**HARAMAYA UNIVERSITY**

**SCHOOL OF GRADUATE STUDIES**

**PERFORMANCE AND CHALLENGES OF VEGETABLE MARKET**: **THE CASE OF KOMBOLCHA DISTRICT, EAST HARARGHE ZONE, OROMIA NATIONAL REGIONAL STATE, ETHIOPIA**

**M.Sc. Thesis**

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**ABBREVIATIONS AND ACRONYMS**

BoARD Bureau of Agriculture and Rural Development

CASCAPE Capacity Building for Scaling up Evidence Based Best

Practices in Production in Ethiopia

CIAT International Center for Tropical Agriculture

CSA Central Statistical Agency

EHDA Ethiopian Horticulture Development Agency

GDP Gross Domestic Product

IHC International Horticultural Congress

LDCs Least Developed Countries

MSDF Ministry of State Farms Development

SCP Structure-Conduct-Performance

WB World Bank

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# 1. INTRODUCTION

## 

## 1.1. Background of the Study

Markets are important for economic growth and sustainable development of a given country, but, emphases in development policies in agrarian countries have usually been placed on increasing agricultural production to serve as a base for rural development. In the absence of well-functioning markets, agricultural production can experience several drawbacks (Belay, 2009).

Horticultural crops play a significant role in developing country like Ethiopia, both in income and social spheres for improving income and nutrition status. In addition, it helps in maintaining ecological balance since horticultural crops species are so diverse. Further, it provides employment opportunities as their management being labour intensive, production of these commodities should be encouraged in labour abundant and capital scarce countries like Ethiopia.

For most Ethiopian smallholders, fruit and vegetable cultivation is not the main activity rather it is considered supplementary to the production of main crops and the cultivation is on a very small plot of land and is managed by a household. This low priority for horticultural crops cultivation was mainly due to the traditional food consumption habits that favor grain crops and livestock products in most parts of the country resulting in weak domestic market demand for horticultural products. Horticulture production is an important source of income for smallholder farmers and demand for the products is raising in both domestic and international markets thus increase smallholder farmers’ participation in the market (Yilma, 2009).

The Hararghe highland is one of the highly populated areas in Ethiopia. As a result, intensive horticultural production has become a means of promoting agro-enterprise development and increasing the land productivity. Horticulture production gives an opportunity for intensive production and increases smallholder farmers' participation in the market (Emana and Gebremedhin, 2007).

Vegetables produced in the eastern part of Ethiopia are supplied to the local markets and to the neighboring countries. Potato and onion/shallot are the most commonly marketed vegetables accounting for about 60% and 20% of the marketed products. The other products such as cabbage, beetroots, carrot, garlic, green pepper and tomato are marketed at relatively smaller quantities by few farmers (Bezabih and Hadera, 2007). The marketing of vegetables in Eastern Ethiopia is characterized by seasonal gluts and shortages which in turn affect the marketing behavior of producers, traders and consumers (Jema, 2008).

In Kombolcha Woreda of Eastern Hararghe Zone different vegetables are grown with different intensities depending on environmental condition and level of marketability. In Kombolcha Woreda 693,899 quintals of vegetables were produced in 2011/12 production season on 2,607.5 hectares of land (KWOARD, 2012). The most commonly grown vegetables are potato, cabbage, carrot and beetroots in Kombolcha Woreda.

In Ethiopia, particularly eastern Hararghe zones have good potential in horticultural crops production for which smallholder farming have diversified from staple food subsistence production into more market oriented and higher value commodities. Despite this production potentials and importance of horticultural crops for the country as well as the study area, there has been limited study with regard to the performance of vegetables market and challenges of the market.

## 1.2. Statement of the Problem

It is common to see imperfect markets in countries mainly depending on the primary agricultural commodities. The problem is severe for countries like Ethiopia that obtain a big share of their gross domestic product, employment opportunity, etc from a single industry. Diversifying the agricultural products and its market base towards non-traditional high-value horticultural crops could increase the earnings and reduce fluctuations.

Eastern Ethiopia, especially eastern Oromia has a comparative advantage of producing vegetables due to its high domestic and export markets. East Ethiopia has access to export markets in Djibouti, Hargesa, Wuchale, Bosaso and domestic markets in Harar, Dire Dawa, Jijiga, etc. Despite this potential, the farmers in the area rarely utilize the opportunity to improve their livelihoods. The smallholder producers are price takers since they have little participation in the value chain and imperfection of the marketing system. As a result, smallholder farmers have repeatedly faced risk of unexpected fall in horticultural product prices.

It is well known that different household attributes put households under different production and marketing potentials. The market performance and the challenges of the market that households face might influence the households/ farmers participation decision and the extent of participation, the type of vegetable crops they would like to grow and the size of farmland they would like to allocate to a specific crop. This could be due to the fact that production and marketing decisions of households are two sides of a coin. The two decisions go hand in hand as farmers produce what they could sell at an available market. Knowing the interaction patterns between the two decisions helps to understand what crop is sold at which market and whether the intention of selling at a particular outlet increases or decreases the size of farmland allocated to the specific crop.

Imperfections in markets and asymmetric market price information hinder the potential gain that could have been attained under the existence of markets with complete information. In this regard, marketing vegetable crops at farm-gate is an interesting process that has not been investigated much. Both buyers and sellers usually do not have equal market information on the vegetable prices at the central market. Under such circumstances, farm households selling vegetable crops at farm-gate deal with the trade-off between selling their crop harvests at higher possible prices and avoiding the risk of losing product quality if the transaction fails by holding on to higher prices. An interesting issue in this regard is what factors determine the farmers to participate in the vegetables market.

As efficient, integrated, and responsive market mechanism is of critical importance for optimal area of resources in agriculture and in stimulating farmers to increase their output (Andargachew, 1990). A good marketing system is not limited to stimulation of consumption, but it also increases production by seeking additional output. However, there is a critical problem that stands in the course of formulating appropriate policies and procedures for the purpose of increasing marketing efficiency. This has to do with lack of pertinent marketing information and other marketing facilities, like storage, transportation, etc.

Potato and cabbage are major vegetable crop produced by the majority of farmers in Eastern Hararge specially Kombolcha district (KWOoARD, 2012). Potato accounted for about 70% of the vegetables marketed. About 75% of the potatoes were supplied from east Hararghe and about 25% from central Ethiopia including the Rift Valley and Shashemene. The supply from other parts of the country is seasonal; often needed to bridge the gap between demand and supply. The potatoes supplied from the central part of the country are considered inferior in terms of quality and sold relatively cheaper. Kombolcha, Jarso and Haramaya districts supply sufficient quantity of carrots, beetroots and cabbages and these commodities are not supplied from other sources. About 94% of the vegetables marketed in Kombolcha were exported to Somalia.

This study has the purpose of investigating the vegetables ( potato and cabbage) marketing challenges and factors affecting vegetables supply to the market, the market integration between the secondary and reference market in Kombolcha district, and reducing the information gap on the subject and by contributing to work better understanding on improved strategies for reorienting marketing system for the benefit of small farmer development and traders.

## 1.3. Objective of the Study

The general aim of this thesis is to examine the vegetables marketing system in the Kombolcha district to draw policy recommendations that improve the performance of vegetables markets.

The specific objectives of the study are:

1. To analyze the market structure, conduct and performance of vegetable market;

2. To analyze the major determinants of marketable supply;

3. To analyze market integration between the secondary and the reference markets; and

4. To identify the principal constraints and opportunities in the marketing of vegetables

## 1.4. Scope and Limitations of the Study

Attempting to analyze the entire vegetables and markets are an impossible action given the limited resources and human skill. Thus, the research was narrowed down to concentrate on the production area Kombolcha and major receivers Jigjiga . The types of vegetables were limited to potato and cabbage for their increasing coverage and the marketing problem they used to face.

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

Different market levels, determinants of marketed supply, price discovery and bargaining characteristics of producers, buying and selling strategies, and traders’ behavior in the marketing process were seen.

## 1.5. Significance of the Study

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

Apart from this, the study used Heckman two stage model to identify determinants and extent of market participation, to adjust the selection bias.

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

## 1.6. Organization of the Study

With the above brief introduction of the research paper, the remaining part of the thesis is organized as follows. The next main section reviews detailed literature on relevant topics on the study of production, marketing, and challenges of vegetables. The successor deals with the research methodology starting with description of the study *Woreda* and end up with definition of econometric variables. The second from the last section explains results and discussions, including data presentation on respondents’ socio economic characteristics, and econometric analysis of detriments and extent of market participation. The final section obviously summarizes the findings of the study with some recommendations.

# 2. LITERATURE REVIEW

In this chapter, the basic concepts of market, marketing, agricultural marketing, approaches to the study of agricultural marketing, vegetables, characteristics of vegetables and its marketing, vegetable production and marketing in Ethiopia, structure-conduct- performance, market integration, measures of market concentration and integration and analysis of factors affecting market supply are discussed.

## 2.1. Concepts and Definitions

**Market:**  The word “market” has many connotations. Bain and Peter (1988), define “markets” as a single arrangement in which one thing is exchanged for another. A market is also thought of as a meeting point of buyers and sellers, a place where sellers and buyers meet and exchange takes place, an area for which there is a demand for goods an area for which price determining forces (demand and supply) operates. For McNair and Hansen (1956), “market is another name for demand”. Others define market as a system or an atmosphere or a mechanism that facilitate price fixation and thereby exchange of goods and services.

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

Marketing has an intrinsic productive value, in that it adds time, form, place and possession utilities to products and commodities. Through the technical functions of storage, processing and transportation, and through exchange, marketing increases consumer satisfaction from any given quantity of output Mendoza (1995). Kotler (2003) also stated shortly marketing as the task of creating, promoting, and delivering goods and services to consumers and businesses.

**Agricultural Marketing:** It is defined as agriculturally oriented marketing. It embraces all operations and institutions involved in moving farm products from farm to consumers Pritchard (1969). It covers all the activities associated with the agricultural production and food, feed, and fiber assembly, processing, and distribution to final consumers, including analysis of consumers’ needs, motivations, and purchasing and consumption behavior (Branson and Norvell, 1983).

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

**Marketable and marketed surplus**: Marketable surplus is the quantity of produce left out after meeting farmers‟ consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc). Marketed surplus shows quantity actually sold after accounting for losses and retention by farmers, if any and adding previous stock left out for sales. Thus, marketed surplus may be equal to marketable surplus, it may be less if the entire marketable surplus is not sold out and farmers retain some stock and if losses are incurred at the farm or during transit (Thakur *et al.,* 1997*)*. The importance of marketed and marketable surplus has greatly increased owing to recent changes in agricultural technology as well as social pattern. In order to maintain balance between demand for and supply of agricultural commodities with rapid increase in demand, accurate knowledge on marketed/marketable surplus is essential in the process of proper planning for procurement, distribution, export and import of agricultural products (Malik *et al*., 1993).

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## 2.2. Approaches to the Study of Agricultural Marketing

Different circumstances involved in the demand and supply of agricultural products, and the unique product characteristics, require a different approach for analyzing agricultural marketing problems (Johan, 1988). The major and most commonly used approaches are functional, institutional and commodity approaches.

**2.2.1. Functional approach**

Functional approach to study marketing is to break up the whole marketing process into specialized activities performed in accomplishing the marketing process (Kohls and Uhl, 1985). The approach helps to evaluate marketing costs for similar marketing middlemen and/or different commodities and costs and benefits of marketing functions (Kohls and Uhl, 1985; and Andargachew, 1990). The widely accepted functions are: exchange (buying and selling), physical (processing, storage, packing, labeling and transportation), and facilitating (standardizing, financing, risk bearing, promoting and market information). The exchange function involves pricing, buying and selling which is a transfer of title between exchanging parties.

### 2.2.2. Institutional approach

This approach focuses on the description and analysis of different organizations engaged in marketing (producers, wholesalers, agents, retailers, etc) and pays special attention to the operations and problems of each type of marketing institution. The institutional analysis is based on the identification of the major marketing channels and it considers the analysis of marketing costs and margins (Mendoza, 1995). An institutional approach for the marketing of agricultural product should be instrumental in solving the three basic marketing problems, namely consumers' demand for agricultural products, the price system that reflects these demands back to producers and the methods or practices used in exchanging title and getting the physical product from producers to consumers in the form they require, at the time and place desired (Johan, 1988).

### 2.2.3. Commodity approach

In a commodity approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed (Kohls and Uhl, 1985). This approach is said to be the most practical as it helps to locate specific marketing problems of each commodity and improvement measures. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently. This approach will be used in this study as a guideline to identify different aspects of the problem.

## 2.3. Characteristics of Vegetables and its Marketing

Being produced both by commercial and smallholder farmers’ vegetable production and marketing is influenced by a number of factors that can be attributed to production, product, and market characteristics. Kohls and Uhl (1985) identified the major attributes that inhabit marketing.

**Perishability:** As vegetables are highly perishable, they start to lose their quality right after harvest and continued throughout the process until it is consumed. For this purpose elaborated and extensive marketing channels, facilities and equipments are vital.

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

**Price /Quantity risks:** Due to perishable nature and biological nature of production process there is a difficulty of scheduling the supply of vegetables to market demand. The crops are subjected to high price and quantity risks with changing consumer demands and production conditions. Unusual production or harvesting weather or a major crop disease can influence badly the production and marketing system.

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

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

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

## 2.4. Vegetable Production and Marketing in Ethiopia

Ethiopia has a variety of vegetable crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as food. The production of vegetables varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets.

According to CSA (2012) the area under these crops (vegetables and root crops) was estimated to be 359,950.13 hectares with a total production of 24,267,581.58 tons in the year 2011/12. Root and tuber crops are by far the dominant product group. Potatoes (32%) stand out as the important products, followed by taro/Godere (19%), garlic (12%), and onions (nearly 12%). Potatoes are mostly found in the Amhara Regional State (51%) and Oromia (33%). Among small-scale producers of vegetables, Ethiopian cabbage (Kale) takes the higher almost 50%, followed by red pepper with a share of 31%, and green pepper 10%.

