farmer (Wolday, 1994).

Bellemare and Barrett (2006) estimated factors affecting sell of animals in Kenya and Ethiopia. They observed that the net purchase and net sales volume choices depend on expected market participation. The household head sex (female headed), age, family size, herd size, female TLUs, encumbered males, and small stock (sheep and goat) had significant and negative influence on number of animals sold. Unlikely, assets, land holding, other income, encumbered females, and average price of larger stock (camels and cattle) had correlated positively with number of animals sold.

Also a study in Alaba Siraro district by Wolday (1994), identified factors that affected market supply of food grain (*teff*, maize and wheat) by using variables such as the size of output, market access, family size, and income from pepper. He identified that size of output (*teff*, maize and wheat) significantly and positively affected *teff*, maize and wheat supplied. On the other hand, access to market significantly and negatively affected volume of sale of *teff* and maize. Poor accesses to the market negatively affected maize sold while positively affected *teff* and wheat sold. Family size also significantly and positively affected quantity supplied of *teff* and wheat while it negatively affected quantity supplied of maize.

A similar study was conducted by Holloway *et al* (1999). Their study sought to identify alternative techniques for effecting participation among peri-urban milk producers in the Ethiopian highlands. They found that cross breed cow type, local breed cows, education level of household head, extension contact, and farming experience of household head positively effected quantity of milk sold while distance to the market affected the volume of sale negatively.

There are a number of highlighted constraints that hamper further development of market supply. Singh and Rai (1998) identify factors affecting marketed surplus of buffalo milk in Haryana. They observed milk production and price significantly affected marketed surplus positively while land holding and family size negatively affected.

2.3. Approaches to the Study of Agricultural Marketing Problem

The study of marketing involves various approaches. The most common are the functional, the institutional, and the commodity approaches.

2.3.1. Functional approach

Functional approach studies marketing in terms of the various activities that are performed in getting farm product from the producer to the consumer. These activities are called functions (Cramers and Jensen, 1982). Using the functional approach, it is feasible to "cost" these functions and to compare them against others (middlemen) doing the same job or against standard of performance (Cramers and Jensen, 1982). And this approach helps to compare cost and benefits of different functions. The widely accepted functions are: a) exchange (buying and selling), b) physical (processing, storage, and transportation), and c) facilitating (standardization, financing, risk bearing, and market information). Most of these functions are performed in the marketing of nearly all commodities.

Marketing of agricultural products consists primarily of moving products from production sites to points of final consumption. In this regard, the market performs exchange functions as well as physical and facilitating functions. The exchange function involves buying, selling and pricing. Transportation, product transformation and storage are physical functions, while financing, risk-bearing and marketing information facilitate marketing

2.3.2. Institutional approach

Institutional approach examines the activities of business organizations or people in marketing. The institutional approach focuses on the study of the various institutions, which perform the marketing activities. These organizations or people are middlemen who perform the operations necessary to transfer goods from the producer to consumer, because of the benefit of specialization and scale that exist in marketing as well as production (Cramers and Jensen, 1982).

2.3.3. Commodity approach

In a commodity approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed. This approach focuses on what is being done to the product after its transfer from its original production place to the consumer (Kohls and Uhl, 1985). It helps to pinpoint the specific marketing problems of each commodity as well as improvement measures. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently. This approach has been used in this study as a guideline to identify different aspects of the problem.

2.4. Framework for Evaluation of Marketing System

The development of reliable and stable market system has been an important element in commercialization and specialization in the agricultural sector. In order to study the functioning of markets many researchers have applied the Structure-Conduct-Performance (SCP) paradigm. The SCP approach was developed in the United States as a tool to analyze the market organization of the industrial sector and it was later applied to assess the agricultural system and this framework was to evaluate the performance of industries in the USA (Wolday, 1994 and citing Meijer, 1994). Subsequently, it was applied in the functioning of markets in agricultural sector, and served as a tool to evaluate the performance of the

commercial system. The framework distinguishes between three related levels; the structure of the market, the conduct of the market, and the performance of the market.

2.4.1. Structure of the market

The term market structure refers to the number of buyers and sellers, their size distribution, the degree of product differentiation, and the ease of entry of new firms into an industry (Branson and Norvell, 1983; Cramer and Jensen, 1982; and Abbott and Makeham, 1981). Examples of such dimensions include: a) number and size distribution of buyers and sellers in the market, (degree of buyers and sellers concentration), b) barriers to potential entrants: refer to the relative ease or difficulty with which new dealers may enter into market. Technological, economic, regulatory, institutional, and other factors that inhibit firms from engaging in new businesses or entering new markets, and c) degree of product differentiation: refers to the extent to which competing products in a market are differentiated is expected to influence the competitive interrelationships of sellers in the market.

Market concentration can be defined as the number and size of sellers and buyers in the market. Concentration is believed to play a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms. The relationships between concentration and market behavior and performance must not be interpreted in isolation. Other factors, such as firms' objectives, barrier to entry, economies of scale, and assumptions about rival firms' behavior, will be relevant in determining the degree of concentration and relationship between concentration and behavior and performance (Schere, 1980).

Market structure can also be defined as characteristics of the organization of a market, which seem to strategically influence the nature of competition and pricing behavior with in the market (Bain, 1968). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive; monopolistic; or oligopolistic (Scott, 1995; Meijer, 1994).

The organizational features of a market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Woldy, 1994).

Kohol and Uhl (1985) suggest that as rule-of-thumb, a four largest enterprise concentration ratio of 50% or more is an indication of strongly oligopolistic industry, 33 -50% a weak oligopoly, and less than that, an un concentrated industry. Oligopoly is a market structure in which there are a few large firms and entry is difficult but not impossible. Oligopolies can produce identical products or differentiated products. Oliogopoly is different from other market structures because firms are interdependent: any action taken by one firm usually provokes a reaction by other firms.

Wolday's study (1994) for the food grain market of Shashemene market indicated that from the total volume purchased, four of the first four big traders (CR_4) had 35% market share. Gebremeskel et al. (1998) reveal that in 25 markets in Ethiopia, the first four big grain traders (CR_4) had a market share of 32.58. In both cases the result indicated a weak oligopoly.

2.4.2. Conduct of the market

The structure and the conduct of market participants have a direct implication for the nature of production price relationships between different marketing levels and the direction of causality.

Market conduct refers to the practices or strategies of traders in maximizing their profits. Among these practices are the use of regular partners, long-term relations with clients, and suppliers, the use of intermediaries, and trade within personalized networks (Wolday, 1994)

Market conduct deals with the behavior of firms that are price-searchers are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982). Price-

searchers can determine their selling prices or quantity of output they sell. In addition, they could use their market power to weaken or eliminate competitors example reducing price.

According to Abbott and Makeham (1981) conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere?

Meijer (1994) said that, "conduct is pattern of behavior which enterprises follow in adopting or adjusting to the market in which they sell or buy", in other words the strategies of the actors operating in the market.

2.4.3. Performance of the market

Performance of the market is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance.

According to Abbott and Makeham (1981) market performance is how successfully the firm's aims are accomplished, which shows the assessment of how well the process of marketing is carried out. Is produce assembled and delivered on time and without wastage? Is it well packed and presented attractively? Is its quality reliable and are terms of contract observed? Is the consumption of the products increasing and sales in competitive market expanding? There are such practical indicators of how well a certain marketing system is operating.

As a method for analysis the SCP paradigm postulates that the relationship exists between the three levels distinguished. One can imagine a causal relations starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth orientation of marketing firms, efficiency of resource use, and

product improvement and maximum market services at the least possible cost) of agricultural marketing system in developing countries (Meijer, 1994).

2.4.4. Methods of evaluating marketing performance

Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels, and market integration. A commonly used measure of system performance is the marketing margin or price spread. Margin or spreads can be useful descriptive statistics if used to show how the consumer's food price is divided among participants at different levels of the marketing system (Getachew, 2002).

2.4.4.1. Marketing costs and margins

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

Marketing margin: A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words it is the difference between retail price and farm price (Cramers and Jensen, 1982). A wide margin means usually high prices to consumers and low prices to producers. The total marketing margin may be subdivided into different components: all the costs of marketing services and the profit margins or net returns.

The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But marketing margins can also be high, even in competitive market due to high real market cost (Wolday, 1994).

There are three methods used in estimating marketing margin (Abbot, 1958): (a) following specific lots of consignments through the marketing system and assessing the cost involved at each of the different stages (time lag); (b) submission of average gross purchase by the number of units transacted for each type of marketing agency; and (c) comparison of prices at different levels of marketing over the same period of time (concurrent method). Because the first two methods are time consuming, the study used has the third method.

2.4.4.2. Market integration

Distortions introduced by governments are in the form of policies either at the border, or as price support mechanisms that weaken the link between the international and domestic markets. Agricultural policy instruments such as import tariffs, tariff rate quotas, and export subsidies or taxes, intervention mechanisms, as well as exchange rate policies insulate the domestic markets and hinder the full transmission of international price signals by affecting the excess demand or supply schedules of domestic commodity markets (Baffes and Ajwad, 2001; Abdulai, 2000). Apart from policies, domestic markets can also be partly insulated by large marketing margins that arise due to high transfer costs. High transfer costs and marketing margins hinder the transmission of price signals, as they may prohibit arbitrage (Sexton et al., 1991).

Price transmission studies are apparently empirical that test the predictions of economic theories and provide important insights as to how changes in one market are transmitted to another, thus reflecting the degree of market integration, as well as the extent to which markets function efficiently (Rapsomanikis et. al. 2003).

Producer marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movements (Goodwin and Schroeder, 1991). For developing countries, there are some additional cases to be made for well-integrated market systems. Linkages to marketing centers have been found to contribute significantly to rural household's escape from of poverty (Kishana, 2004; Kishana, et al., 2004). Furthermore, the existence, extent, and persistence of famines in market economies is also closely linked to market integration.

Time series data on price in different areas are increasingly available at higher frequencies than ever before. However, data on other factors affecting market integration have not followed this trend. This is why the challenge has been to assess the degree of market integration using only price data of a particular commodity in different markets (Campenhout, 2005).

Most of the studies utilize time series econometric analysis techniques that test for the co-movement of prices. The development of these techniques, which include cointegration and error correction models, has become the standard tool for analyzing spatial market relationships, replacing earlier empirical tools, such as the bivariate correlation coefficient and regressions (Goodwin and Shroeder, 1991; Harris, 1979).

Andargachew (1990), found evidence for sheep marketing in central high lands of Ethiopia, using bivariate regression model, and observed integration that between Debre Birhan and Deneba; and Deneba and Degollo markets. Getachew (2002) also examined similar issues in western Shewa on cattle marketing, by using time series price data of cattle with simple bivariate regression model and found contrary results with the two primary markets and integration was weak the three secondary markets in relation with the terminal markets at Addis Ababa (Kera).

Fafchamps and Gavain (1995) used a January1968-1988 price data to test spatial integration of livestock market. They computed correlation coefficients for each pairs of animals and most correlation coefficients lie between 0.3 and 0.6, well below price correlation coefficients

computed for other agricultural products in Third World countries (Blyn, 1973, Timmer, 1974). Those results are globally consistent with the hypothesis that vast distance and poor transport infrastructure lead to high transaction costs thereby making arbitrage unprofitable and isolating market Timmer (1974).

The work by Wolday (1994), on grain market integration in southern parts of Ethiopia, using 43 weekly retail price data for 12 markets applied correlation coefficient of price indices he identified no integration between markets. There was also a study using simple correlation coefficient between wholesale price across markets (Asfaw, 1998) with the result of the spatial wholesale price spread of grain between Addis Ababa and other selected markets were found to be very high.

Cointegration and error correction model

The tight linkage between cointegration and error correction models (ECM) stems from the Granger representation theorem. According to this theorem, two or more integrated time series that are cointegrated have an error correction representation, and two or more time series that are error correcting are cointegrated (Engle and Granger 1987). The ECM incorporates a long run cointegrating relationship, which implies that two cointegrated price series will not drift apart without limit.

Cointegration

Many authors have found the use of correlation coefficient as a measure of market integration to be fraught with the problem (e.g. Harris, 1979, Tmmer, 1974). Cointegration means that despite being individually non stationary, a linear combination of two or more series can be stationary (Gujarati, 2003). The concept of cointegration and the methods for estimating a cointegrated relation or system provide a framework for estimating and testing long run equilibrium relationships between non stationary integrated variables (Granger, 1981, Engle and Granger, 1987).

Several researchers have applied the co-integration test to study the spatial interdependence of markets as measured by price relationships. Granger (1981) used co-integration analysis based on the ordinary least square approach and the time varying parameter estimation approach to examine the market integration between Australian and United States beef prices at the farm gate. Using monthly time series data from 1972 to 1993, co-integration was found between Australian and United States beef prices. The result implied that Australian prices could not be adopted as the world price through empirical analysis.

Goodwin and Schroeder (1991) used a co-integration test of regional price series to evaluate spatial linkages in regional cattle markets in the U.S. weekly price series from January 1980 through September 1987. Co-integration tests were conducted on spatial price relationships among eleven regional markets. The result was that several markets were not integrated over 1980 through 1987.

The work on spatial price transmission and asymmetry, wholesale price indices of Ghanaian maize market was studied by Abdulai (2000), by applying cointegration and threshold error correction model, and observed that wholesale price spreads of maize between central markets were found to be very high.

Solomon (2004) conducted integration of cattle marketing in Southern Ethiopia, using cointegration and error correction model; he found evidence of long run integration between sample markets.

Error Correction Model (ECM)

In addition to formally testing market integration, the concept of cointegration has an important implication, supposed by the Granger Representation Theorem (Engle and Granger, 1987). According to this theorem, in case of two trending, say I (1), variables are cointegrated, their relationship may be validly described by an ECM, and vice versa

Ravallion (1986) formulated a dynamic model of spatial price differentials, allowing differentiation between short-run market integration, long-run market integration, and market segmentation. If evidence for long-run market integration is found, he reformulated the model as an error-correction model. This model, together with the non-stationary nature of most price series gave rise to a whole series of studies that used cointegration techniques to test long-run market integration.

The ECM is the preferred method for estimation when two integrated time series are statistically related or cointegrated since the ECM can be formally derived from the properties of integrated time series. The error correction model, however, is particularly powerful since it enables an analyst to estimate both short run and long run effects of explanatory time series variables (Keele and Suzanna, 2004).

When evidence of long-run market integration is found, error-correction specifications are used to investigate the short run dynamics that are consistent with this long run relationship (Goodwing and Schroeder, 1991).

The results for markets are presented after testing for the general condition of unit root. Before making further analysis, it is important to check the stationarity of series (Granger 1981). Number of formal statistical tests can be used to test the presence of unit roots, and hence for the degree of integration of individual series. This test identifies non stationarity among price series in levels and stationarity series after first differencing which is a necessary condition for cointegration.

Individual price series has to be tested for their order of integration. The same order of integration is the necessary condition for cointegration. If individual series are integrated at higher order (>1) and have the same order of integration, one can test for cointegration. This has been performed using a Dikcey-Fuller (DF) and Augmented Dickey-Fuller (ADF) test.

The Engle and Granger test uses a standard ordinals least square (OLS) estimation for the long run relationship between two price series. In order to conclude that the price series are

cointegrated, the residuals from the OLS estimation have to follow stationery process. When this is the case, the residuals from cointegrating relationship were incorporated in the ECM to analyze short run relationship between markets.

Basic Dickey-Fuller (DF) test

The Dickey-Fuller (DF) test statistics are derived from the estimation of the first-order autoregressive model: In the face of non-stationary series with a unit root (e.g., a random walk series), first differencing appears to provide the appropriate solution to ensuring series is weakly stationary. If an economic time series $[P_t]$ follows a random walk, its first difference forms a stationary series.

$$\Delta P_t = \alpha + (\rho - 1) P_{t-1} + \varepsilon_t \quad (1)$$

$$= \alpha + \delta P_{t-1} + \varepsilon_t \quad (2)$$

The test of market integration is forward if P_t are stationary variables. Often, however, economic variables are non-stationary in which case the conventional tests are biased towards rejecting the null hypothesis. A stationary series is defined as one whose parameters that describe the series (namely the mean and autocorrelation) are independent of time or rather exhibits constant mean and variance and has autocorrelations that are invariant through time (Solomon 2004).

One of the main difficulties with simple DF test is that it is based on the assumption that the variable follows a simple first - order auto regression and that the disturbance term is independently and identically distributed (IID) and for most economic time series the problem of serial correlation is common, because of this the study also used Augmented Dickey Fuller test (ADF).

Augmented Dickey-Fuller (ADF) test

The augmented Dickey-Fuller (ADF) test is a modification of the DF test and involves augmenting the Dickey-Fuller equation by lagged values of the dependent variable. This is done to ensure that the error process in the estimating equation is residually uncorrelated but also captures the possibility that P_t is characterized by a higher order autoregressive process. The ADF test is by far the most popular test used in applied time series testing for a unit root.

The test finds two uses in applied economics. The first involves the testing for a unit root in univariate time series, and the second is testing residuals from a cointegrating regression for a unit root to test the null of no cointegration in the Granger Engle two step methods. The general form of this test's regression looks as follows:

$$\Delta P_t = \alpha + \beta_t (\rho -1) P_{t-1} + \sum_{i=1}^{n} \gamma_i \Delta P_{t-i} + \varepsilon_t \qquad (3)$$

Where: P_t represents a time series, Δ implies first difference, $\Delta P_t = P_t - P_{t-1}$ and t is the time trend. The null hypothesis in the ADF test is also unit root ($\rho = 1$)**.** The number of lagged values (n) is chosen so as to ensure that the residuals are white noise. If the null hypothesis is not rejected (unit root) it needs to go one step further and test whether the series $\Delta_1 P_t$ contains a unit root. If it does, it means that $\Delta_1 P_t$ is not stationary and will need to be differenced further. This type test can be carried out within the DF testing framework. Thus, the regression model becomes:

$$\Delta_1^2 P_t = \alpha + \beta_1 \Delta P_{t-1} \sum_{j=1}^{k} \beta_2 \Delta_1^2 P_{t-j} + e_t \qquad (4)$$

The results from both tests (DF and ADF) indicate that if the calculated t-statistic of DF and ADF tests exceeds the critical value of DF, the series are non stationary. In general, a series P_t is said to be integrated of order d, if the series are stationarity after differencing d times. This is denoted as $p_t \sim I(d)$.

3. METHODOLOGY

This chapter summarizes description of the study areas, source and data requirement, sample size and methods of sampling and method of data collection. It also contains method of data analysis (descriptive and Econometrics).

3.1. Description of the Study Areas

3.1.1. Siltie zone

Silte zone is one of the 13 zones in SNNPRS. The zone covers an area of 3000 sq. km and accounts for 2.63% of the total area of the region. The zone is sub divided into 6 woredas (namely Silti, Dalocha, Sankura, Azernet Berber, Alicho Woriro and Lanfuro), 8 towns and 118 PAs in April 2001. Among the six woredas Dalocha, Silti, Sankura and Lanfuro are main pepper producers.

Most of the zone is fairly level and found in northern part of SNNPRS and located in the south east of Alaba special woreda, in south west Hadiya, in western Oromia and in northern, north western and north eastern Gurage zone. Worabe town is the administrative center of the zone which if found 173 kms from Addis Ababa.

Silte zone can be classified into three major climatic zones on the basis of altitude, rainfall and temperature: 20.6% *Dega*, 5% *Kola* and 74.4% *Woina-Dega* of the total area of the region. Mean annual temperature is between 12- 26 c^{o}. The rainfall is between 700 and 1818mm.

The zonal land use pattern indicates that 63.6 sq. km is currently cultivated. About 262.5 sq. km grazing land, 64.1 sq. km is uncultivated and the rest is rugged and covered with bushes. Agriculture is the main economic activity and the zone has varied ecological zones that range from lowland to mountains, which makes possible the cultivation of various crop. The

agricultural sector is characterized by less diversity, low productivity and low agricultural technologies, weak linkage between agricultural research extension, lack of adequate marketing and other infrastructure facilities.

In 2004 the total population of Siltie zone was estimated to be 796,230 of which 51% are female and 49% are male. By age group 15-64 is 51%, below 15 are 42.2% and above 64 ages is 2.6%. From the total of the zone population 94% live in rural and only 6% is live in urban areas. The total household in the zone is 139,630 on the average 6 family members in each household. As the name tells us people of the zone is Silti ethnic group and most of the population is Muslim.

The major crops in Silte zone are cereals (maize, wheat barley, sorghum, etc), pulses (beans, peas, and chick peas), root crops (*enset*, potato), pepper (green and red pepper), vegetables and fruits. Maize and *enset* are the main food crops. Siltie specializes in the production of red pepper and it is the main criterion to choose the study areas is its major potential and the fact that it is the major pepper surplus producing areas from the region.

