# MARKET CHAIN ANALYSIS OF RED PEPPER: THE CASE OF

# BURE WOREDA, WEST GOJJAM ZONE, AMHARA

# NATIONAL REGIONAL STATE, ETHIOPIA

**M.Sc. Thesis**

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**MARKET CHAIN ANALYSIS OF RED PEPPER: THE CASE OF**

**BURE WOREDA, WEST GOJJAM ZONE, AMHARA**

**NATIONAL REGIONAL STATE, ETHIOPIA**

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**BY**

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As Thesis Research advisors, we here by certify that we have read and evaluated this Thesis prepared, under our guidance, by Alemnew Abay entitled "**Market Chain Analysis of Red Pepper: the case of Bure *Woreda*, West Gojjam zone, Amhara National Regional State, Ethiopia".** We recommend that it be submitted as fulfilling the thesis requirement.

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# DEDICATION

I dedicated this thesis to my be loved mother w/ro Yayesh Yesheta and my wife, Desta Belay, together with my  kids, Tadiwos and Tsion for their patience and sacrifice during my academic study and all aspects of the research.

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## STATEMENT OF THE AUTHOR

First, I declare that this thesis is solely my original work with close supervision and guidance of my advisors. In addition to this all sources of materials used in the thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment for the requirement of an advanced M.Sc degree at Haramaya University and is deposited at the University Library to be made available for borrowers under rules of the Library. I solemnly declare that this thesis is not submitted to any other institution any where for the award of any academic degree, diploma, or certificate.

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Date of submission: October, 2010

# LIST OF ABBREVATIONS

| | |
|---|---|
| ADLI | Agricultural Development Led Industrialization |
| ADF | Augmented Decky Fuller |
| ANRS | Amhara National Regional State |
| BLUE | Best Linear Unbiased Estimator |
| BoA | Bureau of Agriculture |
| BoFED | Bureau of Finance and Economic Development |
| CC | Contingency Coefficient |
| CIF | Cost of Insurance Fund |
| CLR | Classical Linear Regression |
| CSA | Central Statistics Authority |
| DAP | Di-ammonium Phosphate |
| DPPC | Disaster Prevention and Preparedness Commission |
| EIAR | Ethiopian Institute of Agricultural Research |
| EEPA | Ethiopian Export Promotion Agency |
| ESF | Ethiopian Spice Factory |
| FAO | Food and Agricultural Organization |
| FDREPCC | Federal Democratic of Ethiopia Population Housing Census Commission |
| FOB | Free on Board |
| GDP | Gross Domestic Product |
| IPMS | Improving Productivity and Market Success |
| IID | Independently and Identically Distributed |
| Kg | Kilogram |
| Km | Kilometer |
| NGOs | Non Governmental Organizations |
| OLS | Ordinary Least Square |
| PAs | Peasant Associations |
| Q | Quintal |
| RDoA | Rural Development and Office of Agriculture |

**LIST OF ABBREVATIONS (CONTINUED***)*

RMA           Rapid Market Appraisal

SCP            Structure Conduct and Performance

SNNPRS      Southern Nation Nationalities and Peoples Regional State

SPSS          Statistical Package for Social Science

US              United States

VIF             Variance Inflation Factor

# BIBILOGRAPHICAL SKETCH

The author was born on May 20, 1971 at Gundwoin town, in Goncha Sisoenese Woreda, East Gojjam Zone. He attended elementary and junior secondary school at Gundwoin and his high school education at Nefas Silk Comprehensive Secondary School. After successfully completing the Ethiopian School Leaving Certificate Examination he joined the former Alemaya University of Agriculture in 1988. After four consecutive years of study he graduated with BSc degree in Agricultural Economics.

After graduation he was employed in the Ministry of Agriculture in Amhara National Regional State and served as farming system expert, extension team leader, and monitoring and evaluation expert and plan and program department head. Until he joined Haramaya University to pursue his postgraduate study he was working in Amhara National Regional State Investment Promotion Agency at regional level.

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## ABSTRACT

*In Bure, West Gojjam zone, Amhara region red pepper is a major cash crop which is mainly produced by smallholder farmers. The basic objective of this study was to analyze profitability of red pepper production, determinants of household's marketable surplus and the degree of market integration in major regional intermediate markets using primary data collected from households through semi structured questionnaire. The producers' survey result revealed that all farmers supply the product to the market and 85.3% of red pepper produced by the sampled farmers in the production year was supplied to the market. Farmers in the Woreda do not have any standard measure to identify the quality of pepper. They usually identify quality of red pepper by its color, pest damage, size, shape, odor and foreign matter. In the Woreda, the four largest traders handled 30.2% of the total volume of purchased pepper. Hence the structure of the pepper market in the study area was some what competitive. The profitability analysis also indicates that red pepper production was profitable. The average amount of red pepper supplied to the market by producers was 5.24 quintal with minimum amount of 0.5 quintals and maximum of 19 quintals. The variables that influenced the marketable supply positively were agricultural experience, access to credit, yield, land size, current year and lagged prices. Among the significant variables yield and access to credit were highly significant at less than 1% significant level. The result of market integration analysis also shows that pepper markets in the western part of the region were integrated. The major problems identified are low access to improved inputs, collateral problem to get credit, poor storage facilities and low price of produce. To solve these problems increased access to improved inputs, strengthening credit institutions, strengthening of cooperatives, education and training, price information and establishment of storage and processing facilities are recommended.*

# 1. INTRODUCTION

## 1.1. Background

The origin of garden culture can be traced as far back as 3000 B.C or beyond in Egypt. Historical evidence shows that by this time crops such as grapes, olives and onions had been brought under cultivation by the Egyptians and the technology ensuring their production such as land preparation, pruning, irrigation and others had also been used Mathew and Karikari, (1990). Production of fruit and vegetable crops has grown faster than that of cereal crops world wide Lumpkin *et al.*, (2005). In addition to the contribution of valuable nutrients, vegetables add variety, taste, color, and texture to diets Rubatzky and Yamaguchi (1997). Pepper has its origin in Mexico and Central America regions. Nevertheless, the name stuck and he introduced the crop to Europe, and it was subsequently spread into Africa and Asia *(*Bosland and Votava, 2000*)*.

The marketing of agricultural commodities differs according to the commodity, the system of production, the culture and traditions of the producers and traders, and the level of development of both the particular country and the particular sector with in the country Georgy (1997). Therefore, studying agricultural marketing system with respect to the commodity calls for an understanding of the commodity peculiar marketing system and to make some measures in the way that improves its efficiency.

A well developed market for food crops in developing countries like Ethiopia provides access to consumers who depend on the market for their food supplies and to farmers, who needs to shift from subsistence to market oriented production Lutez (1994). The transformation of the production system for domestic and export agricultural commodities requires the existence of efficient marketing system that can transfer the produced agricultural commodities from the point of production to the required market at the least possible cost. According to FAO (2003) the quantity of pepper consumed by an Ethiopian living in urban areas estimated to be 15 grams per day and the annual demand of pepper in urban areas amounts to be 56,431 tons.

The two spice factories found in the country demand annually 7,722 tons of pepper when they work at full capacity. However, due to lack of supply of quality pepper in the market they operate below 50 percent of their full capacity Mulugeta (2004). In addition to having major role in Ethiopians daily dish pepper plays an important role in the national economy.

The performance of the agricultural commodity marketing system in the region and in the country strongly influences the profitability of agricultural input use Mulat and Tadele (1998). Consequently, producers were not in a position to improve the level of production and productivity to the required level. Weak coordination of input, output, and credit markets affected the performance of agricultural marketing in the region too. In the region there are a number of spices that are mainly used in every kitchen for flavoring food.

Red pepper is an important cash crop in the Amhara region. On average 68% of pepper production is for market in ANRS (CSA, 2009). 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. The main processed product, oleoresin, is exported to different countries and the spiced ground is supplied to local market. Oleoresin that is used for food coloring is extracted from red pepper for export purpose. The deep red colored cultivars have a very high processing demand in the country.

The share of the region in the total production of red pepper in the country constitutes 25%, next to SNNPRS, which produces about 64% of the total production in the country CSA (2001/2002). In 2008/2009 production year the total cultivated land and production in the region was 41,069 hectare and 530,466 quintal respectively (CSA, 2009). The total amount of crop produced in 2008/2009 production year was 1,769,219 quintals in the study *Woreda* of which vegetables and red pepper accounts for 364,953 and 21,600 quintals respectively RDoA (2009).

## 1.2. Statements of the Problem

Recognition of critical role of markets in economic development led to sweeping market reforms across a number of developing countries. In spite of these reforms, symptoms of poorly functioning markets in much of Sub-Saharan Africa are evident in the segmentation of markets, low investment in the market infrastructure, the persistence of high margins and the limited progression towards more complex arrangements (Eleni, 2001).

In developing country farmers are not getting the right share of consumer price because of excessive margin mainly because of inefficient and costly transport Colman (1995). Besides transport problems, majorities of agricultural products in Amhara region are small holders, and are not producing and selling their produce and agricultural inputs in an organized manner so that some of their benefit may transfer to the middlemen.

Despite the ecological advantage, horticultural production in the country is very much limited. According to Dawit and Hailemariam (2004), vegetable crops are produced in the country through commercial and small farmers. However, the per capita consumption of horticultural products is probably the lowest in Africa.

According to Wolday (1994), in Ethiopia the performance of agricultural marketing system is constrained by many factors such as: poor quality of agricultural produce, lack of market facilities, weak extension services which ignored marketing development, poor linkage of research and extension, absence of marketing information and intelligent services, excessive price and supply fluctuations, limited access to credit, inefficient handling including, storage, packaging and transportation problems. Farmers in Ethiopia in general and in Amhara region in particular are affected by low producer's price, on one hand, and high consumer's price, on the other hand. One of the reasons for this according to Wolday and Eleni (2003) is lack of proper transport facilities and other infrastructure services.

The Ethiopian agricultural output markets are characterized by inadequate transport network, limited number of traders, inadequate capital facilities, high handling costs, inadequate market information system, weak bargaining power of farmers and underdeveloped industrial sectors (Jema, 2008). Farmers in Ethiopia are more focused on the production part without having adequate market information about their products.

Agricultural marketing has become highly complex and difficult involving very large and long marketing channels, a large number of middlemen, many types of physical, social, economic and facilitating marketing functions and services. The majority of farmers are marginal, small, scattered, illiterate and unorganized. They do not have sufficient time, knowledge and skills for the scientific marketing of their produce. In the absence of well developed markets, marketing facilities, and marketing efficiency, farmers are at disadvantage by selling their increased marketable surplus to traders in the market as they get low prices (Thakur *et al*., 1997).

Red pepper in Amhara region is produced for consumption and market. In rural areas red pepper is highly consumed not only in regular dishes but in other ceremonial events. In the region storage facilities, transportation, linkages with traders, quality controlling mechanisms, market information and price settings are weak and need to be further investigated (BoA,2004). Hence, to benefit producers and other marketing agents involved in the production and marketing of red pepper there is a need to have a well developed infrastructure to keep the product until it reaches the final consumer.

According to IPMS (2007) farmers in the lowland area of the Woreda devote on the average about 0.5 to 1 hectare of land for pepper production annually. But, producers face so many interlinked problems such as poor market information and infrastructural problems (storage, transport and processing). Therefore, to solve production and marketing problems and increase the contribution of red pepper to generate additional income for producers and traders it was important to undertake this study.

**1.3. Objectives of the Study**

The major objective of the study was to conduct pepper marketing chain analysis in Bure *Woreda* with the following specific objectives:

1. To examine the support services (like extension, input supply, credit and marketing Services) in pepper production
2. To analyze determinants of household's pepper supply to markets
3. To analyze profitability of pepper production in the study area
4. To analyze the market structure, conduct, and performance in pepper marketing
5. To analyze the degree of market integration in major regional intermediate markets

**1.4. Scope and Limitation of the  Study**

The study has focused on the overall market chain analysis of red pepper in Bure *Woreda* and major regional intermediate markets. The area coverage was limited to Bure *Woreda* with additional study in Bahir Dar and Debre-Markos to investigate the market integration between the spatially separated markets in the region. The study concentrated on the lowland areas of Bure with some inclusion of the mid altitude kebeles where pepper is produced. The major market participants (producers, intermediaries and consumers) supporting institutions were assessed thoroughly in relation to the different marketing mix in the production and marketing of red pepper (marketing channels, market direction, price formulation and, buying and selling strategies, storage, transport, information and finance). The limitation of the study was that the data collected to analyze market integration in the Western part of the region was restricted to Bure, Bahir Dar and Debre-Markos due to shortage of data on lagged monthly retail price of red pepper. Hence the study didn't incorporate all markets in the Western part of the region and Bure is considered as the source of supply.

## 1.5. Significance of the Study

Analyzing the challenges in pepper marketing would indicate the gaps to improve pepper production and marketing and benefit policy makers and implementers in the area to fill the gaps. In addition to this it will also help to make appropriate marketing decisions by the producers, consumers, traders, investors, and others. The study also suggested strategies for smooth integration among production and marketing by referring to root causes for supply and marketing problems starting from production till the consumption of the product. The other benefit that could be anticipated is that its significance as a source material for further studies, which could be a major input to formulate appropriate marketing policies.

## 1.6. Organization of the Thesis

This thesis contains five chapters. The first chapter deals with the introductory part. The second chapter deals with review of literature where the basic marketing concepts and relevant empirical studies are discussed. The third chapter of the thesis deals with a brief description of the study area and methodology of the research (data collection and analysis method) and the fourth chapter deals with results and discussion. The final chapter summarizes the findings of the study with some recommendation and policy implications.

# 2. LITERATURE REVIEW

In this part of the study the basic concepts and definitions (market, marketing, marketing system, agricultural marketing, market channels, marketing margin, market integration, marketable surplus and supply, supply chain and market chain), fundamental approaches to marketing, and related empirical studies are discussed.

## 2.1. Concepts and Definitions

**Market:** Originally the term market stood for the place where buyers and sellers are gathered to exchange their goods, such as village square. Market is an area in which one or more sellers of a given products/services and their close substitutes exchange with and compete for the patronage of a group of buyers. The term market mean the place where buying and selling takes place, an area in which a good is sold, a group of people carrying on buying or selling, or the commodity traded (Larson,1957).

According to Kilingo and Kariuki (2001) market is defined as an institution within which the forces of demand and supply operate; sellers, and consumers are in constant communication, and there is change of title to goods and/or services. Potential consumers make up a market, which is people with the desire and with the ability to buy a specific product (Eric and Kerin, 2000). Kotler (1998) also defined market as a place that consists of all potential customers sharing a particular need or want who might be willing and able to engage in exchange to satisfy that need/want.

**Marketing:** Marketing is the process of bringing sellers and buyers together for the purpose of exchanging title to goods and services (Kilingo and Kariuki, 2001). According to Kotler (2003) marketing is defined as a social and a managerial process where by individuals and groups obtain what they need and want through creating and exchanging products and value with others.

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

The American Marketing Association representing marketing professionals in the US and Canada states that marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives (Eric and Kerin, 2000).

**Marketing system:** Is defined as the sequential set of kinds or types of business firms through which a product passes during the marketing process (Branson and Norvell, 1983). Also they define marketing system 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. It is usually seen as a "system" because it comprises several, usually stable, interrelated structures that, along with production, distribution, and consumption, underpin the economic process (Mendoza, 1995).

**Agricultural marketing:** Consumers spend a large amount of income on basic foods hence with the growth of urbanization the agricultural marketing system is expected to play a great role in linking the rural and the urban population. Agricultural marketing covers all the activities associated with the agricultural production and food, feed, and fiber assembly, processing, and distribution to final consumers, including analysis of consumers' needs, motivations, and purchasing and consumption behavior (Branson and Norvell, 1983).

**Marketing channels:** 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 Armstrong, 2003). The channel system creates time, place, possession and form utilities. However the benefits of the channel system can not be enjoyed without an element of cost.