Smallholder vegetable farms are based on low input – low output production systems. The use of improved seeds and planting material of high yielding varieties and other inputs such as fertilizer and plant protection materials is not common in the smallholder sector. Technical training and extension services on improved crop husbandry techniques are not available. As a result average productivity levels are low in the small scale farming sector (EHDA, 2011).

The Ethiopian Fruit- and Vegetables Marketing Enterprise (ETFRUIT for short) is a state trading organization established in April, 1980 under the Horticulture Development Corporation (HDC) of the Ministry of State Farm Development. ETFRUIT is a wholesale institution dealing with domestic and export trade of fresh fruits, vegetables, flowers, processed horticultural products and some slice crops. The marketing operation of the enterprise includes the collection of products from production sites, transportation, storage, grading and quality control, packing and distribution of these horticultural, floriculture and spice crops (MSDF, 1984).

## 2.5. Marketing Constraints Facing Smallholder Farmers

The aim of this section is to identify key constraints facing smallholder farmers in the study area, such as lack of physical infrastructure, lack of market, and high transaction costs. Smallholder farmers find it difficult to compete in the new market environment. They face enormous constraints when it comes to physically accessing markets. They also lack market information, business and negotiating experience, and a collective organization to give them the power they need to interact on equal terms with other generally larger and stronger market intermediaries. The result is poor term of exchange and little influence over what they are offered (Heinemann, 2002). Below follows a discussion of some of the common marketing constraints facing smallholder farmers, as revealed through international experience.

### 2.6.1. Constraints on production

Producing for the market calls for production resources that include land , labour force and capital. Poor access to these assets affects the way in which smallholder farmers can benefit for opportunities in agricultural markets, and especially in terms of the volume of products traded and the quality of those products (Bienabe *et al.,* 2004). Small-scale farmers lack regularity in terms of producing for the markets due to insufficient access to production resources.

### 2.5.2. High transaction costs

High transaction costs are caused, inter alia, by poor infrastructure and communication services in remote rural areas (Hease and Kirsten, 2003). Transaction costs also result from information inefficiencies and institutional problems such as the absence of formal markets (Makhura, 2001). Transaction costs include the costs of information, negotiation, monitoring, co-ordination, and enforcement of contracts. Smallholder farmers are located in remote areas and are geographically dispersed and far away from profitable markets. Distance to the market, together with poor infrastructure and poor access to asset and information results high transaction costs. Since small holders are poor, they find it difficult to compete in profitable markets due to the high transaction costs. Traders with higher social capital are better able to enter more capital- intensive marketing activities such as wholesaling and long-distance transport, whereas traders with poor social networks face major barriers to entry into the more lucrative market segments (Kherallah and Kirsten, 2000).

Minimizing transaction costs is the key to improving access to high-value markets in developing countries, because high transaction costs will make it difficult for poor smallholder enterprise to market their produce.

### 2.5.3. Lack of on-farm infrastructure

Smallholder farmers do not have access to on-farm infrastructure such as store-rooms and cold-rooms to keep their products in good condition after harvest. Lack of access to facilities such as post-harvest and processing facilities constitutes a barrier to entry into agricultural markets, since the emphasis of buyers is more on quality. Access to storage facilities increase farmers’ flexibility in selling their products, as well as their bargaining power (Bienable *et al*., 2004).

### 2.5.4. Asymmetry or lack of information on markets

Rural producers, and especially small farmers, have little information about the market demand and price, which is costly to obtain. They may gather information through contact with other actors in the commodity chain, but the accuracy of this information is not certified, since those actors might to be exhibiting “opportunistic behavior” (Bienabe *et al*.,2004). Smallholder farmers lack information about product price and times to sell their products, and about potential buyers. This in turn reduces their ability to trade their products efficiently and to derive the full benefit from the marketable part of their production.

### 2.5.5. Low quantity and poor quality

Due to their low endowment in production factors, such as land, water and capital assets, the majority of smallholder farmers produce low quantities of products that are poor quality, which leads to their products being neglected by output markets. Increasing concentration in the food value chain is a global trend, caused by increasingly demanding consumers and concerns about food safety, which tend to make it very difficult for smallholder farmers to enter high- value markets in light of the low quantity and poor quality of their products.

### 2.5.6. Transportation problems

Most small-scale farmers have no means of transport to carry their produce to markets. Transportation problems result in loose of quality and late delivery, which in turn lead to lower prices, and this regarded as the greatest problem faced by emerging farmers (Louw *et al*., 2004).

### 2.5.7. Lack of markets in rural areas

Most smallholder farmers are located in rural areas where there are no formal agricultural markets or agro-processing industries. They are compelled to market their produce to local communities in their areas, sometimes at lower prices, or to transport their products to towns at a higher cost.

### 2.5.8. Lack of barraging power

The barraging power of the small producers is especially low since they have poor access to market information and limited access to financial markets, which prevents them from selling their products at the most profitable time. Their lack of bargaining power may lead them to undervalue their production and obtain a smaller share of the added value created in the commodity chain. Small farmers have particularly low bargaining power when they operate in long supply chain, where the specificity of the product transformation assets leads to the creation of oligopsony (e.g. the oil-palm and cotton sectors in West Africa) (Bienabe *et al*., 2004).

## 2.6.Conceptual and Methodological Framework

### 2.6.1. Conceptual framework

#### 

#### 2.6.1.1. Structure-Conduct-Performance(S-C-P)

The development of reliable and stable market system has been an important element in commercialization and specialization in the agricultural sector. In order to study the functioning of markets many researchers have applied the Structure-Conduct-Performance (SCP) paradigm.

The structure-conduct-performance approach was developed in the United States of America as a tool to analyze the market organization of the industrial sector and it was later applied to assess the agricultural marketing system. It was designed by Edward S. Madson in pioneering work in 1939, and followed by Bain *et al*.(1987) as cited in Wolday( 1994).

The S-C-P approach analysis the relationship between functionally similar firms and their market behavior as a group and provides a broadly descriptive model of the nature of various sets of market attributes, and the relationship between them and performance. Its basic tenet is that, “given certain basic conditions”, the performance of particular industries 30 depends on the conduct of its sellers and buyers, which in turn is strongly influenced by the structure of the relevant market (Scarborough and Kydd, 1992).

**Market structure**

Market structure includes those characteristics of the organisation of the market that seem to exercise strategic influence on the nature of competition and pricing within the market (Bain, 1986). The most salient characteristics of market structure according to Scarborough and Kydd (1992) include:

1. The degree of seller’s and buyer’s concentration which refers to the number and size distribution of firms in relation to the size of the market;

2. The degree of the product differentiation among outputs of the various sellers in the market; and

3. Barriers to entry or freedom to entry and exit from the market: this refers to the conditions for entry of new firms into the market or exit of existing firms.

Entry or the ease, with which an individual can join and leave business, is important to a competitive market structure. This may refer to the process of setting a license or professional qualification or skill or to the need of having a minimum amount of capital or other resources in order to operate successfully. Lack of available capital could effectively restrict entry of new firms if a large initial outlay is required (Staal, 1995).

**Market conduct**

Market conduct refers to the behavior that firms pursue in adopting or adjusting the market in which they sell or buy. The major aspects according to Scarborough and Kydd (2004) include pricing and selling policies and tactics, overt and tacit inter-firm co-operation, or rivalry, and research and development activities.

The specified structural features of atomistic numbers, homogeneous product, and free entry and exit require a form of conduct such that each firm must operate as if in isolation. The market behavior of firms will determine whether or not they compete and whether they are acting innovatively to improve market efficiency. Informal association between even a small numbers of firms (collusion) can cause price distortions and seemingly independent firms can have joint ownership (subsidiaries) (Staal, 1995).

**Market performance**

Market performance refers to the composite of end results which firms in the market arrive at by pursuing whether lines of conduct they espouse-end results in the dimensions of price, output, production and selling cost, product design, and so forth (Bain and Qualls, 1987). The principal aspects of the market performance according to the same authors are:

1. The relative technical efficiency of production so far as this is influenced by the scale or size of plants and firms (relative to the most efficient), and by the extent, if any, of excess capacity;

2. The selling price relative to the long-term marginal cost of production and to the long run average cost of production (usually about the same as long-run marginal cost), and the resultant profit margin;

3. The size of industry output relative to the largest attainable consistent with the equality of price and long-run marginal cost;

4. The size of sales promotion costs relative to the costs of production;

5. The character of product, or products including design, level of quality, and variety; and

6. The rate of progressiveness of the industry, both products and technologies of production relative to rate which are attainable and also economic in view of the costs of progress.

The above dimensions of marketing performance such as technological progressiveness efficiency of resource use and product improvement and maximum market services at the least possible cost must fit with goals of the agricultural marketing system in developing countries. Due attention should be given to the interrelatedness between the categories of structure, conduct, and performance in studying agricultural marketing efficiency.

**S-C-P MODEL**

Producer

Urban Assemblers

Wholesalers

Local market

Exporters

Retailers

Local traders

Consumers

Adopted from

#### 2.6.1.2. Market integration

Market integration is considered an important determinant of food flow, availability, accessibility and price stability. As Nyange (1999), puts it, the extent to which markets make food available and accessible, and keep price stable, depends on the degree of market integration across a region. Goletti and Christina (2000), define integrated markets as markets in which price of comparable goods do not move independently. According to the Law of One Price(LOP), if two markets are integrated, change in price in one market due to excess demand or supply shocks will have an equal impact in the related market price. If this equilibrium condition holds, the two spatially separated markets are said to be integrated. In other words, the Law of One Price prevails between the two markets (Zanias, 1999; Sexton *et al*., 1991) or the two markets are spatially price efficient (Tomek and Robinson, 1998). Otherwise, markets may have some constraints on efficient arbitrage such as barriers to entry and information asymmetry (Barrett, 2001; Mohr *et al*., 2008) or imperfection competition in one or more markets (Faminow and Benson, 1990). Hence, the study of spatial market relationships provides the extent to which markets are related and effecicent in pricing.

The notion of market integration is often associated with the degree of price transmission, which measures the speed of traders’ response in moving foods to deficit zones when there is an emergency, or some catastrophe that leads to hunger in deficit zones (WFP, 2007). A number of factors that lead to market integration have been identified (Rapsomanikis *et al*., 2005; Timmer, 2009).

Among the key factors, weak infrastructure and large market margins that arise due to high transfer costs have been asserted as the main factors that partly insulate domestic market integration. Especially in developing countries, poor infrastructure , transport and communication services gives rise to large marketing margins due to high costs of delivering locally produced commodities to the reference market for consumption .high transfer coast and marketing margins hinder the transmission of price signals, as they may prohibit (Sexton, *et al*., 1991;Bernstein and Amin, 1995). As a result, change in reference market price is not fully transmitted to local prices, resulting in economics agents adjusting partially to shift in supply and demand.

#### 2.6.1.3. Market supply

Agricultural products differ from manufactured goods in terms of supply and demand. Agricultural products supply is different because of the very seasonal biological nature while their demand is comparatively constant throughout the year. In economic theory, it is stated that human being is always under course of action of choice from a number of options. The basis for the decisions could be issues ranging from household characteristic to the exogenous unmanageable factors. A case in point here is market supply where researchers put each owns point of determining variables.

The analysis can identify factors that determine market supply. A clear understanding of the determinants helps to know where to focus to enhance production and marketable supply. The study of market supply helps fill the gap for success of commercialization. There are different factors that can affect market supply.

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 where as the market surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source.

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

A study made by Moraket (2001) indicated households participating in the market for horticultural commodities are considered to be more commercially inclined due to the nature of the product. Horticulture crops are generally perishable and require immediate disposal. As such, farmers producing horticulture crops do so with intent to sell. In his study it was found that 19% of the sample households are selling all or a proportion of their fruits and vegetable harvest to a range of market outlets varying from informal markets to the large urban based fresh produce markets. Typically, many of the households producing fruits and vegetables also have access to a dry land plot where they commonly produce maize and/or other filed crops.

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

A Similar study on cotton at Metama by Bossena (2008) also indicates that four variables affect cotton marketable supply. Owen oxen number, access to credit, land allocated to cotton, productivity of cotton in 2005/06 were the variables affecting positively cotton supply. Similar study on sesame at Metema by Kinde (2007) also pointed out six variables that affect sesame marketable supply. Yield, oxen number, foreign language spoken, modern input use, area, time of selling were the variables affecting positively sesame supply and unit cost of production was found to negatively influence the supply. Similarly, Abay (2007) in his study of vegetable market chain analysis identified variables that affect marketable supply. According to him, quantity production and total area owned were significant for onion supply but the sign for the coefficient for total area of land was negative. For tomato supply, quantity of production, distance from Woreta and labor were significant.

Similarly, Rehima (2007) in her study of pepper marketing chain analysis identified variables that affect marketable supply. According to her, access to market, production level, extension contact, and access to market information were among the variables that influence surplus. Another study by Gizachew (2006) on dairy marketing also captured some variables that influence dairy supply. The variables were household demographic characteristics like sex and household size, transaction cost, physical and financial wealth, education level, and extension visits. Household size, spouse education, extension contact, and transaction cost affects positively while household education affects negatively.

According to Moti (2007) a farm gate transaction usually happens when crops are scarce in their supply and highly demanded by merchants or when the harvest is bulk in quantity and inconvenient for farmers to handle and transport to local markets without losing product quality. For crops like tomato, farm gate transactions are important as grading and packing are done on the farm under the supervision of the farmer. Therefore, households are expected to base their crop choice on their production capacity, their ability to transport the harvest themselves and their preferred market outlet. From these little reviews, it is possible for households to decide where to focus to boost production and knowing the determinants for these decisions will help choose measures that can improve the marketing system in sustainable way.

### 2.6.2. Methodological Framework

#### 2.6.2.1. Measures of market concentration ratio

Competition plays a key role in harnessing the rivalry and the profit seeking of the market place in order that it may serve the public interest (Khols and Uhl, 1985). Determining the presence or absence of the requirements of the model of perfect competition can be used indirectly to assess the economic efficiency of markets. Many studies concerned with the efficiency of agricultural markets begin in this form of analysis. Following, three methods of measures of market concentration are discussed.

**Market concentration ratio**

Considerable attention has been focused on market concentration as a measure of competition in marketing. Concentration refers to the proportion of industry sales made by its largest firms. In general, the more concentrated the industry sales, the more likelihood that the market will be imperfectly competitive (Khols and Uhl, 1985).