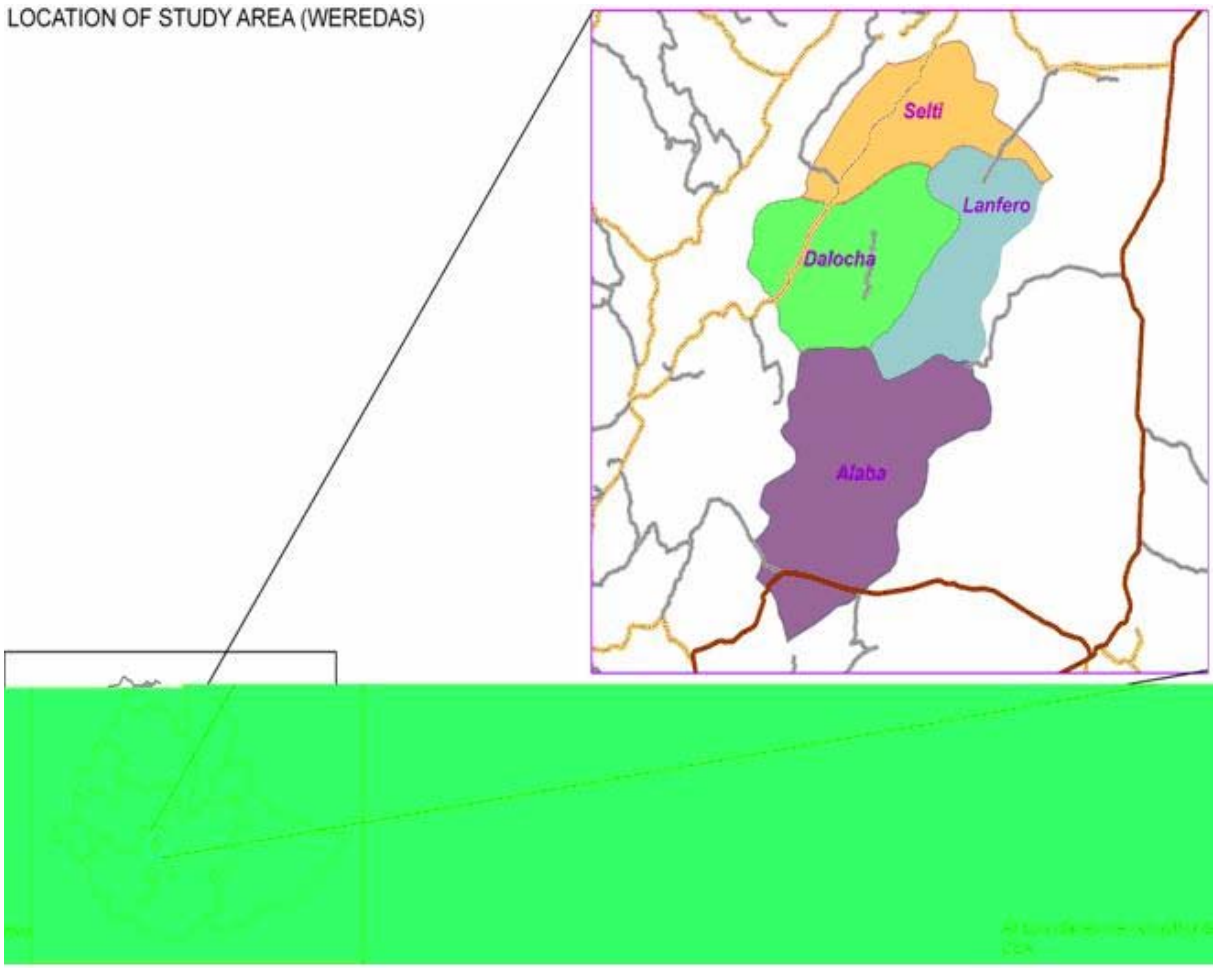

Fig. 1. The study areas (Silti Zone and Alaba Special woreda)
Source: ILRI (IPMS)

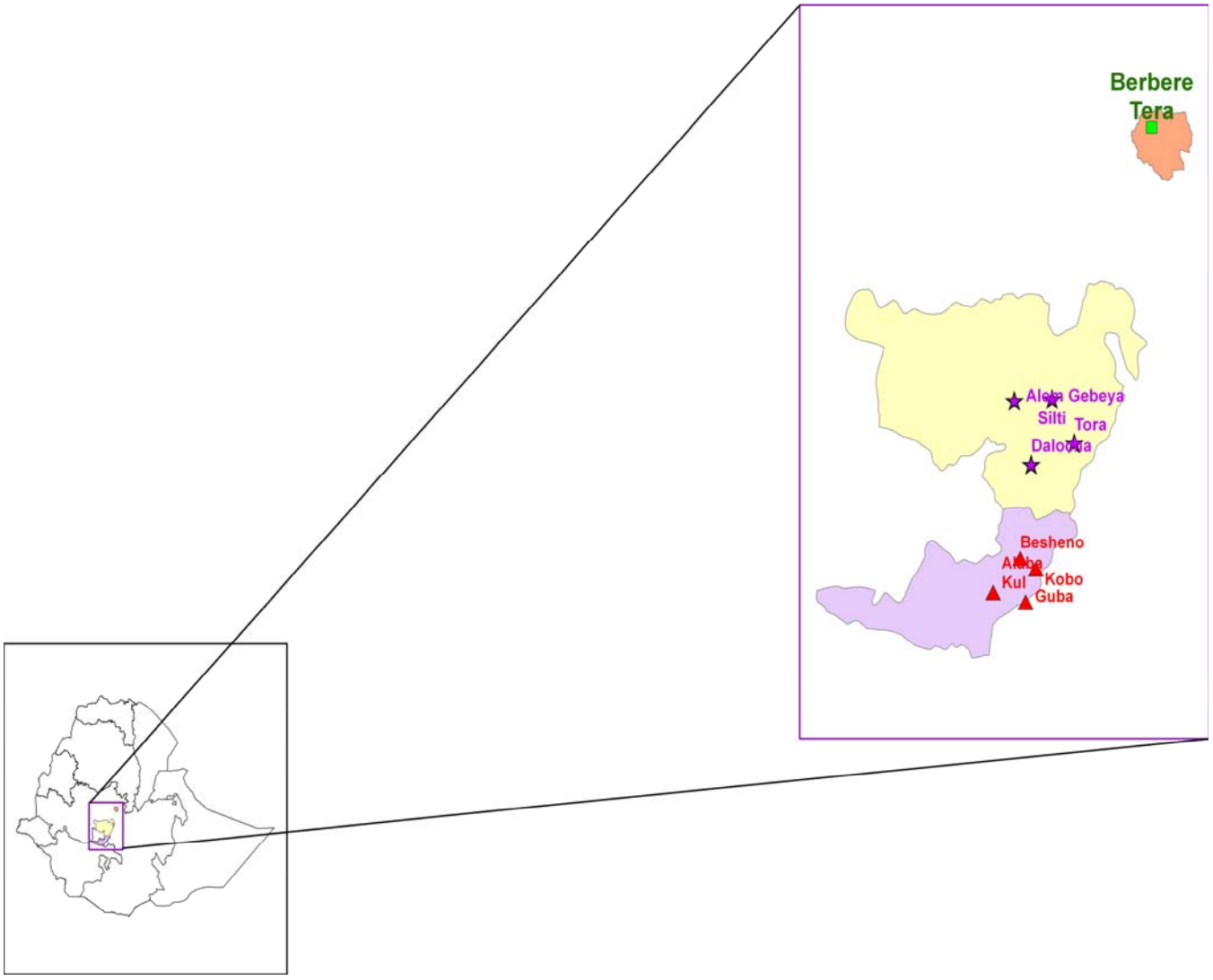

Fig. 2. The study areas (market centers)
Source: ILRI (IPMS)

3.1.2. Alaba special woreda

Alaba Special woreda is one of the eight special woredas in the SNNPRS directly accountable to the regional state and is part of the Southern Rift Valley of Ethiopia. It is placed between Lake shalla and Blatie River, which flows southward across the Alaba Kulito plain. This woreda is organized into two regional towns, four sub rural towns namely, Besheno, Guba, Abokicho and Kobo and 73 PAs. Alaba is surrounded by Siltie zone in the north, Hadiya in the northeast, Oromia and west Kembata and Tembaro in the east. Alaba Kulito is the main town of Alaba, which is found 315 kms from Addis Ababa.

The woreda is found in *woina-Dega* climatic zone with the mean annual temperature ranging between 23-25 c^o and the mean annual rainfall between 700 - 900 mm. The woreda located at 1554 to 2149 m.a.s.l., but most of the woreda is found at about 1800 m.a.s.l. The land use pattern shows that out of the total area coverage of the woreda 64116.25 hectare, 44020 hectare is currently cultivated; 4317 hectare used for grazing, 3644.45 hectare cultivable, 4592 hectare forest cover, 4737.8 hectare for others and the rest about 2805 uncultivable land.

Mixed agriculture is the main activity and trade also plays an important role in the woreda with Alaba ethnic group as the dominant in number. According to the woreda Finance, Plan and Economy Development Office the total population in 2005 was estimated to be 225,303 from which 110,200 are female and 115,103 male. From the total population 88.7% lives in rural areas and 11.3% in urban centers. More than 27 ethnic groups live in the woreda, of which 97% of the people are Muslim, and the other Orthodox Christian and Protestants.

The woreda has regional markets namely Alaba Kulito, and village markets Guba, Besheno and Kobo, among these Alaba Kulito is the biggest. Maize is the most important food crop follower by *teff,* wheat, sorghum, barely, and haricot bean are produced in the woreda. The woreda is reknowned for the high quality red pepper production which, is mainly supplied to Addis Ababa and other parts of the country.

3.2. Source and Data Requirements

The study was used both primary and secondary data. The secondary data on prices, number of licensed pepper traders, list of PAs and traders' legal requirement to enter pepper trading business were collected from Central Statistical Authority (CSA), woreda and zonal planning offices, Woredas' branch offices of Ministry of Agriculture, and Disaster Prevention and Preparedness Offices of different woreda.

Primary data were collected using two types of questionnaire, one for farmers and the other for traders. A checklist was also used to guide the informal discussion conducted to generate data that can not be collected from individual interviews. Primary data collected from farmers focused on factors affecting market supply, size of output, access to market, market information, annual income from non farming activities, livestock ownership, land holding, extension service contact, credit access, family size, production of food grain, etc. from farmers using pre-tested questionnaire.

Moreover, the questionnaire for traders covered the following main areas: (a) defining the trading enterprise; (b) trader characteristics; (c) trading activities and marketing costs; (d) annual volumes of sales, purchases, and storage time. Moreover, in contrast to typical market surveys which focus on business assets, initial capital and the 2004/05 working capital, source of market information, and other data were collected.

3.3. Sample Size and Method of Sampling

The sample frame of the study is the list of household in Minister of Finance (in Alaba special woreda) and PAs (in Siltie zone). In Alaba special wereda, there are 73 PAs. From these major pepper-producing PAs that were first identified purposively, 10 PAs were selected randomly. From these 10 PAs, 100 farmers were selected using systematic random sampling technique. From Siltie zone, three woredas (Silti, Dalocha, and Lanfuro) were selected purposively based on the level of production. Silti, Dalocha, and Lanfuro had 42, 28, and 26 PAs, respectively. From these woredas major pepper-producing PAs were identified

purposively. From those pepper producing PAs, 13 (5, from Silti, 4 from Dalocha and 4 from Lanfuro) PAs were sleeted randomly in the first stage. From each woreda 50 households were selected using systematic random sampling to have 150 household in Siltie zone. The household sample size of the study areas indicated in Table 4 above.

Table 4 Sample size of farmers

Woreda	Number of PAs	Sample size of PAs	Sample size of farmers
Alaba	73	10	100
Silti	42	5	50
Dalocha	28	4	50
Lanfuro	26	4	50
Total	169	23	250

Source: survey result, 2006

The sites for the trader surveys were market towns in which a good sample of pepper traders existed. On the basis of flow of pepper, nine markets (Addis Ababa, Alba Kulito, Besheno, Guba, Kobo, Alem Gebeya, Dalocha, Silti and Tora) were selected, which are the main pepper marketing sites in the study areas. An additional criterion used to select survey sites was the availability of secondary price data for some of the markets.

The objective of this research is to empirically capture the actual practice and behavior of the pepper traders. Due to the absence of reliable census information on the population of traders in both areas, the first step in drawing a systematic random sample was conducted in the selected markets. Scheaffer et al. (1996) states that: "A systematic sample is generally spread more uniformly over the entire population and thus may provide more information about the population than an amount of data contained in a simple random sample."

Table 5 Sample size of traders and processors

	Alba Special Woreda markets				Siltie zone markets					
	Alaba Ku.	Besheno	Guba	Kobo	Siti	Dalocha	Tora	Alem Gebeya	Addis Ababa	Total
Urban wholesaler									4	4
Reg. wholesaler	6				1	3	1			11
Urban retailer									3	3
Farmer trader		1			1	2	3	1		8
urban assembler	4	1	2	3	3	1	2	2	1	19
commission agent								1		1
Balitina shops									2	2
Millers									3	3
ESEF									1	1
Total	**10**	**2**	**2**	**3**	**5**	**6**	**6**	**4**	**14**	**52**

Source: survey result, 2006

An attempt was made to select representative sample whenever possible using systematic random sampling by incorporating licensed and un-licensed traders, and to include respondents from each of the following categories: urban assemblers, farmer traders, wholesalers (urban and rural) and urban retailer. About 46 traders and 6 processors (2 'Balitina' shops, 3 millers, and ESEF) were taken from 9 markets. Sample size of pepper traders and processors are indicated in Table 5 above.

3.4. Method of Data Collection

Independent questionnaires were designed for farmers and pepper traders in Alaba and Siltie. During the course of field visits, the questionnaire was tailored to all market and farmers conditions of both areas. The semi structured formal interview guidelines were written up in the form of a formal questionnaires. Before data collection, the questionnaires were pre tested. This led to further revision of these lists to make sure that important issues had not been left

out. The formal survey made formal interviews with randomly selected farmers and traders using the pre-tested semi-structured questionnaires.

In addition to the questionnaire survey, an informal survey in the form of Rapid Market Appraisal (RMA) technique was employed using checklists for both farmers and traders to obtain additional supporting information for the study. The discussions were made with key informant farmers, traders, and agricultural and relevant experts from both government and non-government organizations. But due to shortage of budget to pay per-diem for farmers and traders, and for the purpose of precaution against conflict, RMA was made independently for each group before and parallel with questionnaire survey.

Enumerators, who were trained on the technique of interviewing for three consecutive days in Alaba and Siltie independently, collected the primary data. Enumerators from Siltie were 12^{th} grade complete while from Alaba who had experienced in data collection, 12^{th} grade complete and worked with, Improvement of Productivity and Marketing Success of Ethiopia (IPMS).

3.5. Methods of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric analysis were used for analyzing the data from farmers and market survey.

3.5.1. Descriptive statistics analysis

This method of data analysis refers to the use of ratios, percentages, means, variances and standard deviations in the process of examining and describing marketing functions, farm household characteristics, resource ownership, role of intermediaries, market and traders characteristics. The indicators used in this part of the analysis are as follows:

3.5.1.1. Structure conduct and performance (S-C-P) model

The model examines the causal relationships between market structure, conduct, and performance, and is usually referred to as the structure, conduct, performance (S-C-P) model. In agricultural economics, the most frequently used model for evaluating market performance is based on the industrial organization model. Wolday (1994) also used this model to evaluate food grain market in Alaba Siraro district. The study used S-C-P model to evaluate pepper market.

3.5.1.2. Concentration ratio (CR)

The concentration ratio is a way of measuring the concentration of market share held by particular suppliers in a market. "It is the percentage of total market sales accounted for by a given number of leading firms". Thus a four-firm concentration ratio is the total market share of the four firms with the largest market shares. The greater degree of concentration is the greater the possibility of non-competitive behavior existing in the market. For an efficient market, there should be sufficient number of firms (buyers and sellers).

$$C = \sum_{i=1}^{m} S_i \qquad \text{i =1,2,…..,m} \tag{5}$$

Where s_i represents market share of i^{th} firm and m is number of largest firms for which the ratio is going to be calculated.

3.5.1.3. Marketing margin

Margin determination surveys should be conducted parallel to channel survey. To determine the channel, one asks the questions “From whom did you buy?” and “To whom did you sell?”

Scott (1995) pointed out to obtain information concerning the margins, agents have to answer the question "what price did you pay?" and "what was the selling price?"

The cost and price information used to construct marketing cost and margin were gathered during field work conducted. Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza 1995).

$$TGMM = \frac{\text{End buyer price - First seller price}}{\text{End buyer price}} X100 \quad (6)$$

Where, TGMM = Total gross marketing margin

It is useful to introduce the idea of 'farmer's portion', or 'producer's gross margin' (GMMp) which is the portion of the price paid by the consumer that goes to the producer. The producer's margin is calculated as:

$$GMMp = \frac{\text{End buyer price - marketing gross margin}}{\text{End buyer price}} X100 \quad (7)$$

Where, GMM_p = the producer's share in consumer price

The net marketing margin (NMM) is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted. The percentages of net income, that can be classified as pure profit (i.e. return on capital), depends on the extension to such factors as the middlemen's own (working capital) costs.

$$NMM = \frac{\text{Gross margin – Marketing costs}}{\text{End buyer price}} X100 \quad (8)$$

Where, NMM = Net marketing margin

3.5.2. Econometric analysis

In this part the supply function (Tobit and Heckman two stage models) and market integration (Cointegration and Error Correction Model) were discussed.

3.5.2.1. Factors affecting market supply

To investigate factors affecting pepper supply (a continuous-valued choice about how much quantity to sell) Tobit model was used. Because of the restrictions put on the values taken by the regressand, this model can be called limited dependent variable regression model. The data have a censored sample as dependent variable, 17.6% of household didn't supply pepper even if they produce pepper from the total of 250 samples, the data are censored, and Tobit estimation is relevant. If zero values of dependent variables were the result of rational choice of farmers, a Tobit model would be more appropriate (Abrar, 2004). Thus, maximum likelihood Tobit estimation (Tobin, 1958) was used in the analysis of factors affecting sales volume. One can concern with the model; recall that in a Tobit with left-censoring at zero:

$$Y^*_i = ß_0 + \sum_{i=1}^{m} ßiX_i + U_i, \qquad i = 1, 2 .. m; \tag{9}$$

Where Y= Y*, if Y* > 0, Y = 0 if Y* $\leq$ 0 and Y= max (Y*,0)

.

Where Y^*_i = market supply of pepper (dependent variable)

$ß_0$ = an intercept

$ß_i$ = coefficients of i^{th} independent variable

X_i = independent variable, and 'i' is 1, 2, 3,…., m

U_i = unobserved disturbance term

The model parameters are estimated by maximizing the Tobit likelihood function of the following form;

$$L = \prod_{y^*>0} \frac{1}{\delta} f\frac{(Y - \beta_i X_i)}{\delta} \prod_{y^*\leq 0} F\frac{(-\beta_i X_i)}{\delta} \quad (10)$$

Where f and F are respectively, the density function and cumulative distribution function of Y_{i*} $\prod_{yi*}>0$ means the product over those i for which $y_{i*}>0$, and $\prod y_{i*} \leq 0$ means the product over those i for which $y_{i*} \leq 0$.

As cited in Maddala (1997), Johnston and Dinardo (1997), proposed the following techniques to decompose the effects of explanatory variables into quantity supply and intensity effects. Thus, a change in X (explanatory variables) has two effects. It affects the conditional mean of Y_{i*} in the positive part of the distribution, and it affects the probability that the observation will fall in that part of the distribution. Similar approach is used in this study.

1.The marginal effect of an explanatory variable on the expected value of the dependent variable is:

$$\frac{\partial E(Y_i)}{\partial (X_i)} = F(z)\beta_i \quad (11)$$

Where, $\frac{\beta_i X_i}{\sigma}$ is denoted by z, following Maddala, (1997)

2. The change in the probability of market participation as independent variable X_i changes:

$$\frac{\partial F(z)}{\partial X_i} = f(z)\frac{\beta_i}{\sigma} \quad (12)$$

3. The change in intensity of quantity supplied with respect to a change in an explanatory variable among sellers:

$$\frac{\partial E(Y_i / Y_i^* > 0)}{\partial X_i} = \beta_i \left[1 - Z \frac{f(z)}{F(z)} - \left(\frac{f(z)}{F(z)} \right)^2 \right] \quad (13)$$

Where, F(z) is the Cumulative Normal Distribution of z, f(z) is the value of the derivative of the normal curve at a given point (i.e., unit normal density), z is the Z score for the area under normal curve, β_i is a vector of Tobit Maximum Likelihood estimates and σ is the standard error.

Normality or homoskedasticity fail to hold, the Tobit model may be meaningless. In OLS, estimates are consistent but not efficient when the disturbances are heteroscedatic. In the case of the limited dependent variable models also, if we ignore hetroscedasticity, the result estimates are not even consistente i.e. is the regression coefficient is upward biased (Maddala, 1997). But nothing can be said about the other coefficients and the direction of the bias.

Estimation of the whole system of supply function would give more efficient estimates, but excluding inconsistencies or biases. In this context, the dependent variable of the supply function is censored by unobservable latent variable influencing the decision of whether or not to supply pepper standard OLS estimates biased. The assumption underlying a Tobit estimation is that farmers are unconstrained which is untenable in light of the fact that supply is below the saturation point. Hence, it is necessary to use the Heckman selection model to account for sample selection bias (Greene, 2000).

Tobit model which assumes all producers are potential suppliers of a good and that volume of supply and market participation are influenced by the same variables in the same way (Blaylock and Blisard, 1993).

Different studies employed different models in order to identify the factors that determine market supply (Behrman, 1996; Bardhan, 1970; Strauss, 1984; Geoz, 1992, Vella, 1998; Minot, 1999; Sigelman, 1999; Matshe 2004). The commonly used ones are the well known Tobit and Heckman's sample selection model. The disadvantage of the Tobit model is the assumption that both the decision to participate and the amount of product marketed given

participation are determined by the same variables, and that a variable that increases the probability of participation also increases the amount of product marketed. This problem can be overcome using the Heckman's sample selection model where a Probit model for the participation or 'selection' equation is estimated and a regression model, which is corrected for selectivity bias, is specified to account for the level of the amount marketed.

In this study, the Heckman's sample selection was also employed. First, the probability of participation was modeled by Maximum Likelihood Probit, from which inverse Mill's ratios were estimated. In the second-stage, the estimated Inverse Mill's Ratio (IMR) was included as right-hand variable in the corresponding pepper supply function. The Probit model is specified as:

$$Y_i = x_i'\beta_i + \varepsilon_{i,} \qquad i = 1, \ldots, n \qquad (14)$$

Where: Y_i is a dummy variable indicating the market participation that is related to it as Y_i = 1 if $Y_i > 0$, otherwise $Y_i = 0$

β_i are the variables determining participation in the Probit model,

x_i' is unknown parameter to be estimated in the Probit regression model,

ε_i is random error term

Then the parameters can consistently be estimated by OLS over n observations reporting values for Y_i by including an estimate of the inverse Mill's Ratio, denoting λ_i, as an additional regressor in (10). More precisely selection model is specified:

$$Y_i = x_i'\beta_i + \mu\lambda_i + \eta_i \qquad (15)$$

Where Y_i is the volume of supply in the second-step,

β_i are the explanatory variables determining the quantity supply,

x_i' is unknown parameter to be estimated in the quantity supply,

μ is a parameter that shows the impact of participation on the quantity supply,

η_i is the error term

An econometric Software known as "LIMDEP" was employed to run the models (Tobit and Heckman two-stage selection). Before fitting important variables in the models (Tobit and Heckman two-stage selection) it was necessary to test multicolinearity problem among continuous variables and check associations among discrete variables, which seriously affects the parameter estimates. As Gujarati, (2003) indicates, multicolliniarity refers to a situation where it becomes difficult to identify the separate effect of independent variables on the dependent variable because existing strong relationship among them. In other words, multicollinearity is a situation where explanatory variables are highly correlated.

There are two measures that are often suggested to test the existence of multicollinearity. These are: Variance Inflation Factor (VIF) for association among the continuous explanatory variables and Contingency Coefficients (CC) for dummy variables.

Thus variance inflation factor (VIF) is used to check multicollinearity of continuous variables. As R^2 increase towards 1, it is a colinearity of explanatory variables. The larger the value of VIF, the more troublesome or collinear is the variable X_i. As a rule of thumb if the VIF greater than 10 (this will happen if R^2 is greater than 0.80) the variable is said to be highly collinear (Gujarati, 2003). Multicollinearity of continuous variables can also be tested through Tolerance. Tolerance is 1 if X_i is not correlated with the other explanatory variable, whereas it is zero if it is perfectly related to other explanatory variables. A popular measure of multicollinearity associated with the VIF is defined as

$$\text{VIF } (X_j) = \left(1 - R_j^{\,2}\right)^{-1} \qquad (16)$$

Where, $R_j^{\,2}$ is the multiple correlation coefficients between explanatory variables, the larger the value of R_j^2 is, the higher the value of VIF (X_j) causing higher collinearity in the variable (X_j).

Contingency coefficient is used to check multicollinearity of discrete variable. It measures the relationship between the raw and column variables of a cross tabulation. The value ranges

between 0 - 1 , with 0 indicating no association between the raw and column variables and value close to 1 indicating a high degree of association between variables. The decision criterion (CC $\leq$ 0.75) is that variables with the contingency coefficient is computed as follows

$$CC = \sqrt{\frac{\chi^2}{N + \chi^2}} \qquad (17)$$

Where, CC is contingency coefficient, χ^2 is chi-square test and N is total sample size.

As cited in Paulos (2002), if the value of CC is greater than 0.75, the variables are said to be collinear. Statistical package SPSS version 12 was used to compute both VIF and CC.