A product may take many routes on its journey from a producer to buyers and marketers search for the most efficient route from the many alternatives available. The channel may be direct or indirect. In the direct channel a producer and ultimate consumer deal directly with each other. In the indirect channel intermediaries are involved between the producers and final consumers and perform numerous channel functions. To choose appropriate channel environmental factors, consumer characteristics, product type and the firm financial, human and technological capabilities determine (Eric and Kerin, 2000).

**Marketing margin:** According to William and Robinson (1990) a marketing margin is defined alternatively as (1) the difference between the price paid by consumers and that obtained by producers (2) the price of a collection of marketing services that is the outcome of the demand for and the supply of such services.

**Market integration:** The most common methodology used in the past for testing market integration involves estimation of bivariate correlation coefficient between price changes in different markets. Despite its simplicity to test market integration the method fails to recognize the possibility of spurious integration in the presence of common exogenous trends like general inflation, common periodicity (agricultural seasonality or auto correlated and heteroscedastic residuals in the regression) with non stationary price data Baulch (1997).
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In the mid 1980s several attempts were made to improve the earlier methods. The most important contribution to market integration analysis came from Ravalion (1986). Ravalion (1986) proposed a dynamic model of spatial price differentials. This method also has limitation in that it still involves serious problems that results in inefficient estimators, which are used for testing alternative hypothesis of market integration. To avoid these problems a new method called co-integration test was proposed for evaluating market integration (Engle and Granger, 1987). To study market integration Augmented Dickey Fuller (ADF) test and Engle Granger two step procedure of co-integration test are used (Kinde, 2007; Rehima, 2007) to analyze sesame and red pepper market integration, respectively in selected markets. In general, if there exists a stationary linear combination of non-stationary random variables, the variables combined are said to be co-integrated (Tsigas, 1991).

Therefore, before testing for co-integration, it is important to test first individual time series for their order of integration. In this case, all individual variables should be stationary after first differences and non-stationary in levels.

Many developing economies have been implementing structural adjustment and market reform programs. It has also been argued that food market integration is a pre-condition for the success of such liberalization. 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). Market integration indicates the co-movement and long run relationship among prices in different localities. Data on price, transaction cost, and trade flows across spatially separated markets are needed to measure the degree of integration between these markets. However, data on trade flows are not readily available; hence market integration is studied using prices. One of the structural problems observed in underdeveloped countries is poor market integration, the difficulty with which information and trade flows among spatially separated markets. Infrastructure, government policy, dissimilarities in production and supply shocks are the most important factors for market integration.

In Ethiopia, since there are no or limited roads beyond the *Woreda*, to transport inputs and outputs from market to the farm and from the point of production to the market producers face a great problem. The communication network is also limited to urban areas and it is traditional to communicate with the change in the market situation especially to the side of producers that is why price decreases are easily transmitted but the increase in price are not fast to be disseminated. In addition to this storage facilities and processing industries are not well developed to preserve and add value to perishable raw materials and supply to the market consistently (Eleni, 2001).

**Supply and marketable surplus:** According to Wolday (1994), market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements whereas the market surplus is the residual with the producer after meeting the requirement for seed, payment in kind and consumption by peasant at source.

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

Empirical studies of supply relationships for farm products indicate that changes in product prices typically (but not always) explain a relatively small proportion of the total variation in output that has occurred over a period of years. The weather and pest influence short run changes in output, while the long run changes in supply are attributable to factors like improvement in technology, which results in higher yields

**Market chain and supply chain**: Agricultural commodities are produced by large numbers of farmers and consumed by large numbers of households. With the exception of food stuffs consumed on-farm or sold locally, they are bought and sold a number of times between the farm gate and the final consumer. While moving between these two points, the commodity is transported, stored, cleaned, graded and processed. Market chain is the path one good follow from their source of original production to ultimate destination for final use. According to Kotler (2003) supply chain is a longer channel stretching from raw materials to final products that are carried to final buyers. He shortly put as value-delivery network. Under a free market, supply chains for a commodity develop to reflect its production, marketing and processing characteristics. It is the overall group of economic agents (producer, trader, consumer, institutions or development organizations) that contribute directly in the determination of the final product (FAO, 2005). Supply chain is a sequence of firms that perform activities required to create and deliver a good or service to consumers or industrial users. It differs from a marketing channel in terms of membership.

## 2.2. Fundamental Approaches to Study Marketing

The most important characteristics of a marketing function is that its physical process or facilitating service which must be performed one or more times within the marketing system. The main marketing physical functions are assembling, grading, storing, processing, packaging, distributing and transporting.

There are also facilitating functions (market research, product research and development, demand development, exchange services, finance and risk bearing and market information). The main approaches to study marketing are:

## 2.2.1. Functional approach

In functional approach we look for the basic activities (functions) that have to be performed in marketing of agricultural commodities and the marketing of inputs for agricultural production. Functional approach studies marketing in terms of the various activities that are performed in getting farm product from the producer to the consumer. 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 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.

## 2.2.2. Institutional /system approach

Institutional approach is concerned with the number and kinds of business firms, various institutions that perform the marketing activities. These organizations or people are middlemen who perform the operations necessary to transfer goods from the producer to consumer and inputs to the product. It covers all market participants (producer, assembler, transporter, wholesaler, retailer and consumer).

## 2.2.3. Commodity approach

Entails analysis of marketing functions, system and structure from the view point of an individual product. 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. 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.

## 2.2.4. Managerial approach

A process where by management systematically identifies the needs of customers and then creates a marketing program that will satisfy those needs. The approach was developed in school of business and has become the accepted methodology for studying the marketing of consumer products.

Among the above mentioned approaches, since the study focus on a specific product, commodity approach has been used and the functions and institutions involved in the production and marketing of the commodity were analyzed.

## 2.3. Related Empirical Studies

### 2.3.1. Red Pepper Production

 Pepper is an annual crop 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. Depending on the area, harvesting starts 5 to 6 months from transplanting. Planting is carried out in the beginning of the main rain season. 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. Red pepper and chill 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.

The total production of pepper in the country for the year 2008/09 Ethiopian main cropping season was estimated to be 1,834,026 quintals. In addition in Amhara region the total production was 530.466 quintal for the same year. Therefore the contribution of the Amhara region for the country production was 29%. The production of pepper in the region is dominantly by smallholder farmers using rain by traditional farming practice. Very small amount of pepper is being produced using irrigation and modern inputs such as fertilizer and improved seeds. Pepper is sold in all markets in the region in its whole form and in some towns it is sold grounded manually by petty traders in small groceries (Mulugeta, 2004).

Virtually every country in the world produces pepper and it is highly demanded for domestic consumption in rural and urban areas. Accordingly, pepper alone accounts for 20 percent in the world spices trade (EEPA, 2007). Pepper is the world 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. Peppers are common all over the world as dried, pickled or otherwise processed products. Pepper in Ethiopia is used for flavoring food and for production of oleoresin that used to color foods in the factories. Horticultural crop production in Ethiopia is supplementary to the main crops grown by small farmers in every small plots of land at a subsistence level, often managed by family labor. In Ethiopia there are a number of spices that are mainly used in every kitchen for flavoring food.

More than 14 types of spices are grown in Ethiopia namely pepper, paprika, turmeric, fenugreek, garlic, korarima, coriander, capsicum, ginger, cardamom, blackcumin, whitecumn, and basil (Endosa, 1998). Among these spices ginger, fenugreek, red pepper, black cumin, and white cumin are found in the region. There are various kinds of pepper such as red pepper, black pepper, green pepper, white pepper, and chilly pepper. In Amhara region red pepper is mainly produced in15 Woredas of seven administrative zones BoA (2004). The major producing *Woredas* are Fogera, Dera and Libokemkem (South Gondar), Jabitehnan and Bure(WestGojjam), Alefa and Denbya (North Gondar), Gangway(Awi) and Kobo(North Wollo).

## 2.3.2 Empirical studies related to spices, and vegetables

The increasing populations of many tropical countries have led to a new awareness of the importance of vegetable crops as source of food, accompanied by the realization that many vegetables can supply essential nutritional materials which may not be readily available from other sources (Tindall, 1983). In his study entitled vegetables in the  tropics on selected vegetables including various pepper species traditional and labor intensive  practices are still of primary  importance  elsewhere  in the  tropics,  where  new  and  desirable  technological developments can only be adopted if other resources become available.

A case study in the highlands of Central Kenya revealed that the higher awareness of issues related to marketing of horticultural produce in Kenya is probably due to the existence of farmers groups. Farmers are aware of the existence of markets in major towns such as Nairobi and Mombassa. They are also aware of the major marketing companies who buy their produce for export (Muturi, 2001). The study identified inadequate irrigation, low rainfall, high input price and pests and disease as the major production problems. The marketing problems were low produce price, lack of market and transport constraints.

The Ethiopian Institute of Agricultural Research (EIAR) has released five pepper varieties namely Marakofana, Bakolocale, Melkazala, Melkadema and Eshete. Among these species Marakofana and Bakolocale are widely used by farmers. Marakofana is about 19 cm height, it has a thick cover and irritating nature. This variety is highly demanded by spice factories like Ethiopian Spice Factory. Bakolocale variety has also red color and thin cover it is highly irritating and it has a total height of about 13 cm.  In the ANRS a team of experts had been organized to study the Agricultural Commodity Marketing System of selected crops in 2004.

Among the crops selected for the study, red pepper marketing system study was one of them. The study was conducted in 9 potential peppers producing Woredas among these; Bure was one of the target *Woredas*. The study results revealed that farmers produce pepper using local seeds with fertilizer, few farmers use compost with local seed.

The research extension linkage is weak and despite the efforts made both at the Federal and Regional levels to promote the production and marketing of red pepper. As a result agro-ecology based research centers are opened. Generally, the research extension system is supposed to be reoriented till it is able to play a role towards creating market oriented agricultural production. Accordingly ten commodity zones were identified for about 18 commodities which have high commercial value in the international and domestic market including red pepper.

The Ethiopian Export Promotion Agency (EEPA, 2003) also carried out a spice potential market study in Amhara, Oromia and SNNPRS, and identified that the land coverage for pepper in the three regions. According to the study results pepper production accounts for 34% of the total spices production in the three regions.

### 2.3.3 Empirical Literature on Marketable Supply

A number of studies pointed out factors that centrally affect marketable supply of agricultural commodities. For example, Wolday (1994) identified major factors that affect teff, maize and wheat at Alaba Siraro District. He studied the relationship of farm level marketable supply of the cereals using cross-sectional data. To capture the influence of the independent variables on the marketable supply of food grain, he adopted multiple regression analysis with both dummy and continuous variables as independent variables. He found out that the size of output, access to market and family size had affected marketable supply of food grain.

In related studies, Rehima (2007) identified that the major factors that affect marketable supply of pepper at Alaba and Siltie of SNNPRS using cross-sectional data with both dummy and continuous independent variables. To identify the variables, Rehima (2007) study revealed that market distance, quantity of pepper produced, frequency of contacts with extension agents and access to market information influenced marketable supply of red pepper.

Kindie (2007) identified major factors that affect marketable supply of sesame in Metema *woreda* using cross-sectional data. His study revealed that the amount of productivity of sesame, number of oxen owned, number of languages spoken by the head of the household, modern inputs used, sesame area, and time of selling of sesame influenced marketable supply positively. Similarly, Wolelaw (2005) identified the major factors that affect the supply of rice at Fogera *Woreda* using multiple linear regressions as a model to study the relationship between the determining factors of supply and the marketable supply of rice. His study revealed that the current price, lagged price, total amount of rice production in the farm, consumption in the household and weather had affected marketable supply of rice. Hence, difference in the marketing system of these commodities, type of commodities, and location of the study area can result in differences in factors affecting marketable supply of the commodities.

## 2.3.4 Red pepper export performance

Agriculture in Ethiopia constitutes the larger proportion in GDP (50%). The contribution of spices in the total foreign exchange earnings is extremely low. Among the spices pepper, ginger, black and white Cummins accounts 81% out of the total spices foreign exchange earnings. Out of the 81% red pepper accounts 28% in the spice trade (EEPA, 2003).The detail import and export of uncrushed and grounded pepper is indicated in Table 1 and Table 2.

Table 1: Exports and imports of uncrushed pepper

| Year | Export | | Import | |
|---|---|---|---|---|
| | Volume(kg) | Volume(million Birr) FOB | Volume(kg) | Volume(million Birr) CIF |
| 2002/03 | 409,495 | 11.91 | - | - |
| 2001/02 | 150,769 | 3.64 | 66,734 | 0.71 |
| 2000/01 | 178,505 | 6.64 | 42,000 | 0.31 |
| 1999/00 | 197,746 | 6.65 | 2,268 | 0.25 |
| 1998/99 | 80,100 | 2.64 | - | - |
| 1997/98 | 532,741 | 14.1 | 366 | 0.0039 |
| Total | 1,549,356 | 45.58 | 111,368 | 1.2739 |

Source: EEPA various publication

Table 2: Exports and imports of grounded pepper

| Year | Export | | Import | |
|---|---|---|---|---|
| | Volume(kg) | Volume(million Birr) FOB | Volume(kg) | Volume(million Birr) CIF |
| 2002/03 | 133,887 | 4.47 | - | - |
| 2001/02 | 106,456 | 5.10 | 1223 | 8523 |
| 2000/01 | 49,070 | 2.19 | 4371 | 30993 |
| 1999/00 | 14,705 | 0.55 | 1534 | 37842 |
| 1998/99 | 8,437 | 0.26 | 5415 | 28437 |
| 1997/98 | 3562 | 0.09 | 195 | 8326 |
| Total | 316,117 | 12.66 | 12738 | 114,121 |

Source: EEPA various publication

# 3. RESEARCH METHDOLOGY

## 3.1. Description of the Study Areas

The Amhara National Regional State covers a total area of 152.6 thousand km$^2$ (BoFED, 2008). The total population of the region is estimated to be 17.21 million of which 15 and 2.21million people lives in rural and urban areas respectively (FDREPCC, 2008). The regional state is currently structured under 10 administrative zones, 138 *Woredas* and 22 town administrations. Bure is one of the 15 *Woredas* in West Gojjam administrative Zone. The mean annual rain fall of the *woreda* is 1000-1500 mm and the altitude of the *Woreda* is 713 to 2604 (masl)) which allows for a variety of crops to be cultivated. The major town of the Woreda, Bure, is found 400 km North of Addis Ababa and 148 km South West of the Regional State capital, Bahir Dar. The *Woreda* has 15 km asphalt road, 84 km all weather gravel road and 103 km dry weather road. It is near by and connected by all-weather road to East Wollega Zone of the Oromia Regional State and Metekel Zone of the Benishangul-Gumuz Regional State. Therefore, Bure has a good opportunity to sell its agricultural products to different regional states.

The topography of the *Woreda* is 76% plain, 10% mountain, 7% undulating and 7% valley. The climatic condition is 1% highland, 77.23% mid altitude and 21.77% lowland. The total area of the *Woreda* is 72,739 ha and 46.6% of the *Woreda* is cultivated. The average household cultivated land holding is about 1.6 ha. At present the Woreda is divided into 19 rural peasant associations (PAs) and 5 town associations. Among the 138 *Woredas* found in the region, Bure is one of the consistently surplus producing *Woredas* including production of red pepper. Bure is also one of the pilot learning *Woredas* of Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project which is currently working in improving the productivity and marketing success of Ethiopian farmers through value chain development and knowledge management approaches. The diversified agro-ecology of the area creates an opportunity for the production of different crops such as cereals, pulses, oil crops, vegetables, spices and perennial crops.