Concentration ratio is one of the commonly used measures of market power, which in other words, refers to the number and relative size of distribution of buyers or sellers in a market. Concentration ratio measures the traded volume accounted for by a given number of participants and is designated by the formula:

**C=**

Where:

C = concentration ratio,

Si = the percentage market share of ith firm, and

r = the number of largest firms for which the ratio is going to be calculated.

Khols and Uhl (1985) suggest that as a rule of thumb, a four enterprise concentration ratio of 50 percent or more is indicative of a strong oligopolistic industry; of 33-50 per cent ratio denotes a weak oligopoly, and less than that an un concentrated industry.

Despite wide application of concentration ratio as a measure of the ratio of market concentration, there are limitations against the index. Scarborough and Kydd (1992) suggest that calculating and using concentration ratios as a measure of market structure is subject to empirical, theoretical and inferential problems.

In most LDCs, where firm records are usually not available publicly, it would be difficult to determine such ratios on anything, but the most local of scales. Furthermore, this single measure doesn’t reveal anything about the distribution of sales between the numbers of largest enterprises, nor does it take in to account product differentiation or other possible monopoly elements, and it doesn’t allow for the possibility of different degrees of oligopoly through time, space market levels, functions and products.

Another problem associated with concentration ratio is the arbitrary selection of r (the firms that are taken to calculate the ratio). The ratio doesn’t indicate the size distribution of r firms. However, when the numbers of participants in an industry is large it will be difficult to organize oligopolistic behaviour. Under such local circumstances, the concentration ratio given above can be usefully determined (Scarborough and Kydd, 1992).

**Hirschman Herindal Index (HHI)**

The other method of measure of market power commonly used is Hirschman Herfindahl

Index designated by the formula:

**HHI=**

Where:

HHI = Hirschman Herfindahl Index,

Si = the percentage market share of ith firm, and

n= the total number of firms.

The index takes into account all points on the concentration curve. It also considers the number and size distribution of all firms. In addition, squaring the individual market share gives some more weight of the larger firms, which is an advantage over concentration ratio.

A very small index indicates the presence of many firms of comparable size, whilst one of 1 or near 1, suggests that the number of firms is small and/or that they have unequal shares in the market (Scarborough and Kydd, 1992).

**Gini- coefficient**

Gini-coefficient is a very convenient shorthand summary measure of concentration. It is done based on Lorenz curve and is obtained, by calculating the ratio of the area between the diagonal and the Lorenz curve divided by the total area of the half square in which the curve lies. It is this ratio that is known as the Gini-concentration ratio or more simply as the Gin- coefficient, named after the Italian statistician who first formulated it in 1912 (Todaro, 1998). Alternatively, Gini-Coefficient is computed using the formula:

G =

Where:

G= Gini-coefficient

Ti-Ti-1= cumulative proportion of traders

Fi+Fi-1= cumulative proportion of the product handled by traders

n = number of traders (Bhuyan *et al*., 1988; cited in Wolday, 1994).

Gini-coefficients are aggregate inequality measures and can vary anywhere from zero (perfect equality) to one (perfect inequality). In actual fact, the Gini-Coefficient with highly unequal distributions typically lies between 0.50 and 0.70, while with relatively equitable distributions it is on the order of 0.20 to 0.35.

However, although Gini-coefficients provide useful information based on Lorenz curve shapes, a problem arises when Lorenz curves cross. It is problematic whether we can in this special case claim that a higher coefficient means a more unequal distribution, so more careful analysis is required (Todaro, 1998).

The other problem associated with Gini-coefficients is that it favors equality of market shares without regard to the number of equalized firms. In other words, the coefficient equals zero for two firms with 50 percent market shares, for three firms with 33.33 per cent market shares each, and so on.

Several mathematical models that have been employed to analyze the performance of different markets are discussed, among the different analytical techniques because of its simplicity for calculation Concentration Ratio(C) was used in this study.

**Marketing margins**

Marketing marginrefers to the difference between the retail price paid by the consumer and the price received by the producer. This amount can be interpreted as the cost of providing a mix of marketing services. In a perfectly competitive market, the margin should, on average and in the long run, be equal to the cost of marketing including costs of capital with a competitive return to labor, management, and risk. Marketing margins can be defined alternatively as the price of a collection of marketing services which is the outcome of the demand for and the supply of such services. The price of such services is determined by particular primary and derived demand computing the total gross marketing margin (TGM) is always related to the final price or the price paid by the end consumer and is expressed as a percentage:

*Consumer price – Producer price×100*

*Consumer price*

It should be emphasized that producers that act as middlemen also receive an additional marketing margin. The producer’s margin is calculated as a difference:

*GMMP=Consumer price – Marketing gross margin×100*

*Consumer price*

*NNN=Gross margin – Marketing cost×100*

*Consumer price*

Where

TGMM = Total Gross Marketing Margin

GMMP = Gross Marketing Margin of the Producer

NMM = Net Marketing Margin

The above equation tells us that a higher marketing margin diminishes the producer’s share and vice versa. It also provides an indication of welfare distribution among production and marketing agents.

#### 2.6.2.2. Measures of market integration

The concept of market integration has retained and increased its importance over recent years particularly in developing countries where it has potential application to policy questions regarding government intervention in markets (Alexander and Wyeth, 1994).

From the economic concept point of view, market integration concerns the free flow of goods and information and thus prices over space, form and time and is closely related to, but distinct from, concepts of efficiency (Barrett, 1996).

An alternative definition of market integration is that when a price shock takes in one location, it will be perfectly transmitted to the other if and only if the two markets are integrated. Therefore, prices in the two regions are said to be integrated, if they exhibit one to- one change (Goodwin and Schroeder, 1991). Analogously, efficient inter temporal market integration implies that there exist rationally speculative arbitrageurs who extinguish positive profit opportunities associated with commodity storage across periods.

As a result, the price differentials between markets should be identical to the storage costs or processing costs if there is market integration across time or form (Baulch, 1997). Among the three forms of integration, measuring spatial integration causes most controversy and receives most attention in the literature (Dahlgram and Blank, 1992; Faminow and Benson, 1990; Goodwin and Schroeder, 1991).

Several methodologies have been proposed to examine spatial price relationships. However, some of the early approaches have been unreliable or inadequate to measure spatial price relationship correctly. Advances in time series econometrics over the last three decades have led to the development of models that address some of the perceived weaknesses. In what follows, we review three different methods: Simple Bivariate Correlation Coefficients, Ravallion method, Co-integration and Error Correction model, each of which has been applied to test for market integration across various goods and industries.

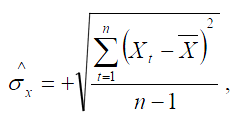
**I. Bivariate correlation coefficients**

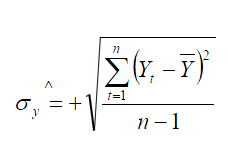
Early research on market integration focused on measuring the co movement of two price series in distinct markets. The correlation coefficient is a relative measure of the linear association between two series. Though there are some limitations in using correlation coefficient to express the relationship between time series variables, it is still one of the most popular, frequently used and easy to calculate tools (Dahlgram and Blank, 1992; Tschirley, 1991).

The estimate of the correlation coefficient of price series between two markets can be estimated as:



Where, is the covariance between Xt and Yt







Xt is the secondary market price series at time ‘t’ and Yt, the terminal market price series at time ‘t’ and X and Y are the means of the series X and Y; respectively.

The coefficient can indicate the strength of the relationship between two series. A low correlation coefficient is an indicator of a weak or non-integration of the two markets. A correlation coefficient of above 60 per cent is an indicator of strong connection, between 30 and 60 per cent, a weak connection, and below 20 per cent no connection between the variables (Goetz and Weber, 1987; cited in Admassu, 1998).

The correlation coefficient is commonly used owing to its simplicity. Useful information about market integration can be obtained from the coefficient if carefully carried out and interpreted with a good knowledge of the workings of the market (Alexander and Wyeth, 1994).

Despite wide application of the bivariate correlation as an index of market integration, the approach has important weaknesses, as a tool for market integration testing. The most frequently referred drawback is the existence of common trends within price series over time. The approach produces high correlation results for markets with even no physical contact, road, or any other means of transport connection. The high correlation could be the result of the common price trends such as inflation, common seasonal variation due to similar climatic conditions, legal factors simultaneously affecting prices, or other shocks among the markets (Heytens, 1986).

**II. Ravallion method**

In order to avoid the inferential dangers of received models using static price correlations, Ravallion (1986) developed a new approach to market integration testing. Ravallion’s model enables an investigator to distinguish between short-run (instantaneous) market integration and the long run (i.e. equilibrium) integration, i.e., the end of short-run, disequilibrium dynamic adjustment processes.

The model assumes that there are local markets from which price shocks originate and local markets linked to the central one by traders. Assuming that local market prices (Pi,..., PN) are dominated by one central market price (P1), Ravallion (1986) constructed the dynamic model as:

Where:

j (the number of lags) = 1, 2, ---, n;

K (the number of markets) = 2, 3, ----, N;

X= other factors,

aij and bij are parameters to be estimated, and elt and eit are error terms.

Assume there are a total of N markets including the central market. The idea behind Ravallion model is to regress the current local market price on its own lagged prices and present and past prices from the central market as well as on common trend variables like inflation and seasonality. The central market price is taken as an exogenous variable in predicting the local markets’ prices.

The relevant hypotheses of relationships tested are:

a. Market segmentation: central market prices do not influence prices in the ith local market.

This happens if bij =0, for j= 0, 1, ---, n.

b. Short-run market integration: A price increase in central market will be immediately passed on to the local market price if bio = 1. There will also be lagged effects on future prices unless, in addition to equation (b), aij=bij=0 for j= 1, 2, ---, n, and

c. Long-run market integration: Long run equilibrium is one in which market prices are constant over time, undisturbed by any local stochastic effects i.e.



**III. Co-integration and Error-correction model**

Due to non-stationary nature of many economic time series, the concept of co-integration has become widely used in econometric analysis. The concept of co-integration is related to the definition of a long-run equilibrium. The fact that two series are co-integrated implies that the integrated series move together in the long run (Golleti and Tsigas, 1991).

Testing co-integration of two price series is sometimes believed to be equivalent to detecting long-run market integration. The co-integration-testing framework has been well developed by Engle and Granger; Engle and Johansen. To use the co-integration procedure, several steps needed to be carried out on the price series under examination. Before proceeding to the different steps, consider the following basic relationship between two markets.

 (1)

Where:

Pit and Pjt, are price series in two markets i and j at time’t’

a= represents domestic transportation, processing, storage costs, etc.

b= the coefficient,

a and b are parameters to be estimated, and

et= residual term assumed to be distributed identically and independently at time t.

The first step is to pre-test the integrating orders of the series, i.e., each price series is tested for the order of econometric integration, that is, for the number of times the series need to be differenced before transforming it into a stationary series. A series is said to be integrated of order ‘d’, I (d), if it has to be differenced ‘d’ times to produce stationary series.

The most commonly employed test for stationary and order of integration is the Augmented Dickey Fuller (ADF) test.

 (2)

The test t- statistics on the estimated coefficient of Pit-1 is used to test the null and alternative hypotheses. The null hypothesis is that the series Pit is integrated of order 1 and the alternative hypothesis is that the series is of order 0. In short, H0: Pit is I (1) Versus H1: Pit is I (0). If the t-statistics for the coefficient b0 is greater in absolute value than a critical value given by the ADF critical value, then the null hypothesis is rejected, and the alternative hypothesis of stationary is accepted. If the null hypothesis is not rejected, then one must test whether the series is of order of integration higher than just 1, possibly of order 2. In this case the same regression equation is applied to the second difference, i.e. the test will be repeated by using (RPit in place of Pit) i.e. by applying the regression:

 (3)

Where:

2 Pit= denotes second deference.

The ADF statistic therefore, tests the following hypotheses. H0: Pit is I (1) versus H1: Pit is I (0) i.e. H0: Pit is I (2) versus H1: Pit is I (1), respectively. If the ADF statistic is not large and negative, H0 is not rejected.

The second step is to estimate the long-run equilibrium relationship of the two time series, which are of the some order of integration (co-integrating regression).i.e.

 (4)

Where, et is the deviation from equilibrium and this equilibrium error in the long-run tends to zero. This equilibrium error of the co-integration equation has to be stationary for co-integration between two integrated variables to hold good.

Hence, the third step is to recover the residual from the co-integration regression and to test their stationary. The most commonly employed test for stationary is the Augmented Dickey Fuller (ADF) unit root test. To perform the ADF test, the auto regression equation must be estimated.

 (5)

Where,  is the first stage estimate of the residual for the co-integrating regression and et is the error term of equation.

The null hypothesis of the ADF test is a1=0. Rejection of the null hypothesis is that the series is non-stationary in favor of the negative one sided alternative hypothesis means the two series are co- integrated of order (1, 1) provided both series are I (1), i.e., the ADF test statistic is the t-ratio of the coefficient of 

The other alternative test for stationary (Co-integration) is the standard Durbin Watson test statistic from the first stage ordinary least square (OLS) estimate of the co-integrating regression.

It is designated as:

 (6)

The null hypothesis of no co-integration is rejected for values of CRDW, which are significantly different from zero.

The fourth step involves the dynamic error correction representation of the co-integrated variables. If two variables are integrated of the same order and thus can be co-integrated, then there exists an error correction representation of the variables where the error corrects the long-run equilibrium. This is also known as Granger Representation Theorem (Sinahory and Nair, 1994). The dynamic model is obtained by introducing the residuals in to the system of variables in levels. Therefore, the Error Correction Model (ECM) is represented by the formula:

 (7)

It is evident from the above equation that the disequilibria in the previous period (t-1) are an explanatory variable. Here it can be said that if in period (t-1) Pj exceeds the equilibrium price, the changes in pi will lead the variable to approach the equilibrium value. The speed at which the price approaches equilibrium depends on the magnitude of a2. Hence the expected sign of a2 is negative. This test confirms that the errors correct to the equilibrium in the long run. Therefore, the final test of market integration can be performed by testing the restriction a1 = 1, a2 = -1, and the coefficients of any lagged terms be zero using F-statistic.