Hypothesis and definition of variables

In the course of identifying factors influencing pepper supply, the main task is to analyze which factor influences and how? Therefore, potential variables, which are supposed to influence pepper market participation and quantity of pepper supply, need to be explained. Accordingly, the major variables expected to have influence on both the farmers' participation decision and quantity supply are explained as follows:

Independent Variables

Quantity supplied (SOLDQUAN): It is a continuous variable which represents dependent variable; the actual supply of pepper by farm household to the market which is selected for regression analysis takes of positive value.

Market participation decision (MKT_PART): The dummy participation decision variable is the dependent variable that is regressed in the first stage of the Heckman two stage estimation procedures. For the respondents who participate in pepper market = 1, and = 0 for the respondents who did not participate in 2004/05.

Dependent Variables

Access to the market (SOLMKTDI): It is a continuous variable measured in walking time (minute) which farmers spend time to sell their product to the market. If the farmer is located in a village or distant from the market, he is poorly accessible to the market. The closer to the market the lesser would be the transportation cost and time spent. Therefore, it is hypothesized that this variable is negatively related to market participation and marketable surplus. A similar study was conducted by Holloway *et al* (1999) milk-market development in the Ethiopian highlands. His result indicates that distance-to market causes market surplus to decline. Similar issue was studied by Wolday (1994) on food grain market in the case study of Alaba Siraro, he identified that poor market access has significant and positive effect on quantity of food grain supplied.

Age of household head (AGE): It is a continuous variable and measured in years. Age is a proxy measure of farming experience of household. Aged households are believed to be wise in resource use, and it is expected to have a positive effect on market participation and marketable surplus. However, some studies used proxy variables to identify factors affecting marketable surplus. Tshiunza, et al. 2001 used age as the major farmers' characteristics that significantly affected the proportion of cooking banana planted for market. He found that younger farmers tended to produce and sale more cooking banana for market than older farmers.

Size of output (T_PEPPER): It is a continuous variable**.** A marginal increase in pepper production has obvious and significant effect in volume of pepper supply. The volume production of pepper is expected to have positive relation to market participation and marketable surplus. Singh and Rai (1998) identified factors affecting marketed surplus of buffalo milk in Haryana. They observed that milk production and price significantly affected marketed surplus positively. Also Wolday (1994) observed that output of food grains (wheat *teff* and maize) have positive effect on quantity supplied to the market.

Price of pepper (PRICE): This is a continuous variable that measured annual average price of pepper in the reference market in 2003/04 i.e. the one year lagged price of pepper. When pepper price is high in the market in the previous year, farmers would be interested to produce and supply more. Therefore price is expected to have positive relation with market participation and marketable surplus. The study of Goetz (1992) on household marketing behavior in Sub-Saharan Africa found a significant positive relationship between grain price and the probability of quantities sold.

Size of land holding (T_LAND): This is the total land holding, which is continuous variable. If the producer has large land size he would allocate more land to his cash crop (pepper). Thus, increase in size of land is expected to have direct influence on market participation and marketable surplus.

Family size (FAM_SIZE): It is a continuous variable, measured in man equivalent i.e. the availability of active labour force in the household, which affects farmer's decisions to participate in market. Since production is the function of labour, availability of labour is assumed to have positive relation with volume of supply. However, family size is expected to have positive impact on market participation and volume of sales, but larger family size requires larger amounts for consumption, reducing marketable surplus. A study by Singh and Rai (1998) found marketed surplus of buffalo milk to be negatively affected by family size. However, a study conducted by Wolday (1994) showed that household size had significant positive effect on quantity of *teff* marketed and negative effect on quantity of maize marketed. In this context family size is expected to have positive or negative impact on market participation and volume of sale.

Number of livestock owned (TLU): This is a continuous variable defined in terms of tropical livestock unit (TLU), which excludes oxen. Pepper is the cash crop of the majority of farmers. Farmer could sell more pepper when he/she produces more. On the other hand, when the household has less production, it must either borrow money or sell his livestock to meet household needs. Farmers who have low production need to specialize in livestock

production. Therefore it is expected to have negative relationship with market participation and marketable surplus.

Number of ox owned (Ox): This is a continuous variable that refers to the number of oxen the respondents owned in 2004/05. Households with high number of oxen may be engaged in more of pepper production that increases the farmers' volume of pepper supply. So, in this study, it is expected to influence positively market participation and volume of pepper.

Productivity of crop (CROP_YIE): It is continuous variable, which is calculated by dividing the total quintals of food crop produced in the household over the total cultivated land after subtracting the pepper cultivated land. If the productivity of food crops decreases, the household will be deficit in food crop production and consumption. It must either divert to pepper production (cash crop) or identify other means. Families who are deficit in food crops production should likely participate in the pepper production and sell i.e. low productivity of food crops is assumed to have positive effect on market participation and marketable surplus.

Sex of household head (SEX): It is a dummy variable; both men and women participate in production of pepper. Male households have been observed to have a better tendency than female household to enter into pepper market and volume supply. Tshiunza et al. (2000) discussed the determinants of market production of cooking banana in Nigeria. In their study the male farmers tended to produce more cooking banana for market than female farmers.

Education of household head (EDU_CAT): It is a dummy variable and refers to the formal schooling of a respondent during the survey period. Those household heads who had formal education determines the readiness to accept new ideas and innovations, and easy to get supply, demand and price information and this enhances farmers' willingness to produce more and increase volume of sales. Therefore, formal education was hypothesized to positively influence market participation and marketable surplus. Holloway et al. (1999) observed that education and visits by an extension agent had significant and positive effect on quantity of milk marketed in Ethiopian highlands.

Extension service (EXT): A dummy variable representing extension service as a source of information on technology. Those farmers who have frequent contact with extension workers are more likely to know the advantage of cash crop production like pepper. Therefore contact with extension agent is assumed to have direct relation with market participation and volume of marketable surplus.

Income from non-farming activity (NONF_INC): It is a dummy variable that show obtained from non-farming activities by the household head. This income may strength farming activity or reluctant to produce pepper to generate money from pepper rather than getting income from non farming activities. However, getting income from non farming activity is assumed to have direct or inverse relation with market participation and marketable surplus.

Credit Access (CREDITOT): This is a dummy variable, which credit indicates taken for pepper production. Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs. Therefore, it is hypothesized that access to credit would have positive influence on market participation and volume of sale.

Market information (INF_NEA): It is a dummy variable. Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to market participation and marketable surplus. In his study of household food marketing behavior, Goetz (1992) found that better information, significantly raises the probability of market participation for potential selling households.

3.5.2.2. Market integration

This paper followed co-integration and ECM that examine integration to address the question about market integration between the market prices differences in pepper markets (Addis Ababa, Alaba Kulito, Tora, Silti, Alem Gebeya and Dalocha).

Engle Granger cointegration tests

Cointegration tests consist of two steps. The first step is to examine the stationary properties of the various prices. If a series, say P_t, has a stationary, invertible and stochastic after differencing *d* times, it is said to be integrated of order *d*, and denoted by $P_t = I(d)$.

Second step is (Engle and Granger (1987)) test, which is formulation test on residuals from regression of equation (18). To investigate the long-run equilibrium relationship between two time series, the cointegration model of Engle and Granger (1987) is used. The test for cointegration is similar in form to the DF and ADF tests for the univariate case. Consider two price series, p_t^1 and p_t^2, that by themselves are non-stationary at their level and must be differenced once to generate stationarity process. A linear transformation of the two original series can result in a series that is stationary, at the same order of integration *I*(d). Engle and Granger (1987) formulation tests on residual from the cointegration regression as follows:

$$p_t^1 = \alpha + \beta_1 p_t^2 + e_t \qquad (18)$$

Where p_t^1 and p_t^2 are prices series of a specific commodity in two markets 1 and 2, t is time (for this specific study it is month) and e_t is the residual error term assumed to be distributed identically and independently. The residuals from the above equation are considered to be temporary deviation from the long run equilibrium.

Cointegration is said to for variables where, despite variables are individually non stationary, a linear combination of two or more time series can be stationary and where there is a long-run equilibrium relationship between these variables. Thus the regression on the levels of the variables is meaningful and not spurious. The ADF unit root tests are then conducted on the residual $\hat{e}_t$ obtained from equation (18):

$$\Delta\hat{e}_t = \gamma\hat{e}_{t-1} + \sum_{i=1}^{p}\gamma_i\Delta\hat{e}_{t-1} + \zeta_t \qquad (19)$$

Consider a pair of variables p_t^1 and p_t^2 each of which is integrated of order d their linear relationship can be given by:

$$\hat{e}_{t-1} = p^1_{t-1} - \alpha - p^2_{t-1} \quad (20)$$

In order to conclude that the price series are cointegrated the residuals from the equation have to follow stationarity. If the residual errors are stationary then the linear combination of the two prices is stationary (cointegrated). If the t-statistic of the coefficient not exceeds the critical value in Engle and Yoo (1987), the residuals, $\hat{e}_{t-1}$ from the cointegration equation (20) are stationary, and thus the price series p_t^1 and p_t^2 are cointegrated. When cointegration between time series is evident there is an identification of a single market.

Error Correction Model (ECM)

The model that differentiates between a long run and a short run relationship for time series analysis has been widely known as the ECM (Engle and Granger, 1987). Since the series show long-run relationship, the ECM should be applied to investigate further on short–run interaction causality between variables. When non-stationary variables in a model are verified as cointegrated, the following ECM model can be derived:

$$\Delta p_t^1 = \alpha + \Sigma \beta_1 \Delta p^1_{t-k} + \delta \Delta e_{t-1} + \Sigma \beta_2 \Delta p^2_{t-k} + \beta_3 \Delta p^2_t + \varepsilon_t \quad (21)$$

Where β_1, β_2 and B_3 are the estimated short run counterparts to the long run solution. *k* represents the lag length of the time, δ represents the speed of adjustment parameter, which indicates how fast the previous moves back towards long run equilibrium in case of deviation in the previous time period and the ε_t is stationary random process capturing other information not contained in either lagged value of p_t^1 and p_t^2. The past value of error term in the equation has an impact on the change of variable p_t^1 and p_t^2. The results of error correction show that the coefficient of the lagged error term (e_{t-1}) was found to be negative. If the two time series are cointegrated causality should exist in at least one direction (unidirectional). The error-

correction term, $e_{t-1,}$ is obtained from the cointegration equation (20) and this term captures the deviation from long-run equilibrium.

4. RESULTS AND DISCUSSION

This chapter deals with the findings, descriptive statistics and econometric models, on red pepper marketing especially, on marketing channels, and the role and linkage of marketing agents. It deals also with the analysis of quantifying costs and margins for key marketing channels and identifies factors affecting pepper supply in Alaba special woreda and Siltie zone. The chapter, in addition, examines integration between regional markets and terminal market.

4.1. Socio-Demographic Characteristics of Sample Farmers and Traders

In this part of the thesis, socio demographic characteristics of farmers (demographic characteristics, market, extension, credit and information access, farming and non farming experience, income, resource ownership, production and productivity, input used, etc.) and traders' demographic characteristics, capital (physical, social and financial) and manpower requirement are discussed one after the other.

4.1.1. Demographic characteristics of sample farmers

The demographic characteristics of farmers defined in terms of sex, religion, marital status, education level, age, and family size of household head are presented on Table 6. Sex of the sample households was comparable for the two research areas (Siltie and Alaba) and 94% of sample household were male. Regarding religion, 98% of the sample households are Muslim. However, there is a statistically significant difference in religion in the two areas at less than 10%. With regard to marital status, 90% total sample respondents are married; however, 93% of the sample respondents in Siltie, which is grater than 84% of Alaba are married household head. Table 6 shows that the chi-square test for marital status of the two areas was found to be significant at less than 5% significance level.

Table 6. Demographic characteristic of sample farmers (% and average)

Variables		N=150 Siltie	N= 100 Alaba	N=250 Total	χ^2 /t-value
Sex	Male	95.3	92	94	1.182
	Female	4.7	8		
Religion	Muslim	99.3	96	98	6.735*
	Orthodox	0.7	2	0.8	
	Protestant			0.4	
	Catholic		2	0.2	
Marital	Single	2	10	5.2	9.135**
status	Married	93.3	84	89.6	
	Divorced	0.7	6	0.4	
	Widow	4		4.8	
Education	Religious school	46	40	43.6	18.389***
	Illiterate	29	43	34.8	
	Read & write	17	2	10.8	
	High school	8	15	10.8	
Age of household head		40 (13.02)	4.6 (15.4)	42.18 (14.16)	3.218***
Family size		7.71 (2.91)	6.33 (2.62)	6.56 (2.58)	1.041

N=sample size, , ***, ** and * significantly at less than 1%, 5% and 10% significance level, respectively, Figures in parenthesis indicate standard deviation
Source: Survey result, 2006

The educational background of the sample household heads is believed to be an important feature that determines the readiness of household heads to accept new ideas and innovations. About 35% and 44% of the sample household heads were illiterate and have religious school background, respectively. However, in Siltie zone, only 29% and in Alaba about 43% of the sample households were illiterate. About 17% and only 2% can read and write whereas 8% and 15% had joined secondary school in Siltie and Alaba, respectively. The chi-square test

indicates that there is a significant difference between the two areas at 1% significance level in their education. The average age of the sample households was 42. The mean age of farmers in Siltie (40) was less than Alaba (46). The independent sample t-test revealed that there is difference at 1% level of significance on mean age of farmers in the two areas. This indicates that Siltie farmers were younger than Alaba's. The available data indicates that average family size in each household is 7 members.

Table 7 depicts that the average years of farming experience for total sampled household were 24 years. The survey result indicates that Alaba farmers (27 years) had more farming experience than Siltie (23 years) and the independent sample t-test revealed that there was difference at less than 5% level of significance on the mean years of farming experience. The table suggests that farming is the main source of household income in both study areas. The average annual farming income of the sample household for the year 2004/05 was Birr 2597 per household.

Table 7. Experience and income of farmers

	N=150 Siltie	N=100 Alaba	N=250 Total	t / χ^2 - value
Years of experience in farming (year)	22.63	26.68	24.25	2.413**
	(12.58)	(13.58)	(13.11)	
Annual farming income (Birr)	2597	2553	2579	0.310
	(1791)	(1389)	(1639)	
Non -farming experience (yes, %)	9	16	12	2.52
Non -farming experience (year)	4.64	5.47	5.35	-0.642
	3.34)	(3.66)	(3.48)	
Annual non farming income (Birr)	1661	738	1169	2.32**
	(1493)	(514)		

N=sample size, ** significantly at less than 5% significance level, Figures in parenthesis indicate standard deviation
Source: survey result, 2006

From Table 7 one can also see that non-farming is the next major source for 12% of the total sample households. These households had a mean of 5 years on non-farming experience. However, the sample households have annual average of non-farming income of Birr 1169 per household. The data in the table shows that the average annual non-farming income (Birr 1661 per /household) in Siltie was higher than in Alaba (Birr 738/household). This income was obtained from trade, those who are PAs leaders were got a salary and as civil servants salary. Analysis of independent sample t- test revealed that there is significant difference on the mean of non-farm income between two areas at less than 5% level of significance.

The nature and development of markets and development centers for factors of production (land, labour), inputs, outputs, and extension service can play a major role in determining patterns of production and sale. Where markets are well-developed and competitive, farmers can be expected to respond largely to the profitability of alternative pepper production and supply options.

With respect to the distance of the markets, about the proximity or distance of, where they sold their pepper, the respondents were asked whether the market place is far or not from their home. Accordingly, the average walking time of total sample household was 1.15 hour.

4.1.2. Resource ownership

Resource ownership is characterized in terms of livestock, ox, bee colony, land, the types of house owned and plowing tools. These are indicated in Table 8. The livestock species found in the study area are cattle, goat, sheep, donkey, mule, horse, poultry, and bee colony. Livestock is kept both for generating income and traction power. To assess the livestock holding of each household, the Tropical Livestock unit (TLU) per household was calculated. In terms of TLU, almost 100% of the total sampled household had an average of more than 5 livestock.

Table 8. Resource ownership of household

Resource		N=150 Siltie	N=100 Alaba	N=250 Total	t / χ^2 - value
TLU	(yes, %)	99	99	99.6	
	mean	5.9	4.87	5.49	1.55
		(4.27)	(2.12)	(4.32)	
Ox	(yes, %)	91	80	86.4	1.33
	mean	1.92	1.74	1.85	
		(1.07)	(0.78)	(0.97)	
Bee colony	(yes, %)	13	14	13.6	-0.74
	mean	2.15	3	2.5	
		(3.13)	(3.55)	(3.29)	
Land holding (ha)	(yes, %)	100	100	100	-1.55
	mean	1.74	1.92	1.82	
		(0.95)	(0.80)	(0.9)	
Grass roofed house	(yes, %)	99	98	98	
	mean	1.89	1.8	1.85	0.82
		(0.89)	(0.92)	(0.9)	
Iron sheet	(yes, %)	17	11	14.4	0.95
	mean	1.08	1	1.05	
		(0.28)	0	(0.23)	
Plowing tools (yes)	(yes, %)	97	93	99.2	3.81*

* significantly at less than 10% significance level Figures in the parenthesis indicates that standard deviation
Source: Survey result, 2006

Table 8 conveys that oxen provide draft power and are the major inputs in pepper production process. While this is the case the table indicates that 86% of the total sampled households had about 2 oxen. In addition to these, 14% of the total sampled households had more than 2 bee colonies. Land is one of the necessary constraints of the households in the study area. The newly formed households have no option to get their own farmlands elsewhere except sharing from their parents. As the table shows, the average farm size in sample study area was 1.82 hectares per household.

Table 8 indicates also, that about 98% of the total sample households had an average 2 grass-roofed houses and that 14% of the total sample households had an average of one iron sheet-roofed house. Plowing tools are the main factors of production in agricultural practice. About 99% of the total sampled farmers had traditional plowing tools. However, the data reveals that more Siltie farmers (97%) had plowing tools than Alaba farmers (93%). Concerning the ownership of plowing tools, the chi-square test indicated that there was statistically significant difference at less than 10% significance level.

4.1.3. Access to services

Table 9 and Table 10 below shows access to service like credit, agricultural extension, and market information, which are the most important factors that promote production and productivity thereby increasing marketable surplus and ultimately farm income.

Table 9. Extension and credit support in 2004/05

Variable	N=150 Siltie	N=100 Alaba	N=250 Total	χ^2/t
Credit need (yes, %)	55.30	70.70	61.2	5.95**
Credit taken (yes, %)	11.30	11.10	11.2	0.003
Amount credit (Birr)	593	818	681	1.095
	(410)	(682)	(533)	
Extension contact (yes, %)	63.30	6	40	81.141***

*** and ** Significant at less than1%, and 5%significance level, respectively, N=sample size, Figures in parenthesis indicate standard deviation
Source: Survey result, 2006

However, from the total of 250 sampled respondents who were asked whether they need credit or not, about 61% of the respondents pointed out that they need credit and only 11% of them had received credit. More of the Alaba farmers (71%) needed credit than Siltie (55%) farmers. The chi-square result shows that there is statistically significant difference at less

than 5% level on credit need. According to Table 9, the average credit taken by 11% of the total sampled household in 2004/05 was Birr 681 per household.

From Table 9 one can see that only 40% of the total sampled household had extension contact in relation to pepper production. The table makes clear also that more of Siltie farmers (63%) had extension contact than Alaba farmers (6%). According to the chi-square test there is a statistically different on extension services between the two areas at 1% level of significance.

Access to market information is extremely limited in the Ethiopian grain market. At the producer level, farmers have very limited information on price prevailing even in nearby markets (Wolday, 1994).

Table 10. Farmers' access to price information (percentage of farmers)

Variables		N=150 Siltie	N=100 Alaba	N=250 Total	χ^2
Information on nearby market price (Yes, %)		59	72	64	3.128*
Information on Addis Ababa market (Yes, %)		21	2	13	20.57***
Source of information	Pepper traders (%)	36	7	24.4	75.03***
	Telephone (%)	1		0.4	
	On market (%)	4	43	19.6	
	Broker (%)	3		1 .8	
	Other different sources (%)	15	29	20.4	

*** and * Significant at less than 1% and 10% significance level, respectively, N=sample size
Source: Survey result, 2006

It is assumed that producers and traders who have market information can decide how much to produce and market. Like the grain market, in the study areas, there was no organized market information system. However, Table 10 revealed that 64% of the total sampled households had pepper price information about the nearby market price before they sold their pepper. From the table one can see that more of Alaba farmers (72%) had nearby market information than Siltie farmers (59%). Only, 13% of the total sampled household was aware

of the price in Addis Ababa market. More Siltie farmers (21%) had information about market price in Addis Ababa than Alaba farmers (2%). The chi-square tests concerning nearby and Addis Ababa market price information indicate that there are statistical significant difference at less than 10% and 1% significance level, respectively.

Asked about where they obtain the market price information, 24% and 20% of the total sampled households pointed out that they obtain price information from pepper traders and personal observation on market, respectively. More of the farmers in Siltie (36%) got information from pepper traders than Alaba (7%). About 43% of Alaba farmers pointed out that they checked price information by directly participating in the market themselves while only 4% of the Siltie farmers participated on the market. The rest of the sample traders indicated that they got information from different sources like neighbors, telephone, brokers, and through the combination of pepper traders, personal observation. The chi-square test indicates that the statistical significant difference on source of market price information at less than 1% level.

4.1.4. Inputs, production and storage of pepper

Table 11 summarizes that the inputs used, which help to improve the productivity of pepper and leads to the increase of production and supply. According to the table, 52% of the total sample farmers used Urea for pepper production while about 81% of the total sample households used DAP. More of farmers in Alaba (88%) used DAP than Siltie farmers (76%). Regarding the DAP consumption, the chi-square shows that there was statistically significant difference between study areas at less than 5% significance level. The table indicates that from those who used fertilizer, about 29 kg of Urea and 52 kgs of DAP per 0.28 hectare (average cultivated area of pepper) was used for pepper production. As one can see in the table, the amount of fertilizer used between the study areas is incomparable. Siltie's sample households used about 33 kgs of Urea and 61 kg of DAP while Alaba farmers used 23 kgs of Urea and 41 kgs of DAP. In both cases amount of Urea and DAP used t-test indicates that there is significant difference at less than 1% significance level.

Table 11. Inputs used for pepper production in 2004/05

Variables	Siltie N=150	Alaba N=100	Total N=250	χ^2/t
Urea (yes, %)	53	50	52	0.032
DAP (yes, %)	76	88	80.8	6.47**
Insecticide (yes, %)	21.3	13.1	18	2.71
Herbicide (yes, %)	14	1	8.8	12.494***
Mareko Fana seed (yes, %)	16.7	1	10.4	15.633***
Unknown seed (yes, %)	75.3	99	84.4	25.809***
Urea used (kg)/pepper area (ha)	32.89	23.01	29.06	3.748***
	(21.38)	(19.23)	(21.05)	
DAP used (kg)/pepper area (ha)	61.09	40.53	52.13	3.686***
	(41.41)	(36.39)	(40.52)	
Mareko Fana seed used	4.53	4.00	4.51	0.12
(kg)/pepper area (ha)	(4.24)		(4.14)	
Unknown seed variety	4.77	4.12	4.47	1.53
(kg)/pepper area (ha)	(2.83)	(3.35)	(3.1)	

*** and ** Significant at less than 1% and 5% level respectively, N=sample size, Figures in parenthesis indicate standard deviation
Source: Survey result, 2006

The data in Table 11 shows that a small proportion of sample households used insecticide and herbicide. This is due to shortage of supply and because most of farmers bought them from market. However, the table suggests that more of Siltie farmers (14%) used herbicide than Alaba farmers (1%) and there was significantly difference at less than 1% significance level on herbicide used.