From the total area of the *Woreda*, 33,865 hectare of land was used for annual crop production in 2008/2009 production year; from the total arable land 1,800 hectare cultivated land was allocated for pepper production (BoA, 2009). From the total land allocated for red pepper production 21,600 quintal red pepper has been produced in the production year.
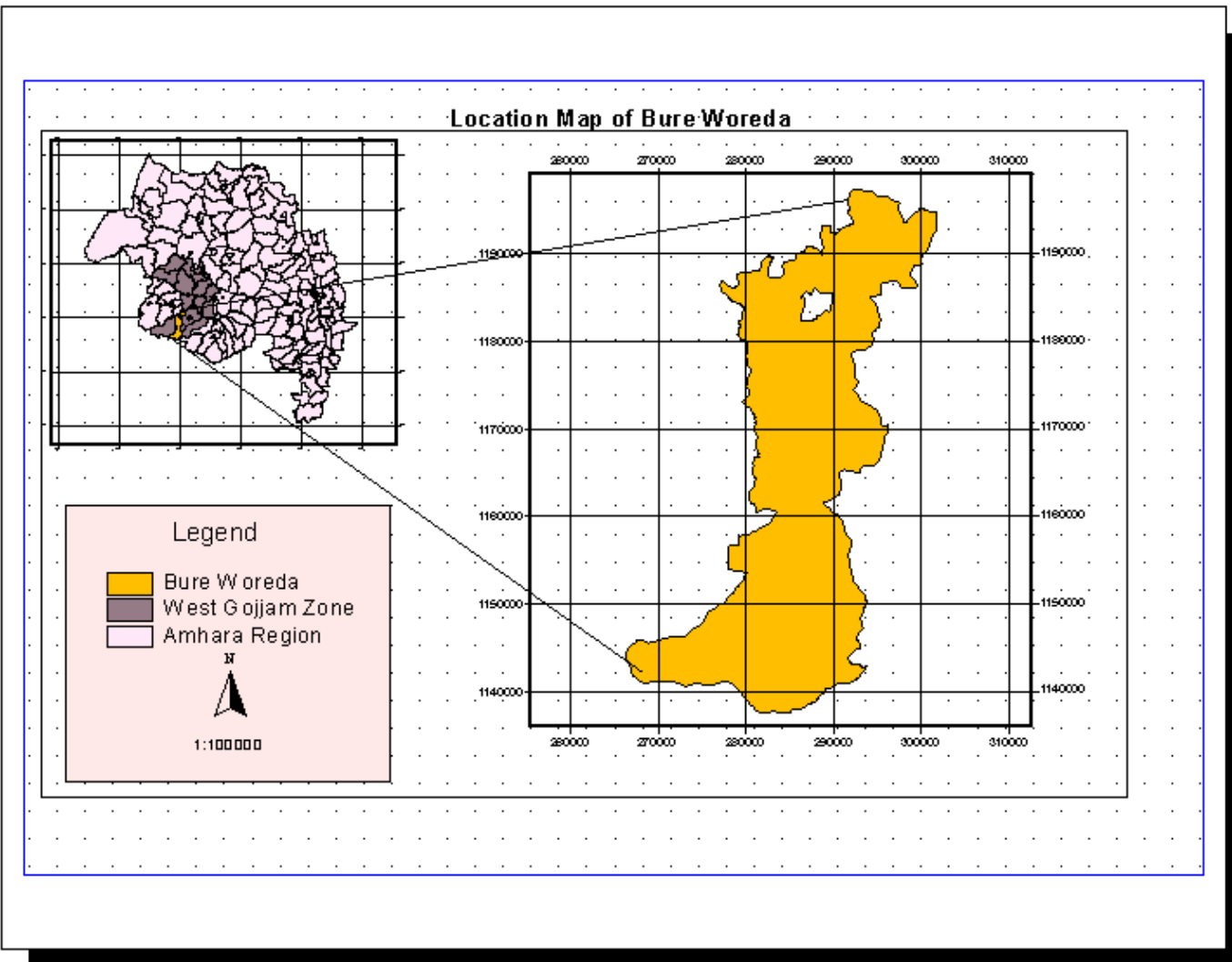


Figure 1: Location map of Western Gojjm Zone and Bure *Woreda*

Source: IPMS (2007)

## 3.2. Data Collection and Sampling Methods

### 3.2.1. Data, data source and collection methods

The sources of data were both primary and secondary sources. The whole situations of the marketing system from the producing farmer up to the end consumer were assessed thoroughly through rapid market appraisal and formal survey.

Data were collected on production, buying and selling, pricing, input delivery and distribution, market participation, problem and opportunities and characteristics of the market. The detail data collection methods were:

**Primary data collection method**: The Primary data was collected at all levels of the marketing chain that includes producers, traders (wholesalers, retailers, rural assemblers and brokers), cooperatives and supporting institutions such as rural development office, trade and industry office and SMES through structured and semi-structured questionnaire individually and through focus group discussion using a checklist to guide the discussion in each sample PAs and in Bure and Kuche towns.

**Secondary data collection method**: Secondary data were also collected on the number of wholesalers and retailers, monthly lagged retail price of pepper, total land used and production, input used, annual volumes of sales, purchases and storage time. The secondary data sources were Regional BoA (West Gojjam Zone Agricultural Development Department and Bure *Woreda* office of agriculture), research centers, Bureau of Finance and Economic Development, primary and secondary cooperatives, cooperative promotion team, Trade and Industry offices and Small and Micro Enterprises (SMES).

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.

### 3.2.2. Sampling methods

To choose an appropriate sample size mainly four factors are taken into consideration these are: level of confidence (Z), margin of error (E), variability of the population(s) and the number of groups within the samples (David and George, 1983). In addition to this the degree of precision desired, method of analysis, objective of research, cost, and time determine the type and size of the sample to be adopted. The sampling methods that were adopted for the study are presented below.

### 3.2.2.1. Producers sampling

To select producers a multi-stage sampling technique was used. In the first stage a stratified sampling method has been used and pepper producing PAs were categorized as lowland and mid altitude agro-ecology. In the second stage among pepper producing PAs, five PAs were selected randomly (3 PAs from low land and 2 PAs from mid altitude) because the number of producers in low land areas was higher than the mid-altitude areas. In the third stage among the households that exist in the five PAs 120 producers were selected using proportionate random sampling technique and interviewed. For focus group discussion 6-10 farmers were selected with the DAs and Kebele leaders in each PAs to supplement the individual interview.

### 3.2.2.2. Traders sampling

Traders (wholesalers, retailers, brokers and rural assemblers) were selected randomly from the total list of traders in Kuche[1] and Bure town. The total number of traders interviewed was 30 (6 wholesalers, 17 retailers, 5 rural assemblers and 2 brokers). To interview traders an independent questioner has been prepared and used.

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*Kuche[1] is a small town found about 28 km from Bure towards Eastern Wollega*

Table 3. Distribution of sample households

| Name of PAs | Total number of households | Sample size of households |
|---|---|---|
| Fetamsemtom | 1232 | 34 |
| Bekotabo | 397 | 18 |
| Fesele | 420 | 20 |
| Gedamljamore | 826 | 26 |
| Wadra | 817 | 22 |
| Total | 3692 | 120 |

Source: Own computation from producers list, 2009

Table 4. Distribution of sample traders

| Town's name | Total number of traders | Sample size of traders | | | |
|---|---|---|---|---|---|
| | | wholesalers | Retailers | Rural assemblers | Brokers |
| Bure town | 23 | 5 | 7 | 0 | 2 |
| Kuche town | 28 | 1 | 10 | 5 | 0 |
| Total | 51 | 6 | 17 | 5 | 2 |

Source: Own computation from traders list, 2009

### 3.3. Data Analysis Methods

The data analysis method was both descriptive statistics and econometric model. The descriptive statistics includes percentages, ratios, 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 and profitability of pepper production. In the econometric model determinants of marketable supply of red

pepper and market integration are analyzed using OLS and Augmented Dickey Fuller (ADF) test respectively.

### 3.3.1. Analysis of Structure Conduct and Performance (S-C-P)

The (S-C-P) model is an analytical approach used to study how the structure of the market and the behavior of sellers of different commodities and services affect the performance of market, and consequently the welfare of the country as a whole (Kizito, 2008). 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.

The Harvard School, also known as Bain's group, established the industrial organization framework based on a paradigm known as Structure – Conduct – Performance (S-C-P) in the early 1950s. The Harvard School framework is sometimes called Traditional Industrial Organization. It is based on the theory that the structure of a market (S) determines market conduct (C), which then determines market performance (P), and that higher concentration ratios generate welfare losses by competition restricting activities.

### 3.3.1.1. Market structure

Market structure includes the characteristics of the organization of a market that appear to exercise a strategic influence on the nature of competition and pricing within the market. Market concentration refers to the number and relative size distribution of buyers/sellers in a market. It is generally believed that higher market concentration implies non-competitive behavior and thus inefficiency.

**Concentration Ratio (C)**

Concentration ratio is a numerical index widely used by industrial organizations for measuring the size of firms in market (Shughart, 1990). Kohl and Uhl (1985) suggested that as rule of thumb, a four largest enterprises concentration ratio of 50 percent or more is an indication of a strong oligopolistic industry, 33-50 percent, a weak oligopoly, and less than that, indicates non-concentrated industry. The problem associated with this index is the arbitrary selection of the number of firms that are taken to calculate the ratio and the ratio does not indicate the size difference of the firms.

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). The method used to study the structure of the market was as follows:

$$S_i = V_i \Big/ \sum V_i \qquad\qquad (1)$$

Where $S_i$= market share of buyer i

$V_i$ =amount of product handled by buyer i

$\sum V_i$=Total amount of the product

$$C = \sum_{i=1}^{m} S_i \qquad i = 1, 2 \ldots\ldots m \qquad\qquad (2)$$

Where C- concentration ratio

$S_i$- percentage share of the $i^{th}$ firm

m- Number of largest firms

### 3.3.1.2. Market conduct

Market conduct refers to the patterns of behavior that enterprises followed in adopting to the markets in which they sell or buy. The principal dimensions of market conduct according to Raid (1987) include price setting, the manner in which the value and quality ranges of products are determined, advertising and marketing strategy, research, development planning, implementation, and legal tactics.

To study market conduct there are no agreed upon procedures for analyzing the elements. The existence of formal and informal producing and marketing groups; the availability of price information and its impact on prevailing prices; and the feasibility of utilizing alternative market outlets pricing, buying and selling practices were assessed.

### 3.3.1.3. Market performance

Scott (1995) argued that performance as well as the integration of markets is the result of the actions of traders and of the operating environment determined by the infrastructure available for trading and policies affecting the price transmission from one market to another. To analyze the performance of the market, marketing margin and co-integration were used.

Market performance refers to the composite of end results which firms in the market arrive at by pursuing whatever lines of conduct they use that results in the dimensions of price, output, production and selling cost, product design, and so forth (Wolday, 1994).

**Marketing margin**

As Mendoza (1995) argued, when there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and then comparing them with the final price to the consumer. The consumer price is then the base or the common denominator for all marketing margins. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and expressed as a

percentage. Net Marketing Margin (NMM) is the percentage over the final price earned by the intermediary as his net income once the marketing costs are deducted.

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 cost and price information obtained from the survey were used to evaluate the gross marketing margin. The method of analysis of marketing margin was as follows:

$$TGMM = \frac{End\ buyer\ price - First\ seller\ price}{End\ buyer\ price} * 100 \qquad (3)$$

The TGMM is useful to calculate '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:

$$GMM = \frac{End\ buyer\ price - marketing\ gross\ marign}{End\ buyer\ price} * 100 \qquad (4)$$

$$NMM = \frac{Gross\ Marign - Marketing\ Costs}{End\ buyer\ price} * 100 \qquad (5)$$

### 3.3.2. Profitability analysis

To estimate profitability of red pepper production all variable costs for red pepper production were considered. Dejene (2008) studied the profitability of extension package inputs for wheat and barley in Ethiopia. He employed simple calculation of value-cost-ratio (VCR).

The unit of analysis is hectare of land. Hence, for this study the gross margin/gross profit was calculated by deducting the total variable cost (VC) from the total revenue as follows:

$$\text{Gross profit} = V - C = PQ - \sum_i^n p_i x_i \tag{6}$$

Where P = price of produce

Q= Total production per hectare

$p_i$= price of input i

$x_i$= quantity of input i

V= Value of production (price times Quantity)

C= Total cost of production

### 3.3.3. Analysis of household's pepper supply to markets

In this part of the analysis factors affecting marketable supply was analyzed. In this study, multiple linear regression model is used to analyze factors affecting red pepper market supply in Bure *Woreda*. The model used for the analysis is specified as:

$$Y = \alpha + \beta' X_i + U_i \tag{7}$$

Where: $Y$= quantity of red pepper supplied to market

$\alpha$ = Intercept

$\beta$ = Vector of parameters to be estimated

$X_i$ = vector of explanatory variables

$u_i$ = disturbance term

The parameter estimates of the above model may not be Best Linear Unbiased Estimator (BLUE) when some of the assumptions of the Classical Linear Regression (CLR) models are violated, thus, it is important to check the presence multicollinearity among the variables that affect supply of red pepper in the area.

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. To detect multicollinearity problem for continuous variables, variance inflation factor (VIF) defined as:

$$(VIF) = \frac{1}{1 - R_j^{\,2}} \qquad (8)$$

As a rule of thumb, Gujarati (2004) states that if the VIF value of a variable exceeds 10, which will happen if $R_j^{\,2}$ (explained variation) exceeds 0.90, then, that variable is said to be highly collinear. Therefore, for this study, variance inflation factor $(VIF)$ is used to detect multicollinearity problem for continuous variables. On the other hand, contingency coefficient is used to check multicollinearity of discrete (dummy) variables. It measures the relationship between the raw and column variables of a cross tabulation. The formula for contingency coefficient is as follows:

$$CC = \sqrt{\chi^2 / n + \chi^2} \qquad (9)$$

Where, CC is contingency coefficient, $\chi^2$ is chi-square value and N is total sample size. The decision criterion with the contingency coefficient is that if the value of CC is greater than 0.75, the variables are said to be collinear (CC > 0.75).

**Variables definitions and hypothesis for marketed surplus of red pepper**

The most important factor which increases marketed surplus significantly is the increased production or output followed by consumption and payments in kind which should be reduced to keep up the quantity of marketed surplus of food grains (Thakur *et al*., 1997).

**Dependant variable**

**Quantity Supplied (QUA SUPP)**: It is a continuous variable which represents the amount of red pepper supplied by the household to the market measured in quintals in 2008/2009.

**Independent variables**

**1. Yield (YIELD)**: Farmers who produce higher output are assumed to supply more to the market than those with lower product. It is a continuous variable measured in quintals per household and assumed to affect the marketable supply of red pepper positively. According to Butler and DNIVA (2005), yield can have serious and unpredictable consequences on the supply.

**2. Land size (LAND):** The total land used for red pepper production was measured in terms of number of hectares the household owns and it was expected to affect the household level of red pepper marketable supply positively because, a producer who owns a large area of land for red pepper production than a producer who own less area of land and under the same input utilization condition can produce more.

**3. Current market price (PRICE)**: Current year price was expected to affect the marketable supply of red pepper positively because prices stimulate marketable supply. If the current market prices are low producers store the produce until the price rises after meeting their immediate needs.

**4. Lagged market prices (L PRICE)*:* Lagged market prices at all levels (rural and urban markets) were also expected to affect supply positively because of their incentive and dis-incentive effect in production. This variable is also measured in birr per quintal. Positive relation of lagged prices is expected with marketable supply of red pepper. In general, if prices were relatively high in the previous years, there is a possibility of increasing land for pepper production and hence the amount produced.

**5. Distance to market (MKT DIS)**: Distance to the market is a continuous variable measured in kilometers from the household residence to the market centers. The closer the residence of the household to the rural market center, the more is the quantity of marketable supply. The assumption here is that the closer a household is to the market, the more the household is motivated to produce red pepper and supply it to the market. Therefore, this variable was expected to have an inverse relationship with marketable supply.

**6. Access to credit (CREDIT):** Access to credit is measured as a dummy variable taking value of 1 if the farmer had access to credit and 0 otherwise. This variable was expected to influence the marketable supply of red pepper positively on the assumption that producers use the credit for production purpose.