Co-integration testing has some alternative features that don’t exist in the other market integration testing. First of all, a co-integration test doesn’t require the tested series to be stationary thus, the controversy surrounding pre-filtering and stationary transformations can be avoided. A co-integration test can be applied to any pair of series provided they are integrated of the same order. Co-integration testing can also provide a method of testing whether one series is exogenous or not and the direction of causality between markets, which is a problem in Ravallion’s model.

Co-integration testing, it is still a popular methodology for testing market integration in the recent literature. Co-integration tests have been applied to examine the market for food by Baulch (1997). Goodwin and Schroeder (1991) used co-integration with rational expectations to test regional U.S. cattle markets. Another study by Sinahory and Nair (1994), on pepper price variation in the international trade, found that international prices of pepper have significant influence on co- integration relations between Indian and Indonesian markets. Furthermore, co-integration tests have been used to test for market integration in some developing countries. For instance, Dercon (2004) applied co-integration testing to evaluate the effects of liberalization and war on food markets in Ethiopia. Alexander and Wyeth (1994) offer reduced form of an error correction mechanism to examine the Indonesian rice market.

Several mathematical models that have been employed to analyze the market integration are discussed. Co-integration and Error-correction model will be used in this study.

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#### 2.6.2.3. Analysis of factors affecting market supply

In order to expand the leading role agriculture plays in economic growth and poverty reduction, smallholder farmers need to improve their marketable supply. A higher marketable supply can help farmers to participate in a high value markets by increasing their level of income. Therefore, investigating the nature of marketable supply is a major component for competitive and comparative advantage.

**Heckit model**

Heckman (1979) has developed a two-stage estimation procedures model that corrects for sample selectivity bias. If two decisions are involved, such as participation and volume of supply, Heckman (1979) two-stage estimation procedure is appropriate. The first stage of the Heckman two-stage model is a ‘participation equation’, which attempts to capture factors affecting participation decision. This equation is used to construct a selectivity term known as the ‘inverse Mills ratio’ (which is added to the second stage ‘outcome’ equation that explains factors affecting volume of supply. The inverse Mill’s ratio is a variable for controlling bias due to sample selection (Heckman, 1979). The second stage involves including the Mill's ratio to the vegetable supply equation and estimating the equation using Ordinary Least Square (OLS) (Woldemichael, 2008).

Specification of the Heckman two- stage equation procedure, which is written in terms of the probability of participation in vegetable market, and market supply of the product, is set as follows.

**The participation equation/the binary probit:**

Y1i\* = 1, if

Y1i\* = 0, if

Where: Y1i = the latent dependent variable, which is not observed,

X1i = explanatory variables that are assumed to affect the probability of participation decision in vegetables products market by the sample vegetable farmers,

β1i = vector of unknown parameter in participation equation,

U1i = residuals that are independently and normally distributed with zero mean and constant variance, and

Y1i\* = vegetable product market participation

**The observation equation /the vegetable products supply equation**:

Y2i is observed if and only if Y1i\* = 1. The variance of u1i is normalized to one because only Y1i\*, not Y1i is observed. The error terms, u1i and u2i, are assumed to be bivariate, normally distributed with correlation coefficient, ρ. β1i and β2i are the parameter vectors.

Y2i is regressed on the explanatory variables X2i and the vector of inverse Mill's ratio (λi) from the selection equation by ordinary least squares.

Where:

Y2i = Amount of vegetables supplied to market,

X2i = factors assumed to affect the volume of vegetable products supplied,

= vector of unknown parameters in the marketed supply of vegetables equation, and

U2i = residuals in the observation equation that are independently and normally distributed with zero mean and variance δ2.

## 2.7. Empirical Literature Reviews

### 2.7.1. Empirical literature on S-C-P

Rehima (2006) conducted study on pepper marketing chains analysis in Alaba and Siltie ones in southern Ethiopia using marketing margin analysis found that the gross marketing margin obtained by pepper retailers was 43.08% of the consumer’s price. The same study reported that producer’s share and net marketing margins obtained by retailers were 50.7% and 29.47% of the consumer’s price.

The study conducted by Gizachew (2005) in Ada’liben in district of Oromiya Region using concentration ratio identified milk market to be weakly oligopolistic of 41.2%, where the four firms dominated milk market. The dairy cooperative got 28.3% of market share and the three processing industries combined have a market share of 12.9%. Intimate traders got net marketing margin of 7.6% for butter and the dairy processing enterprises got the highest net marketing margin (19.9% of retail price) while the least marketing margin (1.05% of the retail price) was obtained by the dairy cooperative.

Solomon (2004) conducted a study using marketing cost and margin analysis on performance of cattle marketing system in southern Ethiopia with special emphasis on Borena found that butchers at Addis Ababa (Kera) market received relatively a larger share from total gross marketing margin amounting to 69.5%, 63.4% and 61.6% for cattle supplied from Yabelo, Negelle and Dubluk markets, respectively. Regarding producers’ portion, which is the portion of the price paid by the end consumer that goes to the producers, he found that the highest percentage was found for cattle supplied from Dubluk market (21.9%), and followed by Negelle and Yabelo characterized with gross margins of 20.6% and 18.6%, respectively.

Yocab (2002) found that butcheries operating in Addis Ababa got total gross margins of 31.7% from average purchase price; more over the study identified that the increase in the profit margin was not transferred to the producer. He further noted that the producer’s share of the retail price was decreased from 76% in 1983/84 to 55% in 1995.

Study conducted by Scott (1995) on potato marketing using marketing margin analysis in Bangladesh indicated that producer’s price and margin were 1.27 and 67 %, respectively. Similarly, study conducted by Pomerory (1989) on four fish markets using concentration ratio (market share ratio) in Philippines found that 50% of the industry made 80% of the fish purchases. In the Gulf of Nicoya study, Scheid and Sutinen (1981) reported that the fisher’s share of retail prices was 41%, where as the wholesale and retail sector received 22% and 37%, respectively.

### 2.7.2. Empirical review on marketed supply

Mamo and Degnet (2012) identified that gender and educational status of the household head together with household access to free aid, agricultural extension services, market information, non-farm income, adoption of modern livestock inputs, volume of sales, and time spent to reach the market have statistically significant effect on whether or not a farmer participates in the livestock market .The study uses binary logit to explore the determinants of smallholder livestock farmer’s market participation using a micro-lever survey data from Ethiopia.

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

Adugna (2009) identified major factors that affect marketable supply of papaya in Alamata District. Adugna’s study revealed that papaya quantity produced influenced marketable supply positively. Similarly, Gizachew (2005) analyzed factors affecting dairy household milk market entry decision using Logit model and marketed milk surplus using Tobit model in Ada’ha Liben district in Oromiya region by using data from 61 sampled dairy households. His study revealed that education level of the dairy household head, extension visits and income from non-dairy sources had positive relationship with household milk market entry decision. Gizachew (2005) also found that dairy cow breed, loan, income and extension visit, education level of spouse and distance from milk market were related to marketed surplus positively; however, distance from district and education level of the household head were related negatively with marketed milk supply.

Abay (2007) applied Heckman two-stage model to analyze the determinants of vegetable market supply. Accordingly, the study found out that marketable supply of vegetables were significantly affected by family size, distance from main road, number of oxen owned, extension service and lagged price.

A Similar study on cotton at Metama by Bossena (2008) also indicates that four variables affect cotton marketable supply. Owen oxen number, access to credit, land allocated to cotton, productivity of cotton in 2005/06 were the variables affecting positively cotton supply. Similar study on sesame at Metema by Kinde (2007) also pointed out six variables that affect sesame marketable supply. Yield, oxen number, foreign language spoken, modern input use, area, time of selling were the variables affecting positively sesame supply and unit cost of production was found to negatively influence the supply.

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

### 2.7.3. Empirical review on market integration

Solomon (2004) conducted a study on integration of cattle marketing in southern Ethiopia using monthly average price data of cattle from October 1996 to September 2002 of primary markets( Yabelo and Dubluk), secondary market (Negelle) and border terminal market (Moyale) by using co- integration and error correction model. He found that there was a spatial linkage between cattle market in Borena rangeland. Moreover, he also identifies that there was no short run integration but long run integration in these sample market.

Palaskas and Harris (1993), Bahrumshah and Habibulla (1994), Alexander and Wyeth (1994) and Dercon (1995), have all applied co-integration and error correction models to test level of market integration. The price changes in one market will be fully transmitted to other markets.

Markets that are not integrated may convey inaccurate price information that might distort marketing decisions and contribute to inefficient product movement (Bahrumshah and Habibulla, 1994).

Wolday (1994), Mulat and Bekele (1995) and Asfaw and Jayne (1997) had undertaken market integration studies on grain price by applied a co-integration and error correction approach found that grain prices were strongly integrated in the long-run and markets were fully integrated in the short-run.

Admasu (1998) and Solomon (1996) conducted a study on performance of coffee marketing in

Sidama , Illubabor and Jimma zones, respectively. Both of the study had used a cointegration and error correction approach analysis and found that that local and central coffee markets were integrated in the long run but there was no short run and full market integration between local and central markets.

### 2.7.4. Empirical review on challenges and opportunity

Bezabih and Hadera (2007) identified pest, drought, shortage of fertilizer, and price of fuel for pumping water as the major constraints of horticulture production in Eastern Ethiopia. Other problems which they reported also include poor know how in product sorting, grading, packing, and traditional transporting affecting quality.

Million and Belay (2004) indicated that, lack of market outlets, storage and processing problems, lack of marketing information, capital constraints, high transportation cost and price variation are some of the important constraints in vegetable production.

Dawit and Hailemariam (n.d) identified major production and marketing constraints to include shortage of chemicals, shortage of commercial fertilizer, shortage of irrigation water, shortage of quality seeds, low product prices, intensive influence of speculators and brokers in reducing the bargaining power of farmers, poor market access, poor access to transportation, and intensive competition among producers.

# 3. METHODOLOGY

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

## 

## 3.1. Description of the Study Area

This study is undertaken in Eastern Ethiopia in major vegetable growing Woreda (namely Kombolcha Woreda of Oromia Regional State) which are known in vegetables production. Description of Woreda is given below.

Kombolcha woreda is one of the nineteen Woredas found in East Hararghe Zone of Oromia Regional State, Ethiopia. The Woreda is composed of 19 rural kebeles and 1 urban kebele. Komblocha Woreda is located about 542 kms southeast of Addis Ababa and 16 kms northwest of Harar town, the capital of East Hararghe Zone of Oromia Region. The Woreda is strategically located between the two main cities Harar and Dire Dewa. In addition, due to its proximity to Djibouti and Somalia, the Woreda has access to potential markets in the area.

The Woreda had total population of about 157,444, of which 77,659 were females in 2011(CSA, 2012). About 45.1%, 53.0% and 1.9% of the total population were young, economically active and old age, respectively. Average family sizes for the Woreda was 4.9 persons per household. The crude population density of the Woreda is estimated as 517 persons per km2.

Lowland and midland agro-ecological zones characterize the Woreda’s climate. The Woreda receives mean annual rainfall of 600-900 mm, which is bimodal and erratic in distribution. The main rainy season in the Woreda is from February to mid-May and from July to end of August. The economy of the Woreda is dominated by traditional cash crop farming mixed with livestock husbandry. The major crops produced in the Woreda include sorghum, maize, vegetables (potato, cabbage, beetroot, and carrot), chat, groundnut, coffee and sweet potato (KWOoARD, 2012).

**MAP OF THE STUDY AREA HERE**

## 3.2. Types, Sources and Methods of Data Collection

The study used information on different variables such as data on vegetable production, vegetables marketed, prices of vegetable supplied, distance to Woreda market, distance to all weather roads, age of the household head, extension service, educational status of the household head, family size, access to market information, credit facility, and type of sellers and buyers. Survey was made to obtain these information.

The secondary data were collected from Central Statistical Authority (CSA), Bureau of Agriculture and Rural Development (BoARD), Capacity Building for Scaling Up of Evidence Based Best Practices in Agricultural Production in Ethiopia (CASCAPE) project and other sources. Primary data were collected using informal and formal surveys, and from key informants. The formal survey was undertaken through formal interviews with randomly selected farmers and traders using a pre-tested semi-structured questionnaire for each group.

## 3.3. Sampling Procedure and Sample Size

For this study, in order to select a representative sample a multi-stage random sampling technique were implemented to select vegetables producer kebeles and sample farm households. In the first stage, with the consultation of Woreda agricultural experts and development agents, out of 19 of Kombolcha 4 vegetables producer kebeles were purposively selected based on the vegetable crop production. In the second stage, from the identified or selected rural kebeles, 4 sample kebeles namely Bilusuma, Kakali, Waltalemi and Kerensa were selected randomly. In the third stage, using the household list of the sampled kebeles 123 sample farmers were selected randomly based on proportional to the population size of the selected kebeles (Table 1 ).

Table1 : Sample size distribution in the sample rural kebeles

Name of selected kebeles Total number of vegetable producers Number of total sample

Bilusuma 214 43

Kakali 150 30

Waltalami 139 28

Kerensa 113 22

Total 616 123

Source: Own computation from OoARD and kebele administration data

**TABLES SHOULD BE REAL TABLES NOT LINES**

For this study, data from traders were also collected. The sites for the trader surveys were market towns in which a good sample of vegetable traders existed. The lists of wholesalers were obtained from the respective Woreda Office of Trade and Industry (OoTI) and for other traders there is no recorded list. From 55 wholesalers, 12 wholesalers were selected randomly. In addition, 8 retailers and 5 collectors were randomly selected constituting a total of 37 traders from Melkarafu and Harar markets.

## 3.4. Methods of Data Analysis

Descriptive statistics, inferential statistics and econometric analysis were used to analyze the data collected from vegetable producers, traders and consumers.

### 3.4.1. Descriptive and inferential statistics

These methods of data analysis refer to the use of percentages, means, standard deviations, t-test, χ2-test, F-test and maps in the process of examining and describing marketing functions, facilities, services, and household characteristics.

**DID YOU USE F-TEST?**

Statistical models that were employed to analyze the performance of different markets are presented below with its different analytical techniques.