Improved seed is one of the major inputs that affect the productivity and production of crops. However, the table indicates that the majority of the sample household used unknown seed variety from market and their own production. Farmers respond that this is the major problem, which affects the productivity and production of their pepper. According to the table, about

10% and 84% of the total sampled household used *Mareko Fana*, and unknown seed variety, respectively. It is clear in the table that 17% of Siltie sample households used *Mareko Fana* variety while only 1% used it in Alaba. In Alaba, 99% of the sample households used unknown variety while 75% of Siltie's used unknown variety. The chi-square test showed that there is a statistically significant difference on *Mareko Fana* seed and unknown seed variety used between the two areas at less than 1% significance level independently. On average individual farmers used 4 kg per 0.28 hectares for *Mareko Fana* and unknown variety, individually.

The primary cash crop relative to level of cash income was red pepper for 88% of the total sample households. About 94.7% and 78.80% of sample farmers produced pepper as a primary cash crop in Siltie and Alaba, respectively.

Table 12. Area planted, production and productivity of pepper in 2004/05

	N= 135 Siltie	N=94 Alaba	N=126 Total	t-value
Pepper area cultivated (ha)	0.28	0.29	0.28	-0.65
	(0.57)	(0.66)	(0.15)	
Quantity produced (qt)	1.29	1.00	1.16	1.71*
	(1.56)	(1.04)	(1.35)	
Productivity per hectare(qt)	5.09	3.56	4.46	2.61**
	(5.76)	(3.02)	(4.88)	

** and * Significant at less than 5% and at 10% significance level, respectively, Figures in parenthesis indicate standard deviation
Source: Survey result, 2006

The land cultivated for pepper production was about 0.28 hectare in all sampled households and comparable in both areas. The average quantity production of pepper per sample household was 1.16 quintal. However, Siltie farmers produce 1.29 quintal which was more than that of Alaba farmers who produce only 1 quintal per household. Table 12 suggests that there is a statistically significant difference between the two areas in average quantity of production at 10% level of significance.

Table 12 indicates that the average production per hectare in total sample was 4.46 quintals. Productivity in Siltie was about 5 quintals which is more than Alaba 3.56 quintals per hectare in each sample household. This is because Silte's farmers used more amount of fertilizer, *Mareko Fana* seed and more of them had extension contact than Alaba farmers. In addition to these, more of Alaba farmers used unknown variety seed than Siltie farmers and this might have caused low productivity. However t-statistics indicated that there is difference at 5% significance level concerning pepper productivity.

Selecting storage system is a major farming activity in order to avoid post harvest losses. About 60% of the total sample households indicate that they put their pepper by filling in sack and placing it at '*ko*t' (shelf). The data shows that the storage system in the study areas was not identical. From Table 13 one can see that 79% of the sample households in Siltie and 46% of Alaba store their pepper by filling it in sack and placing it at *ko*t'. The table makes clear also only 18% of the household from Siltie and 48% of households from Alaba placed their pepper in store or '*gotera*'. The rest stored their pepper on the floor and in a large basket '*kefo*'. Chi-square test was indicates that there is a significant difference on storage system between the two areas at less than 1% level of significance.

According to Table 13, 126 of the sample farmers avoided sales immediately after the harvest in both areas and stored about for 5 months. The table indicates that about 67% of total sampled households responded that, the major reason for storing was high price expectation. However, about 81% the farmers in Siltie and 58% of sample households in Alaba, who stored pepper, avoid immediate sale by expecting high price. The chi-square test revealed that there was a significant difference in the underlying reason for storing pepper at less than 1% level of significance.

Table 13. Storage time, storage system and storage purpose

Variables		N= 57 Siltie	N=69 Alaba	N=126 Total	t/χ^2
System	Filling in sack & placing in 'kot' (%)	78.95	46.38	60.31	14.687***
	In store/'gotera' '(%)	17.54	47.83	34.12	
	At home (floor) (%)	3.51	4.35	1.58	
	'Kefo'(%)		1.45	0.79	
Storage time (month)		5.70	5.03	5	1.1
		(3.33)	(2.59)	(3.02)	
Reason	Expecting high price (%)	80.7	57.97	67.46	15.28***
	Lack of market demand (%)	7.02	1.45	3.96	
	Saving purpose (%)	5.26	7.25	6.34	
	Other (%)	7.02	33.33	24.60	

*** Significant at less 1% level, N= sample size, standard deviation in parenthesis
Source: Survey result, 2006

4.1.5. Demographic characteristics of traders

Table 14 summarizes the demographic characteristics of traders in terms of age, family size, sex, marital status, and religion. The survey result indicates that the sampled traders were on average 35 years old. Urban assemblers were the youngest of all other traders who were 31 years old on the average. Family size differs across the markets and the average family members are 7.

Traders had 8 years of experience on the average. Wholesalers (regional and urban) are more experienced, and had much exposure to trade. The survey indicates that 80% of the sample traders were males while 20% of them are females. However, the chi-square test indicates a significantly difference at 5% significance level on sex distribution among markets. About 74% of traders were Muslims while the remaining were Orthodox Christians, Protestants and Catholics. The chi-square result indicates that there is a 1% significance difference on religion distribution among markets. From sample traders 78% were married, and 41% and 43% of the

sample traders are within the level of primary and secondary school education, respectively and only 4% of the traders are joined higher learning institutes.

Table 14. Demographic characteristics of traders

Variable		Alaba Kullito	Besheno	Guba	Kobo	Sitti	Dalocha	Tora	Alem Gebeya	Addis Ababa /Merkato	Toital	t/χ^2
Age (year)		37	32	31	23	31	32	35	41	38	35	0.735
		(8.55)	(8.74)	(1.4)1	((3.46)	(8.35)	(7.66)	(7.78)	(8.50)	(11.61)	(8.97)	
Family size		9	9	7	5	12	4	8	7	5	7	4.519
		(2.64)	(5.86)	(1.41)	(1.15)	(14.65)	(2.68)	(4.73)	(4.11)	(2.62)	(5.83)	
Trade experience (Year)		10	5	9	4	8	7	6	10	7	8	0.707
		(5.42)	(1.53)	(9.19)	(3.21)	(3.36)	(4.85)	(3.63)	(4.65)	(5.86)	(4.83)	
Sex	Male (%)	20	7	2	4	4	11	13	9	11	80	15.77**
	Female (%)	2		2	2	7				7	20	
Religion	Muslim(%)	2	7	2		9	9	13	7	17	74	48.22***
	Orthodox Cri. (%)	2			2	2	2		2		11	
	Protestant (%)	9			4						13	
	Catholic (%)			2							2	
Marital	Single (%)	4			2		4	2		4	17	18.68
status	Married (%)	17	7	4	4	9	7	2	9	2	78	
	Divorced (%)									2	2	
	Widows (%)					2					2	
Educational	Illiterate (%)				2					2	4	43.4
level	Read and write (%)		2					2	2		7	
	Elementary (%)	9	2	2	2	4	7	7	7	2	41	
	High school (%)	2	2	2	2	7	4	4		2	43	
	Above 12 (%)	2								2	4	

figures in parenthesis indicate standard deviation
Source: survey result, 2006

4.1.6. Resource ownership of traders

Physical assets: Physical assets related to their business are summarized in Table 15. The survey indicates that 22% of the sample traders reported that they had a separate place of storage while 20% of them indicate that they had residence store. Especially, wholesalers (regional and urban) and urban assemblers assemble pepper from one or more markets and transport to regional or terminal markets for sale. Traders' average storage holding capacity for such separate store was 73 quintal whereas the residence store was 5 quintals. Traders' separate store with the largest capacity was found in terminal market especially with the average capacity of 225 quintals for urban wholesalers. The chi-square test indicates that there is a significantly difference regarding ownership of separate store at 10% significant level. About 74% of the traders store their pepper for 50 days on average before sale. Farmer traders store for 10 days before they sale while regional sellers store their pepper for about 99 days before they sale.

Only 11% and 17% of the total sample traders had mobile phone and land line telephone, respectively. In terms of value, vehicles are clearly the most important. However, ownership of vehicles is highly concentrated with a small proportion of surveyed traders. Thus, only 7% of traders (regional wholesalers in Alaba Kulito market) had vehicle. About 9% of sample traders (in Alaba Kulito) own bicycle. In terms of equipment, 63% of the surveyed traders own weighing scale and the rest borrow from other traders' scale. For transporting pepper from collection point to store and market, and from store to market, only 11% and 4% of traders had hand pool cart and pack animals, respectively. Among the sample traders, 9% had shop (shade) and 7% had collecting place in the market.

Table 15. Physical assets owned by pepper traders (2004/05)

Variables	Alaba Kullito	Besheno	Guba	Kobo	Sitti	Dalocha	Tora	Alem Gebeya	Addis Ababa /Merkato	Toital	t/χ^2
Separate store (yes, %)	9				2	2	2	2	4	22	10*
Separate store capacity(qt)	24				2	22	10	100	225	73	3.78
	(24)								(106)	(98)	
Residence store (yes, %)			2		7	4	4	2		20	2.778
Residence store capacity(qt)			3		5	9	10	4		5	
					(0.7)	(7.77)				(4)	
Mobile telephone (yes, %)	4								7	11	0.833
Land line telephone (yes, %)	9				4				4	17	
Truck (yes, %)	7									7	
Bicycle (yes, %)	9									9	
Weighing scale (yes, %)	2	4	4	4	4	9	9	9	9	63	
Hand pool cart (yes, %)				4	4		2			11	
Pack animal (yes, %)						4				4	4
Shop(shed) (yes, %)				2	2				4	9	
Purchasing place (yes, %)						4	2			7	

* significantly at less than 10% level, figures in parenthesis indicate standard deviation
Source: survey result, 2006

Financial capital: Table 16 reveals that the average nominal value of the 2004/05 working capital of pepper traders is more than 2.5 times greater than their initial capital and initial capital varied from Nil to Birr 30000. Sampled traders, had average working capital of Birr 9691 in 2004/05. The working capital of this year varies from Nil to 100,000. The regional wholesalers had the highest average capital of Birr 3129. The χ^2- test for mean difference is at 10% significance level among markets on the 2004/05 working capital.

The table shows that most of the working capital comes from internal sources and the external finance is extremely limited. About 63% of pointed out that they the sample traders used their own fund and only 22% of them was used personal loan. The rest of them took working capitals from bank and the combination of personal saving, micro finance, personal loan, gift and share funds. Table 15 suggests again that the loan repayment duration was determined in month, weekly and monthly basis. However 13% of debtors repay their loan when they have money at hand and the other 7% of the sample trader are limited to repay within a month and week, individually. Only 4% of the sample trader could pay the loan they paid daily basis.

Table 16 . Financial capital of pepper traders

Variables		Alaba Kullito	Besheno	Guba	Kobo	Sitti	Dalocha	Tora	Alem Gebeya	Addis Ababa /Merkato	Toital	t/χ^2
Initial working Capital (birr)	Mean	3997	2100	175	77	536	4760	1233	725	1588	2094	5.85
	Minimum	0	0	50	30	30	0	200	200	0	0	
	Maximum	30000	6000	300	100	2000	20000	6000	2000	5000	30000	
Working capital in 2004/05 (birr)	Mean	25600	5400	1550	367	2320	15660	5083	4125	4063	9691	13.74*
	Minimum	2000	0	600	200	100	100	400	2000	500	0	
	Maximum	100000	15000	2500	700	4600	60000	25000	7000	10000	100000	
Source of working capital (2004/05)	own	17	4	4	4		7	9	4	13	63	45.1
	Personal loan	2				7	4	4	2	2	22	
	bank					2					2	
	other									2	2	
Repayment schedule	monthly		2			2	2				7	28
	when money was available				2	4		2	2	2	13	
	daily						2	2			4	
	weekly	4							2		7	

* significantly at less than 10% level
Source: survey result, 2006

Social capital: Social capital is summarized in Table 17. It is broadly defined as a 'stock' of trust resulting from close functional or emotional attachment to a group or society that facilitates the provision of public goods (Fukuyama 1995). With respect to previous occupation prior to becoming involved with pepper trade, one fourth of the sample traders previously worked in different trading activities, and three fourth of them works in non-trading activities. Previous trade experience is nearly in non-agricultural trade and agricultural trade. In terms of parental background, most of the traders came from a non-trading family background. The table shows that about 61% of traders had farmer father. The obtained data indicates that 24% of the sample traders were from trading pepper, of pepper trader fathers most of them found in Addis Ababa market. The rest are engaged in other different trading activities. According to the data, traders' mothers have different occupations. However, 80% of them were housewives and 15% were involved in pepper trade. Most of pepper trader mothers are found in the terminal market.

Suppliers and buyers are from different ethnic and religious groups. About 39% of the sample traders are not ethnically nor religiously related, 17% met socially, and the rest had the combination of relation in religion, social, close relative, no relation and have ethnic relation with their suppliers. This indicates that the existing relationships are based on business trust rather than ethnic, social or family relationships. This is due to the fact that most of the suppliers in regional markets were farmers. About 59% of sample traders are related to their buyers as client *dembegna*. And 22% of the sampled traders had no relationship with their buyers, and only 2% were close relatives. The rest are the combination of relative, exclusive relations and social relations. This indicates that these relationships are based on client.

Traders often deal with regular suppliers and buyers. Among the sample traders, 76% of traders have an average of 9 regular buyers in 2004/05. Addis Ababa market traders have the highest number of regular buyers (23 on average). And 28% of sample traders have an average of 6 regular suppliers. Therefore, the transactions with suppliers are conducted through non-regulars whereas transaction with buyers is through regulars.

Table 17. Social capital of pepper traders (2004/05) (percentage of traders)

Indicators		Alaba Kullito	Besheno	Guba	Kobo	Sitti	Dalocha	Tora	Alem Gebeya	Addis Ababa /Merkato	Total	t/χ^2
Previous occupation	Trading	2	2	2	2	2	2	4	4	2	24	63
	Non trading	15	7	2	7	7	4	9	7	15	72	
Father's occupation	Farmer	17	4	2	4	2	7	13	9	2	61	74.04***
	Pepper trader	4	2			2				15	24	
	Other trade			2	2	7	4				15	
Mother's occupation	Farmer							2	2		4	16.2
	Pepper trader				2			2		11	15	
	House wife	22	7	4	4	11	11	9	7	7	80	
Supplier relation	No relationship	4	2	4	7	4	7	4	4	2	39	64.43
	Meet socially	2				4	2			9	17	
	Other	15	4			2	2	9	4	7	43	
Buyer relation	Close relative								2		2	62.23**
	No relation			2	2	7	4	4	2		22	
	Client	20	4	2	2	2	7	9	2	11	59	
	Other	2	2		2	2			2	7	17	
Regular buyers	Yes	20	7	4	0	7	9	11	7	13	76	13.11
Number of regular buyers	Mean	5	3	2		3	2	4	6	23	9	
		(5.38)	(1.15)	(1.41)		(3.21)	(2.30)	(3.14)	(5)	(41.66)	(21.7)	
Regular suppliers	Yes	9	7	13							28	12.11
Number of regular supplier	Mean	1				8		10		2	6	
		(2)				(7)		(9)		(4)	(3)	
Supplier attract	Better price	2	2		7	4	2	7	2	4	30	40.1
	Fair scaling	11	4	4		4	4	7	7	7	48	
	Other	4				2	2			2	11	
Attract buyers	Better price			9							9	71.03
	Quality	4	4	50							59	
	Fair scaling			2							2	
	Other		4	26							30	
Number of language spoken		3.5	3.7	3.5	3.0	2.6	2.0	3.2	3.0	2.9	3.0	14.97**
		(0.85)	(0.58)	(0.71)	(0.00)	(0.55)	(0.00)	(1.17)	(0.82)	(0.64)	(0.83)	

Figures in the parenthesis indicates that standard deviation
Source: survey result, 2006

The data in Table 17 shows that pepper traders use different methods to approach their supplier and buyers. About 30% and 48% of them attract their suppliers by paying better price than others and fair scaling, respectively. The rest of them use both methods to approach their supplier. Traders express their loyalty to their buyers by the quality of their product. About 59% of sample traders used this method to attract their buyers. The rest used charge better price than others, fair scaling and other methods used to attract their buyers.

On average traders could speak about 3 languages which help them to communicate with other traders and farmers. However *Siltigha* language is spoken next to Amharic. Even in Alba special woreda markets, Siltigna is more popular and all regional wholesalers came from Silie ethnic group. Pepper traders do not seem to be organized into any formal groups or associations that may play a role in the marketing process by providing various services and price formation. No one of the sample traders reported being a member of a formal association and only 2% of them have informal credit societies called I*kub.*

Table 18. Manpower of pepper traders

	Alaba Kullito	Besheno	Sitti	Dalocha	Tora	Alem Gebeya	Addis Ababa /Merkato	Total
Employees (Yes, %)	20	4	2	9	7	2	7	50
No. of family	4	2		4	4	1	3	3.5
	(4)			(2)	(2)		(4)	(3)
No. of non-family	3	2	1	2	4	3		3
	(1)			(1)	(2)			(1)
Total employee	5	2		4	6	4	3	4
	(3)		(1)	(1)	(3)		(4)	(3)

Figures in the parenthesis indicates standard deviation
Source: survey result, 2006

Trader's manpower: Table 18 indicates that apart from the trader himself or herself, the traders employ assistants to help them carry out their business. About 50% of the sample traders have average employed on a total of 4 individuals. The average number of family and

non family employees is almost similar. This simply indicates that pepper trade is non family based business.

4.2. Major Production and Marketing Constrains

There are a number of highlighted constraints that hamper further development of the pepper sector in Siltie and Alaba. The following production and marketing problems were the main issues indicated by various respondents.

4.2.1. Production and marketing problem of farmers

Given the current production levels and the production of pepper for market as a deriving motive, there appears that the farmers have market problem. However, the less possibility of improved production and expansion of pepper might decrease the amount of pepper sold and create problems in marketing.

Table 19 summarizes production issues that impact on pepper trade potential. Thr table shos that primarily, pepper diseases were indicated as the major hindrance of production by 96% of the farmers. Diseases to pepper are also critical problems that affect quality. The disease defined by local name are: *Girf_Akimit(Bubala), wag, (ametinitHucha), and Kishkisht* with different symptom. The other constraints identified were poor access to agricultural inputs such as fertilizer, seed and chemical in order of importance. About 83%, 72% and 42% of sample farmers reported that lack of these respective inputs are causes for low productivity. Due to delay in distribution, fertilizer in particular, farmers could not apply to increase marketable surplus. Regarding seed, most of the farmers used seed form their own production or bought unknown variety from the market which may result in low quality of pepper. The table reveals that access to credit was very limited, and 40% of farmers confirm that there was credit problem which resulting decrease in pepper production. Since it is only the cash crop and expensive and light to load relative to other crops, about 38% of farmers are exposed to

theft on the survey year. Farmers watch their farms since pepper starts to mature and after its harvest.

Table 19. Production and marketing problems of households (% of farmers)

	N=150 Silti	N=100 Alaba	N=250 Total
Disease	96.7	96	96.4
Fertilizer supply	72.0	99	82.8
Seed supply	56.7	95	72
Chemical	28.7	63	42.4
Credit	25.3	61	39.6
Theft	48.0	24	38.4
Price setting	43.3	79	57.6
Scale	44.7	61	51.2
Tax	59.33	25	45.6
Demand	11.3	51	27.2

N= Sample size
Source: Survey results, 2006

Price setting is the major problem of marketing. Farmers could not set price for their product. The reasons stated by farmers are: usually price set by traders, more unstable pepper price than other crops, and lack of real price information from terminal market and no direct relation with traders. About 58% of the farmers' pepper was set by traders. Weighing or scale is the second marketing problem for 51% of the farmers. Even if farmers have knowledge about weighing, they are not allowed to check the scales. Another factor that has been found to have adversely affected pepper marketing was the high and multiple taxes in regional markets. Farmers had to pay tax before pepper sold. This forces them to sell at village market at low price. About 46% of them responded that tax is the other major problem related to market. About, 27% of the sample farmers responded that face is a demand problem, due to low quality of pepper caused by of disease, increase in supply in other parts of the country and absence of regular buyers.

4.2.2. Marketing constraints of traders

Table 20 indicates the major problems faced by pepper traders: adulteration, natural quality, capital shortage, demand, government support, supply shortage, access to credit, farmers' reluctance to sell, administrative problems, competition with licensed traders, road, theft, competition with unlicensed and unlicensed traders, storage, telephone services, information flow, health, unstable prices, packaging, broker, bank service and journey are reported as the problems. Only some of the most important problems are briefly discussed below:

Table 20. Marketing problems of pepper traders (% of traders)

Problems	N= 18 Alaba	N= 20 Siltie Zone	N=8 Addis Ababa	Total N=46
Adulteration	100	90		93.5
Natural quality	94.4	90	62.5	89.1
Capital shortage	94.4	90		87.0
Lack of demand	83.3	70		78.3
Absence of government support	83.3	75		76.1
Supply shortage	66.7	80		71.7
Access to credit	72.2	80		69.6
Farmers' reluctant to sell	72.2	75		67.4
Administrative	50	80	25.0	58.7
Transport	44.4	75	12.5	52.17
Theft	50	40		41.3
competition with unlicensed	27.8	55		34.8

N= Sample size
Source: Survey results, 2006

Adulteration is the major problem. Improving quality of pepper starts from production, harvesting, and storing of pepper by farmers. However about 94% of the sample traders confirmed that they face adulteration problems. About 89% of them confirmed that they faced

quality problems due to disease; farmers' low quality seeds from markets, drought and lack of inputs for farmers.

According to Table 20, about 87% of the traders indicated that they face capital shortage to conduct and expand their business. This is due to lack of lending institutions and most of the traders sold their pepper on credit to their buyers (other traders). About 78% of them reported that they face demand problem due to limited number of buyers, high supply of pepper in other parts of the country (Tedelle, in Gurage zone), and low quality of pepper due to disease, road and transportation problem, especially in Alem Gebya and Besheno markets. Their other problem is unstable price of pepper causes demand problem.

The table revealed that 76% of traders complain that the government didn't support, and didn't focus on pepper trade (which is similar to other grain traders) by building storage facility like '*ehil berenda'* and credit facility. They also complain that they could not get regular buyers and could not sell their product to governmental organization unless they register for value added tax (VAT). This according to them is because pepper trade is seasonal and operated only few months. Traders in terminal markets also complain that they are forced to pay annual tax while their business is only for limited months. About 72% of them face supply shortage due to pepper storage by farmers by expecting high price, but instead exposing it to damage in the store. According to the traders, disease of pepper plant, drought and large number of buyers in the specific market are also the cause of supply shortage.

Access to credit was reported by the sample traders as limiting factor in operation and business expansion. The problems in acquiring loan occur from lack of collateral for micro finance and banks. Even if there is an access to credit, the complexity of process to get credit from micro finance, and high interest rate discourage loan. Pepper trade is seasonal and its profitability is doubtful for informal lenders. Therefore nobody wants to lend for pepper traders. Despite the fact that 70% of those interviewed reported did not obtain any credit.

About 67% of the traders respond that farmers reluctant to sell their produce on time due to lack of real price information, the low price offer, and their low quality of pepper fetched low

price. About 59% of the traders face administrative problems. Among the administrative problems they face are high municipality charge and Inland Revenue, multiple and double tax, and absence of discrimination between big and small traders with regard to licensing.