**7. Market information (MKT INFO)**: This variable was measured as a dummy variable taking a value of 1 if the farmer had access to market information and 0 otherwise. It has been hypothesized to affect marketable supply of red pepper positively. Producers that have access to market information are likely to supply more pepper to the market than informed producers.

**8. Age (AGE)**: It is a continuous variable measured in years. A farmer with longer period of experience in production was assumed to have a better knowledge than who has a lower experience in agriculture because through time producers acquire skill about marketing and supply better than those who are less experienced. It was also assumed that as age increases the production capacity will decrease and amount produced and marketed supply decrease. Hence, both inverse and direct relation was assumed to the amount supplied.

**9. Family Size (FAM SIZE)**: A household with more number of family members is assumed to supply less amount of red pepper to market than those households with relatively less number of family members because of the increase in consumption. Households with large family size may produce more and supply more. Hence, in this study either positive or negative relation between family size and marketable supply of red pepper was expected.

**10. Education (EDU)**: This variable is a dummy variable taking a value 1 if the household head has a formal education and 0 if a farmer has no formal education at all. Education increases farmers' ability to get and use information. Since households who have better knowledge are assumed to adopt better production practices, this variable was assumed to have positive relation with marketable supply of red pepper.

**11. Extension service (EXTN)**: This variable was measured as a dummy taking a value of 1 if the household head has contact with a development agent and 0 otherwise. Extension service was expected to have positive effect for market participation through its stimulation of production and productivity. Farmers that have frequent contact with DAs will have better knowledge to produce and market their product.

**12 Agricultural experiences (EXP)**: This continuous variable measured by number of years stayed in red pepper production which is different from age influence market participation positively. Household with better experience in red pepper production was expected to produce more amount of red pepper than those with only less experience and, as a result, it is expected to supply more amounts to market. Therefore, experience in red pepper production was expected to have a positive relation with marketable supply.

**13 Number of oxen owned (OXEN NO):** It is a continuous variable which is expected to influence production participation then by supply positively. It was expected that participation probability of farmers to supply pepper would increase as farmers increased their number of oxen because even if there is a limited land there will be proper and timely land preparation then by increase in productivity. Kindie (2007) found that the number of oxen owned by the household affected the marketable supply of sesame in Metema *woreda*.

**14. Non-farm income (NF INC):** It is a dummy variable that shows income obtained from non-farm activities by the household head. Income from non farm activities was assumed to have inverse relation with market supply because farmers will have alternative sources of income to cover tax, loan and other social requirements and then decrease the supply.

### 3.3.4. Market integration analysis

To analyze market integration Augmented Dickey Fuller (ADF) for unit root test for each price series and residuals and Error Correction Model (ECM) were used to analyze the short run relationship and speed of price adjustment.

### a) Augmented Dickey Fuller (ADF) test

Before we conduct co-integration test, we need to examine the univarate time series properties of the data and confirm that all the price series are non-stationary and integrated of the same order. It is performed by ADF test developed by Dickey and Fuller (1979, 1981). The test of market integration is forward if $Y_t$ 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. The null hypothesis is that there is a unit root in the process $\{(p-1) = 0,$ implies $p = 1\}$. Hence the modified DF test will be used. The general form of this test's regression is as follows:

$$\Delta Y_t = \alpha + \beta_t (\rho - 1)Y_{t-1} + \sum_{i=1}^{k} \Delta Y_{t-i} + e_t \tag{10}$$

33

Where $\Delta Y_t$ = Implies first difference, and $\Delta Y_t = Y_t - Y_{t-1}$

t = is the time trend.

$\alpha$ = is the intercept

$B_t$ = the coefficient of the change in market price of Y at time t-1

$e_t$ = the disturbance term

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. The null hypothesis is that the series $Y_t$ is integrated of order one, I (1) and the alternative hypothesis is that the series is of order zero, I(0).

## b) Co -integration test

Due to non-stationary nature of many economic time series, the concept of co-integration becomes widely used in econometric analysis. Co-integration is an econometric technique that allows the identification of both the degree of integration and its direction between two markets. After we conduct stationary test on each price series, co-integration test will be conducted between the price series which are stationary at their first difference and non-stationary at their level using OLS by taking one market price dependent on the other. The residuals are also obtained from the co-integration regression and tested for stationary in order to see the long run relation using ECM as follows:

$$Y_t = \alpha + \beta X_t + v_t \tag{11}$$

$$\Delta v_t = \alpha' + \langle \rho - 1 \rangle v_{t-1} + \sum_{i=1}^{k} \delta_t \Delta v_{t-1} + \varepsilon_t \tag{12}$$

Where:

$Y_t$ = the price at market Y during period t

$X_t$ = the price at market X during period t

$\Delta V_t$ = ordinary least squares residual that can be interpreted as the

deviation of $Y_t$ from its long run path.

k= the lag length

## c) Error Correction Model (ECM)

The fact that two series are co-integrated implies that the integrated series move together in the long run. Hence, price in different markets have co-movements if the markets are integrated. Therefore, testing co-integration of two price series is sometimes believed to be equivalent to detecting long run market integration. Engle and Granger (1987) have developed a model known as Error Correction Model (ECM) that enabled us to differentiate between long run and short run relationships of time series analysis. To analyze the short run relationship and see the speed of adjustments between the different market prices the joint hypothesis test was used. The null hypothesis is that there is short run causality in between the price series ($\beta_2 = \beta_3 = 0$) and $\delta = -1$ and F calculated was compared with F tabulated values at 5% level of significance by deploying the following ECM :

$$\Delta Y_t = \alpha + \sum \beta_1 \Delta Y_{t-k} + \delta \Delta e_{t-1} + \sum \beta_2 \Delta X_{t-k} + \beta_3 \Delta X_t + \varepsilon_t \qquad (12)$$

Where: $\beta_1$, $\beta_2$, and $\beta_3$ are the estimated coefficients to the short run relationship

$\Delta Y_t$ = Price change at Bure

$\Delta X_t$ = price at Bahir Dar and Debre Mararkos

K = the lag length of time,

$\delta$ = the speed of adjustment parameter,

$\varepsilon_t$ = stationary random process capturing other information not contained

in either lagged value of $P_{it}$ and the actual $P_{jt}$

# 4. RESULTS AND DISCUSSIONS

The result and discussion part of this thesis deals with the findings from descriptive statistics and econometric analysis, in red pepper production and marketing mainly socio-demographic characteristics of farmers and traders, Structure Conduct and Performance of red pepper marketing for each marketing channels, profitability of red pepper production, determinants of red pepper supply to the market in Bure *Woreda*. In addition, the chapter examines market integration between major regional markets in the Western part of the region.

## 4.1. Socio-Demographic Characteristics of Sample Farmers and Traders

In this part of the thesis, sampled farmers and traders' socio-demographic characteristics (sex, age, religion, marital status, education, family size, resource ownership and others) are discussed.

### 4.1.1. Demographic characteristics of sample farmers

Household characteristics, namely sex, age, religion, marital status, education, family size are believed to influence production and marketing decision of farmers in different aspects. The results of the study revealed that 97.5% of sample households were male headed and 2.5% were female headed. Their average age was 42 years and 43% of the respondents' were above 43 years age with an age interval of 24-67 years. Religion of the sampled farmers indicates 93.3% of the respondents were orthodox Christians and 6.7 percent were Protestants. The marital status indicates 97.5 % of the sampled respondents were married. The educational level of the respondents also indicates that 11.7 % of them were illiterate. Table 5 shows the detail demographic characteristics of farmers.

Table 5.  Demographic characteristic of sample farmers

| Description | Number of HH/members (N=120) | Percentages |
|---|---|---|
| Sex | | |
| Male | 117 | 97.5 |
| Female | 3 | 2.5 |
| Educational level | | |
| Illiterate | 14 | 11.7 |
| Literate (read and write) | 106 | 88.3 |
| Religion | | |
| Orthodox | 112 | 93.3 |
| Protestant | 8 | 6.7 |
| Marital Status | | |
| Single | 2 | 1.7 |
| Married | 117 | 97.5 |
| Divorced | 1 | 0.8 |
| Age of Household head | | |
| 24-28 | 10 | 8.3 |
| 29-33 | 10 | 8.3 |
| 34-38 | 33 | 27.5 |
| 39-43 | 16 | 13.33 |
| >43 | 51 | 42.57 |
| Family size | | |
| 1-4 | 17 | 14.17 |
| 5-7 | 78 | 65 |
| 8-10 | 20 | 16.66 |
| >10 | 5 | 4.17 |

Source: Survey result, 2009

## 4.1.2. Socio economic characteristics of farmers

The socioeconomic characteristics of farmers considered so far are type of houses, land use pattern, cropping pattern, livestock holding and off-farm income as shown in Table 6.

**Table 6. Socio economic characteristic of sample farmers**

| Description | Number of HH/members (N=120) | Percentages |
|---|---|---|
| Type of houses | | |
| Corrugated iron | 120 | 100 |
| Both | 23 | 19.16 |
| Major crops | | |
| Maize | 120 | 100 |
| Wheat | 102 | 85 |
| Pepper | 120 | 100 |
| Teff | 90 | 75 |
| Livestock holding | | |
| Oxen | | |
| 1-3 | 82 | 53.3 |
| 4-6 | 54 | 45 |
| >6 | 2 | 1.7 |
| Non-farm income | 29 | 24.15 |
| Petty trade | 8 | 6.65 |
| House rent | 3 | 2.5 |
| Handicraft | 18 | 15 |

Source: Survey result, 2009

Land use pattern and farmer's sources of non-farm income are indicated in the Appendix Table 1 and 6

## 4.1.3. Demographic characteristics of traders

The survey result indicates that the sampled traders were on average 33 years old and 4 years of average experience (minimum 1 and maximum 10 years). Religious of traders were 90% w Orthodox Christians while the remaining were Muslims. Table 7 summarizes the demographic characteristics of traders.

Table 7. Demographic characteristics of pepper traders (% and averages)

| Description | Number of Sampled traders (N=30) | Percentages |
|---|---|---|
| Sex | | |
| Male | 29 | 96.67 |
| Female | 1 | 3.33 |
| Educational level | | |
| Illiterate | 5 | 16.67 |
| Literate (read and write) | | |
| Grade 1-4 | 10 | 33.33 |
| Grade 5-8 | 10 | 33.33 |
| Grade 9-12 | 5 | 16.67 |
| Religion | | |
| Orthodox | 27 | 90 |
| Muslim | 3 | 10 |
| Marital Status | | |
| Single | 5 | 16.67 |
| Married | 25 | 83.3 |
| Age | 30 | 33[a] |
| Years of experience in trading | 30 | 4[a] |

Note: [a] mean value

Source: Survey result, 2009

### 4.1.4. Socio economic characteristics of traders

The socioeconomic characteristics of traders include the physical and financial assets such as store, balance, telephone (fixed or mobile), vehicles, mill, pack animals, animal driven cart and working capital. The survey result indicates that all the sample traders store the product on the average for 52 days before sale. From the total respondents 93% of them have a separate place of storage while 7% of traders use residence store. The average holding capacity of the store was 108 quintals (minimum 20 maximum 250). To exchange market information 93% of traders use mobile telephone while the remaining ones use fixed telephone. Traders source of capital was on average 70% own capital. Only few traders have access to credit. The main source of credit was ACSI with annual interest rate of 12.5%.

### 4.2 Red Pepper Production

In Amhara region red pepper is mainly produced in 15 Woredas of the seven administrative zones (BoA, 2008/2009). The proportion of pepper being produced by irrigation is less than one percent as compared to the total production (BoA, 2002). Irrigation is best practiced in North and South Wollo and Oromia zone. Eighty five percent of the sampled farmers practice intercropping. The main crops used for intercropping were onion (35%), onion and black cumin (16%) and 14% with soybean.

All the sampled farmers in Bure *Woreda* produce red pepper using rain fed agriculture. The trend of production over the 2004/2005-2008/2009 period is presented in Table 8. As indicated in the table there was a variation in productivity at national, regional and woreda level productivity due to the change in climatic condition over the periods. Productivity was the highest in 2005/2006 production year for both national and regional data and 2007/2008 was the highest period for the *Woreda* productivity.

Table 8. Red pepper production over the 2004/2005-2008/2009 period

| Production year | Ethiopia | | | Amhara Region | | | Bure | | |
|---|---|---|---|---|---|---|---|---|---|
| | Land used(ha) | Production (qt) | productivity (qt/ha) | Land used(ha) | production (qt) | Productivity (qt/ha) | Land used(ha) | production (qt) | Productivity (qt/ha) |
| 2004/2005 | 56,991 | 724,655 | 12.72 | 20,362 | 235,813 | 11.58 | 1,348 | 15,501 | 11.5 |
| 2005/2006 | 81,544 | 1,790,282 | 21.95 | 29,111 | 491,264 | 16.88 | 1,432 | 15,752 | 11 |
| 2006/2007 | 56,914 | 1,017,238 | 17.88 | 25,929 | 352,966 | 13.6 | 1,760 | 13,929 | 7.9 |
| 2007/2008 | 75,341 | 1,223,997 | 16.25 | 27,505 | 370,393 | 13.47 | 2,000 | 38,109 | 19.1 |
| 2008/2009 | 110,406 | 1,834,026 | 16.61 | 41,069 | 530,466 | 12.92 | 1,800 | 21,600 | 12 |

Source: CSA (2004-2009) annual report for National and Regional data
Bure district Rural Development and Agricultural Office for Bure *Woreda*
Production data

### 4.2.1. Red pepper production characteristics

#### 4.2.1.1. Input utilization

Farmers in Bure *Woreda* use modern agricultural inputs such as fertilizer (DAP and urea) and improved seed (Maracofana variety). Except Maracofana variety, other improved varieties that were released by the EIAR were not used in Bure. From the total respondents 95% and 89% use DAP and urea fertilizer respectively. In addition to this 44% of farmers use natural fertilizer or compost to supplement the use of fertilizer. However, farmers on the average use 45 kg of DAP and 34 kg of urea per hectare which is below the recommended rate (100 kg DAP and 100 kg urea) per hectare. On the other hand, farmers use on the average 1.35 kg improved seed per hectare which is much higher than the recommended rate (0.6-1kg) per hectare because producers accustomed to use above the recommended rate expecting high yield due to their low awareness in using appropriate rate of seed. The use of chemicals such as pesticides and herbicides is almost none, only 2.4% percent of the respondents use

chemicals. The basic reasons why farmers do not use improved varieties where due to timely unavailability (54%), lack of information (24%) and expensiveness of the input. The basic reason not to use chemicals was attributed to lack of information and expensiveness of the input (39%) and unavailability of the input (37%) in the surrounding area. The major suppliers of inputs were office of agriculture and Bure town traders for the supply of fertilizer, improved seed and chemicals.

Table 9. Average price of inputs used, 2009

| Inputs | Average cost (Birr per Quintal, kg or liter) |
|---|---|
| Fertilizer (Q) | |
| DAP | 805.39 |
| Urea | 616.41 |
| Improved seed (kg) | |
| Maracofana | 113 |
| Pesticides (liter) | 45 |

Source: Survey result, 2009

### 4.2.1.2. Product quality

The types and quality of red pepper produced in the region are many such as Marakofana, Denbure, Rib type and Fogera type. They differ one to the other by color, pungency, size, taste, moisture content and oleoresin content. Farmers in the *Woreda* do not have any standard measure to identify the quality of pepper. They usually identify the quality of red pepper by its color, pest damage, size, and shape, odor and foreign matter. The sampled farmers use color and shape (42.5%) as a means of differentiating the quality of the product.

The quality of red pepper as mentioned by the Bure *Woreda* Office of Agriculture and Rural Development Office is good that had been assured by the Ethiopian Spice Factory (ESF) which is equivalent to Alaba and Silte in their assessment to find a source market for contractual farming. The detail methods of quality measurements of producers are indicated in Table 10.