**i. Market concentration**

Concentration ratio (CR) was used to estimate the concentration of firms as a characteristics of the organization of the market that seem to exercise strategic influence on the nature of the competition and pricing within the market. These are designed by formula:

**C=**

Where:

C = concentration ratio,

Si = the percentage market share of ith firm, and

r = the number of largest firms for which the ratio is going to be calculated.

**ii. Marketing margins**

Margin determination surveys should be conducted parallel to channel survey. To determine the channel, one asks the questions “From whom did you buy?” and “To whom did you sell?” Scott (1995) pointed out to obtain information concerning the margins, agents have to answer the question “what price did you pay?” and “what was the selling price?” The cost and price information used to construct marketing cost and margin were gathered during field work conducted. Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza, 1995).

Where, TGMM = Total gross marketing margin

Producers' gross margin is the proportion of the price paid by the end user or end buyer that goes to the producer.

Where, GMMp = the producers share in consumer price

The producer's share is the commonly employed ratio calculated mathematically as, the ratio of producer's price to consumer's price. Mathematically expressed as:

Where: Ps = Producers share,

Px = Producer's price of vegetable,  
 Pr = Retail price of vegetable, and

MM = Marketing margin.

### 3.4.2. Econometric Model

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

#### 3.4.2.1. Factors affecting market supply

To investigate factors affecting vegetables supply (a continuous-valued choice about how much quantity to sell) Heckman model was used.

Different studies employed different models in order to identify the factors that determine market supply (Behrman, 1996; Bardhan, 1970; Strauss, 1984; Geoz, 1992, Vella, 1998; Minot, 1999; Sigelman, 1999; Matshe 2004). The commonly used ones are the well known Tobit and Heckman’s sample selection model. The disadvantage of the Tobit model is the assumption that both the decision to participate and the amount of product marketed given participation are determined by the same variables, and that a variable that increases the probability of participation also increases the amount of product marketed. This problem can be overcome using the Heckman’s sample selection model where a Probit model for the participation or ‘selection’ equation is estimated and a regression model, which is corrected for selectivity bias, is specified to account for the level of the amount marketed.

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

**The participation equation/the binary probit:**

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

xi’ is unknown parameter to be estimated in the Probit regression model,

Ui is random error term

Then the parameters can consistently be estimated by OLS over n observations reporting values for Yi by including an estimate of the inverse Mill’s Ratio, denoting i, as an additional regressor. More precisely selection model is specified:

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

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

Thus variance inflation factor (VIF) is used to check multicollinearity of continuous variables.

As R2 increase towards 1, it shows high multicollinearity of explanatory variables. The larger the value of VIF, the more troublesome or collinear is the variable Xi. As a rule of thumb if the VIF greater than 10 (this will happen if R2 is greater than 0.80) the variable is said to be highly collinear (Gujarati, 2003). Multicollinearity of continuous variables can also be tested through Tolerance. Tolerance is 1 if Xi is not correlated with the other explanatory variable, whereas it is zero if it is perfectly related to other explanatory variables. A popular measure of multicollinearity associated with the VIF is defined as:

Contingency coefficient is used to check multicollinearity of discrete variable. It measures the relationship between the raw and column variables of a cross tabulation. The value ranges between 0 - 1 , with 0 indicating no association between the raw and column variables and value close to 1 indicating a high degree of association between variables. The decision criterion (CC < 0.75) is that variables with the contingency coefficient is computed as follows:

Where, CC is contingency coefficient, 2 is chi-square test and N is total sample size. As cited in Paulos (2002), if the value of CC is greater than 0.75, the variables are said to be collinear. Statistical package SPSS version 12 was used to compute both VIF and CC.

#### 3.4.2.2. Market integration

This paper followed co-integration and ECM that examine integration to address the question

about market integration between the market prices differences in vegetables markets (Kombolcha, Harar and Jigjiga).

**Engle Granger cointegration tests**

Cointegration tests consist of two steps. The first step is to examine the stationary properties of the various prices. If a series, say Pt, has a stationary, invertible and stochastic after differencing d times, it is said to be integrated of order d, and denoted by Pt = I(d). Second step is (Engle and Granger (1987)) test, which is formulation test on residuals from regression of equation (18). To investigate the long-run equilibrium relationship between two time series, the cointegration model of Engle and Granger (1987) is used. The test for cointegration is similar in form to the DF and ADF tests for the univariate case. Consider two price series, pt1 and pt2, that by themselves are non-stationary at their level and must be differenced once to generate stationarity process. A linear transformation of the two original series can result in a series that is stationary, at the same order of integration I(d). Engle and Granger (1987) formulation tests on residual from the cointegration regression as follows:

pt1= α+β1pt2+ et (18)

Where pt 1 and pt 2 are prices series of a specific commodity in two markets 1 and 2, t is time

(for this specific study it is month) and et is the residual error term assumed to be distributed

identically and independently. The residuals from the above equation are considered to be temporary deviation from the long run equilibrium.

Cointegration is said to for variables where, despite variables are individually non stationary,

a linear combination of two or more time series can be stationary and where there is a long run equilibrium relationship between these variables. Thus the regression on the levels of the variables is meaningful and not spurious. The ADF unit root tests are then conducted on the residual eˆt obtained from equation ():

Consider a pair of variables pt1 and pt2 each of which is integrated of order d their linear relationship can be given by:

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

**Error Correction Model (ECM)**

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

Where β1, β2 and B3 are the estimated short run counterparts to the long run solution. K represents the lag length of the time, δ represents the speed of adjustment parameter, which indicates how fast the previous moves back towards long run equilibrium in case of deviation

in the previous time period and the εt is stationary random process capturing other information not contained in either lagged value of pt 1 and pt 2. The past value of error term in the equation has an impact on the change of variable pt 1 and pt 2.

The results of error correction show that the coefficient of the lagged error term ( t -1 ) e was found to be negative. If the two time series are cointegrated causality should exist in at least one direction (unidirectional). The error correction term, et-1, is obtained from the cointegration equation () and this term capture the deviation from long-run equilibrium.

## 3.5. Definition of Variables and Hypothesis

In the course of identifying factors influencing vegetables supply, the main task is to analyze which factor influences and how? Therefore, potential variables, which are supposed to influence vegetables, market participation and quantity of vegetables supply, need to be explained.

Accordingly, the major variables expected to have influence on both the farmers’ participation decision and quantity supply are explained as follows:

### 3.5.1. Dependent variables

**Decision to participate in Vegetable market (MRK\_PART) :** It is a dichotomous dependent variable that represents the probability of market participation of the household in the vegetable market that is regressed in the first stage of two stages estimation procedure. For the household who participate in vegetable market the variable takes the value of 1, where as it takes the value of 0 for the household who does not participate in the market.

**Volume of Vegetable Sales (VEG\_SALE):** It is a continuous dependent variable in the second step of the Heckman selection equation it is measured in quintal (100kg) and represents the actual supply by vegetable farm household to the market in the survey year.

**Price movement (PRI\_MOV):** The parallel movement in prices between markets or market integration, which usually involves pair wise comparisons between price series, was estimated by analyzing the integration of the secondary markets and terminal market prices using a time-series data. Co-integration and Error Correction Model (ECM) will be employed to test the hypotheses of market integration.

### 3.5.2. Independent variables

Based on review of literature, the following variables are hypothesized to affect vegetables supply to the market.

**Age of the household head (HH\_AGE):** It is a continuous variable and measured in years. Aged households are believed to be wise in resource use, on the other hand young household heads have long investment horizon and it is expected to have either positive or negative effect on volume of vegetable sales. The expected sign is positive as age one of the parameters of human capital. As an individual stays long, he will have better knowledge and will decide to participate. Adugna (2009) who found that age of the household head have negative effect on the elasticity of onion supply to the market.

**Access to market information (MRK\_ INFO):** Access to market information is assumed to have positive impact on marketable supply of vegetables. It is a dummy variable with a value of one if a household head has access to market information and zero otherwise. The general idea is that maintaining a competitive advantage requires a sound business plan. Again, business decisions are based on dynamic information such as consumer needs and market trends. This requires that an enterprise is managed with due attention to new market opportunities, changing needs of the consumer and how market trends influence buying (CIAT, 2004). Therefore those who have access to dynamic information will produce more vegetables for market. Muhammed (2011) who found that if wheat producer gets market information, the amount of wheat supplied to the market increases.

**Sex of the household head (HH\_SEX):** A dummy variable taking zero if female and one if male for variable to be considered. Sign will not be attached with the variable. Tshiunza *et al.* (2001) determined that male farmers tended to produce more for market and therefore participated in vegetable market more than female farmers participate.

**Credit Utilization (CRD\_UTL):** This is continues variable which indicates credit taken for vegetables production. Credit utilization would enhance the financial capacity of the farmer to purchase the inputs, thereby increasing vegetable production and market share size and then the competition. Alemnewu (2010) and Muhammed (2011) who found that if pepper and teff producer gets credit, the amount of pepper and teff supplied to the market increased. Therefore, it is hypothesized that credit utilization would have positive influence on level of production and sales.

**Income from non/off farming activities (OFF\_INCOME)**: It is continues measured in terms of amount obtained income from off and non-farming activities. This income may strengthen farming activity on one side and may weaken it on the other side. Rehima (2007) who found that if pepper producer have non-farm income, the amount of pepper supplied to the market decreases. But for this study it will be assumed to have inverse relation with volume of vegetable sales.

**Frequency of extension contact (FRQ\_CONT):** It is a continuous variable measured by number of extension contact and representing extension services as a source of information on technology. It is expected that extension service widens the household’s knowledge with regards to the use of improved technologies and has positive impact on vegetables sale volume. Ayelech (2011) found that if fruit producer gets extension, the amount of fruits supplied to the market increases.

**Distance to the nearest market (MRK\_DIST):** It is the distance of the vegetables producer households from the nearest market and it is measured in hours of walking time**.** The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities. In this study distance to the nearest market is hypothesized to affect volume of vegetables sales negatively. Similar issue was studied by Ayelech (2011) on fruit market in Goma woreda identified that poor market access has significant and negative effect on quantity of avocado and mango supplied.

**Education of the household head (HH\_EDU):** It is a continuous variable measured in terms of years of schooling. Education broadens farmers’ intelligence and enables them to perform the farming activities intelligently, accurately and efficiently. Moreover, better educated farmers tend to be more innovative and are therefore more likely to adopt the marketing systems. Formal education enhances the information acquisition and adjustment abilities of the farmer, thereby improving the quality of decision making (Fakoya *et al*., 2007). Astewel (2010) found that if paddy producer gets educated, the amount of paddy supplied to the market increases, which suggests that education improves level of sales that affects the marketable surplus. Therefore, this variable is hypothesized to influence volume of vegetable sales positively.

**Vegetable farming experience(FAR\_EXP):** It is the total number of years a farmer stays in production of vegetables. A household with better experience in vegetable farming is expected to produce more amounts of vegetables and, as a result, he is expected to supply more amounts of vegetables to market. Farmers with longer farming experience are expected to be more knowledgeable and skillful (Ayelech, 2011).Therefore, this variable is hypothesized to positively influence vegetable market supply.

**Farm size (FAR\_SIZE)**: This variable is a continuous variable and it refers to the total area of farmland that a farmer owns in hectare. In agriculture, land is one of the major factors of production. It is assumed that the larger the total area of the farmland the farmer owns, the higher would be the output. The availability of land enables the owner to earn more agricultural output which in turn increases the marketable supply (Desta, 2004). Therefore, farm size and marketable supply are expected to have direct relationship.

**Livestock holding (LIV\_HOLD):** This is a continuous variable measured in tropical livestock unit. Farmers who have a number of livestock are anticipated to specialize in livestock production so that they allocate large share of their land for pasture. Study by Rehima (2006) on pepper marketing showed that TLU showed a negative sign on quantity of pepper sales. On the other hand, it is assumed that household with larger TLU have better economic strength and financial position to purchase sufficient amount of input (Kinde, 2007). But for this study TLU will be hypothesized to influences volume of vegetable sales negatively.

**Quantity of Vegetables produced (VEG\_PROD):** It is continuous variable measured in quintals. A marginal increase in vegetable production has obvious and significant effect in motivating market supply. Therefore, this variable is hypothesized to have a positive effect on market supply. Astewel's (2010) analytical result showed that, the quantity of paddy produced jointly affected both the probability of market participation and volume of supply. Therefore it is assumed to affect participation decision and market supply positively.

**Household size(HH\_SIZE):** House hold size of a respondent is a continuous variable measured in terms of number of family members in the household. As vegetable production is labour intensive activity, vegetable production in general and market supply of vegetable products in particular is a function of labour. Accordingly, families with more household members tend to have more labor which in turn increase vegetable production and then increase vegetable market supply. On the other hand, family size also decreases market supply because high proportion of the product would be used for consumption. But for this study family size was expected to influence positively the volume of vegetable supply to the market. Gezahagn (2010) who found that family size have positive effect on the households’ gross income from groundnut production.

# 4. RESULTS AND DISCUSSION

This chapter deals with the analysis of the survey data and interpretation of the analytical findings. A structured questionnaire was administered to 123 sample households in Kombolcha district with the main aim of investigating determinants of marketable supply. The questionnaire was designed in such a way that it enables to collect data on personal and socioeconomic characteristics of farm households as well as on opportunities and constraints of the vegetables market. Four DA’s were participating in the data collection.

## 4.1. Descriptive Results

Of the 123 sample respondents 70 reported that they were participate in vegetables market , whereas the remaining (53 respondents) reported that they were not participate in the vegetables market.

### 4.1.1. Demographic Characteristics of the Sample Households

The average family size of the sample farmers was about 11.25 persons. This average makes differences in family size, where the largest family size was 18 and the smallest was 5. The average number of family members was about 11.2 persons per household for participant farmers, while it was about 10.5 for non-participant farmers the two tailed test was statistically significant meaning the household size between the market participants and non-market participants were different (Table 2). The survey result shows that 97.56% of the sample farmers were married while 1.63% and 0.81% were single and divorced, respectively. With regard to religious affiliation, 100% of the respondents were Muslims.

The age structure of the sample households shows that the average age of the participant and non- participant farmers was almost the same (36 years). This implies that both participant and non-participant farmers have had almost equal farming experiences.