The other infrastructural problem is that village markets are connected with the woreda town markets by poorly paved roads. Human portages and pack animals are the most frequently used to transport larger loads. Many of the roads to the village markets are difficult for vehicles during rainy season. In town, varieties of forms of transport are hired to get bags of pepper from farmers to wholesale points, including donkeys and trucks. However, 52% of the traders reported that there was transport problem. Kobo, Dalocha, Tora and Alem Gebeya road are inaccessible for vehicles for 3 to 4 months. Especially Besheno, Alem Gebeya and Kobo market roads are very rugged and difficult for vehicles. It was observed that Isuzu trucks are the only and best means of transport for traders and to move goods from place to place. From June to September Isuzu trucks go to the market with digging tools, which help them to take out the truck from mud. If the road is muddy, trucks will stay up to 3 days with their load in the road. Under such cases traders are forced to pay high transportation cost to cover the time cost.

All sample traders from Besheno, Alem Gebeya and Kobo markets reported that they could get transport only on market days and contract. Because of transportation problems, mobile traders couldn't reach to the market on time. Under such circumstance, farmers will be unable to sell their product and return it back home from the market.

Theft is another problem in the survey areas. According to traders from regional markets, 41% of the sample traders face theft problem due to packaging problem, the product may remain on the ground thereby making it conducive to thieves. Some of traders face theft problem at the time of their journey, because they transport their pepper at night. For example, in Alaba Kulito market where purchasing price setting is done at night traders forced to transport their produce at night. The small trucks and pick-ups that bring pepper from different regional markets to Addis Ababa terminal market arrive and park in open spaces within the market boundaries. Selling is conducted in a confused and crowded environment.

Traders often complain about theft and being cheated by the brokers in the terminal market.

The study indicates that lack of a uniform mechanism to enforce licensing requirements with regard to all traders is the most important problem in the pepper markets. About 35% of the traders reported that the absence of government control on un-licensed merchants. Although the law requires merchants to acquire a licence from the regional authorities in order to engage in pepper trading, licensed traders allege that this is not well enforced and provides an un-even playing field in pepper trading.

4.3. Structure and Conduct of Pepper Markets

In this part of the thesis pepper marketing participants, their role and linkages, market channels, market structure and conducts are discussed.

4.3.1. Pepper marketing participants, their roles and linkages

In this study, different pepper market participants were identified in the exchange functions between farmer and final consumer. Market participants in the study areas include: producers/farmers, farmer traders, urban assemblers, wholesalers (regional and urban), retailers, processors (millers, *Balitina* shops, and ESEF) and commission agent. Even though, each participant was involved in different activities (wholesale, retail, assembly etc), based on major activity undertaken, the sampled market participants were categorized into different categories.

Producers: Table 21 below shows farmers' market outlet. Producers or farmers produce and harvest their pepper. They transport pepper to the nearest markets (village market) or regional markets themselves, either carrying sack themselves or using donkeys, over a distance of 1.15 hours on an average. They had several marketing options, selling directly or selling through broker to assemblers (*shoke negade* and urban assemblers) and regional wholesalers. Alternatively, they sell to village assemblers known as "farmer traders" who assemble pepper

from large number of farmers. Farmers also sell their products directly to urban wholesalers in regional markets who move from terminal market to regional market. Some of the farmers in the sample also sold their pepper to ESEF in the terminal market.

Village markets are markets which are the closest to the nearest of farmers, but has less marketing facilities (transport, electricity, water etc) and farmers sell small quantity of pepper. Regional markets are surplus markets, which are found in the woreda town where, most of surplus agricultural products are transacted. Terminal markets are deficit markets which are found in town, and most of surplus products flow to these markets.

Table 21. Farmer's market outlet

Agents	% of farmers outlet
Regional Wholesaler	44.2
Farmer trader	6.6
Urban assembler	27.9
Commission agent	1.2
Urban wholesaler	12.3
ESEF	8

Source: Survey result, 2006

Farmer trader/village assemblers: Farmer traders/village assemblers are farmers or part-time traders in the assembly markets who collect pepper from farmers in village markets for the purpose of reselling it to consumers or regional wholesalers in regional market. They use their financial resources and their local knowledge to bulk pepper from the surrounding area.

Urban assembler: The assemblers play important role in the system of assembly. Not only they not only do they know the areas of surplus well, but also speak the local language well. Moreover, the assemble traders could be classified by size of the working capital, as large and small assembler. Those who have small capital act as rural assemblers with local name '*shoke negade'*. They buy pepper from farmers in small village markets to resell to regional

wholesaler or urban assemblers who have large capital. The majority of '*shoke negades'* are female who have hand-weighing scale with maximum measuring capacity of 50 kg.

Urban assemblers have larger capital than '*shoke negade'* and they buy pepper from farmers and *'shoke negade'* in the regional market to resell to consumers and wholesalers (urban and regional) in regional and terminal markets. Assemblers also relieve their customers of the burden of quality by controlling the small quantities of pepper typically offered by farmers. To some extent, the assemblers also sort well-dried grade and a lower quality (discolored). Once the required quantities have been gathered, the assemblers contact the purchaser. Their customers are usually regional wholesalers. The assemblers often receive cash from wholesalers after they sell the pepper in the terminal market.

Brokers: Brokers are agents who work for a commission on behalf of other participants. They specialize in bringing the buyers and sellers together. They disseminate price and other information to the market participants and they play the leading role in influencing pepper trade and price formation mainly in Addis Ababa. These intermediaries play important role in the process of arbitrage on Tora and Alaba markets, in particular for farmers and non-resident wholesalers. They get their reward on *feresula* basis (2 birr *per feresula*) or about Birr 20 birr per market day from individual trader.

Wholesalers: Wholesalers are someone who buys large quantities of goods and resells to merchants rather than to the ultimate customers. Wholesalers are the major actors in the marketing channels. There are two major categories of traders:

Regional wholesalers: Regional wholesalers are those who reside in woreda town and purchase pepper either through broker or directly from farmer or farmer trader or urban assemblers or commission agents. They re-sack it to big sack "*teka*" or they may directly purchase it with "*teka*" and supply the pepper to the terminal market (Addis Ababa) and other deficit markets. They had three market outlets; they sell to retailer or urban wholesalers, or to the ESEF in the terminal market. *Balitina* shops also purchase their raw material from Regional wholesalers.

Urban wholesalers: Urban wholesalers are terminal market wholesalers who reside in terminal market (Addis Ababa) and travel to regional market to buy pepper through the service of a broker or directly from farmers or regional wholesalers or urban assemblers. Wholesalers in the terminal market purchase pepper in bulk from regional wholesalers in terminal market and sell it to retailers. They also serve as retailers in their local area and to a large extent also supply pepper to '*balitina*' shops and millers.

Urban Retailers: Retailers are persons or company that sells commodity to end users. The majority of pepper retailers in the terminal market is characterized by, no stores and shops, often trading whole pepper purchased from wholesalers (regional or urban) or farmer traders or urban assemblers or farmers. There are no retailers in regional markets therefore rural consumers can buy from urban assemblers or farmer traders or farmers.

Commission Agents: Commission agents are buyers in the village or regional markets from farmers to sell pepper to regional wholesalers. They do not invest their own capital. These actors are pre-financed by regional wholesalers and buy pepper on their instructions. Commission agents obtain their reward from the price difference between the price they paid and the price that is agreed to be paid by regional wholesalers.

***Balitina* Shops:** '*Balitina*' shops play major role in pepper trading and processing. There are about 8 well known '*Balitina*' shops that are found in Addis Ababa. They buy whole pepper from rural and urban wholesalers. They process and sell pepper to consumers and to retailers in Addis Ababa. Some of '*Balitina*' shops have agents in other parts of the country and sell through these agents for domestic consumption and export market.

Spice extraction factories: There are two extraction factories engaged in the production of paprika capsicum, turmeric, and ginger oleoresin: Ethiopian Spice Extraction Factory (ESEF), and KASSK Spices and Herbs Extraction Factory. The two factories extract different types of oleoresins from pepper, ginger, and turmeric. At present, the factories' major product is oleoresin from pepper.

The ESEF established the plant primarily to extract oleoresin paprika from red peppers grown in the southern part of Ethiopia. Formerly, the entire product was exported to the United States. The Company was nationalized in the late 1970's under the socialist *Derg* regime. ESEF obtained its raw material from Dalocha market from both traders and farmers. By 2004/05, it actually bought 21506 quintals to supply pepper flour to domestic market and to extract oleoresin for export.

Millers: Millers are owners of pepper mills who process the pepper. Usually they buy low quality pepper at low price directly from regional and urban wholesalers and use low quality spice to resell their processed product to consumers or retailers. In addition to this, they provide grinding services to *'Balitina'* shops, wholesalers, and consumers.

4.3.2. Marketing channels

According to Mendoza (1995), marketing channel is the sequence of intermediaries through which whole pepper passes from farmers to consumers. 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 the final destination (consumer).

The pepper market channels, depicted in figure 3, were constructed based on the data collected in 9 markets. The result revealed that there are 8 major marketing channels obtained from traders' survey. Informal survey suggested that there are also a possibilities that farmers sell their products directly to consumers and retailers (channel IX and X). The actual marketing channel is more complicated, but the main marketing channels of the 9 pepper markets in terms of quantity flow of pepper in 2004/05 is from producer to consumer through different intermediaries are:

Channel I Farmer-Regional wholesaler-Retailer-Consumer
Channel II Farmer-Regional wholesaler-Urban wholesaler-Retailer-Consumer
Channel III Farmer-Urban assembler-Regional wholesaler-Retailer-Consumer
Channel IV Farmer-Urban assembler-Regional wholesaler-*Balitina* shops-Consumer

Channel V Farmer-Urban assembler-Retailer-Consumer

Channel VI Farmer-Urban wholesaler-Consumer

Channel VII Farmer-Urban wholesaler-Millers –consumer

Channel VIII Farmer-ESEF-consumer

Channel IX Farmer-Consumer

Channel X Farmer- Consumer

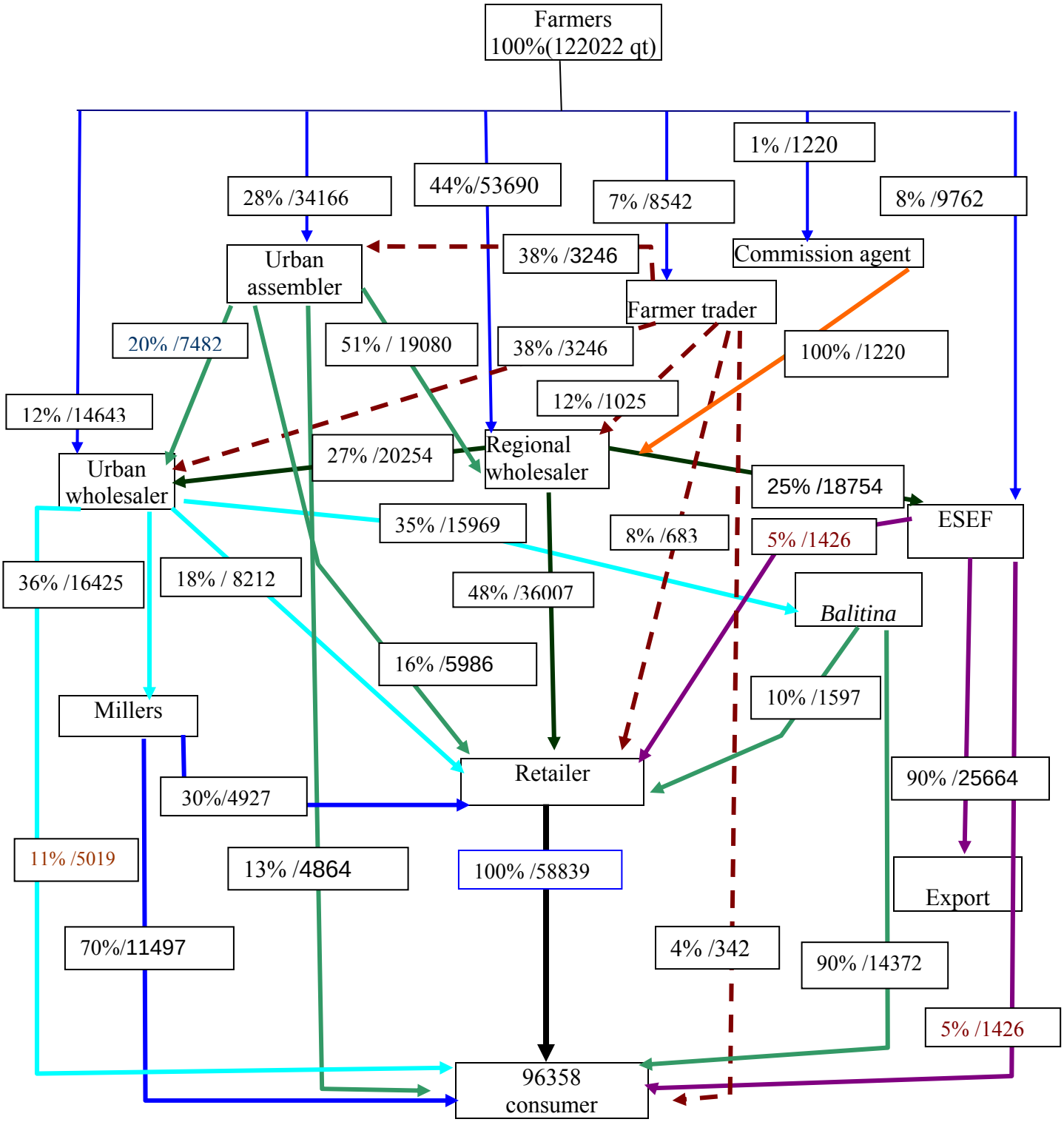

Fig. 3 Pepper marketing channels of 9 markets, 2004/2005 (percentage and quintals)

Source: Survey result

Proportion of pepper purchased from farmers by regional wholesalers, farmer traders, urban assemblers, commission agent, urban wholesalers and ESEF are indicated in Table 21.

The percentage and quantity of marketed quantity flows from farmers to consumers is indicated in Figure 3. The figure depicts the various market participants, their relationships, the options available in different market participants in buying or selling pepper, and the estimated percentage and quantity of pepper passing through the altrnative channels. During main season (*Meher*) total production of pepper was 107863 and 32392 quintals in Siltie and Alaba, respectively in 2004/05 (CSA 2006). The total production was 140255 qintals and 87% (122022 quintals) of the total production was marketed. As can been seen from the figure regional wholesalers and urban assemblers are the principal actors in regional pepper markets. Regional wholesaler and urban assemblers purchase 44% (53690 quintals) and 28% (34166 quintals) of farmers produce, respectively. Figure 3 indicates that farmers supplied 12% (14643 quintals) to regional wholesalers. The survey result estimates that farmers supplied 8% (9762 quintals) of the total production to ESEF. The rest 7% (8542 quintals) and 1% (1220 quintals) of farmers' produce passed through farmer traders and commission agents, respectively.

4.3.3. Structure of the market

The structure of the pepper marketing system should be evaluated in terms of the degree of market concentration, barrier to entry (licensing procedure, lack of capital and know how, and policy barriers), and the degree of transparency (Pender et. al 2004).

In this study the structure of the pepper market is characterized using the following indicators: market concentration, the degree of transparency (market information) and entry conditions (licensing procedure, lack of capital and know how).

4.3.3.1. Degree of market concentration

Pepper market shows concentrated buyers. The analysis of the degree of market concentration was carried in Addis Ababa, Alaba Kullito, and Tora sample markets. Concentration was calculated by taking annual volume of purchased pepper in 2004/05 from sample traders' survey at area level (Siltie zone, Alaba special woreda and Addis Ababa). The result shows that in Addis Ababa, Alaba Kulito and Tora, pepper traders were relatively concentrated in the hands of few traders (Table 22).

Table 22. Concentration ratio for sample markets 2004/05

Sample markets	Concentration index top four firms (%)
Addis Ababa (Merkato)- processors	90.3
Alaba Kullito –Regional Wholesaler	87.57
Tora- Reagional Wholesaler	70.42

Source: Survey result, 2006

In Addis Ababa, the four largest traders handled 90% of the total volume of purchased pepper. From this, ESEF accounted 75% of the total volume of the purchase. In Alaba Kulito (from Alaba special woreda markets) and Tora (from Siltie zone markets) markets the four largest traders handled 88% and 70% from the total volume of purchased, respectively were found.

Applying the market structure criteria suggested by Kohls and Uhl (1985), the pepper market shows that strongly oligopolyistic market in Addis Ababa, Alaba kulito and Tora markets. This suggests that there is market imperfection because a few traders seem to have monopolized the pepper market.

4.2.3.2. Degree of market transparency

There is system of dissemination of market information. However it is not transparent among pepper traders in sample markets and farmers. About 74% of the traders stated willingness to pay for information cost, if there were well organized and transparent information center. However, in the sample markets, all traders had information through different sources. Pepper traders rely on contact with brokers and other traders to obtain market information regarding price in Addis Ababa. Moreover, information on price in the nearby market is unevenly distributed among all sample traders indicating that they have access to their information.

Survey result indicated that 38% of the sample traders got price information through the combination of telephone, personal observation and other traders and brokers. About 28% and 17 % of the traders knew price by personal observation and from other traders, respectively. The rest of traders had information through telephone only and through apparent acts of traders interested to buy large quantity of pepper at higher price. It was observed that many small urban assemblers line up near by telephone office on the market day to check Addis Ababa market price before they sell to urban wholesalers or urban assemblers. In these cases price information was the main problem in pepper market.

4.3.3.3. Barrier to entry

Licensing Procedure: Based on the informal survey results, there were about 200 different unlicensed traders in each market.In Siltie zone, there were only two traders (wholesalers) registered with the initial capital of 10,000 Birr each. According to this study there are no restrictions to enter in the pepper markets in respect to license in Siltie zone markets.

In Alaba special woreda except small markets; Kobo, Besheno and Guba markets all traders had trade license. There were 69 traders registered according to their capital who reside in Alaba Kulito town. There are two types of registration; those who have an initial capital of 10,000 Birr are considered as wholesalers. They purchase pepper in regional markets and

transported to terminal markets (Addis Ababa or deficit areas). Those who are registered with initial capital of 300 birr are considered as retailer/urban assemblers and can purchase and sell in regional markets only.

But from the sampled traders 33% of them have pepper-trade license and 67% of the sample traders had no pepper-trade license. According to the survey result more than 50 percent of the traders responded that it is easy to get pepper trade license if they fulfill the initial capital requirement. In practice, however, this is not the case, as most of the traders operating in the study areas had no pepper-trade license; therefore it seems that, there was no restriction to enter in the pepper markets with relation to pepper trading license.

Capital: Traders were constrained from receiving credit from micro finance for lack of guarantor and complicated process to get credit. In the survey about 87% (Table 20) of the sample traders respond that major problem to run their business was lack of capital. In interviews, they stated that their greatest constraint is access to finance, which they view as a constraining factor in expanding their scale of operations, achieving greater efficiency, and engaging in the long-term storage needed. In these cases, capital requirement discourage entry into pepper trading.

Level of Education: As indicated in Table 14, 41% and 43% of sample traders had received elementary and secondary schooling, respectively. About 4% had joined higher education and the rest did not have formal education. This indicates that the level of formal education seem to be a barrier to entry because majority of pepper traders had formal education.

Lack of experience: From survey result more tan 50% had been in pepper trading business for more than 5 years. Survey result reveals that, 43%, 35%, 13% and 9% of traders had 1-5, 6-10, and 11-15 and 16-20 years of experience, respectively (Table 23).

The majority of traders found in over all markets that had 1-5 and 6-10 years of experience. There appears relatively high variation within a sample that it is from 2 to 20 years of

experience. This may explain that there is no barrier to entry in pepper trade with respect to years of experience.

Table 23. Experience in pepper trading

Years range	N=46 Total	%
1-5	20	43.5
6-10	16	34.8
11-16	6	13.0
16-20	4	8.7

Source: survey result, 2006

4.3.4. Conduct of pepper market

Market conduct refers to the patterns of behavior that firms follow in adopting or adjusting to the markets in which they sell or buy (Bain, 1968). In this report conduct of the pepper market is analyzed in terms of the traders' price setting, purchasing and selling strategies.

4.3.4.1. Traders price setting strategy

The method of price formation is critical importance. About 50% of the sampled traders set purchase price themselves, 13% of them reported that their price is set by market, 13% of the traders set price by negotiation, and the rest reported that the price is set by traders from Addis Ababa and Alaba, wholesalers, and brokers. This indicates that the pepper traders had significant role in price setting.

The informal survey result on price setting practice in Alaba Kulito market shows that small traders especially urban assemblers collect pepper from small markets (Besheno, Kobo and

Guba) and Alem Gebeya and sold to wholesalers in Alaba Kulito market. On the market day, in the daytime, wholesalers collect pepper from farmers directly or through their broker and put their store by making their own mark on sacks without any payment. They also collect pepper from urban assemblers and farmer traders without any payment until price setting. This practice applies to only Alaba Kulito market.

None of the traders allow payment for their purchase before price is set by wholesalers; this is their informal rule. After mid night, the time of '*waga koreta'* local language based on price information of Addis Ababa market and after so many discussions among regional wholesalers, one of the wholesalers selects to set the price. Around 2 am the set price will be announced to the sellers who wait the price setting around pepper collection points. No other traders permit to pay above the set price. Even if the farmers refuse to sell their pepper, no body can buy above the set price. And no other traders would buy the pepper that other traders refuse to buy from farmers due to low price offer. Because the informal rules among traders nobody would violate the practice. Farmers will thus have no option after mid night. Their pepper will be damaged if it stays more than two days because it is packed, repressed and stitched with water to protect scratch. Therefore, farmers are forced to sell at whatever price that is set. But urban assemblers have information about current price from regional wholesalers before they collect pepper from farmers and other assemblers on every market day. Thus, they would not incur loss. The local government has not yet taken any action regarding the purchase price setting practice known as 'waga *koreta*'.

4.3.4.2. Traders purchasing strategy

Regional wholesalers are very active and about 78% and 13% of their supply is from farmer and urban assemblers, respectively (Figure 3). Traders are highly mobile and they purchae from different markets in a week. On average one trader in 2004/05 visited more than one market per week (Table 24) in regional markets. Urban assemblers and regional wholesalers visited more markets from 1 to 5 markets per week than other traders.

Table 24. Average number of markets visit in a week in 2004/05

Agent	Mean
Regional wholesaler	2.36
Shoke negade	1.50
Farmer trader	2.43
Urban assembler	2.22
Commission man	2.00
Urban retailer	1.00

Source: survey result, 2006

About 57% of the traders purchase directly without median brokers, 24% of them purchased throgh brokers, and the rest of traders bought by combination of direct purchase, through commision agents and brokers. Brokers were very important for regional and urban wholesalers and urban assemblers at the time of purchase.

The informal survey indicated that many traders take excessive advantage by cheating the farmers by means of manipulating the weighing scale, and farmers also develop a habit of adultration of the pepper by puting water into the already dried pepper, mixing foreign matter, not well matured and dried, and low quality pepper. Traders also put water on the already dried pepper.

A farmer may use different methods of checking the weighing scale before selling: The mechanism may be checking one's weigh and comparing it at different weiging scales (or some weighing pepper on different weiging scales). However, traders manipulate the weighing scale and all traders seems to talking the same language, cheating a minimum of 10 kg per quintal. Even if a farmer has knowledge of weighing scale, he is forbidden to see the scale. If the farmer refuses to sell, traders start to renegotiate on kg instead of price with farmers and with the intermediation of brokers. Moreover traders consider about 5 to 8 kgs per quintal for wettness of pepper and sacks which is known locally as "*bardan"*.