Table 10. Quality measurement methods of traders during buying

| Measurement methods | Percentage of Sampled households |
|---|---|
| Color | 28.3 |
| Color  and shape | 42.5 |
| Color, shape and odor | 2.5 |
| Color, shape and absence of foreign matter | 16.7 |
| All | 10.0 |
| Total | 100 |

Source: Survey result, 2009

### 4.2.1.3. Post harvest handling

Storage services help for smooth and continuous flow of products marketed and create time utilities. Farmers harvest pepper in two forms, when green and dried for different purposes. The main concern here is about the red pepper post harvest handling, when pepper is harvested when dried and its post harvest handling methods. Without checking whether it is uniformly dried or not, farmer's stored red pepper in sack or traditional container called "*gotera*" which is highly vulnerable to insects and rodents.

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According to the survey, the storage materials that 82% of the farmers used were by filling in sack and put in *Kot*[1] the rest use *gotera*[2]. Farmers on the average store red pepper for 222 days with a minimum of 30 days and maximum of a year. Different factors initiate farmers to store red pepper as indicated in Table 11. Farmers dry red pepper in a floor which is liable to dust and other foreign matters. In addition to this, some farmers dry red pepper at the top of their house that leads to over drying and decrease its pungency. According to the scientific researches conducted harvested red pepper should be dried uniformly until its moisture content reaches 11%.

Table 11. Factors that initiate producers for storage

| Variables | Number of Households | Percentage of Sampled Households |
|---|---|---|
| Expecting future increase in price | 66 | 55.0 |
| Low demand | 2 | 1.7 |
| Consumption | 6 | 5.0 |
| Expecting future price and low demand | 3 | 2.5 |
| Expecting future price and for consumption | 43 | 35.8 |
| Total | 120 | 100 |

Source: Survey result, 2009

### 4.2.2. Access to services

Access to services such as credit, agricultural extension, market information and transport are the most important factors that promote production and productivity thereby increasing marketable surplus and ultimately farm income.

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*Kot*[1] a wooden made long height table *gotera*[2]an oval shaped storage material made from mud

### 4.2.2.1. Credit

Finance is the crucial element starting from land preparation up to the marketing of the product. The study result revealed that only 16% of producers had access to credit at an annual interest rate of 12.5%. The main objectives of the credit were to purchase fertilizer (63%) and improved seed (25%). The amount of credit ranges from 1500-3000 birr for a production year and 93% of the respondents mentioned that the credit was not sufficient for pepper production. The only source for credit was Amhara Credit and Saving Institution.

### 4.2.2.2. Extension services

The study result indicates that 95% of sampled households had contact with development agents in relation to pepper production. The extension services provided were about production, input use, seedling raising and post harvest handling. In addition to the development agents, 80% of the sampled farmers have got extension services from office of agriculture and innovative farmers.

Each sampled PAs has at least one development agent. Among the sampled PAs two PAs have two development agents graduated from different disciplines (Plant science, animal science and natural resource). The frequency of extension services provided for producing farmers is indicated in Table 12. The distance from the producing farmers up to the extension agent was on average 1.74 km.

Table 12. Frequency of extension contact of producers with extension agents

| Extension contact | Frequency | Percentage of farmers With extension contact |
|---|---|---|
| Weekly | 51 | 44.3 |
| Per two weeks | 47 | 40.9 |
| Per month | 9 | 7.8 |
| Per three months | 8 | 7.0 |
| Total | 115 | 100 |

Source: Survey result, 2009

## 4.2.2.3. Road and transport

The availability of well functioning transport network is very important because it creates place utilities of the product. It there by allows farmers in surplus areas to profit from better prices from other markets and also consumers in deficit areas benefit from lower prices by transporting from surplus areas. According to the survey result, the sampled farmers use pack animals, animal pulled carts, and car to transport the product as indicated in Table 13.

In the study area, the average distance farmers traveled to transport the product to market was 6 km because of the existence of markets other than Bure. The major markets farmers used to supply the product to the market were Bure and Kuche.

Table 13. Means of transport farmers used to transport red pepper

| Means of transport | Number of sample households | Proportion |
|---|---|---|
| Pack animals | 34 | 28.33 |
| Animal pulled cart | 20 | 16.66 |
| Car | 11 | 9.18 |
| Pack animal and animal carts | 49 | 40.83 |
| Pack animal and car | 6 | 5 |
| Total | 120 | 100 |

Source: Survey result, 2009

### 4.2.2.4 Market information

Access to market information is extremely limited in the Ethiopian grain market at producer level; farmers have very limited information on price prevailing even in near by markets (Wolday, 1994). However, 98.3 % of sampled farmers had access to market information from different sources in the study area. The type of information provided were 49% about output price and post harvest handling and 27% about input and output price. The major sources of information were 22% from friends and neighbors and 21% from radio, friends and development agents.

Table 14. Comparisons of households mean pepper supply by access to services

| Access variables | Status | Pepper supply in (Q) | | t-ratio |
| | | Mean | Standard Error | |
| --- | --- | --- | --- | --- |
| Had access to market information? | Yes | 5.49 | 4.21 | |
| | No | 5.00 | 0.56 | 0.149 |
| Had access to credit? | Yes | 7.33 | 3.34 | |
| | No | 5.51 | 4.22 | 1.422* |
| Had access to extension services? | Yes | 5.6 | 4.17 | |
| | No | 1.10 | 0.56 | 0.202 |
| Had access to transport? | Yes | 5.19 | 4.19 | |
| | No | 5.38 | 4.76 | 0.292 |

Source: own computation

.  * indicates level of significant at 10% significance level.

From Table 14 it is possible to generalize that there is a significant difference in between producers with access to credit services and with no credit services at 10% significance level to supply the product. But since almost all producers had got market information there is no significant difference in this variable to supply the product. In addition to this access to transport had no significant effect whether producers were found in the near by market or far they supply the product being the main marketable commodity for producers in the *woreda*.

## 4.3. Structure, Conduct and Performance of the Pepper Market

Production of perishable crops like vegetables requires efficient marketing system. The efficiency of the market could be in the speed with which the product reaches the ultimate consumer, prices and quality. The number and sizes of enterprises within the system, how the market behaves and the overall performance of the market are analyzed as follows:

### 4.3.1. Red pepper market structure

The salient features of market structure are: the degree of sellers and buyers' concentration, the degree of product differentiation among the outputs of the various sellers in the market, and barriers to entry or freedom to entry and exit from the market. Market structure is analyzed based on the numbers and sizes of enterprises within the system, and the potential access of additional participants to it (licensing procedure, lack of capital and know how, and policy barriers) and the degree of transparency (Pender *et al.,* 2004). In this study, the structure of the pepper market is characterized by pepper market participants, marketing channels, market concentration, and degree of transparency and entry conditions.

### 4.3.1.1. Pepper market participants, their roles and linkages

The main actors involved in red pepper marketing were producers, wholesalers, retailers, brokers, rural assemblers, cooperatives and consumers. Producers supply the product mainly in two markets, Bure and Kuche. The main role played by producers was the consistent supply of red pepper in terms of amount and quality. However producers face a great problem in 2008/2009 due to a price fall. As mentioned by producers and key informants, expecting the previous year high price which was up to 50 birr/kg for retail price they produce more but the price has fallen unexpectedly.

**Producers**: Producers are the first link in the marketing chain. Producers have linkage with input suppliers (Ethiopian Improved Seed Agency, Office of Agriculture, cooperative and traders to by inputs), financial institutions such as ACSI to get a credit, Trade and Industry Office to get market information, Woreda and kebele administration to secure land and solve administrative problems in their localities. The buyers of the product were mainly retailers and wholesalers. The linkage with cooperatives was low because the nearby primary and secondary cooperatives focus on non perishable products like teff, maize and soybean to store products incase of price fall.

The average amount of red pepper supplied by producers in 2008/2009 was 5.24 quintal (with a minimum 0.5 and maximum amount of 19 quintal). The survey result indicates that 60% of the sampled households use plastic sacks to transport the product to the market using pack animals, animal cart and car. The buyer and sellers have no any quality measurement rather they develop experience to do this. They measure quality by its color, odor, shape, absence of foreign matter and origin. As soon as they agreed, weighing and loading would start.

**Wholesalers**: The wholesale buyers were found in Bure and Kuche. They purchased on average 275 quintals of red pepper of which 89% of the product had been sold in the same year. The average capital of wholesalers was 43,000 birr and the source of their capital was totally own capital. They were also serving as retailers in their local area and to a large extent also supply pepper to other retailers in Bure and other areas. All wholesalers were literate; their educational level ranges from grade four up to grade nine. The experience of wholesalers in the business ranges from three to ten years.

**Retailers**: These are the final link in the marketing chain who delivers red pepper to end users or consumers. All retailers have mobile telephone to exchange current information. The working capital of retailers ranges from 3,000 up to 35,000 birr. The source of capital was 88% own and 12% ACSI with an interest rate of 12.5%. The group lending procedure followed by ACSI was the major challenge retailers faced to use the credit. Retailers use rented and their own store because some traders store is not found in front of the main road to attract sellers.

They are very numerous as compared to wholesalers and rural assemblers and their function was to sell to consumer in pieces after receiving larger volumes from wholesalers, rural assemblers or producers.

**Brokers**: These are marketing agents that exist between producers and the final consumers. They facilitated the buying and selling activities between farmers and other marketing agents. Brokers were mainly involved in between retailers and wholesalers, retailers and other retailers, wholesalers and consumers and retailers and consumers. All brokers use mobile telephone to exchange market information to link the marketing agents involved in between producers and consumers.

Brokers disseminate price and other information to the market participants and influence pepper trade and price formation mainly in between wholesalers in the district and wholesalers out of the district such as Bahir Dar, Debre-Markos and Gondar. The main problem respondent's mentioned was licensed wholesalers and retailers in addition to their permanent business activities act as brokers. The main activity brokers usually did was negotiating and informing buyers and sellers. The average amount of money brokers had got was thirteen cents per kg.

**Assemblers**: They mainly used to buy small lots of red pepper directly from farmers and sell it to wholesalers and retailers in Bure and Kuche market based on the agreement made prior. These are farmers or part time traders in the assembly markets who collect pepper from farmers in village markets for the purpose of reselling. Their sources of money and market information are mainly their clients (retailers and wholesalers).

**Cooperatives**: Are autonomous and independent organizations that render services to members and non-members to meet their social and economic benefits. There were about 5 primary cooperatives and one cooperative union (Damot cooperatives union) in the *Woreda* engaged in pepper trade. In 2008/2009 these primary cooperatives purchased 750 quintal red pepper and delivered to Damot cooperative union. The union sold the product to other cooperative unions found in Wollo, consumer cooperatives in Bahir Dar and for Universities

(Bahir Dar and Debre-Markos). All primary cooperatives purchased red pepper directly from producers. Cooperatives had also linkages with producers in input supply such as fertilizer, improved seed and chemicals.
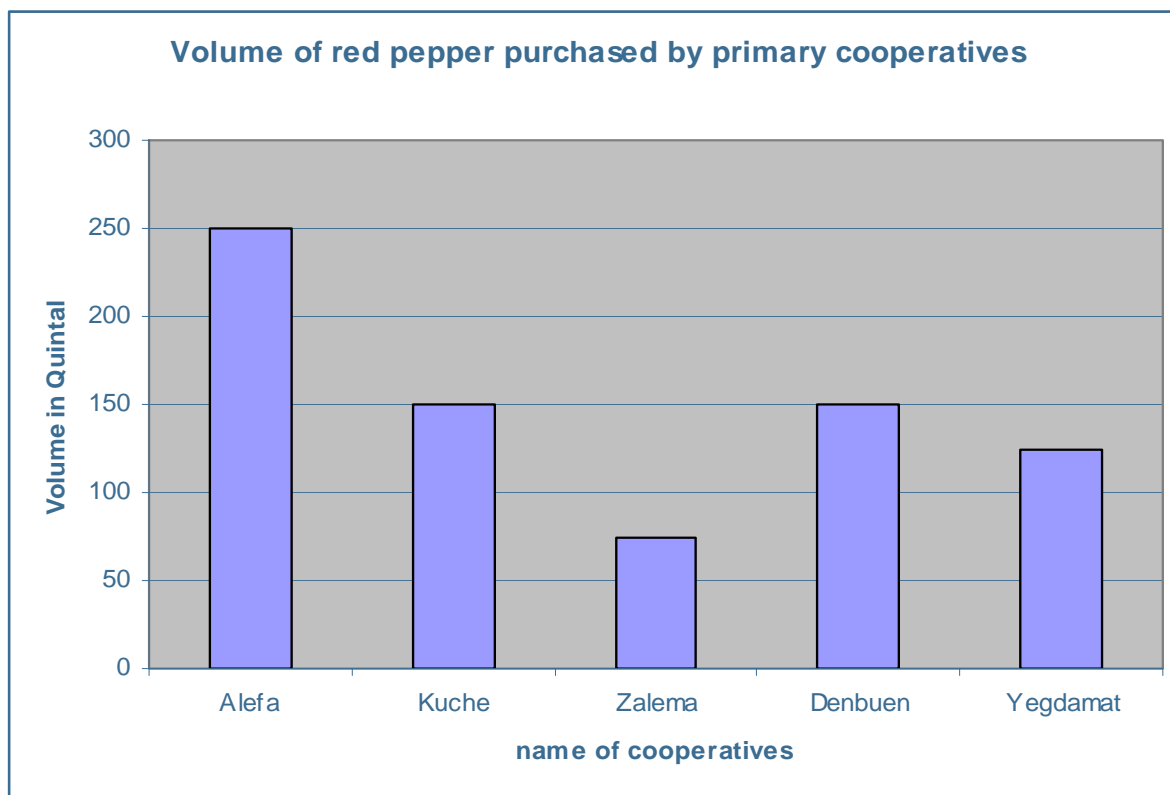


Figure 2:  Volume of transaction primary cooperatives purchased in 2008/2009

Source: Damot cooperative union, 2009

**4.3.1.2 Marketing channels**

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 Armstrong, 2003). The analysis of marketing channels is intended to know the alternative routes the product follow from the point of origin to final destination. 7 main alternative channels were identified for red pepper marketing. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were:

Channel-1: producer →consumers

Channel-2: producers → retailer →consumers

Channel-3: producers →wholesaler →consumers

Channel-4: producers → wholesaler→retailers→consumers

Channel-5: producers→rural assemblers→wholesalers→consumers

Channel-6: producers→rural assemblers→retailers→ consumers

Channel-7: producers→ primary cooperatives→-cooperative union→-consumers
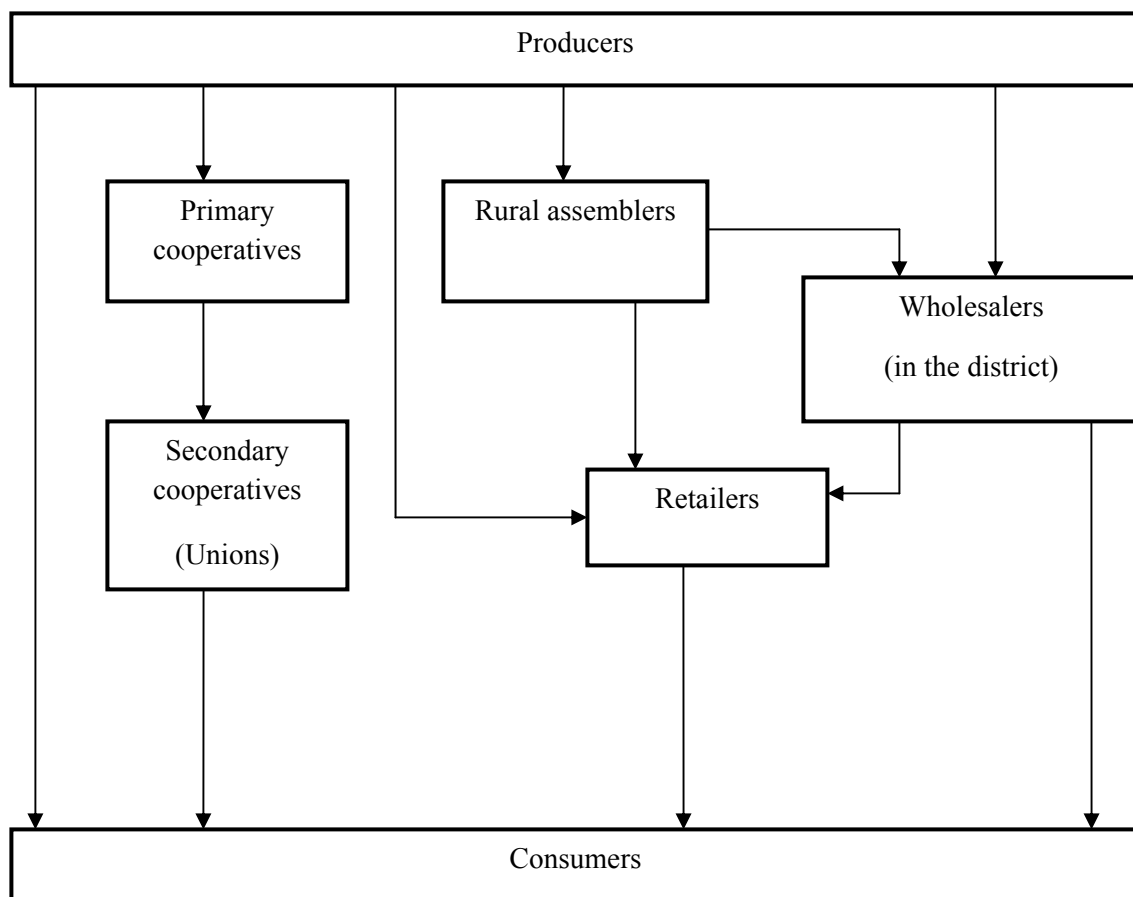
Figure 3. Red pepper market cannels for different market participants

Source: Survey result, 2009

**4.3.1.3. Degree of market concentration**

Market Concentration Ratio(C), as noted by Shughart (1990) is the numerical index most widely used by industrial organizations for measuring the size distribution of firms in a market. Due to the limited number of traders in their respective locality, *Woreda* level market concentration ratio is used to analyze the type of markets prevailed in the district. Concentration ratio was calculated by taking annual volume of red pepper purchased in 2008/09.