The survey results show that 82.86 % of the participant farmers were 0-4 years of schooling, and the remaining (17.14 %) were 5-8 (Table 2). On the other hand, the non- participant farmers 69.81% were 0-4, and 30.19 % were 5-8 years of schooling. The mean difference of educational level for the two groups was significant at less than 5 percent significance level (Table 2). The survey results show also that 97.56 % and 2.44% of the sample respondents were males and females, respectively.

Table 2: Age, sex, religion, educational level, family size and farming experience of sample

Farmers by participation on vegetables market

Variable Participation on Vegetables market χ2/t-test

No Yes

Age

Mean 35.5 36.3

Standard deviation 7.53 6.70 0.2715

Family size

Mean 5.52 6.18

Standard deviation 1.70 1.66 0.0168\*\*

Sex

Female 0 3

Male 53 67 0.127

Educational level

Mean 2.9 1.77

Standard deviation 2.54 2.37 0.0043\*\*

Religion

Muslims 53 70 ---------

Farming experience

Mean 11.83 11.77

Standard deviation 6.44 6.07 0.4794

Source: Survey result, 2015

### 4.1.2. Socioeconomic Factors

#### 4.1.2.1. Land holding

The average size of cultivated land owned by the sample respondents were about 0.45 ha, the minimum and the maximum being 0.25 ha and 1 ha, respectively. Participant farmers owned on the average 0.48 ha of cultivated land. The corresponding figure for the non-participant farmers was 0.42 ha. The mean difference of own cultivated land for the two groups was significant at 5 percent significance level (Table32).

Table 3. Average size of holdings (ha), by participation on vegetable market

Variable Participation on Vegetable market χ2/t-test

No Yes

Total land holding

Mean 0.42 0.48

Standard deviation 0.161 0.160 0.0412\*\*

Source: survey result, 2015

#### 4.1.2.2. Livestock ownership

Livestock are important assets for rural households in Ethiopia. They are used as sources of food, draft power, income, and energy. Moreover, livestock are indices of wealth and prestige in rural areas. All of the sample households reared livestock, which constituted cattle, small ruminants, and pack animals. On average, the sample households kept about 1.96 animals (Table 4 ). The minimum number of livestock kept was 0.26 whereas the maximum was 3.97.

Table 4. Livestock ownership of the sample households, by participation on vegetable market

Variable Participation on Vegetable market χ2/t-test

No Yes

Livestock ownership

Mean 1.85 2.05

Standard deviation 1.01 0.98 0.1419

Source: survey result, 2015

#### 4.1.2.3. Source off/non-farm income

Sales of chat, cash crops, and livestock are the major off-farm activities and cash income sources for the households in the study area. About 12.86 % of participant and 79.25% of non-participant sample households reported that they earned cash income from sales of khat whereas about 84% of participant and 13.21% of non- participant farmers had no other source of income. The average cash income from different sources was about Birr 1587.32 for the participant and Birr 1564.71 for non-participant sampled households (Table 5).

Table 5. Sources of off- farm income by vegetables market participation

Variable Participation in vegetable market χ2/t-test

No Yes

Off farm income

Mean 1564.71 1587.32

Standard deviation 3238.96 4550.32 0.4872

Source of income

No source 13.21 89.29

Chat 79.25 12.86

Cash crop 5.66 0

Chat & cash crop 1.89 0

Fattening 1.43 0

Mill 1.43 0 0.000\*\*

Source: survey result, 2015

#### 4.1.2.4. Vegetables production

The major vegetables grown in the study area are potato and cabbage. The average quantity of vegetables production by the sample farmers was about 5,546 kg. This average makes differences in production, where the maximum production was 28,700 kg and the minimum production was 1,0,00 qt. The average production was about 64.45 qt per household for participant farmers, while it was about 43.58 qt for non-participant farmers. The mean comparison between the two groups in relation to annual vegetables production showed that the difference between the two groups is statistically significant indicating that the market participants had higher vegetables yields than non-market participants. The result is consistent with the findings of Omiti et al. (2009) and Astewel (2010) who confirmed that increasing the volume of production increases market participation (Table 6).

Table 6. Quantity of Vegetables produced, by Vegetables market participation

Variable Participation in vegetables market χ2/t-test

No Yes

Vegetables production

Mean 43.58 64.45

Standard deviation 38.38 44.51 0.0036\*\*

Source: Survey result, 2015

### 4.1.3. Institutional Factors

#### 4.1.3.1. Extension contact

Agricultural extension services provided by agricultural development offices are believed to be important sources of information about improved agricultural technologies. About 97.56% of the sample respondents reported that they had contact with agricultural extension agents. 97.14 percent of the respondents indicated that they had received extension advice on vegetables market. Table 5 shows that 66.67% of sample household heads who were participate in vegetables market had no contact with extension agents. The corresponding figure for non-participant farmers was 33.33%. 4.29% 0f the participant farmers had no contact and 31.43% of the participant household heads had less than or equal to 4 contacts per year with extension agents on matters related to vegetables market and 44.29 % of them had 5 up to 7 contacts per year and 20% of them had 24 contacts . Similarly, 88.66% of the non- participant respondents had less than or equal to 4 contacts whereas 3.7% 6 contacts per year with extension agents and 7.55% sample households had no contact with extension agent.

Table 7. Number of extension contacts per year, by Vegetables market participation

Variable Participation in vegetables market χ2/ t-test

No Yes

Extension contact

No 33.33 67.66

Yes 43.33 56.67 0.730

Frequency of contact

0 7.55 4.29

1-4 88.66 31.43

5-7 3.77 44.29

24 ----- 20 0.0000\*\*\*

Source: survey result, 2015

#### 4.1.3.2. Access to credit

The main source of credit in the study area was relatives and friends. From the sample households 4.88 percent sampled farmers had received while 95.12% do not receive credit. The chi-square result shows that there is statistically significant difference at 5% level on credit access. The average credit taken by 4.88 % of the total sampled household was Birr 40.83 per household.

Table 8. Credit access by vegetables market participation

Variable Participation in vegetables market χ2/t-test

No Yes

Credit access

No 100 0

Yes 91.43 8.57 0.029\*\*

Credit utilization

Mean 35.29 44.92

Standard deviation 186.35 185.13 0.3896

Source: survey result, 2015

#### 4.1.3.3. Access to market information

About 82.11% of the sample respondents reported that they had access to information related to vegetables market and 17.89 of the sample respondents had no access to information. Table 7 shows that 53.47% of sample household heads who were participate in vegetables market had access to information. The corresponding figure for non-participant farmers was 72.73. 46.53 % 0f the participant farmers and 27.27 % of the non participant household heads had no access to information related to vegetables market. The chi-square result shows that there is statistically significant difference at 10 % level on vegetables market information access.

Table 9. Access to market information by vegetables market participation

Variables Participation in vegetables market χ2/t-test

No Yes

Access to information

No 27.27 46.53

Yes 72.73 53.47 0.098\*

Source: survey result, 2015

#### 4.1.3.4. Market Distance

The mean distance to the market place in hours of walking time for the sample respondents were about 1.88 hr, the minimum and the maximum being 0.75 hr and 6 hr, respectively. The average for participant households were 1.90hr while for the non-participant households 1.85 hr (Table 10).

Table 10. Market distance by vegetable market participation

Variable Participation in vegetables market X2/ t-test

No Yes

Market distance

Mean 1.85 1.90

Standard deviation 0.11 0.09 0.3325

Source: survey result, 2015

**Post harvest handling**

Post harvest handling, which includes different activities like sorting, grading, packing, storing, transportation, loading and unloading, is done by the farmers themselves or traders or brokers. If vegetables are sold at the farm gate all aforementioned activities are performed by the buyer (traders or broker). Most of the farmers use sacks, underground storage and ground floor of their residential house as a store . There are high postharvest losses due to improper harvesting, handling, packaging and poor facilities to market. The result of the sample farmers’ survey shows that 25.4% and 20.2% of potato and cabbage damaged before it reach to market (Table 11). Survey result also shows that 43.8% of sample producers conduct sorting and grading of vegetables by separating damaged and undamaged vegetables, cleaning and cutting when needed before they take it to the market (Table 11).

Table 11. Post-harvest loss of vegetables in percent of production

Vegetables Mean SD χ2/test

Potato 25.4 14.5

Cabbage 23 18.3 0.07

Source : own computation from survey result ,2015

### 4.1.4. Demographic characters of traders

The average age of the sampled traders was 30 year with a range of 19 to 45 years (Table 12).

Table 12. Age, family size of the sampled traders

Variable Mean Min Max

Age 30 19 45

Family size 3.9 0 8

Source: survey result, 2015

**Structure and conduct of vegetable marketing**

The structure and conduct of a market have a big effect on its performance. Vegetables (potato and cabbage) produced flows from different participants at different stages and forms.

Given that different marketing agents perform different functions within the vegetables marketing chains, the efficiency with which these functions are carried out becomes an important aspect of market performance. These two major aspects formed the basis for evaluating both the effectiveness and the efficiency of the vegetables marketing channels in the study area. In this part of the thesis marketing participants, their role and linkages, marketing channels, market structure and conduct were discussed.

**Marketing participants, their roles and linkages**

This survey identified major market participants between farmers and consumers. Market participants in the study area include: producer/farmers, collector, wholesalers and retailers.

**Producers:** producers or farmers produce and harvest their vegetables. They transport vegetables (potato and cabbage) to the nearest markets( village market) or sold to collectors at farm gate; secondary market and destination markets themselves, either carrying sack themselves over a distance of 1.88 hours on an average. Alternatively , they sell to village collectors known as “ farmer traders” who assemble/ collect vegetables ( potato & cabbage) from large number of farmers. Farmers also sell their products directly to wholesalers in destination market.

Table 13. Amount vegetables (potato & cabbage) sold from producer to different agents

Quantity in quintal Per cent

Vegetables Potato Cabbage

Producer sold to Village collector

Wholesaler 210 161

Retailer

Total

Source: Survey result, 2014

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

Table 14. Producer’s vegetables (potato and cabbage) production and selling

Variable Minimum Maximum Sum Mean

Vegetables Potato Cabbage Potato Cabbage Potato Cabbage Potato Cabbage

Production area in hectare .25 1 .45

Yields in quintal 3 2 100 250 3790 3012 31.06 24.68

Quantity sold in quintal 3 2 97 246 3460 2842 28.39 30.24

Selling price in quintal 450 250 750 500 55220 18250 452.62 192.10

Source: survey result, 2014

As the Table 14 depicted, producers produce on average 31.06 and 24.68 quintal potato and cabbage respectively and sold 28.39 and 30.24 quintal potato and cabbage respectively from a production area of 0.45 hectare and sold at 4.52birr/kg and 1.92birr/kg respectively.

**Brokers:** Theses are agents specializing in negotiating buyers and sellers. They were operating between bulk buyer and seller agents. Their major duty is on potatoes collection market due to its wideness. They negotiate the farmer during production and force them to sell for the collector or wholesaler they were dialed with. They disseminate information to the market participants and influence trade. As the reward they got 10 birr/quintal.

**Wholesalers**: wholesalers are someone who buys large quantity of goods and resell to merchants rather than to the ultimate customers. Wholesalers are the major actors in the marketing channels. These were those participants of the marketing system who used to buy vegetables (potato and cabbage) on a large volume than other actors did. They resell vegetables (potato and cabbage) in Harar and Jigjiga towns and some quality potatoes were sent abroad (Somali land) using tracks.

Retailers: retailers are agents that resell commodity to end users. The majority of vegetables (potato and cabbage ) retailers are characterized by having road side shade and used to sell vegetables purchased from wholesalers or farmer traders or farmers to ultimate consumers in pieces after receiving large volumes.

**Marketing channels**

Marketing channel refers to the sequence of intermediaries and markets through which goods pass in route from producer to consumer. It is an alternative route of product flows from producers to consumers. The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin( producer) to the final destination( consumer). Consequently effectiveness is defined in terms of the ability of the marketing channels to offer proper service outputs or the right service in relation to consumer preference i.e. quality product and minimum price.

This section presents result for the identified marketing channels, activities carried along the channels and the consumer preference that the channels are designed to meet. The potato and cabbage market channels depicted below were constructed based on the data collected. The result reveled that there are five major marketing channels obtained from trader’s survey.

**Potato marketing channel**

Five main alternative channels were identified for potato marketing. It was estimated that 112,219.2qts of potato were marketed in 2014/15. From the total quantity marketed 1137qts of potato are supplied by sample respondents. From the quantity supplied by sample farmers around 12.2 qts traded outside the Woreda market and the remaining quantities flow through the identified channel to consumers and exporters. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were depicted in Figure ---.

As can be understood from figure -- the main receivers from producers were retailers and wholesalers with an estimated percentage share of 32.95% and 52.2%, respectively. According to volume of potato passed to different channels, the channel of producer – wholesaler– exporter carry the largest volume followed by producer – collectors – wholesaler ; and producer – retailer– consumer that carry a volume of 614.3qts, 315.6qts and 112.3qts in that order.

I. Producers Consumers (67Qts)

II. ProducersRetailersConsumers (112.3Qts)

III. ProducersWholesalersExporters (614.3Qts)

IV. ProducersWholesalersRetailersConsumers (6.3Qts)

V. ProducersCollectorsWholesalersExporters (315.6Qts)

**Cabbage marketing channel**

Five main alternative channels were identified for cabbage marketing. It was estimated that 73,455.2qts of cabbage were marketed in 2014/15. From the total quantity marketed 1330.5qts of cabbage was supplied by sample farmers. From the total quantity around 27.87qts traded outside the Woreda market and the remaining quantities flow through the identified channels to consumers and exporters.

The main receivers from producers were wholesalers and retailers with an estimated percentage share of 31.6% and 29.4%, respectively. According to volume of cabbage passed to different channels, the channel of producer – retailer – consumer carry the largest volume followed by producer – wholesaler – exporter; and producer – consumer that carry a volume of 390.6qts, 265.2qts and 176.16qts in that order.