Table 25. One fersula weigh in diferent markets (kg)

Alaba Kullito	Besheno	Guba	Kobo	Tora	Siltie	Dalocha	Alem Gebeya	Addis Ababa
20	20	20	20	17	17	17	20	17

Source: Survey result, 2006

The commen local weight measurment for pepper is '*feresula*'. Table 25 shows the standard weight of one fersula in different markets. When traders purchase in Alaba kulito, Besheno, Guba, Kobo, and Alem Gebeya standard reference for one feresula is 20 kgs. But when traders sell at terminal market a feresula weighs 17 kgs. Traders from these markets get a benefit of 3 kgs. In Silti, Dalocha and Tora markets a '*feresula*' weighs 17 kg.

4.3.4.3. Traders selling strategy

Brokers are very important to regional wholesalers and urban assemblers at the time of sell. About 28% of the traders use the service of brokers at the time of sale specially in Alaba Kulito, Tora, and Silti markets. About 61% of them reported are personally incharge of sale and the rest 11% of them sell through the combination of the two methods.

4.4. Marketing Costs and Margins

4.4.1. Marketing cost

Table 26 indicates different types of marketing cost related to the transaction of pepper by assemblers, wholesalers (urban and regional), farmer traders, retailers, and commission agents. The structure of marketing cost reveals that storage loss is the highest cost for each marketing agents. This is due to the loss of moisture content of pepper. Thus, the storage loss is the amount highest followed by transport even for traders in terminal markets. Among pepper traders, commission agents has lowest marketing cost because they buy pepper at

market place and regional wholesalers receive all the pepper at market place and cover other related cost. Farmer traders relatively incur highest cost of all other traders because they incur additional cost (head load cost) since they transport pepper from farmer to the market.

Table 26. Marketing cost for different marketing agents (Birr/qt)

agent	Regional Wholesaler	Retailer	Farmer trader	urban assembler	Commis-ion agent	Urban Wholesaler
Sack	8.70(8.34)	7(8.12)	9.75(9.10)	9.94(9.66)	3(24.53)	6(6.15)
Fill & stitch	4.40(4.22)	2(2.32)	3.50(3.26)	3.80(3.69)	3(5.66)	4(4.10)
Load	3.45(3.31)	9(10.44)	3(2.80)	1.82(1.77)		4(4.10)
Unload	3.82(3.66)		2.57(2.40)	2.33(2.27)		5(5.12)
Brokerage	13.22(12.68)	12(13.93)	9.25(8.63)	11.50(11.17)		13(13.32)
Vehicle	19.55(18.74)		13.71(12.79)	13.33(12.96)		16.25(16.65)
Cart	3.67(3.52)		2(1.87)	1.83(1.78)		
Head load		9(10.44)	10(9.33)	6.50(6.32)		10(10.25)
Sorting	3.70(3.55)	5(5.80)	4.50(4.20)	3.44(3.34)		5(5.12)
Wage			3(2.80)	10		11(11.27)
Storage	5.71(5.48)	10.67(12.38)	9(8.40)	2.70(2.62)		5.50(5.64)
Storage loss	24.28(23.28)	20(23.21)	18.75(17.49)	16.82(16.34)	35(66)	10(10.25)
Telephone	1.23(1.18)	3(3.48)	1.33(1.24)	2.90(2.82)		2.33(2.39)
Guard	1.08(1.03)	5(5.80)	3.50(3.26)	2.63(2.55)		1(1.02)
Information	2.33(2.24)	1(1.16)	2(1.87)	4.20(4.08)		
Personal expense	9.15(8.77)		11.33(10.57)	9.17(8.91)	2(3.77)	4.50(4.61)
Weighing		2.50(2.90)				
Total cost	**104.28**	**86.17**	**107.20**	**102.91**	**53**	**97.58**

Note: Percentage share of marketing cost from total of marketing cost in the parenthesis
Source: own computation, 2006

4.4.2. Marketing margin

Table 27 gives an overview of the marketing margin among different actors in different channels. The total gross marketing margin (TGMM) is highest in Channel IV and followed by channel VIII which accounts for 72.36 and 56.05% of the consumer's price, respectively. Of all pepper traders '*Balitina*' shops, ESEF and millers get the high gross marketing margin which they account for 56.6%, 56.05%, and 48.71% of consumer's price, respectively.

Table 27. Marketing margins for pepper traders in different marketing channels

marketing	Marketing Channels							
margins	I	II	III	IV	V	VI	VII	VIII
TGMM	54.55	54.55	54.64	72.36	54.64	21.93	25.81	56.05
GMM_{RWS}	16.21	12.48	12.23	9.65				
GMM_{UWS}		9.68				21.93	-22.90	
GMM_{UA}			10.03	6.11	11.57			
GMM_{Rt}	38.34	32.39	32.39		43.08			
GMM_{ESEF}								56.05
GMM_{Balt}				56.60				
GMM_{mill}							48.71	
GMM_{P}	45.45	45.45	45.36	27.64	45.36	78.07	74.19	43.95
NMM_{RWS}	7.66	3.93	3.67	4.44				
NMM_{UWS}		1.68				8.68	-35.49	
NMM_{UA}			1.58	0.97	3.12			
NMM_{Rt}	31.27	25.32	25.32		36.00			
NMM_{ESEF}								31.58
NMM_{Balt}				36.6				
NMM_{mill}							6.77	

Source: own computation, 2006

TGMM is lowest which accounts 21.93% of the consumer's price and producer's share (GMMp) is highest (78.07%) in consumers' price in Channel VI. In channel VII urban wholesalers incur loss; its GMM is 22.90% of the consumer's price. This is mainly due to absence of a system of grades and standards inspection and certification of pepper which is obtained from farmers and traders. The left out pepper, which is of the low quality, is sold at low price to millers. In general producer's share in consumer price is less than 50% in all channels except channels VI and VII.

Among different traders and processors, '*Balitina*' shops obtain relatively highest NMM of consumer's price, followed by retailers and ESEF. NMM are some what high in channel IV, V and VIII which accounts, 36.6% and 36% and 31.6% of consumer price, respectively. In contrast urban wholesalers get negative NMM (35.5%) in channel VII when they sell low quality of pepper. Usually millers use low quality pepper and buy at low price.

4.4.3. Marketing profit

Marketing profit of traders is summarized in Table 28. Profit of regional wholesalers was highest (Birr 93 per quintal) in channel I. This profit was made possible due to the by-passing of other middlemen (urban wholesalers) intervening between retailers and regional wholesalers. The profit obtained by urban assemblers was highest in channel V (Birr 38 per quintal). This was because of urban assemblers direct sale to retailers. But their profit in channel III and IV was lower than channel V because urban assemblers marketed their produce through urban wholesalers. Urban wholesalers obtained highest profit (Birr 64 per quintal) in channel VI because of the direct purchase from farmers, total elimination of intermediaries (urban assemblers, regional wholesalers, and retailers), and direct sale to consumers. In contrast urban wholesalers incur loss in channel VII which is Birr 275 per quintal due to low quality pepper (obtained from farmers and other traders) and sale to millers at cheap price. Retailers obtained highest profit (Birr 439 per quintal) in channel V due to the absence of intermediaries wholesalers (regional and urban). In general, all marketing channels are profitable (efficient) except channel VII.

Table 28. Marketing profit for different agents (Birr/qt)

Agents		Marketing channels							
		I	II	III	IV	V	VI	VII	VIII
Regional	Purchase price	554	554	675	675				
wholesaler	Marketing cost	104	104	104	104				
	Selling price	752	706	824	868				
	Marketing profit	93	48	45	89				
Urban	Purchase price			553	553	553			
assembler	Marketing cost			103	103	103			
	Selling price			675	675	694			
	Marketing profit			19	19	38			
Urban	Purchase price		706				575	575	
wholesaler	Marketing cost		98				98	98	
	Selling price		824				737	398	
	Marketing profit		20				64	-275	
Balitina	Purchase price				868				
shops	Marketing cost				400				
	Selling price				2000				
	Marketing profit				732				
ESEF	Purchase price								835
	Marketing cost								465
	Selling price								1900
	Marketing profit								600
Millers	Purchase price							398	
	Marketing cost							325	
	Selling price							775	
	Marketing profit							52.5	
Retailers	Purchase price	752	824	824		694			
	Marketing cost	86	86	86		86			
	Selling price	1219	1219	1219		1219			
	Marketing profit	381	309	309		439			

Source: own computation, 2006

Among different processors in different channels, '*Balitina*' shops obtain relatively highest profit per quintal, followed by ESEF. Profit is some what high in channel IV and VIII which amounts to Birr 732 and 600 per quintal, respectively. Next to Channel IV (i.e. sales through urban assemblers and regional wholesalers), channel VIII (i.e. sales through ESEF) and channel V (i.e. sales through urban assemblers) were comparatively the top three profitable (efficient) channels for sale of pepper in the study areas.

4.5. Factors Affecting Pepper Market Supply

The hypothesized determinants of pepper market participation and marketable surplus are summarized in Table 29, where 9 variables are continuous and the remaining 6 are dummy variables. The Tobit, Probit and Selection models results are depicted in table 30, 31 and 32, respectively.

Table 29. Description of dependent and independent variables used in the Tobit and Heckman selection models

Variable	Description	Types	Values
SOLDQUAN	Quantity supplied	Continuous	Amount of pepper sold in kg
SOLMKTDI	Access to the market	Continuous	Walking minutes
AGE	Age of household head	Continuous	Number of years
T_PEPPER	Size of output (pepper)	Continuous	Pepper production (kg)
T_LAND	Size of land holding	Continuous	Total land obtained in hectares
PRICE	Price of pepper of 2004/05	Continuous	Average annual lagged price (Birr)
FAM_SIZE	Family size	Continuous	Man equivalent
TLU	Number of livestock	Continuous	TLU exclude number of oxen
OX	Number of oxen owned	Continuous	Number of oxen
CROP_YIE	Productivity of food crops	Continuous	Quintal per hectare
MKT_PART	Market participation	Dummy	1= sale, 0=otherwise
SEX	Sex of household head	Dummy	1=male, 2=female
EDU_CAT	Education of household head	Dummy	1=yes, 0=otherwise
NONF_INC	Income from non-farming	Dummy	1=yes, 0=otherwise
CREDITOT	Credit access	Dummy	1=yes, 0=otherwise
EXT	Extension service	Dummy	1=yes, 0=otherwise
INF_NEA	Market information	Dummy	1=yes, 0=otherwise

Source: own computation, 2006

Before running the Tobit and Heckman selection models, the multicollinearity test was carried out. The effect of the 9 continuous explanatory variables was checked for multicollinearity using Variance Inflation Factors while Contingency Coefficients were used to detect the degree of association among the 6 discrete explanatory variables see (Appendices 4 and 5). According to the results no significant problems of multicollinearity and very high degree of association were observed.

4.5.1. Tobit result

The Tobit model estimated results of the variables that are expected to determine quantity pepper supply are presented in Table 30. Out of 15 variables, 4 were found to significantly influence the quantity of pepper supplied to the market. Accordingly, market distance, production of pepper, extension contact and market information significantly affected the quantity of pepper supply.

Access to market (SOLMKTDI): Distance to market was expected to adversely affect total sales (both volume and participation). However, the opposite has been observed in the result. Access to the market was significantly and positively affected marketable surplus. An increase in one minute walking time indicated on increase in the quantity supplied by 0.0234 kg among the whole sample and 0.0233 kg among the seller group. As distance increased by a minute a probability of quantity supplied increased among non-sellers group by 0.0002%. The assumption that farmer who has nearest market that the positive impact on market supply, because markets tend to be important to make other business would entail expectation that quantity sale would decrease, with distance. However, it is likely that better non-farm employment opportunities in addition to farming activity for households close to the markets may account for their smaller reliance on pepper sale.

Production of pepper (T_PEPPER): As hypothesized the regression coefficient of pepper production variable was positively related with quantity supplied and significant at 1% probability level. The marginal effect of output on quantity supplied was 0.9782 kgs among the whole groups and 0.9742 kgs among the seller group. Each additional kg of pepper production led to increase in the probability of quantity supplied among non-sellers group by 0. 006%. The implication is that since pepper is the major cash crop for the majority (88%) of farmers, markets seemed the most important factor motivating farmers to produce and supply.

Table 30. Maximum likelihood estimates of Tobit model and the effects of change on the selected explanatory variables on intensity of quantity supplied.

Explanatory Variables	Estimated Coeffi-cients	Standard Error	t-ratio	Change among the whole $\frac{\partial E(Y_i)}{\partial x_i}$	Change among pepper sellers $\frac{\partial E(Y_i / Y_i^* > 0}{\partial X_i}$	Change in Probability $\frac{\partial F(z)}{\partial X_i} = f(z)\frac{\beta_i}{\sigma}$
Constant	-1.9061	10.1576	-0.188	-1.9055	-1.8977	-0.00013
SOLMKTDI	0.0234	0.0111	2.111**	0.0234	0.0233	1.54E-06
SEX	-3.5102	4.2684	-0.822	-3.5091	-3.4947	-0.0002
AGE	0.0651	0.0776	0.840	0.0651	0.0649	4.28E-06
EDU_CAT	2.2348	2.2543	0.991	2.2341	2.2250	0.0001
NONF_INC	-4.2809	2.8829	-1.485	-4.2796	-4.2620	-0.0003
CREDITOT	0.0334	0.1385	0.241	0.0334	0.0332	2.19E-06
T_PEPPER	0.9785	0.0075	129.914***	0.9782	0.9742	6.43E-05
T_LAND	-1.7967	1.3743	-1.307	-1.7962	-1.7888	-0.0001
EXT	5.8791	2.0154	2.917***	5.8774	5.8532	0.0004
INF_NEA	5.8041	2.1655	2.680***	5.8023	5.7785	0.0004
ACTIV_LA	0.1635	0.8893	0.184	0.1634	0.1627	1.07E-05
TLU	-0.2663	0.3559	-0.748	-0.2662	-0.2651	-1.7E-05
OX	-1.9939	1.3075	-1.525	-1.9933	-1.9851	-0.0001
CROP_YIE	-0.2903	0.2226	-1.304	-0.2902	-0.2890	-1.9E-05
PRICE	-0.5653	0.9780	-0.578	-0.5652	-0.5628	-3.7E-05

Log likelihood function = -853.0278 Z= 0.0009

F(z)=0. 9997 f(z)= 3.39

Sigma = 13.6957 Number of observations 250

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

Source: own computation

Extension contact (EXT). As hypothesized, contact with extension agents positively influenced the quantity supplied and was significant at 1% significance level. On average, change in the extension contact of the household on the quantity of pepper supplied was

5.8774 kgs among the whole group and 5.8532 kgs among the sellers group. Extension contact of household heads increased the probability of quantity supplied among the non sellers by 0.04%. This suggests that access to extension service improved production and farmers could be aware of the various aspects of the production and productivity of pepper.

Access to market information (INF_NEA): Information access is also another factor, which positively affects quantity supply at 1% significance level. On the average, the change in having market information of farmers on quantity supplied was 5.8023 kgs among the whole group and 5.7785 kgs among the sellers. Having market information increase the probability of quantity supplied among non-sellers by 0.04%. The implication is that obtaining and verifying information helps to supply more.

4.5.2. Heckman two-stage result

Tobit model implies that all producers are potential suppliers of pepper i.e. sellers may not be drawn randomly from the population and introducing a selectivity bias into the supply equations and that supply levels and market participation are influenced by the same variables and in the same way. However, if two decisions are involved, such as participation and volume of supply, a Heckman is desirable. This model allows the supplier to choose whether or not to participate in a particular market, and if so, to choose the volume of supply. Thus, a Heckman (1979) two-stage procedure is used in which the inverse Mill's Ratio is calculated from a Probit estimation of the decision to sell and introduced into the supply equations.

4.5.2.1. Determinants of pepper market participation decision

Results of the Probit model are summarized in Table 31. In the first stage, households decide whether they will be sellers, or not. The decision to participate in the pepper market was estimated by Probit maximum likelihood method. Of the potential variables i.e. a total of 12 potential predicted variables (5 dummy and 7 continuous) were selected and entered in to the Probit model. The Probit model was highly significant with a χ^2-value of 213.1239 and

correctly predicted 95% of the observed outcomes. The significant variables described as follows:

Production of pepper (T_PEPPER): As hypothesized, pepper production influenced the farmers' decision to participate in pepper market positively. This is explained by the fact that pepper is the major cash crop for the majority of farmers and shows that the higher the output, the higher is the farmer willing to participate in the market.

Table 31. Maximum likelihood estimates of Probit model

Variables	coefficients	t-ratio	Marginal effect
Constant	0.8772	0.524	4.498E-05
SEX	-0.6341	-0.867	-1.015E-05
AGE	0.0008	0.078	4.307E-08
EDU_CAT	0.0388	0.097	2.067E-06
NONF_INC	-0.4552	-0.896	-8.546E-05
CREDITOT	0.0026	0.246	1.330E-01
T_PEPPER	0.0649	6.233***	3.329E-06
T_LAND	-0.1959	-0.754	-1.004E-05
EXT	0.4788	1.218	2.556E-05
FAM_SIZE	-0.1022	-0.720	-5.242E-06
TLU	-0.0319	-0.658	-1.637E-06
CROP_YIE	-0.1174	-2.466**	-6.018E-06
PRICE	0.0113	0.073	5.801E-07

Log-likelihood function -9.756451 Chi-squared 213.1239
Restricted log likelihood -116.3184 Predicted Success 95%
Significance level 0.0000000 Number of observation 250
*** and ** indicate statistically significant at 1%, and 5% respectively
Source: own computation, 2006

Productivity of food crops (CROP_YIE): The productivity of food crops influenced pepper market participation negatively. The implication is that the low productivity of food crops increases pepper market participation, which is in line with the expectation that a family who

faces low productivity in grain production will face food grain shortage that needs to be compensated through purchase of food grains. The cash source in turn can be from the sale of cash crops like pepper.

4.5.2.2. Factors affecting quantity of pepper sold

The second stage estimation is summarized in Table 32 and it indicates that the decision of how much households sell. Each decision has been studied by using a selection model which included the inverse Mill's Ratio calculated from a Probit estimation of the decision to sellers into the supply equations. There are 14 potential explanatory variables (8 continuous and 6 dummy) including inverse Mill's Ratio (LAMBDA). Out of these 5 variables, production of pepper (T_PEPPER), non farming income (NONF_INC), extension contact (EXT), livestock (TLU) and inverse Mill's Ratio (LMBDA), had significant effect on quantity of pepper supplied. The F-test value 5.11 for the selection model was highly significant and the adjusted R^2 was 99.07%.

Non-farming income (NONF_INC): As hypothesized, non-farm income of the household heads negatively affected quantity supplied. On average, if a pepper producer gets non-farming income causes a 4.55 kgs reduction in the quantity of pepper supply. This may be explained by the fact that farmers who have better non-farm income will not tend to generate cash from sell of agricultural commodities (pepper) rather from their non-farm income.

Production of pepper (T_PEPPER): As hypothesized the regression coefficient of pepper production variable was positively related with quantity supplied and significantly at 1% probability level which is the similar significance level. The result shows that a one kg increase in the pepper production causes a 0.9710 kgs increase in the amount of marketed supply. Total pepper production influenced the amount of marketed supply of pepper positively showing that farmers who produce more sell also more, which is consistent with the general expectation.

Table 32. Estimates of selection model

Variables	Coefficient	Standard deviation	t-ratio	Marginal effect
Constant	-5.5281	8.2933	-0.667	-5.5281
SOLMKTDI	0.0040	0.0096	0.419	0.0040
SEX	-1.4928	3.7463	-0.398	-1.4928
AGE	0.0621	0.0667	0.932	0.0621
EDU_CAT	2.1165	1.9876	1.065	2.1165
NONF_INC	-4.5428	2.5851	-1.757*	-4.5428
CREDITOT	-2.5770	2.6278	-0.981	-2.5770
T_PEPPER	0.9710	0.0072	135.078***	0.9710
EXT	4.8113	1.7743	2.712***	4.8113
INF_NEA	-0.8691	1.9392	-0.448	-0.8691
FAM_SIZE	0.1661	0.7568	0.219	0.1661
TLU	-0.4932	0.2070	-2.383**	-0.4932
CROP_YIE	-0.2137	0.1898	-1.126	-0.2137
PRICE	0.0892	0.8135	0.110	0.0892
LAMBDA	7.7730	3.7503**	2.073**	7.7730

R-squared = 0. 99074 Adjusted R-squared = 0. 9901 Rho = 0.61003
Probability value = 0.00000 F-value 5.11 *** Number of observations 250
Log-L = -973.9455 Restricted (b=0) log-L = -1565.333
***, ** and * show the values statistically significant at 1%, 5% and 10% respectively
Source: Own computation, 2006

Extension contact (EXT): the other significant variable was extension contact, which affected positively the marketed supply of pepper. On average, if a pepper producer gets extension contact the amount of pepper supplied to the market increases by 4.8113 kgs. This suggests that access to get extension service avails information regarding technology which improves production that affects the marketable surplus.

Number of livestock (TLU): This variable influenced the quantity of pepper supply negatively. This is mainly due to the fact that farmers with more TLU tend to specialize in livestock production reducing the importance pepper production as means of cash generation. The result shows that a unit increase in the livestock causes 0.4932 kgs decrease in the amount of marketed supply.

Inverse Mill's Ratio (LMBDA): The inverse Mill's Ratio affects the quantity supplied positively with 5% significance level and it indicates that in Heckman two-stage model, the correction for selectivity bias is significant.

The results of the Tobit differ substantially from those of the Heckman two-stage model. Many of the more sensitive results only emerge from the more general estimation method used. For example, market access and market information and theses overloaded appear only in Tobit specification. Non- farming income, crop yield and livestock ownership significant in the more general, in Heckman two-stage model. All of these qualitative differences suggest that the estimator the study introduced indeed adds real value.

4.6. Market Integration Analysis

The data used in this research are monthly pepper price of six markets: Addis Ababa, Alaba Kulito, Tora, Silti, Alem Gebeya and Dalocha. The data covered the period from September 2001 – August 2005 obtained from woredas' BOA, the department of Disaster Prevention and Readiness, and CSA.

Cointegration and error correction models, introduced by Engle and Granger (1987) were used to determine the market integration. To do these STATA software was used.

4.6.1. Unit root test

A non-stationary series is integrated of order I (0), while a stationary series is integrated of the

order I (1). The examination of market integration is done in the six markets: Addis Ababa, Alaba Kulito, Tora, Silti, Alem Gebeya and Dalocha. All price series are tested, and the results are presented in Table 33.