Table 15 indicates that the four large firms handled 30.15 % of the total volume of red pepper purchased over the year. Kohls and Uhl (1985) suggest that, as a rule of thumb, a four enterprise concentration ratios of 50 percent or more is indicative of strongly oligopolistic industry, 33-50 percent a weak oligopoly, and less than that, an un-concentrated industry.

Table 15. Pepper traders' Concentration Ratio in Bure *Woreda*

| Number of traders (A) | Cumulative frequency of traders (B) | % of traders $\left(D = \dfrac{A}{30}\right)$ | Cumulative % of traders (E) | Quantity purchased in Qt (F) | Total quantity purchased in Qt $(G = AXF)$ | % share of purchase $S_i = \dfrac{G}{4094}$ | % cumulative purchase $\left(C = \sum_{i=1}^{r} Si\right)$ |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.34 | 3.34 | 350 | 350 | 8.54 | 8.54 |
| 2 | 3 | 6.66 | 10 | 300 | 600 | 14.65 | 23.19 |
| 1 | 4 | 3.34 | 13.34 | 285 | 285 | 6.96 | 30.15 |
| 1 | 5 | 3.34 | 16.68 | 200 | 200 | 4.88 | 35.03 |
| 1 | 6 | 3.34 | 20.02 | 150 | 150 | 3.66 | 38.69 |
| 1 | 7 | 3.34 | 23.36 | 132 | 132 | 3.22 | 41.91 |
| 1 | 8 | 3.34 | 26.7 | 125 | 125 | 3.05 | 44.96 |
| 1 | 9 | 3.34 | 30.04 | 123 | 123 | 3.00 | 47.96 |
| 1 | 10 | 3.34 | 33.38 | 122 | 122 | 2.97 | 50.93 |
| 3 | 13 | 10 | 43.38 | 120 | 360 | 8.79 | 59.72 |
| 4 | 17 | 13.33 | 56.71 | 115 | 460 | 11.23 | 70.95 |
| 1 | 18 | 3.34 | 60.05 | 105 | 105 | 2.57 | 73.52 |
| 6 | 24 | 20 | 80.05 | 100 | 600 | 14.65 | 88.17 |
| 1 | 25 | 3.34 | 83.39 | 96 | 96 | 2.34 | 90.51 |
| 1 | 26 | 3.34 | 86.73 | 95 | 95 | 2.32 | 92.83 |
| 2 | 28 | 6.66 | 93.39 | 90 | 180 | 4.39 | 97.22 |
| 1 | 29 | 3.34 | 96.73 | 85 | 85 | 2.07 | 99.29 |
| 1 | 30 | 3.34 | 100 | 26 | 26 | 0.64 | 100 |
| 30 | | 100 | | | 4094 | 100 | |

Source: Own Computation

### 4.3.1.4. Degree of market transparency

There is no well established system of dissemination of market information in the *Woreda*, the trade and industry office disseminate market information, but, it is not consistent and uniform to all pepper traders. However, there is a clear licensing and renewal procedure which is uniform to all traders. In the sample markets, all traders had information through different sources (other merchants and using telephone). The results of the study indicated that the source of market information was 73% from other traders and using mobile telephone with the central market. Information among the sample traders on price about the near by markets was not also uniform.

### 4.3.1.5. Barrier to entry and exit

According to the focus group discussion made with trade and industry and small and micro enterprise office there are no restrictions to enter in the pepper markets with respect to license. There were 51 traders (8 wholesalers and 43 retailers) registered based on their capital who reside in Bure and Kuche town. Even though pepper trade does not require huge investment capital the price of the commodity is highly volatile to be engaged in the business confidentially which is an entry barrier because only those who can take such risks will join the business.

The regulatory action to control unlicensed traders was minimal in the *Woreda*. Since these unlicensed traders do not pay tax they have the opportunity to charge competitive price and discourage the licensed traders. Traders do not blame about the payment for licensing and renewal. But, they claim that the tax rate is unfair and high and very subjective. The survey result indicated that 67% of traders pay tax based on the volume of the product handled but there was no continuous and proper counting. Non accessibility of accurate and timely market information mechanisms was also the other barrier to join in pepper trade. Hence, it is possible to generalize that except capital, price fluctuation and market information there were no entry barriers and there are no exit barrier rules and regulations in pepper trade in the area.

### 4.3.2. Red pepper market conduct

To study market conduct there are no agreed upon procedures. The conduct of the pepper market is analyzed in terms of the availability of price information, price setting, purchasing and selling strategies of producers and traders.

### 4.3.2.1. Conduct of producers

Red pepper is the most important cash crop in Bure *Woreda* as well as in Amhara region. It is among the 18 strategic agricultural commodities selected and studied at regional level by a team of experts organized from different sectors. Red pepper supply starts in November and reaches its peak in January and sharply decline after February. The main market information farmers' used were input and output prices. According to the survey result, all producers supply the product to the market and almost all the sampled farmers had market information before sale. The sources of information were from friends, neighbors and through telephone. The price setting strategy producers used to sale the product were 33.4% through negotiation and by the current market demand and supply and 27% based on the market. The detail price setting strategy is indicated in Table 16. There was no any contractual based marketing system in the area to minimize marketing risks.

During the marketing of the product both traders and farmers cheat each other. Traders minimize the volume of the product during weighing, which was the major activity they usually did taking the advantage of the knowledge of farmers. On the other hand, farmers cheat traders by watering red pepper and adding other foreign matters so as to increase weight that had a great impact on the quality of the product.

Table 16. Price setting strategy of producers to market the product

| Who sets pepper price in a market? | Number of sampled Households responded | Proportion |
|---|---|---|
| Producers | 22 | 18.3 |
| Buyers | 2 | 1.7 |
| Through negotiation | 3 | 2.5 |
| Market(demand and supply) | 32 | 26.6 |
| Negotiation and market | 40 | 33.4 |
| Assemblers and buyers | 21 | 17.5 |
| Total | 120 | 100 |

Source: Survey result, 2009

### 4.3.2.2 Conduct of traders

**Price information**: Market information plays a great role for traders because it affects the volume of the product to be purchased, price of purchasing and selling, and time of sales. The market information was not transparent between the different categories of traders that created high price variability and difference among traders. Wholesalers, either with the help of their commission agents or partners, have got quick and readily information relative to retailers. As indicated in Table17. Trader's sources of information were 73.3% from other traders in their residence and through telephone from other traders out of Bure.

Table 17. Traders market information source about price

| Source of information | Number of sampled traders | Proportion |
|---|---|---|
| Other traders | 7 | 23.4 |
| Telephone | 1 | 3.3 |
| Other traders and telephone | 22 | 73.3 |
| Total | 30 | 100 |

Source: Survey result, 2009

**Buying and Selling Strategies**: The sampled traders preferred the local market i.e. a market out of the capital city of the *Woreda* to purchase the product directly from producers because of the price advantage they got with due consideration of the transportation cost. During buying all traders make a price difference for quality based on their experience. Traders attract buyers (88%) by paying reasonable price and using correct measure. With regard to the time of purchase, 60% of the respondents purchased the product during harvest and the remaining ones purchased through out the year. During buying 43% of the sampled traders set price by negotiation and 13% of them by the central market price.

Traders attract producers by showing their loyalty in providing fair price and proper weighing as mentioned earlier. As the survey result indicated 83% of sampled traders do not have permanent customer to supply the product. The buying and selling price of the product was 53% similar and 47% different in between traders. Traders were taxed mainly based on the volume of the product they handled during the year and 57% of traders developed the experience to record the volume of the product transacted (bought, sold and price).

Trade associations that act as a bridge to connect traders with the government institutions are very important for traders. However, traders during the focus group discussion mentioned that the absence of trade association had made the market to be disordered that is some traders purchase at a low price that exploit producers and some purchase at high price.

Hence, the trade association that was established earlier due to the opposition of exploiting traders had become non-functional. Traders buy products from different sources and transport from buying to store using human portage, cars, animal cart, and pack animals) as indicated in Appendix table 5.

Table 18. Traders' sources of pepper supply

| Sources of product supply | Number of sampled traders | Proportion |
|---|---|---|
| Producers in Bure market | 2 | 6.7 |
| Markets out of Bure town from other traders | 4 | 13.3 |
| Markets out of Bure town from producers | 24 | 80.0 |
| Total | 30 | 100.0 |

Source: Survey result, 2009

### 4.3.3. Red pepper market performance

The red pepper market performance was evaluated based on the level of marketing margins and also the level of market integration among the major regional markets in the western part of the region. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services from its origin to final destination.

**4.3.3.1. Marketing costs**

The marketing costs in the transaction of red pepper by the different marketing agents (wholesalers, retailers, rural assemblers, primary cooperatives and secondary cooperatives) are presented in Table 19. Primary cooperatives incur costs for employees (casher and accountant) and secondary cooperatives employee in addition manager and other experts but this costs are not included because the employees did multipurpose activities and the share of red pepper was minimal.

Storage losses were lower in secondary cooperatives due to a well established and cemented store constructed by the Regional Cooperative Promotion Agency where as it was higher in urban wholesalers because expecting higher prices wholesalers store the product for long period and their store was poor. The transaction costs were higher for urban wholesalers and lower for primary cooperatives.

Table 19. Marketing costs for different marketing agents (Birr/qt)

| Cost items | Urban wholesalers | Retailers | Rural assemblers | Primary cooperatives | Secondary cooperatives |
|---|---|---|---|---|---|
| Sack | 6.50 | 6.20 | 6.20 | 7.00 | 7.00 |
| Load | 3.60 | 2.70 | 2.20 | 2.00 | 3.00 |
| Unload | 3.60 | 2.72 | 2.60 | 2.00 | 3.00 |
| Transport[*] | 18.00 | 7.00 | 7.60 | 6.00 | 20.00 |
| For brokers | 23.00 | 21.00 | | | |
| Storage loss | 24.50 | 16.27 | 14.00 | 15.00 | 9.00 |
| Telephone | 2.60 | 2.27 | 2.00 | 1.50 | 3.00 |
| Guard | 3.50 | 3.00 | | | |
| Personal expenses | 8.20 | | 6.00 | 2.00 | 7.00 |
| Total | 93.50 | 61.16 | 40.60 | 35.5. | 52.00 |

Source: Survey result, 2009

* Indicates the amount varies depending on the market they buy or sale

**4.3.3.2 Marketing margin**

As mentioned earlier marketing margin is the difference between the price paid by consumers and that obtained by producers. Based on the reported prices by the different market participants, summarized in Table 20, the gross and net margins for different marketing channels are calculated as follows.

Table 20. Percentage marketing margins for different marketing channels

| Marketing margins | Marketing channels | | | | | | |
|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII |
| TGMM | 0 | 13.3 | 12.87 | 14.11 | 18.23 | 15.15 | 16.12 |
| GMMP | 100 | 86.7 | 84.13 | 85.89 | 81.77 | 84.85 | 83.88 |
| GMMRE | | 13.30 | | 7.05 | | 12.15 | |
| GMMWH | | | 12.87 | 7.05 | 11.42 | | |
| GMMRA | | | | | 6.81 | 3.00 | |
| GMMPC | | | | | | | 6.45 |
| GMMSC | | | | | | | 9.67 |
| NMMRE | | 9.60 | | 3.35 | | 8.40 | |
| NMMWH | | | 7.28 | 1.50 | 6.57 | | |
| NMMRA | | | | | 3.37 | 0.60 | |
| NMMPC | | | | | | | 4.20 |
| NMMSC | | | | | | | 6.32 |

Source: own computation, 2009

Without considering channel 1 (producers sell directly to consumer) the total gross marketing margin (TGMM) is the highest in channel V which is about 18.23 % and lowest 2.87 % in channel III. Retailers and wholesalers have got the highest gross marketing margin whereas rural assemblers have got the lowest marketing margin.

Producer's share (GMMp) is highest (86.7%) from the total consumers' price in channel II and lowest in channel V (81.77) because of the involvement of rural assemblers in this channel that purchase relatively at a lower price from producers in their locality. NMM are some what high in channel II and VI because of the involvement of brokers to link wholesalers and retailers.

## 4.4 Profitability of Red Pepper Production

The profitability of red pepper production was calculated by taking the average total income and expenses of all the sample producers' in 2008/2009 production year as indicated in Table 21. The average yield of sampled producers for the production year was 6.25 quintal per household and the average selling price of all producers' marketed surplus was used to estimate profitability per hectare.

Table 21. Cost structure of red pepper production 2008/2009 production year

| Cost items | Average cost (Birr/ha) |
|---|---|
| Land preparation (oxen days and human labor) | 600.00 |
| Seed and Chemicals | |
| Fertilizer (DAP and urea) | 1421.00 |
| Improved seed | 113.00 |
| Chemicals | 45.00 |
| Labour costs | |
| Sawing/transplanting | 160.00 |
| Weeding | 255.00 |
| Chemical spray | 39.00 |
| Harvesting | 288.00 |
| Compost preparation | 200.00 |
| Transport from farm to home | 14.00 |
| Packing materials | 24.00 |
| Interest rate (fertilizer) | 177.62 |
| Total variable cost (Birr/ha) | 3336.62 |
| Average Selling price of producers (Birr/Qt) | 1108.00 |
| Total value of red pepper production/year (Birr/ha)* | 13296.00 |
| Gross margin (Birr/ha) | 9959.38 |

Source: Survey result, 2009

* This is with the assumption that average pepper productivity is 12 quintal per hectare.

## 4.5. Factors Affecting Quantity of Red Pepper Supplied to the Market

Red pepper is produced mainly for market and it is the main cash crop for producers in Bure *Woreda*. The survey result revealed that all farmers supply the product to the market after meeting their household requirement and 85.3% of red pepper produced by the sampled farmers in 2008/2009 production year has been supplied to the market.