I. Producers Consumers (176.16Qts)

II. ProducersRetailersConsumers (390.63Qts)

III. ProducersWholesalersConsumers (37.89Qts)

IV. ProducersWholesalers Exporters (265.21Qts)

V. ProducersWholesalersRetailersConsumers (101.87Qts)

As result computed indicates that the most that is 52.2 % and 31.6 % of the total potato and cabbage produced have been sold to wholesaler respectively and 32.95 % and 29.4 % of the total produced potato and cabbage were sold to retailers

**Services given by vegetables (potato and cabbage) marketing channels**

In this study, the effectiveness of the vegetables marketing channels were mainly assessed by different services that the channels have offered in the market in order to maximize consumer satisfaction. Most of these are: exchange functions (assembling and distribution); physical function ( storage and transport). Regarding assembling and distribution, the distributions of wholesaler and retailer shades as well as the availability of transportation services were taken in to consideration. Result indicated that producer, wholesaler and retailers who targeted consumers were built their shades places that could offer some convenience for transport, loading and un-loading or at a central place that customers can easily visit in order to attract more customers. With respect to storage, this study identified that traders store potato during unstable price was observed in a market for short period to gem or benefit from price fluctuation.

**Structure of the market**

Market structure is a description of the number and nature of participants in a market. The structure should be evaluated in terms of 1) the degree of market concentration 2) barrier to entry (licensing procedure, lack of capital and policy barriers), and 3) the degree of transparency. (Pender *et al*., 2004). In this study the structure of vegetables market is characterized using the following indicators: market concentration and the degree of transparency (market information).

**Degree of market concentration**

Concentration ratio is used as an indicator of the relative size off the firm in relation to the whole. Concentrations have been seen for wholesalers found in the study area due that they have a direct impact on vegetables trade. Concentration was calculated as the sum of the percent market share of the top four firms by taking capital of these agents in 2013/2014 from wholesalers.

Table 15. Concentration ratio for market agent

Vegetables Marketing agent Concentration ratio top four firms (%)

Potato Wholesaler 54.24

Cabbage Wholesaler 55.88

Source: survey result, 2015

As shown on above table, applying the market structure criteria suggested by Kohls and Uhl (1985), the potato and cabbage show oligopoly market . This suggest that there was market concentration by few firms

**Degree of market transparency**

Survey result indicated that 60%, 24%, 12% and 4% of the sample potato traders got price information through personal observation, telephone, other traders and brokers, other traders and telephone, other traders and telephone respectively. 56 %, 24 %, 12% and 8% of the sample cabbage traders got price information through telephone, personal observation, other traders and brokers ,other traders and telephone ,other traders and telephone and personal observation respectively. It was observed that village collectors had limited information at destination market. In this case price information was the main problem in the vegetables (potato and cabbage) market. There was system of dissemination of market information; however it was not transparent among traders in sample markets and farmers.

About 96% of the sample traders stated willingness to pay for information cost, if there were well organized and transparent information center while 4% of them were not willing to pay for information. However, in the sample markets, all traders had information through different sources. They use a combination of sources of information as a source of information.

Moreover, 64%, 16%, 12% and 8% information on supply of potato obtained from personal observation, telephone, other traders and brokers, other traders and personal observation, other traders and telephone and personal observation respectively, and 64%, 16%, 12% , 4% and 4% information on supply of cabbage also obtained from personal observation, telephone, other traders and brokers, personal observation, other traders, telephone and brokers respectively. While, 64%, 24%, 8% and 4% of demand information on potato were obtained from personal observation, telephone, other traders and brokers, other traders, personal observation and telephone respectively, 56%, 24%, 12% 4% and 4% information on demand of cabbage were obtained from personal observation, telephone, other traders and brokers, other traders, personal observation, telephone and brokers respectively.

**Conduct of vegetables (potato and cabbage) market**

Market conduct deals with the behavior of firms or patterns of behavior that firms follow in adopting or adjusting to the markets in which they sell or buy. In this report conduct of the vegetables market is analyzed in terms of traders’ 1) pricing setting 2) purchasing and 3) selling strategies.

**Traders’ price setting strategy**

The method of price formation is critical importance. About 60% of the sampled traders set purchasing price by negotiation or through colluding with other traders, 28% of the sampled traders reported that purchasing price was set by the market and 12 % of the traders reported that the purchasing price was set by the sellers. This indicated that the vegetable traders had no significant role in price setting.

This informal survey result identified price setting practice, in such a way that, wholesalers collect vegetables from farmers directly and put to their store and start to negotiate the farmer to a predetermined price. On the other hand, producers had no power to present their produce to wholesaler. Wholesaler didn’t offer them a good price and differentiated vegetables into good quality and poor quality called ‘*magasha*’ locally. But after bought from farmers, they mix together as a good quality and sold to the buying agent.

They also collected vegetables from collectors and farmer without any payment with a predetermined price. No other traders permit to pay above the set price. Even if the farmers refuse to sell their vegetables, nobody can buy above the set price. And on other traders would buy the vegetables that other traders refused to buy from farmers due to low price offer. Because the informal rules among traders nobody would violate the practice. Farmers will thus have no option not to sell. Their vegetables will be damaged if it stays longer time. Therefore, farmers were forced to sell at whatever price that is set.

About 44%,32%, 12% and 12% of the sampled traders set purchasing price one day before the market day, at the evening of the market day, early in the morning of the market day and at the time of purchase respectively following observed fluctuation of demand in the market. While retailer set a purchasing price during buying from a supplier based on suppliers price. That is , if the price of vegetables increase from what it was prevailed before, they were increase their selling price to get a profit they want. In contrary to this, it was not significant to decrease retailing price if supply price was decreased. On the other hand 36%, 32% ,20% and 12% of the sampled traders set their selling price one day before market day, at the time of selling, at the evening of market day and early in the morning of market day depending on the supply of vegetables respectively.

**Traders purchasing strategy**

Collectors were collected vegetables from the farmers daily searching for where it is available. They also negotiated farmers as their customers and follow the time vegetables (potato and cabbage) were harvested to collect. But wholesalers use Kombolchas’ markets to purchase.

About 36%,32 %,16 % and 16 % of the sample traders purchased potato from farmers, farmers and urban wholesalers , farmers, retailers, wholesalers and urban assemblers and wholesalers respectively, and 60%, 24%, 12% and 4% of traders purchased cabbage from farmers, farmers and wholesalers , farmers, retailers , wholesalers and urban assemblers and wholesalers respectively. While 36%, 32%, 24% and 8% of the sampled potato traders sell to wholesalers, wholesaler, retailer, urban assembler and consumer, consumer and urban assembler respectively, and 52%, 24%, 16% and 8% of the cabbage traders sell to wholesalers, consumers, retailers and urban assemblers respectively.

The informal survey indicated that many traders take advantage by cheating the farmers by means of manipulating the weighting scale. The common local weight measurement for vegetables (potato and cabbage) is kg.

**Trades selling strategy**

As survey result shown, traders set selling price 36%, 32%, 20% and 12% one day before market day when there was information disseminated on the supply side, depending on the supply of vegetables (potato and cabbage), if there was high demand and low supply observed they charged their selling at the time of sell, they set their selling price also at the evening of the market day and early in the morning of the market day depending on the supply of vegetables respectively. Wholesalers and collectors were shown a negotiation to each other to set a selling price when there was a supply shortage observed and during fasting time when there was observed high demand.

**Performance of the market**

**Marketing cost and profitability analysis**

Method employed for the analysis of vegetables (potato and cabbage) market performance were marketing margins by taking into account associated marketing costs for key marketing channels. Hence, on the consideration of 2014/15 production year, costs and purchase price of channel actors, margin at farmers, wholesaler’s and retailer’s level was conducted. The structure of marketing cost reveled transportation cost was the highest cost for village collectors than other actors.

Among vegetables (potato and cabbage) traders, informal survey revealed that commission agents had lowest marketing cost because they buy vegetables at market place and wholesalers receive all the vegetables at market place on time and cover other related cost. Farmer traders /village collectors were relatively incurred highest cost of all other traders because they incurred additional cost (transport) since they transport vegetables from farmers to the market.

Table 15. Marketing margin of traders( mean)

Traders Wholesaler Retailer Total

Potato Cabbage Potato Cabbage

Purchasing price 486.33 261.81 338.12 192.5

Labour cost 15 15 10 10

Loading and unloading 20 20 12 12

Transport cost 25 25 17 17

Pack material 15 15 10 10

Loss 2 5 3 7

Tax 10 10 10 10

Total marketing cost 573.33 351.81 400.12 258.5

Selling price 650 368.18 562.5 275

Gross marketing margin 163.67 106.37 224.38 82.5

Net profit 76.67 16.37 162.38 16.5

### Stationarity and Co-integration test

Econometric analysis begins by checking the Stationarity and non-Stationarity of data. For co-integration relationship, it’s one of the assumptions that data must be integrated of either same order or different order. Unit root testing procedures like Augumented dickey fuller (ADF) test is then applied to discuss the Stationarity and non-Stationarity empirically. After this, co-integration techniques are used to find out long run relationship between Harar and Jigjiga cabbage and potato price.

### 

### Stationarity test

To test the Stationarity in monthly time series data for Harar and Jigjiga from September 2010- December 2014, Augmented Dickey Fuller (ADF) test is performed with trend. ADF (Augmented DickeyFuller) tests are most commonly used as unit root tests, these tests assume that errors are statistically independent and have a constant variance (Enders, 1995). Therefore, the stationarity tests for cabbage and potato price are presented here under.

**Unit root test for cabbage**

Table 16: Stationarity Test of Harar and Jigjiga cabbage price at First difference

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Market | ADF test statistic | Critical v. at 1% | Critical v. at 5% | Null hypothesis | Stationary status |
| Harar | -8.714(0.000) | -3.580 | -2.930 | Rejected | Stationary |
| Jigjiga | -10.650 (0004) | -3.594 | -2.936 | Rejected | Stationary |

Source: Own computation, 2015. Note: numbers in bracket indicates the significant level.

**Unit Root Test for Cabbage**

Table 17. Stationarity Test of Harar and Jigjiga for cabbage and Potato price at their First Difference

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cabagge Price | | Potato Price | |
| Harar market | Jigjiga Market | Harar market | Jigjiga Market |
| ADF test statistic | -8.714(0.000) | -10.650 (0000) | -7.685(0.000) | -8.965 |
| Critical v. at 1% | -3.580 | -3.594 | -3.580 | -3.580 |
| Critical v. at 5% | -2.930 | -2.936 | -2.930 | -2.930 |
| Null hypothesis | Rejected | Rejected | -2.600 | -2.600 |
| Stationary status | Stationary | Stationary | Stationary | Stationary |

Source: Own computation, 2015. Note: numbers in bracket indicates the significant level.

As verified in table 17, after taking the first difference of Harar and Jigjiga prices for both cabbage and potato market, they became stationary as confirmed by using ADF test. Therefore, for both variables the null hypothesis of the unit root is rejected at 1% and 5% of significance level at their first difference. It can be concluded that, the unit root test reveals that the variables used in Harar and Jigjiga market for both cabbage and potato prices are stationary at the ADF unit root tests. In order to continue with the analysis, all variables in each model should be integrated in the same order which are these variables are integrated at the first order 1. Due to this reason, the analysis will continue with the co-integration technique studying the long-run relationship.

### Long-run relationships and the short-run dynamics

**Engle-Granger (Residual based) test for cointegration**

To test the presence or absence of co-integration between Harar price and Jigjiga regarding cabbage and potato prices in different time period, further proceed and apply different co-integration methods. With this regard, in order to analyze co-integration, an Engel-Granger test is used.

It has been already seen that Harar and Jigjiga market cabbage and potato price series are stationary at 1% and 5% of significance level at their fist difference integrated of order one, now the long run equilibrium relationship test for both vegetables at Harar and Jigjiga market cabbage are estimated by regressing the two market prices and saved the residual. This residual also tested whether it is stationery or not. If it is stationery, it would confirm the presence of integration between Harar and Jigjiga for cabbage and potato prices in long term separately. Based on the mentioned procedure tests are shown as follow.

Table 18: The logarithmic Regression of Harar by Jigjiga cabbage price

 Source: Computed from CSA monthly price data (September 2010 - December 2014).

Note: **DlnHcabage** which is a dependent variable is the lograthemic value of the price of cabage for harar market over the given period of time after first differencing while **DlnJCabagge** is for Jigjiga market in the same manner from the above regression table 18.

Table 19: The logarithmic Regression of Harar by Jigjiga Potato price



Note: **DlnHpotato** which is a dependent variable is the lograthemic value of the price of potato for harar market over the given period of time after first differencing while **DlnJpotato** is for Jigjiga market in the same manner from the above regression table 3.

**Lag Length Determination**

Before running the estimation, choosing the optimum number of lags that should be included in the model is the first task. Therefore, as indicated in the following table, based on AIC (Akaike Information Criterion), FPE (Final Prediction Error), LIR (Sequential Modified LR  test  statistic) and HQ (Hannan­Quinn) information  criterion, one lag I(I) is selected

Table 20: Lag length Determination for cabbage



Table 21. Lag length Determination for cabbage



Source: own computation, 2015 S\*=recommended lag by each criteria

Since the optimum lag is determined according to the above criterion in the table 5 and 6, we can run co-integration test accordingly. One of the conditions for testing co-integration for time based data is that time series must be non stationary in nature and both series must be integrated at same order for Stationarity.

After running the regression, for both vegetables, the next step is conducting stationarity for the predicted residuals by using ADF test.

Table 22. ADF test result of the residuals for cabbage and potato

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | ADF test statistic | Critical v. at 1% | Critical v. at 5% | Null hypothesis | Stationary status |
| Residual for cabbage | -10.650 (0.000) | -3.594 | -2.936 | Rejected | Stationary |
|  |  |  |  |  |  |
| Residual for Potato | -8.965(0.000) | -3.580 | -2.930 | Rejected | stationary |
|  |  |  |  |  |  |

As can be seen from Table 22, the price of cabbage and potato for both markets have been found significant at 1% significant level and residuals are stationery. This situation tells that the two markets have long term relationship or in the long run they move together. Hence, it can be concluded that the two variables for both vegetables are co-integrated and therefore a valid and positive long-run relationship exist between Jigjiga and Harar market for cabbage and potato price. Therefore, the result shows that the markets found long-term equilibrium relationship and Jigjiga market price has very strong causal effect on Harar cabbage market price.