Table 33. Unit root tests for level and first difference

	Null: Single Unit root test				Null: Two unit root test			
Price series	ADF T-value	Mackinnon P-value	# of lags	X^2 at 10 lags ($P > X^2$)	ADF T-value	Mackinnon P-value	# of lags	X^2 at 10 lags ($P > X^2$)
Addis	-2.67*	0.08	4	3.87				
Ababa				(0.95)				
Alaba	-3.23**	0.02	0	6.49				
				(0.77)				
Tora	-2.09	0.25	0	9.80	-6.78***	0.00	0	10.48
				(0.46)				(0.39)
Silti	-1.75	0.40	2	9.87	-6.54***	0.00	1	10.36
				(0.45)				(0.41)
Alem	-1.42	0.57	4	11.31	-6.34***	0.00	3	12.56
Gebeya				(0.33)				(0.25)
Dalocha	-2.20	0.20	0	10.03	-6.62***	0.00	0	12.28
				(0.44)				(0.27)

Note: lag length was determined based on the significance level of the lag structure,***, ** and * indicate significance at 1 %,, 5% and 10%, respectively, t-value in the parenthesis, X^2 = Durbin's alternative test for serial correlation, the values in the parenthesis show the significance level to reject the null hypothesis (Ho: No autocorrelation),
Source: own calculation, 2006

Accordingly, the result of the unit root test for the hypothesis showed that pepper prices indicate that all price series were non-stationary at their levels with exception of Addis Ababa and Alaba price series. The results of the unit root test show that prices are stationary at first difference in Tora, Silti, Alem Gebeya and Dalocha. This shows that the order of integration of Tora, Silti, Alem Gebeya and Dalocha monthly prices is one, I(1) and the calculated t-statistic of DF and ADF tests exceed the critical values of Dickey-Fuller.

Thus, one can test for market integration between Tora, Silti, Alem Gebeya, and Dalocha pepper markets. Since the price series for Addis Ababa and Alaba are stationary process, there is no need to have cointegration test as we know that they do not cointegrate with Tora, Silti, Alem Gebeya and Dalocha markets. In other words Alaba and Addis Ababa are stationary at level.

4.6.2. Cointegration test

The Engle and Granger test uses a standard OLS estimation for the long run relationship between the pair market prices. Table 34 indicates that the OLS estimate. When the price in Silti, Alem Gebeya and Dalocha rises by 1%, there is a corresponding long run increase in the Tora price level by 0.63%, 0.71% and 1.5%, respectively. Similarly when the price in Alem Gebeya and Dalocha rose by 1%, the corresponding long run increase in Silti price level is 0.86%, and 1.38%, respectively. The price increase by 1% in Dalocha caused corresponding long run increase in the Alem Gebeya price level is 1.22%. However, the result is not in a position to conduct any test of hypothesis on these estimated coefficients given.

In order to conclude that the price series are cointegrated, the residuals from the OLS estimation have to obey stationarity. To confirm any stable equilibrium relationship between two prices, stationary test is conducted on the residual obtained from equation (18). The DF/ADF test is used to test for a longer cointegration relationship in the residual of the pair (Tora – Silti, Tora - Alem Gebeya, Tora – Dalocha, Silti – Alem Gebeya, Silti – Dalocha and Alem Gebeya - Dalocha) markets.

Table 34. OLS estimates of cointergating regressions

Markets	Constant (T-value)	Coefficient T-value)	R-square	Model test F-value
Tora - Silti	2.08	0.63	0.50	45.47***
	(2.48)**	(6.74)***		
Tora – Alem Gebeya	2.66	0.71	0.43	34.22***
	(3.08)***	(5.85)***		
Tora – Dalocha	-2.04	1.5	0.63	79.41***
	(-1.88)*	(8.91)***		
Silti – Alem Gebeya	2.76	0.86	0.49	44.54***
	(3.02)***	(6.67)***		
Silti – Dalocha	-0.17	1.38	0.42	33.59***
	(5.80)***	(-0.11)		
Alem Gebeya - Dalocha	-1.01	1.22	0.50	45.41***
	(-0.86)	(6.74)***		

Note: ***, ** and * indicates significance at 1%, 5% and 10% level, t-value in the parenthesis
Source: own calculation, 2006

The cointegration tests on residual summarized in table 35 confirm the existence of cointegration between the different regional markets. The result leads us to conclude that the Tora pepper market has been integrated with Silti, Alem Gebeya, and Dalocha markets. Similarly a Silti pepper market has been integrated with Dalocha and Alem Gebeya markets. Alem Gebeya pepper market also has been integrated with Dalocha market. Thus, the test resulting using DF/ADF methodology supports the prediction under expectation that the prices are cointegrated. The conclusion based on the result that pepper markets which are found in Siltie zone are spatially integrated.

Table 35. Cointergation tests (Unit root test on residuals)

Residuals	Null: Single Unit root test				
	ADF T-value	Mackinnon P-value	Number of lags	X^2 at 10 lags ($P > X^2$)	Critical value
Tora - Silti	-3.05**	0.03	2	44.15 (0.00)	-2.944
Tora - Alem Gebeya	-2.94 **	0.04	0	8.88 (0.54)	-2.938
Tora – Dalocha	-4.00***	0.00	0	4.08 (0.94)	-3.600
Silti – Alem Gebeya	-4.28***	0.00	1	7.28 (0.70)	-3.607
Silti – Dalocha	-5.71 ***	0.00	1	6.16 (0.80)	-3.607
Alem Gebeya - Dalocha	-4.07 ***	0.00	0	11.34 (0.33)	-3.600

Note: *** and ** indicates significance at 1% and 5% level
X^2 = Durbin's alternative test for serial correlation, the values in the parenthesis show the significance level to reject the null hypothesis (Ho: No autocorrelation)
Source: own calculation, 2006

4.6.3. Error correction model

An investigation of the price adjustment process, where significant response to different price shock can be recognized, provides further evidence for market integration. Since the series show long-run relationship, the ECM applied to investigate further on short-run interaction causality between markets. To examine the short-run relation and causality, the study tests the joint hypothesis using *F*-statistics.

Table 36 indicates that the condition for error correction as specified in equation (21) in section 3.5.2.2 $\delta < 0$ was satisfied for all cases except Tora-Silti market. Their negative sign shows that the adjustment was towards the equilibrium.

The result when using Tora as dependent variable shows that some of short term response parameters are statistically significant. The speed of adjustment implies that a deviation from the long run equilibrium in Alem Gebeya and Dalocha the preceding period is adjusted for by 26.7%, and 43.7%, respectively in Tora market the following month. In other words there is a short-run effect of Tora market prices on that of Alem Gebeya and Dalocha markets. A 1% increase in price of pepper in Alem Gebeya the preceding month yields a 0.26% increase of the price level in Tora the current time period. About 46% and 99% of the change in Alem Gebeya and Dalocha markets price respectively was due to the current change in Tora market price.

Table 36. Error correction in sample markets

Pair markets	α	β_1	δ	β_2	β_3	F	R^2
Tora - Silti	0.031	0.130	0.470	-0.261***	0.374	3.14**	0.235
	(0.13)	(0.88)	(3.23)	(-1.57)	(2.75)		
Tora – Alem G.	0.023	-3.18E-06	-0.267**	0.260***	0.457*	4.12**	0.287
	(0.11)	(000)	(-2.19)	(1.69)	(3.24)		
Tora – Dalocha	0.067	0.024	-0.437*	0.258	0.993*	6.65*	0.394
	(0.32)	(0.15)	(-2.95)	(0.95)	(4.24)		
Silti – Alem G.	0.080	0.407**	-0.547*	-0.184	0.439*	5.73*	0.359
	(0.32)	(2.61)	(-4.11)	(-1.08)	(2.79)		
Silti – Dalocha	0.149	0.575*	-0.642*	-0.475	0.599***	5.9*	0.365
	(0.6)	(3.53)	(-4.65)	(-1.66)	(1.98)		
Alem G.-	0.106	0.041	-0.489*	-0.068	0.621**	4.8*	0.319
Dalocha	(0.5)	(0.27)	(-3.51)	(-0.26)	(2.63)		

***, ** and * indicate the statistical significance at the 1%, 5% and 10% levels of significance respectively, t-value in the parenthesis
Critical values of the *F*-statistic for sample size of 48 are 2.61 at the 5% level of significance
Source: own calculation

The result when using Silti as dependent variable indicating that the result of a price change in the own region (Silti) the preceding is adjusted for by 40.7% and 57.5% increase of the price level in with relation to Alem Gebeya and Dalocha. The speed of adjustment parameter implies that a deviation from the long run equilibrium in Alem Gebeya and Dalocha the preceding time period, is adjusted for by 54.7% and 64.2%, respectively in Silti market the following month. The test confirms that the error corrects towards the equilibrium in the long run. The result indicates that the disequilibrium adjustment. Along this 44% and 60% of pepper price change at Alem Gebeya and Dalocha, respectively, were due to the current price change in the Silti market.

The result also indicates that when using Alem Gebeya as dependent variable indicates that 62% of the change in price in Dalocha due to the current price change in Alem Gebeya. The speed of adjustment parameter accounts 48.9% in this case.

The hypothesis of short run and full market integration was rejected because the calculated F-values exceeded the tabulated value critical value at (n=48 and DF=4 is 2.61) see Table 36. Admasu (1998) and Solomon (2004) obtained a comparable result of no short run and full market integration between local and terminal markets of coffee and cattle market, respectively.

Full adjustment requires about 3 months' time period between Tora - Dalocha, Silti - Alem Gebeya, Silti - Dalocha and Alem Gebeya – Dalocha markets. Between Tora and Alem Gebeya markets full price adjustment needs about 4 months' time period. Full price adjustment is, what was suggested by Admasu (1998), approximately 1- δ)/δ units of time of analysis, where δ is the positive coefficient of the lagged error term.

To summarize, the results for pepper market, it is evident that the prices in pair markets are cointegrated and follow a long run relationship. This result supports the hypothesis of integrated markets for pepper in regional markets which are found in Siltie zone.

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1. Summary and Conclusion

The study has duly focused on the structure and conduct, market participants and integration of pepper markets. The main determinants of volume of pepper supply were also analyzed. The data were generated by individual interview and group discussion using pre tested semi structured questionnaires and checklist. This was supplemented by secondary data collected from CSA, Disaster Prevention, and Preparedness Office of the woredas. The main findings of this research are summarized as follows.

Quantity of pepper passed through different marketing agents from farmers to consumers. However, 44% (53690 quintals) and 28% (34166 quintals) of farmers production were purchased by regional wholesalers' and urban assemblers', respectively in 2004/05.

Structure of pepper market indicates that four-firm Concentration Ratio (CR_4), that is, the share of the largest four traders in the total volume of pepper purchased. Addis Ababa, in particular, is characterized by a large number of participants and a high level of market concentration. However, the four largest traders handled 90% of the total volume of purchased pepper. Two regional markets also, e.g. Alaba Kulito and Tora, have a fairly high degree of market concentration. This suggested that the pepper market shows a strongly oligopolyistic market.

Barrier to entry in terms of licensing and years of experience did not hinder entry into pepper market, but Education and capital were barriers. Market information system is not transparent among farmers and traders. Howeever, all traders have information from different informal sources.

Regarding the conduct of pepper market, pricing strategy of the traders indicated that 50% of traders set their purchase price. However, Alaba Kulito market price setting strategy was different from other markets because price setting is usually conducted after the mid night.

Purchasing strategy of traders indicates that about 57% of traders purchase by themselves, and 24% purchased by uing brokers. Traders are highly mobile and purchased from different markets per week. Urban assemblers and regional wholesalers visited the markets with relatively higher frequency which varied from 1 to 5 markets per week. Standard of measures are also different among markets, some used standard measure of 1 *feresula* as 17 kg and others 20 kg. Cheating was very common in pepper marketing by manipulating weighing scale. Regarding selling strategy, about 61% of traders are personally in charge of sale and 28% of traders use the service of brokers.

The results of the marketing cost, margin and profit analysis indicates that commission agents incurred the smallest marketing cost followed by retailers. The ESEF bears the highest cost which was Birr 468 per quintal followed by '*Balitina*' shops (Birr 400). The processing cost of the pepper millers are still high, but lower than that of ESEF and *Balitina* shops; this is because millers used low quality pepper with low quality spice.

Marketing margins of *Baltina* shops is highest, which is about 37% of consumer's price in channel IV. The profit of market participants varies among different channels. Regional wholesalers, urban assemblers, and urban wholesalers obtained highest profit in channel I, V, and VI and obtained Birr 93, 38 and 64 per quintal, respectively. In contrast, urban wholesalers incurred a loss in channel VII which is Birr 275 because of low quality pepper obtained from farmers and other traders. Retailers obtained highest profit (Birr 439 per quintal) of all market participants in channel V. Among processors, '*Balitina*' shops obtain relatively highest profit per quintal, followed by ESEF in channel IV and VIII which is Birr 732 and 600, respectively. Profit margins for all marketing agents are positive except that urban wholesalers in channel VII incurred loss due to sorted low quality pepper. Therefore, we can conclude that the markets are operating quite profitable.

The main determinants of the quantity supply of pepper were analyzed using Tobit model. However the problem with the Tobit model is that it assumes that all producers are potential suppliers of a good and that volume of supply and market participation are influenced by the

same variables in the same way. This may introduce a selectivity bias. Hence the study applied Heckman two-stage model.

Based on the Heckman two-stage model, the study had identified the determinants of participation decision on pepper market and its effect on the quantity supply.

Pepper production is the most important and significant variable influencing the decision to participate in pepper market positively. However, food crop yield adversely affected pepper market participation.

Moreover, pepper production and extension contacts are the significant determinant factors of the quantity of pepper supplied positively. However, non farming income and number of livestock are the significant determinants of the quantity of pepper supplied negatively. The coefficient associated with the inverse Mill's ratio was significant, indicating that the influence of unobservable factors in the farmers' decisions to participate was significant.

The research investigated that the terminal market (Addis Ababa) is not integrated with the regional markets (Alaba Kulito, Silti, Dalaocha, Tora, and Alem Gebeya) even though, the regional markets are the major supplier to Addis Ababa market. This implies tat there is poor market information system, limited bargaining power of farmers, oligopolistic market structure.

However, long run equilibrium relationship in pair markets (Tora – Silti, Tora - Alem Gebeya, Tora – Dalocha, Silti – Alem Gebeya, Silti – Dalocha and Alem Gebeya - Dalocha) were cointegrated over the sample period. Analysis of the results from short run estimates indicates faster adjustment towards the long run equilibrium level market. The result of market integration analysis shows that Siltie zone market places are highly integrated with the exception of Tora – Silti pair markets. However, full market integration will take a period of about 3 months between pair markets (Tora - Dalocha, Silti - Alem Gebeya, Silti - Dalocha and Alem Gebeya– Dalocha markets). Moreover, full price adjustment between Tora and Alem Gebeya markets needs about a period of 4 months.

5.2. Recommendations and Policy Implications

Based on the findings of this study, the following policy measures could be recommended, because there is a need for the promotion of increasing pepper production and market supply.

The enhancement of pepper producers' bargaining power through cooperatives is the best measure that should target at reducing the olgopolistic market structure in the regional markets. Such measure also facilitates the regular supply of pepper at reasonable price to consumers.

There is an urgent need for government intervention with regard to Alaba Kulito market price setting strategy. It is different from other markets and usually price setting is after the mid night. This needs measures from the relevant government organs.

Findings based on the results of the study (Heckman two- stage model), to promote pepper market participation in a sustainable way, some policy implication are suggested to be addressed by those stakeholders (extension agents, NGOs and spice extraction factories). The most important variables influencing the decision to participate in pepper market are pepper production (positively) and crop yield (negatively). Consequently, extension workers advertising are to be designed to encourage farmers to participate in pepper market. Keeping households specialization and social role in pepper production potential areas is necessary like other crops, such as *teff* from Ada' and Becho, butter form Sheno, honey form Gojam, and etc.

Moreover, pepper production and extension contacts are the positive determinant factors of the quantity of pepper supplied. Therefore, policies that would improve pepper production capacity by identifying new technologies and the causes of diseases problems. Creating stable demand for surplus production would enhance farmers' decisions on pepper production. Agricultural extension services are the major institutions operating in the rural areas. To obtain this advantage there is a need to improve extension system, and technical supervision and follow up must be strong. Strengthening of market extension (linking farmers with

markets, building marketing capacity of farmers, etc.) is necessary. And it is necessary to provide information and enhance the knowledge and skills of farmers and other institutional changes ought to be made.

The result of this study has shown that the increase in size of livestock and farmers non-farming income affected the quantity supply of pepper negatively. Here, the stakeholders should further evaluate critically farmers cost incurred and benefit obtained from the livestock, non farming income and pepper production and then, let report them the result. Then, the farmers can decide where to invest by comparing and contrasting the results of the evaluation.

The results of the study also revealed that terminal and regional markets are not integrated mainly owing to crucial problems such as inadequate market (price) information. Competitive market and market information services have to be established or strengthened to provide farmers and traders accurate and timely information on current supply, demand and prices at national and regional levels.

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7. APPENDIX

Appendix Table 1. Conversion factors used to compute tropical livestock units

Animal category	TLU
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cow or ox	1.00
Horse/mule	1.10
Donkey adult)	0.70
Donkey young)	0.35
Camel	1.25
Sheep or goat adult)	0.13
Sheep or goat young)	0.06
Chicken	0.013
Bull	0.75

Source: Storck *et al*., 1991

Appendix Table 2. Conversion factors used to estimate man equivalent

Age group	Male	Female
< 10	0	0
10-13	0.2	0.2
14-16	0.5	0.4
17-60	1	0.8
>60	0.7	0.5

Source: Bekele Hundie, 2001

Appendix Table 3. Retail price of pepper (Birr/kg)

		Addis Ababa	Alaba kulito	Tora	Silti	Alem gebeya	Dalocha
2001/02	September	11.75	5	6	7.5	4 a	7
	October	10.52	5	6	5.5	4 a	6
	November	10.67	4	5	5	4.1 a	5
	December	7.86	3.5	4	5	4.2 a	4.5
	January	9.77	2.25	3	4	4.2 a	3
	February	7.44	2.25	3	4	4.3 a	4
	March	8.12	3.75	3.5	4.5	4.3 a	4
	April	7.4	3.75	4	4.5	4.4 a	5
	May	7.9	3.5	4	4.5	4.5 a	5
	June	8.45	6	5	5	4.5 a	5
	July	9.94	6	4.5	6	4.5	6
	August	9.94	5.75	4.5	7	5 a	6
2002/03	September	9.68	6.5	6	7	5.5	4
	October	12.76	5	4.5	5	4	4.45
	November	9.81	6.5	4	5	4.5	5
	December	9.34	6	6	7.5	4	5
	January	13.36	7.5	7	7.25	5	6
	February	14.17	8	9	9	5	7
	March	14.82	10	10	9.5	6	7
	April	16.51	4	10	10.75 a	5	7
	May	16.15	11	10	12	5	7
	June	19.03	11	10	12.5	9	7
	July	17.74	12.25	12	13	10	8
	August	17.83	13	12	11.5 a	9.5	7

a.= Not available in records, therefore estimated
Source: Disaster Prevention and Preparedness Office of woredas and CSA

Appendix 3 (*Continued*)

2003/04	September	19.17	5	12	10	10	8
	October	18.82	6	5.5	5.5	4	6
	November	13.24	6	5.5	6	4.5	5
	December	12.18	5.82	6	6.5	4	5
	January	11.73	6.75	7.5	7	5	5
	February	9.69	10.12	8.25 a	8	10	6
	March	10.76	9.12	9	9	8	6
	April	14.96	9	9	10.5	8.5	6
	May	10.38	8.5	8	12	8.5	6
	June	13.17	8.5	9.5	12	8	7
	July	15	10.25	10.33 a	11.33 a	9	9
	August	17.83	10	11.17 a	10.67 a	10	9 a
2004/5	September	12.39 a	15	12	10	11.17	9
	October	14.67	10	12	10	9	8
	November	15.33	6	5	10	10	7
	December	13.33	7	7	10	10	8
	January	11.33	7.25	7.5	10	10	8
	February	10.67	7	7	10	11	8
	March	10.67	6.5	7.5	12	11	6
	April	10.67	7	7	15	7	6
	May	11.33	6.75	7.5	15	7	7
	June	11	6.68	9	6	6	7
	July	10.67	6.75	10	6	6	8
	August	10.33	6.58	10.01 a	12	8	7

a.= Not available in records, therefore estimated
Source: Disaster Prevention and Preparedness Office of woredas and CSA

Appendix Table 4. Variance inflation factor for continuous independent explanatory variables

	VIF $(1-R^2)^{-1}$	TOLERANCE
SOLMKTDI	1.116	0.896
AGE	1.160	0.862
T_PEPPER	1.192	0.839
T_LAND	1.781	0.561
PRICE	1.263	0.792
FAM_SIZE	1.158	0.864
TLU	2.664	0.375
OX	2.327	0.430
CROP_YIE	1.326	0.754

Source: own computation

Appendix Table 5. Contingency coefficients for dummy variables

	SEX	EDU_CAT	NONF_INC	CREDITOT	EXT	INF_NEA
SEX	1					
EDU_CAT	.327	1				
NONF_INC	.093	.189	1			
CREDITOT	.090	.152	.140	1		
EXT	.171	.235	.003	.061	1	
INF_NEA	.117	.101	.097	.032	.017	1

Source: own computation

6. Questionnaire

*Analysis of Red Pepper Marketing Chains in the case of Alaba special Woreda and Siltie Zone. Farmers' questionnaire. By Rehima Mussema

Questionnaire number:_____
Name of enumerator:_____
Date: _____/_____/_____

I Area information

1 Wereda Alaba=1 Dalocha=2 Slti=3 Lanfuro=4

2 Name of Rural Peasant Administration----------

3 Distance of your residence from the nearest market center _____walking time (minute)

4 Distance of your residence to the nearest development center _____walking time(minute)

II Demographics

1 Name of household head _____
2 Sex of household head 1 Male 2 Female
3 Age of household head _____years
4 Religion of household head

1 Muslim 2 Orthodox Christian 3 Protestant 4 Catholic 5 Other (specify) ---

5. Marital status household head Code
1. Single 2 Married 3 Divorced 4 Widows

6. Education level of household head *

1 Illiterate 3_____Years of formal education 5 other
2 Read and write 4 Religious school (specify) _____

7 Age, sex & education level of family members

Name	Age	Sex M=male F=Female	Education level. use code from Q.6)

* **Multiple answer is possible**

8 Experience and revenue from ------activities

Activity	Did you participate in activities 1=yes 2=No	Years of experience	Annual income (Birr)
Farming			
Non-farming			

III Resource ownership and tenure

9. Ownership of resources

Resource	1=Yes 2=No	No.
Type of house owned1 -1=Grass roofed		
-2= Iron sheet roofed		
-3 =Both types		
Plowing tools (*Mofer, Kenber, maresha* etc)		Na
Animal cart		

10. Livestock ownership

Type of livestock		Number owned in 2004/05	No. of sold	Cash income from sold (Birr)
Cows				
Oxen				
Heifers				
Yearling				
Calves				
Bulls				
Sheep	mature			
	lamb			
Goats	mature			
	kids			
Donkeys	mature			
	kid			
Horses				
Mules				
Poultry				
Bee colony				
Other (specify)				

11. Total Land holding_____timad in 2004/05

1 Cultivated area _____timad 3 Fallow land _____timad 5 Others (specify)__timad
2 Private pasture land ____timad 4 Homestead_____ timad

12 Did you involve share cropping in land for pepper in 2004/05? 1 =Yes 2= No

IV Production

13 Production of pepper and food grains in 2004/05 EC

	Type of crop	Area in *timad*	Quantity produced (qt)	Quantity consumed (qt)	For seed (qt)	Quantity sold (qt)	Price/qt
1	*Teff*						
2	Maize						
3	Wheat						
4	Sorghum						
5	Barley						
6	Chick pea						
7	Lentil						
8	Fababean						
9	Field pea						
10	Pepper - Produced on own land						
11	- Share out *Enset*						
12	Other (specify)						
Your cash crop relative to level of cash income 1=primary, 2=secondary and 3= tertiary)				1			
				2			
				3			