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The average amount of red pepper sold by producers was 5.24 quintal with a minimum amount of 0.5 quintal and maximum amount of 19 quintal.

**Definition of variables**: 14 variables (9 continuous and 5 dummy) were hypothesized and tested using OLS. The variables used are presented in Table 22.

Table 22. Description of dependent and independent variables used in the OLS

| Variable | Description | Types |
|---|---|---|
| QUA SUPP | Quantity supplied in quintal | Continuous |
| PRICE | Price of pepper in 2008/2009 in Birr | Continuous |
| L PRICE | Price of pepper in 2007/2008 in Birr | Continuous |
| MKT DIS | Distance to market in Km | Continuous |
| YIELD | Amount of output in quintal | Continuous |
| LAND | Size of land for red pepper production in ha | Continuous |
| OXEN NO | Number of oxen owned | Continuous |
| FAM SIZE | Family size in number | Continuous |
| AGE | Age of household head in years | Continuous |
| EXP | Experience in red pepper production in years | Continuous |
| EDU | Education of household head | Dummy |
| NF INC | Income from non-farming | Dummy |
| MKT INFO | Market information | Dummy |
| EXTN | Extension service | Dummy |
| CREDIT | Credit access | Dummy |

Source: own consumption, 2009

**Determinants of red pepper supply to market**: The result of the econometric analysis indicates that among the 14 hypothesized variables only six variables (current year price, lagged price, credit access, yield, land size and agricultural experience) significantly affect the household marketable supply as indicated in Table 23.

Table 23. Determinants of red pepper marketed surplus (OLS result)

| Variables | Coefficient | Standard error | t-ratio |
|---|---|---|---|
| (Constant) | -15.772 | 3.311 | -4.763*** |
| MKT INFO | 1.935 | 1.814 | 1.067 |
| PRICE | 0.377 | 0.087 | 4.312*** |
| L PRICE | 0.082 | 0.046 | 1.777* |
| MKT DIS | 0.060 | 0.044 | 1.364 |
| CREDIT | 3.485 | 0.678 | 5.144*** |
| EXTN | -0.046 | 0.185 | -0.250 |
| YIELD | 0.492 | 0.068 | 7.254*** |
| LAND | 2.469 | 0.941 | 2.625*** |
| OXEN NO | -0.148 | 0.163 | -0.909 |
| FAM SIZE | 0.124 | 0.107 | 1.157 |
| AGE | -0.017 | 0.021 | -0.793 |
| EXP | 0.067 | 0.019 | 3.568*** |
| EDU | 0.262 | 0.585 | 0.448 |
| NF INC | 0.208 | 0.405 | 0.513 |
| Adjusted $R^2$ | 0.88 | | |
| F value | 62.27*** | | |
| Number of observations | 120 | | |

*** and * show values statistically significant at 1% and 10% respectively

The degree of multicollinearity among the explanatory variables has been tested using VIF for continuous variables and CC for dummy variables. The results for all VIF were ranging between 1.15 and 3.40. The result of the contingency coefficient was also less than 0.75. Therefore, Since VIF is less than 10 and CC is less than 0.75 multicollinearity can not be suspected and would not be a problem. For details see (Appendix Table 3 and 4). The variables that influenced the marketable supply positively as expected were experience in pepper production, access to credit, yield, land size, current year and previous year prices.

**Yield (Quantity produced)**: Total pepper production influenced the amount of marketed supply of pepper positively showing that farmers who produce more also supply more as expected. Wolday (1994) identified major factors that affect teff, maize and wheat at Alaba Siraro *Woreda*. He studied the relationship of farm level marketable supply of the cereals using cross-sectional data. He found that size of output has a significant effect on the marketable supply of food grain. Rehima (2007) also identified that the major factors that affect marketable supply of pepper at Alaba and Siltie of SNNPRS using cross-sectional data and found that quantity of pepper produced significantly affect the amount supplied. In this study too, the variable was highly significant at 1% significant level as indicated in Table 23.

**Total size of land owned**: Total land a respondent owned for red pepper production, is a continuous variable measured in hectare influence participation decision. The sign was as expected. This variable affect the amount supplied significantly. Kinde (2007) in his study to analyze factors affecting sesame marketable surplus found that total land owned has a significant effect to the amount supplied.

**Access to credit**: This variable was also expected to influence the marketable supply of red pepper positively on the assumption that producers use the credit for production purpose. As farmers have access to credit services the amount of red pepper supplied to the market has increased due to the increase in production. Credit is expected to increase farm efficiency, the flexibility of farmers' decisions, and then helps attain economies of scale in production, and consumption smoothing (Edilegnaw, 2000).

**Current year market price**: Price was expected to affect the marketable supply of red pepper positively because prices stimulate production, and thus marketable supply. The variable was measured in birr per quintal. It affects the amount supplied to market positively as it was expected. Wolelaw (2005) identified the major factors that affect the supply of rice at Fogera *Woreda*. His study revealed that the current price had affected marketable supply of rice poitively.

**Lagged market prices**: Lagged market prices also affect marketable supply positively as expected because of the incentive and dis-incentive effect in production. This variable was also measured in birr/q. The study by Wolelaw (2005) also revealed that the lagged price had also affected marketable supply of rice.

**Experience in pepper production:** This variable was significant to volume supplied to market. The sign was as expected. As farmer's experience in red pepper production increases the amount supplied to market increases.

## 4.6. Market Integration Analysis

The sources of price data for the study were CSA for Bahir Dar and Debre-Markos markets. But the sources of data for Bure monthly retail prices were from IPMS and Disaster Prevention and Preparedness Office. The data covered the period from January 2005 up to December 2009 see (Appendix Table 8). Out of 60 monthly retail prices of each of the three markets the missing values were only 14 and these values were estimated based on the price trend. To analyze the data EViews 3.1 software was used.

**4.6.1. Unit root test**

Following the Engle Granger two-step procedure of co-integration test, the individual monthly retail prices were tested for their order of integration and then co-integration test was made. The test for the order of integration using ADF unit root test is summarized in Table 24. The results of the unit root test shows that all price series were non-stationary at level and stationary at first difference. This shows that the order of integration of Bure, Bahirdar and Debre-Markos monthly prices is one I(1) and the calculated t-statistic of DF and ADF tests exceeds the critical values of Dickey Fuller in absolute value. Hence we can test market integration between Bure, Bahir Dar and Debre-Markos markets.

Table 24. Unit root tests for level and first differences (2005-2009)

| Price series | Unit root test for levels | | | | Unit root test for first differences | | | |
|---|---|---|---|---|---|---|---|---|
| | 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 $(P > x^2)$ |
| Bure | -1.89 | 0.26 | 0 | 1.81 (0.58) | -7.16*** | 0.00 | 0 | 2.17 (0.35) |
| Bahir Dar | -1.84 | 0.17 | 3 | 1.98 (0.32) | -5.94*** | 0.00 | 1 | 2.07 (0.45) |
| Debre-Markos | -2.28 | 0.42 | 1 | 2 (0.65) | -5.50 *** | 0.00 | 0 | 2.75 (0.48) |

Note: *** indicates significance at 1% significance level

x2= Durbin's alternative test for serial correlation, the values in the parenthesis show the Significance level where there is no autocorrelation

Source: own calculation, 2009

### 4.6.2. Co-integration test

For the long run relationship between the pair market prices the Engle and Granger test uses a standard OLS estimation. The result of the unit root test on the different market pair prices is summarized in Table 25. Based on the OLS estimates, when the price in Bahir Dar and Debre-Markos rises by 1 Birr there is a corresponding long run increase in the price level by 0.32 and 0.75 Birr in Bure market respectively. Similarly, when the price in Bahir Dar increases by 1 Birr, the corresponding long run increase in Debre-Markos price level was 0.95 Birr.

Table 25.  OLS estimates of Co-integration regressions

| Markets | Constant (T-value) | Coefficient (T-value) | R-square | F-value |
|---|---|---|---|---|
| Bure-Bahirdar | 0.06 (5.10)** | 0.32 (6.28)*** | 0.52 | 65.40*** |
| Bure-Debremarkos | 0.02 (10.2)*** | 0.75 (6.02)*** | 0.64 | 74.39*** |
| Debremarkos-Bahirdar | 0.12 (12.9)*** | 0.95 (5.51)** | 0.76 | 58.01*** |

Note: *** and ** indicates significance at 1%, and 5% level, t-value in the

Parenthesis

Source: own calculation, 2009

The result of the co-integration tests on residuals also indicates that the pepper market in Bure, Bahir Dar and Debre-Markos were integrated as shown in Table 26. The test resulting using ADF methodology supports that the prices are co-integrated. Thus, from the result it is

possible to say that pepper markets which are found in the western part of the region are spatially co-integrated.

Table 26. Co-integration tests (Unit root test on residuals)

| Residuals | ADF T-value | Mackinnon P-value | # of lags | $x^2$ at 10 lags $(P > x^2)$ | Critical value |
|---|---|---|---|---|---|
| Bure-Bahir Dar | -6.01** | 0.02 | 1 | 7.5 (0.92) | -3.54 |
| Bure-Debremarkos | -6.02 *** | 0.00 | 1 | 8.2 (0.35) | -3.50 |
| Debremarkos-Bahir Dar | -5.51*** | 0.00 | 0 | 6.4 (0.55) | -3.54 |

Note: *** and ** indicates significance at 1% and 5% significance level

x2= Durbin's alternative test for serial correlation, the values in the parenthesis

show the Significance level where there is no autocorrelation

Source: own calculation, 2009

### 4.6.3. Error Correction Model

Error correction model (ECM) is a method to test whether the co-integrating markets have short run relation and are integrated or not. To examine the short run relation and causality, the study tests the joint hypothesis using F statistics. If $\delta < 0$ it shows the adjustment process will be towards the equilibrium. The negative sign showed that the speed of price adjustment was towards the equilibrium. The result when using Bure as dependant variable shows that a 1 % increase in price of pepper in Bure market the previous month results a 0.32 % and 0.24 % price increase Bahir Dar and Debre-Markos the current month respectively.  14% and 45% of

changes in Bahir Dar and Debre-Markos market prices were resulted due to the current change in Bure market respectively.

In addition to this about 26% of change in Bahir Dar price was due to the current change in price of Debre-Markos. The time required for one market to rich in equilibrium with the other market price, as suggested by Admasu (1998), approximately $(1-\delta/\delta)$ units of time, where $\delta$ is the positive coefficient of the lagged error term. The time required for Bure market to rich in equilibrium with Bahir Dar market was 2 months whereas the time required to rich in equilibrium with Debre Markos market was 1.5 months.

Table 27. Estimation of Error Correction Model between sample pair markets

| Pair markets | $\alpha$ | $\beta_1$ | $\delta$ | $\beta_2$ | $\beta_3$ | F |
|---|---|---|---|---|---|---|
| Bure- Bahirdar | 0.06 | 0.04 | -0.32** | 0.12** | 0.14** | 5.69*** |
| Bure-Debrmarkos | 0.10 | 0.40 | -0.38*** | 0.35 | 0.45*** | 4.16*** |
| Debre-Markos-Bahir Dar | 0.04 | 0.02 | -0.35*** | 0.24* | 0.26*** | 5.87*** |

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

A critical value of F statistic for sample size of 60 is 3.74 at 5% significant level.

Source: own calculation, 2009

## 4.7. Major Production and Marketing Constrains and Opportunities

Based on frequent rapid field survey and group discussion and key informant survey red pepper production and marketing in Bure *Woreda* is constrained by so many factors. The major production and marketing problems and opportunities are discussed below.

### 4.7.1. Production and marketing constraints of farmers

**Production constraints**: The major production constraints mentioned by the sampled farmers were both manmade and natural. The natural problem was shortage of rain and its distribution, the rainfall starts lately and stopped early before the product completely matured. The other constraints identified were poor access to agricultural inputs such as fertilizer, improved seed and chemicals. Inputs were not supplied at the right time, place and at fair prices especially fertilizer price is increasing year to year. The improved seed supplied was only Marakofana and its price was expensive. Producers use fertilizer below the recommended rate and improved and local seed above the recommended rate that ultimately affects production and income of producers. The average amount of fertilizer used was 45 kg of DAP and 34 kg of urea per hectare which is below the recommended rate (100 kg DAP and 100 kg urea) per hectare for pepper production.

The other problem observed was diseases and pests such as aphids, white flies and soil born diseases. Shortage of water forced producers to hand sawing rather than using transplanting by raising seedlings which was also the other constraint attributed to low production by decreasing productivity. Only 16% of producers have access to credit with an interest rate of 12.5%. The amount of credit was ranging from 1500-3000 Birr which was very limited in supply for producers. Absence of appropriate post harvest handling practice is a major problem in the area, some farmer's dry red pepper in areas which is not clean and liable for foreign matters. It was also observed that farmers dry red pepper at the top of their house that leads to over drying and decrease its pungency then by the quality of the product.

Although, almost all producers had access to market information, the quality of market information and timeliness was not uniform. The information was delivered untimely and was not accessed equally among producers. The study result indicates that 95% of producers had access to extension services but only 50% of them had frequent contact (weekly) with the development agents.

**Marketing constraints**: The imperfect pricing system of traders was a major problem to producers. Traders charge low price at peak supply periods which is not based on the real demand and supply interaction but they use the information gap of producers. Traders also influence producers in setting price and do not pay reasonable price either by decreasing the price or by reducing the amount during exchange.

On the other hand, producers influence traders through deliberate adulteration by adding water and other foreign matters to increase weight. The survey result indicates that 60% of producers supply the product during harvest to pay tax, loan, purchase industrial gods and to meet other requirements. The price of red pepper was also highly fluctuating and unstable that creates uncertainty among producers to produce more. Hence, producers were not confident to produce red pepper constantly due to the fear of the decrease in price

Bure *woreda* is relatively good in terms of road condition, availability and transport rates. 90% of producers have access to transport services but it was not evenly distributed to all PAs. Some producers are constrained with lack of all weather roads to transport outputs to the market. Cooperatives participation in red pepper marketing was very minimal because cooperatives focus on non-perishable products like maize, teff, wheat, soybean and others. Cooperatives purchased only 4% of the product of the sampled farmers. Hence, there was no any marketing institution to safeguard farmer's interest and rights over their marketable produces. The absence of standards in measurement especially in rural areas has an adverse effect to provide market information about the price and quality of produce and hence leads to market inefficiency. There were no identified and applied quality standards but traders and producers traditionally identify quality from their experience. Most farmers obtained market information on the local market from their neighbors, friends and Development Agents. However, the information was not uniformly distributed because there is no well organized institution that provides information to producers consistently.

## 4.7.2. Marketing constraints of traders

Existence of unlicensed traders that do not pay tax charge competitive price and discourage licensed traders. Some licensed traders were forced to return their license due to unfair and prohibited trade practices by the unlicensed traders that purchase relatively at a higher price and sale at a lower price than licensed traders because they do not pay tax. Shortage of capital was also a critical problem for traders. Retailers 70% source of capital was own capital while others use credit and share capital. The average capital of traders was 18,933 Birr ranging from 3,000-60,000 Birr.

The major problem for low credit access as mentioned by traders was the group lending procedure followed by ACSI and collateral problem to borrow from other financial institutions. Absence of trade associations that serve as a bridge to link traders with government institutions was also a problem for traders. Through trade association traders could stabilize price by providing market information, solve disputes and promote products. However, the government support to establish trade association was very low. During the rainy season many of the villages and rural markets were not accessible with the town markets. Increased cost of transportation due to the increased in oil price is also the other problem traders mentioned.

The storage capacity and quality of stores was also very poor. Almost all traders don't use modern storage facilities in terms of appropriate design, pest prevention and building materials. Few wholesalers even don't have store they simply use retailers store and act as brokers and sell products with out handling the product. Price fluctuation of the produce was also a serious problem for traders. Expecting the previous year price traders had bought large volume of the product but the price has decreased unexpectedly. Brokers also create price instability so as to benefit themselves by misinforming traders about the central market price.