14 What was your input for pepper production & their sources in 2004/05?

Type	1=Yes 2=N0	Source (code) ✱	Amount use (kg)	Value Birr)	1=Cash ✱ 2=Credit
Fertilize Urea					
DAP					
Organic					
Insecticide)					
Herbicide					
Seed: 1=Mareko Fana					
2=Papri king					
3=Papri queen					
4=Backo Local					
5=You don't know					
6= own production					
From: 1 From market		4 Ethiopian spices Extr. Factory			
2 Bureau of Agriculture		5 Development center			
3 Own production		6 Other (specify)			

15 Did you store pepper in 2004/05? 1=Yes 2 =No

16 If yes, how long did you store it? _____ Months

17 How did you store the pepper? ✱

1 Filling in sack & placing in 'kot' 3 in store/'*gotera'* 3 other (specify) ____

18 If you stored, what was the motive behind store? ✱

1 Expecting high price 3 Saving purpose
2 Lack of market demand 4 other (specify)_____

19 If you expected a better price, did you sell at what you expected? 1=Yes 2 =No

20 Was there any change in the quantity (weight) and quality of the stored pepper?

1 Quality decrease, quantity weight remained the same
2 Both quality and quantity (weight) decreased
3 Quality remained the same, quantity (weight) decreased
4 No change in quality and quantity (weight)

21 What was your packaging material when you sold? ✱

1 Sisal sack '*teka*' 3 Plastic Sack (*Madaberya*) 5 other (specify) -------
2 Sisal sack '*jonia*' 4 Basket

V Access to Services

22 Did you have extension contact in relation to pepper production in the 2004/05 cropping season?
1= Yes 2=No

23 If yes, how often the extension agent contacted you? ✱

1 Weekly 3 Monthly 5 Once in a year
2 Once in two week 4 Twice in the year 6 any time when I ask them

24 What was the extension advice on? ✱

1 Seed bed preparation 3 Post harvest handling 5 fertilizer applications
2 Spacing 4 transplanting 6 chemical applications
7 other (specify) ---------

25. Did you need credit in 2004/05? 1= Yes 2 =No

26. Did you take credit in 2004/05? 1 =Yes 2=No

27. If yes, how much did you take?----------Birr

28. For what purpose did you take the credit? ✱

1 Fertilizer 4 to rent in land for food grain prod 7 Other (specify)---
2 Seed for grain 5 to pay tax
3 to purchase animals (oxen) 6 to purchase food grain

29. From whom did you get credit? ✱

1 Relative 3 Bank 5 micro finance institution 7 Friends
2 Traders 4 NGO 6 Peasant association 8 other (specify)---------

30. Did you have access to irrigation for pepper production? 1= Yes 2= No

31. If yes, area planted? -------*timad*

VI Marketing aspect

32. Supply of pepper to the market and to market agents in 1997?

Time of sale	Quantity sold (qt)	Where did you sale Market use code)	To whom did you sale agents, use (code)	Relationship use (code)	%age share of buyers	Terms of sale 1= Cash 2= Credit 3= (both)		Amount unsold (stock)

Time of sale:	Where:	To whom:	Relationship:	Advantages:
1 Immediately after harvest 2 after a month 3 after 2 month 4 after 3 month 5 after 4 months 6 after 5 months 7 6-12 months 8 >12 months	1 Village market 2 Alaba kulito 3 Besheno 4 Guba 5 Kobo 6 Silti/Kibet 7 Dalocha 8 Tora 9 Alem Gebeya 10 Addis Ababa (Merkato)	1 farmers consumer) 2. Wholesalers (urban) 3. Wholesalers (regional) 4. Retailer (urban) 5. Retailer (rural) 6 Consume (urban) 7 Consume (rural) 8 Urban assembler 9 ESEF 10 Miller 11 Service Cooperatives 12 farmer trader village 13 Gov't Organization 14 You don't know	1 The same religion 2 The same ethnic 3The same origin 4 Close relative 5 No relationship 6 Meet socially	1 Lesser transport cost 2 Give high price 3 Scaling fair 4 Reduce transport cost 5 other (specify)

33. How did you sale your produce in 2004/05? ✱

1 Direct to the purchaser 3 through commission man to the purchaser
2 Through broker 4 Other (specify) ----------

34. On average how long did it take you to sale your pepper? ✱

1 < 1 hour 3 4-6 hour 5 9-12 hour
2 1-3 hour 4 6-9hour 6 > one day

35 What was /were problem/s created by brokers in 1997? ✱

1 took to limited client 3 charged high brokerage 5 others (specify)---
2 cheating scaling (weighing) 4 wrong price (market) information

36 Did you face difficulty in finding buyers when you wanted to sell? 1= yes 2= No

37 if yes, in Q 39 is it due to: ✱

1 Inaccessibility of market 3 Lack of information
2 low price offer 4 other (specify)----------

38 What did you do, when the pepper you offered to the market was not sold? ✱

1 Took back home 4 Sold at lower price
2 Took to another market on the same day 5 Sold on other market day
3 Took to another market on another day

39 Who set your selling price in 1997? ✱

1 Yourself 3 set by demand and supply 5 other (specify)----------
2 Buyers 4 negotiations

40 When did you get the money after your sale?

1 as soon as you sold 3 other days after sale
2 after some hours 4 other (specify) ----------

41 How did you transport pepper -----from farm to home? ✱

1 Head/back loading 2 Animal's cart 3 Pack animal 5 0ther (specify) -------

42 How did you transport pepper -----from home to market? ✱

1 Head/back loading 3 Vehicle 5 0ther (specify) ----------
2 Animal's cart 4 Pack animal

43 Did you know the nearby market price before you sold your pepper? 1=Yes 2=no

44 Did you know Addis Ababa market price before you sold your pepper? 1=Yes 2=no

45 How did you get information on supply, demand & price of pepper in other markets?

	Use code ✱	Source of information
Supply		1 Other pepper traders 4 personal observation 7 TV
Demand		2 Radio 5 Broker 8Others----
Price		3 Telephone 6 News paper

46 How did you qualify your source of information? ✱

1 it was reliable 3 it was timely
2 it was adequate 4 other (specify) ----------

47 Did you face problem pepper in production and marketing? If yes what was the cause & your suggestions to solve each problem?

No.	Problem faced	1= Yes 2= No	If yes what do you think was/ were) the cause/s) of this problem?	What is your suggestion to solve each problem?
1	Fertilizer supply			
2	Chemical supply			
3	Seed supply			
4	Shortage of land			
5	Disease type of disease)			
6	Loan repayment			
7	Credit			
8	Theft			
9	Tax double taxing)			
10	Price setting			
12	Scaling Weighing)			
13	Other (specify)			

Thank you!!!!

*Analysis of Red Pepper Marketing Chains in the case of Alaba special Woreda and Siltie Zone. Traders' questionnaire. By Rehima Mussema

Questioner number----------

Name of enumerators----------

Date----------/----------/----------

I Area information

1.1 Name of Market----------

1Village market 6 Silti/Kibet
2Alaba kulito 7 Dalocha
3 Besheno 8 Tora
4 Guba 9 Alem Gebeya
5 Kobo 10 Addis Ababa Merkato)

1.2 Wereda/zone Alaba special woreda= 1 Siltie Zone = 2

1.3 Distance from residence to the market----------Km /walking time in minutes

II Socio-demographics

1. Name of trader----------
2. Age of trader --------Years
3. Sex of trader

1 Male---------- 2 Female---------

4. Religion of trader?

1 Muslim 2 Orthodox Christian 3 Protestant 4 Catholic 5 Other (specify)--------

5. Marital status of trader?

1 Single 2 Married 3 Divorced 4 Widows

6 Total family size----------

7 Educational level of trader?*

1 Illiterate 4 ----------Years of formal education
2 Read and write 5 other (specify)----------
3 Religious schools

8 What different languages do you speak? *

1 Alabigna 3 Guragigna 5Amharic
2 Siltigna 4 Oromigna 6 other (specify)--------

---

* **Multiple answer is possible**

9 Major businesses (es) in 2004/05 in order of importance write 1st for the most important, 2nd for the next important etc.) ✱

1Wholesaler 4 urban assembler 7 commission man
2 Retailer 5 processor 8 other (specify) --------
3 Farmer trader (village collector) 6 Broker ('delala')

10. Total number of family members in own business----------

11. Total number of persons employed in your business in 2004/05?

Employee	Permanent		Temporary	
	M	F	M	F
Family members				
Non family members				
Total				

12 What was your father's occupation? ✱

1 Farmer 3 Grain trader 5 Non agricultural product trader
2 Pepper trader 4 Tailor 6 others (specify) ----------

13 What was your mother's occupation? ✱

1 Farmer 3 Grain trader 5 Non agricultural product trader
2 Pepper trader 4 Housewife 6 others (specify) ---------- ------

14 For how long have you been in this business? -------Years

15 When did you do your business in2004/05?

1 Year round 3 when purchasing price low high supply)
2 During holidays only 4 other (specify) ----------

16 Did you have occupation (s) before becoming pepper trader? 1=Yes 2=No

17 If yes, for how long?

Occupation	Years
Non-trading activities: Student	
Farmer	
Civil servant	
Tailor	
Soldier	
Other----------	
Trading activities: Spice	
Grain	
Commodity trader	
Other----------	
If no occupation put '0'	

III Capital

III. 1 Fixed business capital

18 Initial fixed capitals when you start this business

Asset		No.	Average capacity of each qt)	Total value	Asset	No.	Average capacity of each qt)	Total value
Store	Separate				Weighing scale			
	Residence				Animal cart			
Mobile telephone			Na		Hand pool cart			
Telephone land line			Na		Pack animal		Na	
Vehicle personal truck					Milling machine		Na	
Motor cycle			Na		Shopshed)			
Bicycle			Na		Other (specify)			
If no fixed capital put '0'								

19 Assets owned in 2004/05

Asset		No.	Average capacity of each qt)	Total value	Asset	No.	Average capacity of each qt)	Total value
Store	Separate				Weighing scale			
	Residence				Animal cart			
Mobile telephone			Na		Hand pool cart			
Telephone land line			Na		Pack animal		Na	
Vehicle personal truck					Milling machine		Na	
Motor cycle			Na		Shop(shed)			
Bicycle			Na		Other (specify)			
If no fixed capital put '0'								

II. 2 Financial capital

20 What was the amount of initial working capital when you start this business?----------Birr

21 What was the amount of your working capital in 2004/05?----------Birr

22 What was the source of the working capital in 2004/05? ✱
1 own 2 loan 3 gift 4 Share 5 others (specify)

23 If it was loan, from whom did you borrow? ✱
1 Relative/family 3 private money lenders 5 NGO 7 Friends
2 other traders 4 micro finance institution 6 Bank 8 other, (specify)-------

24 How much was the rate of interest? _____Birr for formal----------for informal

25 what was the reason behind the loan? ✱
1 to build store 2 to purchase a car 3 for working capital 5 other (specify)-----

26 How was the repayment schedule? ✱

1 Monthly 3 Semi-annually 5 other (specify)-----
2 Quarterly 4 when you get money

27. Is there change in accessing finance for pepper trade these days?
1 improved 2 deteriorated 3 no change

III.3 Social capital

28 How did you attract your supplier? ✱

1 By giving better price relate to others 3 by visiting them
2 by fair scaling weighing) 4 other (specify)----------

29 How did you attract your buyers ✱
1 By giving better price relate to others 4 by visiting them
2 Quality of your product 5 by giving credit
3 by fair scaling weighing) 6 other (specify)

30 How many regular buyers did you have in 2004/05 ? ✱
1 Wholesalers urban)----- 5 ESEF---------- 9 Urban assembler -------
2 Wholesalers rural)------- 6 consumers urban)------ 10 Other gov't organizations---
3 Retailers (urban) ----------7 consumers urban)----- --11 millers/processors(uurban)--
4 Retailers (rural)----------8 processors(rural)---------12 Other (specify)-----

31 How many regular suppliers did you have in 2004/05? ✱

1 Wholesalers urban) ----- 4 Retailers(rural)-------- 7 Farmer--------
2Wholesalersrural)-------- 5 Urban assembler-------- 8 Other(specify)----
3 Retailers urban) ---------6 Farmer traders village collector)-----

IV Purchase practice

32 From which market and supplier did you buy pepper in 2004/05?

Purchased from Market, (use code) ✱	Purchased from sellers, (use code) ✱	Relationship (use code) ✱	%age share of seller	Average quantity purchased per market in a week (qt)	How many weeks did you operate in this market in 2004/05	average price per qt	Term of payment 1=cash 2= credit 3=advance payment ✱

Where	From sellers :	Relationship:
1Village market 2Alaba kulito 3 Besheno 4 Guba 5 Kobo 6 Silti/Kibet 7 Dalocha 8 Tora 9 Alem Gebeya 10 Addis Ababa (Merkato)	1 farmers 2 Retailers Urban) 3 Retailers Rural) 4 wholesalers Urban) 5 wholesalers Rural) 6 farmer trader village collector) 7 urban assembler 8 you don't know	1 The same religion 2 The same ethnic 3The same origin 4 Close relative 5 Exclusive relation 6 Meet socially 7 Other (specify)

33 From which market (s) did you prefer to buy most of the time in 2004/05? Use from the above table✱

34 Why did you prefer this market (s)? ✱
1 Better quality 2 High supply 3 shortest distances 4 other (specify) ---------

35 How did you set the purchase price in 2004/05? ✱
1 set at the time the advance is given 3 it is the market price at the time of delivery
2 negotiated at delivery 4 others----------

36 If purchasing price was set at the time of the advance is given, how did you agree? ✱
1 Orally 2 written agreement 3 Other (specify)---------

37 Who purchase pepper for you in 2004/05? ✱
1 Myself 3 Family members 5 Friends
2 through broker 4 commission agent 6 other---------

38 If others purchased for you how you did pay them? ✱
1 ------birr/quintal 3% on purchase price
2 Above the price you decide 4 Other (specify)---------

39 If you used broker, what were problems created by them in 2004/05? ✱

1 took your sellers & buyers to other traders 4 cheating quality
2 cheating scaling weighing) 5 wrong price information
3 charged high brokerage 6 Other (specify)-------

40 If you used commission men, what were problems created by commission men in 2004/05? ✱

1 didn't buy enough quantity 3 cheating on price 5 Cheating on quality
2 cheating scaling (weighing) 4 charged high commission 6 Other (specify) ----------

41 What was the advantage of using brokers in 2004/05? ✱

1 You could get buyer and sellers easily 4 Brought many buyers and sellers
2 reduce transaction costs 5 purchased at low price
3 save your time 6 Other (specify)----------

42 What was the advantage of commission men in 2004/05? ✱

1 You could get enough quantity 4 charge low commission 7 Other (specify)----------
2 save your time 5 purchased at low price
3 you could get quality pepper 6 reduce transaction cost

43 On average, how many markets did you visit in a week in 2004/05? ----------Markets

44 On average, how many days operate in pepper trading in 2004/05?----------days

45 At what time of a day was it preferable to purchase pepper in terms of quantity?

1 Before 12 am 3 2-4 pm 5 any time
2 12-2 pm 4 4-6pm 6 Other (specify)---------

46 At what time of a day was it preferable to purchase pepper in terms of price?

1 Before 12 am 3 2-4 pm 5 any time
2 12-2 pm 4 4-6pm 6 Other (specify)---------

47 Was the price of pepper the same on the same day in a marketing center in 2004/05?

1= Yes 2= No

48 Is your usual purchasing price higher than your competitors? 1= yes 2 = no

49 If yes in Q. 48 what was the reason? ✱

1 to attract more supplier 3 to kick out your competitor from the market
2 to buy more quantity 4 to get better quality pepper 5 others (specify)----------

50 How did you measure your purchase?

1 by sack 2 by basket 3 by weighing kg) 4 by 'feresula' 5 others-----

51 If you used 'feresula', how many kg one 'feresula' weighs? -----Kg

52 What was your packaging material? ✱

1 Sisal sack/ '*tecka*' 3 Sisal sack 'jonia' 5 Others (specify)---------
2 Plastic sack '*Madaberya*' 4 Basket

53 Who set your purchasing price in 2004/05? ✱

1 Myself 3 negotiation between me and the seller 5 other traders from Addis Ababa
2 The seller 4 by market 6 other (specify) ----------

54 If you decided on the purchasing price, how did you set the price?

1 Individually 2 collude consultation with other traders 3 other (specify)----------

55 When did you set purchasing price? ✱

1 Early in the morning of the market day 4 One day before the market day 7 others----
2 At midday of the market day 5 At the evening of the market day
3 At the time of purchase 6 After you sell the produce in other market

V Selling practices

56 To which market and whom did you sell in2004/05 EC?

Where did you sale Market, (use code) ✱	To whom did you sell buyers (use code) ✱	Relationship (use code) ✱	%age share of buyers	Average quantity sold per week in this market	How many weeks did you operate in this market	average price/qt	Terms of sell 1=cash 2=credit 3=advance receive ✱

Where		To buyer:	Relationship:
1Village market	6 Silti/Kibet	1Retailers urban)	1 The same religion
2Alaba kulito	7 Dalocha	2 Retailers rural)	2 The same ethnic
3 Besheno	8 Tora	4. Wholesalers urban)	3The same origin
4 Guba	9 Alem	6 Consumers rural)	4 Close relative
5 Kobo	Gebeya	7 Millers/processor	5 Exclusive relation
Merkato)	10 Addis	8 ESEF	6 Meet socially
	Ababa	9 Urban assemblers	7 Other (specify)
		10 farmer trader village (collectors)	
		11Gov't organization, (specify) --	
		12 You don't know	

57 Did you have other branch shops/shades to sell your pepper? 1= yes 2=No

58 Who decided on your selling price 2004/05? ✱

1 Myself 3 Purchaser 5 negotiation between me & the purchaser
2 By the market 4 other traders 6 Other (specify)----------

59 If you decided on the selling price, how did you set the price?

1 Individually 2 consult with other traders 3 Other (specify)----------

60 When did you set selling price? ✱

1 Early in the morning of the market day 4 One day before the market day
2 At midday of the market day 5 at the evening of the market day
3 At the time of selling 6 others (specify)----------

61 Who sold pepper for you in 2004/05? ✱

1 Myself 3 Family 5 Other (specify)---------
2 through broker 4 commission men

62 If others sold for you how did you pay them? ✱

1 ------birr/quintal 3% on sales price
2 Above the price you decide 4 Other (specify)---------

63 Did you give bonus per quintal at the time of your sales? 1= Yes 2= No

64 If yes, how many kg per quintal?---------Kg

65 Did you have a brochure/ notice board for customers that describe your firm's capabilities? 1=Yes 2=No

66 How many sellers were there in this market in 2004/05?----------sellers

67 How many buyers for you in this market in 2004/05? ----------buyers

68 What was the major problem to enter pepper trade? ✱

1 License 2 lack of capital 3 government policy 4 Other (specify)----------

69 Are there restrictions imposed on unlicensed pepper traders? 1= Yes 2= No

VI Marketing Services

70 Did you pay tax for the pepper you purchase in 2004/05? 1= Yes 2=No

71 Did you pay tax for the pepper you sell? 1= Yes 2=No

72 What was the basis of tax? ✱

1 Per sack-------Birr 3 per basket-------Birr 5 Per kg-----Birr
2 Per quintal-------Birr 4 Fixed payment-------Birr 6 other (specify)-------

73 What is your opinion regarding the marketing fee paid in this market as compared to your transactions?

1 Low 2 High 3 Average 4 I don't know

74 Is pepper trading in your locality needs a trading license?

1= Yes 2= No 3= not mandatory

75 If yes, how do you see the procedure to get the license? 1 Complicated 2 Easy

76 Did you have pepper-trade license? 1=Yes 2= No

77 How much did you pay for pepper trade license? _____Birr

78 How much is the renewal payment? _____Birr

79 Did you store pepper before you sold in 2004/05? 1= Yes 2= No

80 If yes for how long did you store maximum?---------- days

81 Indicate your average cost incurred per quintal in the trading process in 2004/05?

Marketing cost components in the chain	Source (use code)---	Source (use code)-----	Source (use code)-----
	Birr/qt	Birr/qt	Birr/qt
Purchased price of quality pepper per quintal			
Packaging material			
Labor employed to fill the bag and stitch			
Load			
Unload			
Brokerage			
Transportation: Vehicle			
Cart			
Head/back load			
Sorting			
License fee			
Taxes and fee			
Wage for permanent employee			
Storage cost			
Storage loss			
Water			
Electricity			
Manufacture cost			
Telephone expense			
Watching and warding			
Information cost			
Personal travel & other expense			
Others (specify)			
Total costs			
Selling price of quality pepper per quintal			

Purchased from:

1Farmersurban assembler 3 Retailers Rural) 5 wholesalers Rural)
2 Retailers Urban) 4 wholesalers Urban) 6 farmer trader (village collector)
7 Other (specify)----------

82 Did you have bonus per quintal at the time of your purchase? 1= Yes 2= no

83 If yes how many kg per quintal?---------Kg

VII Information and Transportation

84 How did you get information on supply, demand & price of pepper in other markets?

	Use code ✱	Source of information multiple answer is possible)
Supply		1 Other pepper traders 4 personal observation 7 TV 2 Radio 5 Broker 8Others------- 3 Telephone 6 News paper
Demand		
Price		

85 Are you willing to pay for market information in the future?1=Yes2=No

86 Was there transportation problem? 1= yes 2= No

87 If yes what was the problem? ✱

1 No transportation service 2 high fare 3 it was seasonal 4 other--

88 How was this market roads look like in rainy season for vehicle transport?

1 It was difficult 2 No problem

89 If it was difficult, for how long impassable for vehicle?----------Months

90 How did you get vehicle transport to come to this market? ✱

1 Daily 2 only market day 3 contract 4 other----

91 What mode of transportation did you use from collection point to store? ✱

1 Head/back load 3 Pack animal 5 other--------

2 Trucking/Vehicle 4 Cart

92 What mode of transportation did you use from store to market? ✱

1 Head/back load 3 Pack animal 5 other--------

2 Trucking/Vehicle 4 Cart

VIII Linkage among traders and sub sector outcomes

95 Were you organize in the following organization?

Organization	1=Yes 2=No	Benefit (use code) ✱	Benefit
Social association: 'idir' 'iqub'			1Access to credit 2 You got financial support when you incur a loss 3 Encourage to save 4 facilitate joint marketing 5 no benefit 6 Got market information 7 Coordinate purchase and sale 8 Protection against unfair competition 9 Credibility 10 Other (specify)
Trade association			
Pepper marketing cooperative			

96 Are there problems on pepper marketing? If yes what are the problems, & your suggestions to overcome each problem?

No.	Problem	1=Yes 2= No	If yes what do you think are the cause s) of this problem?	What are your suggestions (s) to solve each problem?
1	Infrastructure: Road			
	Telephone			
	Electricity			
	Water			
2	Administrative measure (multiple taxation and other fees)			
3	Shortage of supply			
4	Storage problem			
5	Theft			
6	Natural quality problem			
7	Adulteration			
8	Information flow			
9	Capital shortage			
10	Access to credit			
11	Technical training			
12	Business management (Financial accounting training)			
13	Absence of government support to improve pepper marketing			
14	Lack of demand (low price)			
15	Too much competition with licensed traders			
16	Too much competition with unlicensed traders			
17	Farmers reluctance to sell due to lower price			
18	Other (specify)			

Thank you!!!!