The other problem traders mentioned was the subjective tax rate levied by the government. It was only 66.7% of traders pay tax based on the volume of transaction handled during the year others pay subjectively.

### 4.7.3. Opportunities for producers and traders

The existence of Agricultural Development Led Industrialization Policy of the country (ADLI) creates good opportunity for producers through input and output supply and extension services provided by the DAs and *woreda* expertise. The favorable agro-ecology of the area to produce pepper is also a good opportunity to boost production and increase demand in the area. Even though cooperatives involvement in red pepper marketing was low at present cooperatives could benefit producers by decreasing the transportation cost and purchase the product at fair price.

Red pepper is among the 18 strategic commodities selected at the regional level and incorporated in the agricultural commodity marketing system study project due to its domestic and international importance. The *Woreda* is near-by to East Wollega Zone of the Oromia Regional State and Metekel Zone of the Benishangul Gumez Regional State and connected by all weather roads. Therefore, Bure has a good opportunity to sell its agricultural products for different regional states.

The trend in the growth of production and increase in the number of investors in the area is also a good opportunity to increase supply and introduce new technologies due to their positive externalities effect. The infrastructural development such as mobile telephone and wireless telephone are also the other advantages to improve the production and marketing system in the area. The existence of NGOs like IPMS is another opportunity to increase productivity and benefit producers and traders to produce and market the product. In addition to this the capacity building program of IPMS benefited different stakeholders' expertise to upgrade their technical capacity then by improve performance in the *Woreda*.

The other opportunity is access to foreign markets; Ethiopia export as well as import grounded pepper in the year 1993-2003 (Mulugeta, 2004) hence if we increase production there will be the opportunity to export after meeting domestic demand. The major world pepper buyers are U.S America, Netherlands, Singapore, Germany, India, France, Japan, Canada, Spain, Britain, Ukraine and others (EEPA, 2008).

# 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1. Summary and Conclusion

This thesis has analyzed red pepper market chain in Bure *Wored*a, West Gojjam. For this study, a total of 150 respondents (120 producers and 30 traders) were interviewed using structured and semi-structured questionnaires. Rapid market appraisal with focus group discussion and key informant interview was also conducted. Secondary data on basic agricultural activities and population was also collected from different stakeholders and CSA. Descriptive and econometric methods of data analysis were used to analyze the data by deploying SPSS software.

The study has focused on the structure, conduct, and performance of red pepper market participants and market integration in the Western part of the region. In addition, determinants of red pepper supply to market were also analyzed. Farmers in Bure *Woreda* use modern agricultural inputs such as fertilizer (DAP and urea), improved seed (Marakofana variety) and chemicals. Except Marakofana variety, other improved varieties released by the EIAR were not used. From the total respondents, 95% and 89% use DAP and urea fertilizer respectively. Farmers use fertilizer below the recommended rate but they use improved and local seed above the recommended rate per hectare although there is a shortage of improved seed. The major suppliers of inputs were office of agriculture and Bure town traders.

Farmers in the *Woreda* do not have any distinct/unique standard characteristics to identify the quality of pepper. They usually identify quality of red pepper using a mix of attributes like color, pest damage, size and shape, odor and foreign matter. 97% of sampled farmers store red pepper for different purpose such as expecting future increase in price (55%), low demand during harvest, and for consumption. The storage mechanism used by most farmers is by filling in sack and put on *Kot*. Other farmers store in *gotera*. Farmers on the average store red pepper for 222 days with a minimum of 30 days and maximum of 365 days.

Only 16% of producers had access to credit at an interest rate of 12.5% from ACSI. The main objectives of the credit were to purchase fertilizer (63%) and improved seed (25%). The amount of credit ranges from 1500-3000 birr for a production year. 95% of sampled households had extension contact with development agents in relation to pepper production. In addition to the development agents, 80% of the sampled farmers have got extension services from office of agriculture and innovative farmers. Almost all sampled farmers had access to market information from different sources but it was not uniform and continuous. According to the survey result, 40% of the sampled farmers use pack animals and animal carts to transport the product, 28% of farmers use pack animals and 17% of the farmers use animal cart only. The major markets that farmers use to supply their products were Bure and Kuche.

The structure of the market was analyzed by taking the share of the four large firms from the total volume of trade by the sampled traders in 2008/2009. The four firms Concentration Ratio ($CR_4$) indicates the four largest traders handled 30.2% of the total volume of purchased pepper. Hence the structure of the pepper market in the study area was some what competitive but near to slight oligopoly. Except capital, price fluctuation and market information, there were no entry and exit barrier rules and regulations in pepper trade. The sources of market information for producers were friends and neighbors, and traders through telephone. Producers selling price was determined through negotiation and the market (33%) with traders based on the current market demand and supply and 17% based on brokers and buyers interest. During buying all traders make a price difference for quality based on their experience to identify the quality of the product. The survey result indicates that 73% of the respondent's sources of information were from other traders and through telephone.

The total gross marketing margin (TGMM) is highest in the channel that involves producers, wholesalers, retailers and consumers which is about 18.23 and lowest (12.87) in channel where producer, wholesalers and consumers were participating. Retailers and wholesalers have got the highest gross marketing margin where as rural assemblers have got the lowest margin. The profitability of red pepper production was calculated by taking the average total income and expenses of all the sample producers' in the production year. Of all costs fertilizer cost was the highest and transportation cost was the lowest.

Producers earned a gross margin of 9959.38 Birr/ha/year. Therefore, red pepper production in that particular period was profitable to producers. All producers supply the product to the market during the year. The average amount of red pepper supplied to market by each producer was 5.24 quintal with a minimum amount of 0.5 quintal and maximum amount of 19 quintals.

The variables that influenced the marketable supply positively as expected were agricultural experience, access to credit, yield, land size, current year and lagged prices. Among the significant variables yield and access to credit were highly significant at less than 1% significant level. As farmer's experience increased the amount of red pepper supplied to market has increased. Access to credit and yield also influence the marketable supply of red pepper positively because as producers use the credit for production purpose output has increased and then marketable supply. Price (lagged and current year) as it was expected affect the marketable supply of red pepper positively because prices stimulate production, and thus marketable supply. The pepper markets in the Western part of the region were integrated in the long run but they were not integrated in the short run and the time required for Bure market to rich in equilibrium with Bahir Dar market (2 months) was higher than that of Debre-markos market (1.5 months).

## 5.2. Recommendations

The major factors identified as a problem in red pepper market chain analysis were related to both pepper production and marketing. Thus, appropriate interventions are required to alleviate these problems. To solve the production and marketing problems and increase production and marketable supply of red pepper, the following recommendations are forwarded:

**1. Improve access to inputs to increase productivity of red pepper**

The results of the study indicate that increase in production has a significant effect to the amount supplied. Hence, it is important to provide modern inputs at the right time and the required amount at reasonable price to increase production.

**2. Provision of adequate price information**

The co-integration results of the study also revealed that Bure and Bahirdar markets were not integrated as Debre-Markos due to inadequate market information in the short run. Hence, market information services have to be established or strengthened to provide farmers and traders consistently and timely.

**3. Strengthening credit institutions**

Access to credit for both production and marketing has considerably affected marketable supply. Hence, it is important to strengthen credit institutions in terms of spatial coverage, amount of credit and timely provision for both farmers and traders. Solving the group collateral procedure and collateral problems of farmers and traders to get a credit from different financial institutions is very important.

**4. Promoting and strengthening of cooperatives**

Both current and lagged year prices were significant to the amount supplied. Hence, to solve the low prices received by producers, cooperatives have to be involved in red pepper marketing significantly because cooperatives are service rendering organizations that do not strive for profit so that they will relatively purchase at a fair price from producers.

**5. Continuous training and education in red pepper production**

The increase in red pepper production technique has a significant effect to increase production then by marketed surplus. Hence, continuous education and training that would change the production skill of producers is very important to change the attitude of farmers. Hence, concerned stakeholders need to provide continuous education and training in production and marketing of red pepper.

## 6. Establishment of processing and storage facilities

Red pepper storage facilities are poor in both rural and urban areas. Red pepper being bulky and perishable, farmers and producers face storage loss and quality deterioration. To solve these problems constructing storage and processing facilities by traders and the government would be very important.

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# 7. APPENDICES

Table 1. Land use pattern of sampled producers (in ha)

| Description | Number of sampled farmers | Minimum | Maximum | Mean |
|---|---|---|---|---|
| Own land for agriculture activities | 120 | 0.250 | 4.750 | 2.563 |
| Own land for a forestation | 13 | 0.031 | 0.500 | 0.209 |
| Own land for Forage | 13 | 0.062 | 0.250 | 0.209 |

Source: Survey result, 2009

Table 2. Number of animals producers own in 2008/2009

| Description | Number of sampled farmers | Minimum Number of animals | Maximum number of animals | Total number of animals |
|---|---|---|---|---|
| Oxen | 120 | 1 | 8 | 404 |
| Cows | 103 | 1 | 15 | 269 |
| Heifers | 86 | 1 | 4 | 149 |
| yearlings | 84 | 1 | 7 | 84 |
| Calves | 87 | 1 | 6 | 181 |
| Donkeys | 77 | 1 | 3 | 107 |
| Mules | 8 | 1 | 1 | 8 |
| Sheep | 89 | 1 | 16 | 400 |
| Goat | 35 | 1 | 18 | 178 |
| Bee Colony | 42 | 1 | 20 | 127 |

Source: Survey result, 2009

Table 3. Test for Multicollinearity for continuous variables

| Variables | $R_j^{\,2}$ | $1-R_j^{\,2}$ | $VIF = \dfrac{1}{1-R_j^{\,2}}$ |
|---|---|---|---|
| Current year price(2008/209) | 0.248 | 0.752 | 1.32978 |
| Lagged price(2007/2008) | 0.294 | 0.294 | 3.40136 |
| Yield | 0.731 | 0.629 | 1.58982 |
| Land size | 0.536 | 0.464 | 1.5625 |
| Owned oxen number | 0.217 | 0.783 | 1.27713 |
| Age | 0.196 | 0.804 | 1.24378 |
| Agricultural Experience | 0.355 | 0.645 | 1.55038 |
| Distance from market main s in the District | 0.136 | 0.864 | 1.157407 |
| Family size | 0.103 | 0.897 | 1.11482 |

Source: Own computation

Table 4. Contingency coefficient for dummy variables

| Description | Access to extension | Access to credit | market information before sale | Access to non farm income | Education |
|---|---|---|---|---|---|
| Access to extension | 1 | 0.094 | 0.027 | 0.028 | 0.076 |
| Access to credit | | 1 | 0.116 | 0.032 | 0.160 |
| Market information | | | 1 | 0.055 | 0.047 |
| Access to non farm income | | | | 1 | 0.088 |
| Education | | | | | 1 |

Source: Own computation

Table 5.  Means of transport of traders from buying up to the store

| Description | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Human portage | 12 | 40.0 | 40.0 |
| Cars | 4 | 13.3 | 53.3 |
| Animal carts | 7 | 23.3 | 76.7 |
| Others | 2 | 6.7 | 83.3 |
| Men and animal court | 3 | 10.0 | 93.3 |
| Pack animals and human portage | 2 | 6.7 | 100.0 |
| Total | 30 | 100.0 | |

Source: Survey result, 2009

Table 6.  Non farm income source of producers

| Description | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Weaving | 2 | 6.9 | 6.9 |
| Metal work | 2 | 6.9 | 13.8 |
| Tailoring | 1 | 3.4 | 17.2 |
| Mill service | 6 | 20.7 | 37.9 |
| Radio maintenance | 1 | 3.4 | 41.4 |
| House rent | 3 | 10.3 | 51.7 |
| Salary from cooperatives | 1 | 3.4 | 55.2 |
| Trade | 8 | 27.6 | 82.8 |
| Mill and rent | 2 | 6.9 | 89.7 |
| Milling and trade | 2 | 6.9 | 96.6 |
| Carpenter and milling | 1 | 3.4 | 100.0 |
| Total | 29 | 100.0 | |

Source: Survey result, 2009

Table 7. Storage materials used by producers to market red pepper

| Description | Frequency | Percent | Cumulative Percent |
| --- | --- | --- | --- |
| plastic sack | 70 | 58.3 | 58.3 |
| Plastic  sacks  and *jonya[1]* | 5 | 4.3 | 62.6 |
| Plastic  sacks  and basket | 9 | 7.5 | 70.1 |
| Plastic  sacks , basket, *jonya* and basket | 32 | 26.6 | 96.7 |
| Plastic  sacks, *Akmada[2]* and basket | 1 | .8 | 97.5 |
| Others | 3 | 2.5 | 100.0 |
| Total | 120 | 100 | |

Source: Survey result, 2009

1 and 2 indicates storage materials made from silk and got leather respectively

Table 8. Monthly retail prices of red pepper (2005-2009)

| Year and markets | Monthly retail prices/kg of red pepper | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | January | Feb | Mar | April | may | June | July | August | Sep | Oct | Nov | Dec |
| 2009 | | | | | | | | | | | | |
| Bure | 16 | 13 | 12 | 10 | 10 | 13 | 9.5 | 15 | 12 | 12.5 | 12 | 12.8 |
| Bahir Dar | 17 | 18.5 | 19 | 16.5 | 16 | 17.1 | 17.67 | 17.9 | 13 | 13 | 13 | 13.5 |
| Debremarkos | 16.8 | 16.9 | 19.33 | 17.3 | 17.4 | 17.5 | 17.33 | 18 | 15 | 14.8 | 15.67 | 16.2 |
| 2008 | | | | | | | | | | | | |
| Bure | 30 | 28 | 32 | 30 | 30 | 30 | 35 | 35 | 28 | 26 | 22 | 15 |
| Bahir Dar | 34.33 | 35.67 | 37.33 | 40 | 42.67 | 43.2 E | 43.8 E | 44.67 | 42.67 | 37 | 37 | 30.67 |
| Debremarkos | 30 | 35 | 35.67 | 35 | 35 | 36.5 E | 37.5 E | 44.32 | 40 | 35 | 32.33 | 30.67 |
| 2007 | | | | | | | | | | | | |
| Bure | 11 | 11 | 12.2 | 13 | 32$_E$ | 40 | 38 | 35 | 35 | 25 | 25 | 25 |
| Bahir Dar | 11.5$_E$ | 11.67 | 18.3 | 19.2 | 36.5 E | 41 | 42.2 | 42.3 | 42.3 | 39 | 41.2 | 35 |
| Debremarkos | 11$_E$ | 11 | 18 | 18.5 | 25 | 42 | 45.1 | 46.5 | 47.33 | 38.5 | 42.5 | 33.67 |
| 2006 | | | | | | | | | | | | |
| Bure | 6.5 | 8.3 | 5.8 | 5.85 | 6.5 | 7 | 8 | 7.8 | 24 | 26 | 25 | 24 |
| Bahir Dar | 10 | 7.92 | 9.67 | 8.33 | 8 | 8 | 8.6 | 8.83 | 11.83 | 11.95 E | 12.4 E | 12 |
| Debremarkos | 7.5 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 9.5$_E$ | 10$_E$ | 12 |

| 2005 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bure | 7.6 | 7.5 | 8 | 5.85 | $6_E$ | 7 | $7.5_E$ | 7.8 | 7.8 | 7.9 | 3.4 | 6.5 |
| Bahir Dar | 10.87 | 10.33 | 9.92 | 9.58 | 9.5 | 9.9 | 9.75 | 9.5 | 9.5 | 9.3 | 8.33 | 8.17 |
| Debremark os | 9 | 9 | 9 | 9 | 9 | 9 | 8.83 | 8.5 | 8.5 | 8.67 | 8.67 | 8 |

Source: CSA monthly retail prices (2005-2009) and Bure woreda DPPC

E: indicates estimated prices