### 4.2.5. Short run price transmission and speed of adjustment

Following the stationarity of the residuals, the short-run analysis which is the Error Correction Model (ECM) will be estimated for both vegetables. Therefore,

Table 23. Error-correction model result for Cabbage

reg DlnHCabage DlnJCabagge DlnHCabage\_01 resid\_01Cabage

Source SS df MS Number of obs = 48

F( 3, 44) = 3.23

Model .148565994 3 .049521998 Prob > F = 0.0312

Residual .673840818 44 .015314564 R-squared = 0.1806

Adj R-squared = 0.1248

Total .822406813 47 .017498017 Root MSE = .12375

DlnHCabage Coef. Std. Err. t P>t [95% Conf. Interval]

DlnJCabagge .2200936 .1028295 2.14 0.038 .0128544 .4273328

DlnHCabage\_01 -.2762138 .1354251 -2.04 0.047 -.5491452 -.0032823

ECM .780596 1.156121 2.41 0.020 .4505869 5.110605

\_cons -.0111751 .0205773 -0.54 0.590 -.052646 .0302957

Where: DlnHCabage is the logarithmic value of cabbage price at Harar market after first difference; DlnJCabagge is the logarithmic value of cabbage price at Jigjiga market after first difference; DlnHCabage\_01 is the one lag logarithmic value of cabbage price at Harar market after first difference and resid\_01Cabbage is the one lag value of the residual which is ECM.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Table 24. Error-correction model result for potato |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| |  |  | | --- | --- | | reg DlnHpotato | DlnHpotato\_01 lnJJPOPrc resid\_01P | | Source | SS df MS | Number of obs = 50 | |  | F( 3, 46) = 0.53 |  | | Model | .029549768 3 .009849923 | Prob > F = 0.6651 | | Residual | .85778609 46 .018647524 | R-squared = 0.0333 | |  | Adj R-squared = -0.0297 |  | | Total | .887335858 49 .018108895 | Root MSE = .13656 | |  |  |  | | DlnHpotato | Coef. Std. Err. t P>t | [95% Conf. Interval] | |  |  |  | | DlnHpotato\_\_01 | -.1312348 .14928 -0.88 0.384 | -.4317199 .1692503 | | lnJJPOPrc | .35828 .1077999 -0.33 0.741 | -.2528179 .1811619 | | resid\_01potato | .7325511 .418600 1.76 0.045 | -.7221644 2.187267 | | \_cons | .0715916 .2042654 0.35 0.728 | -.3395732 .4827564 | |  |  |  |  |  |
|  |  |  |  |  |  |
| Where: DlnHpotato is the logarithmic value of potato price at Harar market after first difference; lnJJPOPrc is the logarithmic value of potato price at Jigjiga market after first difference; DlnHpotato\_01 is the one lag logarithmic value of Potato price at Harar market after first difference and resid\_01potato is the one lag value of the residual which is ECM for potato. |  |  |  |  |  |
|  |  |  |  |  |  |

Source: Computed from CSA monthly price data (September 2010 - December 2014).

Since long-run cointegration was detected for Jigjiga and Harar markets, Error Correction Model (ECM) was estimated for these market’s price. As indicated in Table 8, Short-term price transmission of cabbage for Jigjiga market was found significant at 5% for Harar market. Here Degree of short- term price transmission is 1 Birr increase in the Jigjiga price causes an increase of 22% of one ETB at Harar market. In addition the speed of price adjustment is 78.1% per month.

Similarly, short-term price transmission of potato for Jigjiga market was found significant at 5% for Harar market. Here Degree of short- term price transmission is 1 Birr increase in the Jigjiga price causes an increase of 35% of one ETB at Harar market. In addition the speed of price adjustment is 73.2% per month.

**Results of the Heckman Two-Stage Model**

Table 25 summarizes the variables determining the market participation decision and volume of marketed supply of vegetables. In order to check the existence of multicolliniarity among the continuous variables, Variance Inflation Factor was used and the degree of association among the dummy (discrete) explanatory variables was investigated by using Contingency Coefficient. The test result indicated that there was no significant multicolinearity or association of variables observed for the test.

**Factors determining the market participation decision of households**

In the first stage of Heckman sample selection model, the Probit maximum likelihood estimation method was used to identify factors affecting the market participation decision of households. A number of variables were hypothesized to affect the market participation decision of households. Results of the Probit model showed that out of the 12 explanatory variables that were entered to the model, seven of them, namely age , access to credit , total land owned , frequency of irrigation, education level of households, frequency of extension contact and non-farm income were found to significantly affect producers’ decision to sell vegetables . The results of the Probit model are depicted in Table 25.

Table 25. Results of the probit model

Variable coefficient marginal effect Std.Err P >|z|

Age .102 0.16 0.044 0.021\*\*

Family size 0.14 0.02 0.093 0.018\*\*

Education -0.444 -0.07 0.123 0.000\*\*\*

Total land 8.38 1.33 2.594 0.001\*\*\*

Freqirr 4.158 0.66 1.05 0.000\*\*\*

Extension 0.286 0 .04 0.069 0.000\*\*\*

Credit 1.935 0.19 0.722 0.007\*\*\*

Off farm -1.538 -0.24 0.446 0.001\*\*\*

\*\*\*: significant at 1% level; \*\*: significant at 5% level

Age of the household head significantly and positively influenced market participation. An increase in the age of household head by one year increases the probability of participating in vegetables market by 0.16%, all other factors held constant. This implies that as an individual stays long, he will have better knowledge and experience. The finding concurs with that of Woldemichael (2008), who found older dairy household head could have more milking cows increasing the probability of the household milk market entry decision.

Education level of the household head significantly and negatively influences market participation. One year increases in household head’s education decrease the probability of participating in vegetables market by 0.07 %, all other factors held constant. This can be explained by the fact that as an individual access more education he/she is empowered with the other skills and knowledge than farming that will spur individual to participate in the other professions. The finding concurs with that of Holloway; et al. (2000) who found that education of the household has negative coefficient and inverse relationship with market participation decision

Total land holding significantly and positively influences market participation. An increase in land holding by one hectare increases the probability of participating in vegetables market by 1.33 %, all other factors held constant. This implies that as the land holding increase the farmer’s plant more vegetables yield increases, market participation also increases. This is in line with Desta( 2004) who found that land enables the owner to earn more agricultural output which in turn increases the market participation and marketable supply.

Frequency of extension contact significantly and positively influences market participation. An increase in contact by one increases the probability of participating in vegetables market by 0.04 %, all other factors held constant. This implies contact with agents improves the household’s intellectual capitals, which improves vegetables production and post harvest management practices. Therefore, number of extension visits has direct influence on market participation and sales volume. This is in line with Holloway et al., (2000) who shown that visits by extension agent improve participation and volume decision of dairy sale.

Income from non- farming activities significantly and negatively influences market participation. An increase in income of household head’s from off farm activities decreases the probability of participating in vegetables market by 0.24%, all other factors held constant. This may be explained by the fact that farmers who have better non-farm income does not have motive to produce vegetables which is perishable by nature. The finding concurs with that of Rehima (2006) who found that if pepper producer have non-farm income, the amount of pepper supplied to the market decreases.

Credit access significantly and positively influences market participation. Increases in household head’s access to credit increase the probability of participating by 0.19%, all other factors held constant. This can be explained by the fact that credit is an important institutional service to finance poor farmers for input purchase, payment of labor, cover transport and irrigation costs and ultimately to adopt new technologies.

Frequency of irrigation significantly and positively influences market participation. Increase in the number of irrigation increase the probability of participating by 0.66%, all other factors held constant.

Family size significantly and positively influences market participation. An increase in size of the house hold family by one person increases the probability of participating in vegetables market by 0.02%, all other factors held constant. This implies that as vegetable is labour intensive activity, larger family size provides higher labor to undertake vegetable production and management activities easily which in turn increases vegetables yield leading to increased market participation. The results is consistent with that of Woldemichael (2008) who found that family size has a positive effect on probability of dairy household milk market participation decision.

**Factors influencing the extent of market participation**

Table 26 shows Heckman outcome equation results. Family size, frequency of irrigation and frequency of extension contact significantly influence the extent of market participation in vegetables marketing.

Table 26. Heckman second stage result

Variable coefficient Std.Err P>|z|

Family size 1.57 0.80 0.052\*\*

Frequency irrigation 9.59 4.46 0.034\*\*

Freq\_ext -1.58 0.37 0.000\*\*\*

Lambda -8.74 2.04 0.000\*\*\*

\*\*\*: significant at 1% level; \*\*: significant at 5% level

Family size of the household head significantly and positively influences the extent of market participation. An increase in a farmer’s family size by one person increases the proportion of vegetables sale by 1.57qt. The households with the large number of family size are believed to have cheap labor force used for the production and sales of vegetable which in turn increases the proportion of vegetables sales. This is in line with Wolday (1994) who showed that household size had significant positive effect on quantity of teff marketed. Similarly Bezabih and Hadera (2007) have also witnessed that different sources of labor are employed in horticultural production of eastern Ethiopia where family labor takes the lion share for labor allotments.

Frequencies of extension contact significantly and negatively influence the extent of market participation. The result showed that a unit increases in the extension contact decrease the proportion of vegetables sales by 1.58qt. This denotes that the limited training that extension officers deliver and their involvement in many non extension activities such as input distributions, collection of loans and taxes. Therefore, extension service given to the farmers may push them to produce more cereal crops and this in turn reduces vegetables quantity produced and supplied to the market. This result is in line with Jema (2006) where extension visit significantly and negatively affected technical efficiency of vegetable producers in Kombolcha and Haramaya districts.

Frequency of irrigation significantly and positively influences the extent of market participation. An increase in the frequency of irrigation increase proportion of vegetables sales by 9.59qt. This is because of that as the frequency of irrigation increasers the soil fertility decreases than before as a result the productivity of the soil and yield of the product decrease and this decrease the volume of vegetables sale.

The coefficient of Mills ratio (Lamda) in Heckman two-stage estimation is significant at probability of 1 %. This indicates sample selection bias, existence of some unobservable household’s characteristics affecting likelihood to participate in vegetables market and thereby affecting volume of supply.

## 4.4. Marketing constraints

### 4.4.1. Marketing constraints facing framers in the Kombolcha Districts

#### 4.4.1.1. Access to resource and support services

This section reports on the resource and support services accessed by the framers interviewed in the survey. The resources discussed in this section are access to land, access to irrigation water and extension advice as a support service.

#### Access to land

Among the resources playing a crucial role in agricultural productivity land is regarded as one of the most important agricultural resource. It is widely acknowledged that access to land is the most fundamental determinant of income-earning potential in rural areas. Although almost all of the farmers in the sample who were interviewed had access to land for vegetable production, the size of the plot was identified as a major constraint. The situation is exacerbated by the high number of households on a single small plot.

|  |  |  |
| --- | --- | --- |
| Total land in Ha | Number of respondents | Percent |
| 0.25-0.5 | 105 | 85.37 |
| 0.5-0.75 | 13 | 10.57 |
| 0.75-1 | 5 | 4.06 |

Source: survey data,2014

As indicated in table 4.1, most of the surveyed households that were producing vegetables were doing so on plots smaller than 0.5 hectares. Very view of the farmers interviewed owned land more than 0.75 hectare in size. The majority 85.37 (%) of respondents were not fully utilizing their land due to lack of on-farm infrastructure. The farmers identified water and irrigation infrastructure as being the major constraints causing under- utilization of the land.

#### Extension support services

Extension is an important means of bringing new technologies to farmers and identifying the problems experienced by farmers in view of appropriate research. In the district the services are close to the farmers. This serves to minimize transportation costs for farmers when they need to enquire about services offered by the department. Personal visits to the field by the extension officer are the most common form of extension services in the districts. From the survey, 82.93 % respondents indicated that they were less contact with extension officers. Only 11.38 % of the farmers indicated that the extension officers’ visits were routine. The farmers indicated that they were dissatisfied with the services being provided by the extension officers. There is no specific record of the extension officers’ discussions with farmers, or of the conditions of the planted crops or any information on the diseases or new farming techniques. Although an extension service is delivered to the farmers, the quality of such service is questionable, since some farmers also revealed that there is no follow-up from government officials.

### 4.4.2. Marketing constraints facing farmers

The marketing constraints discussed in this section are lack of transport, distance to market and market information.

#### 4.4.2.1. Lack of transport

Access to transport by farmers plays a significant role in their ability to access markets. The quality of vegetables begins to go down from the moment of harvest and this decline continues throughout the marketing process. Since vegetables are highly perishable, there is a sense of urgency in marketing these products as quickly and efficiently as possible in order to maintain their farm- fresh value.

The majority 71.5 (%) of the farmers interviewed did not have access to modern transportation system, like vehicle to ship their products to the markets particularly in summer and they were forced to hire transport from other people in their communities in order to market and purchase their production inputs. however, it has also been found that some farmers find it costly to hire transport, especially after harvesting, and consequently women often carry the produce on their heads or in cart and wheelbarrows.

Farmers indicating lack of access to transport as the major constraint when it comes to accessing markets in towns and consequently they are forced to sell their produce to local customers at lower prices for fear of their fresh produce rotting.

#### 4.4.2.2. Distance to market

It is well known that nearness to towns reduces transaction costs in agriculture, since farmers need to access input and output markets. The more prosperous farmers in the Kombolcha district indicated that when producing cabbage and potato in bulk, they sometimes supplied to fresh produce markets in the Harar town which is situated 16 kilometers away. Majority of farmers lack logistical infrastructure such as cold rooms, pack houses and refrigerated transport to keep their products in good quality particularly for long distance markets. These long distance markets offer low profit margins since farmers have to pay the transportation costs for the trucks that come to collect their products at the collection point, and they also have to pay a certain percentage to the market agent for marketing their produce.

The study found that farmers supplying to the agricultural markets seem to be located closer to towns than those who do not. The proximity to the market gives farmers more opportunity to access market information and agricultural services than farmers who are located far away from town. Farmers located far from towns market their products to local markets, sometimes at lower price.

#### 4.4.2.3. Market information

The more market information a household has, the lower its transaction cost will be, increasing market participation (Makhura, 2001). 17.89 % of the farmers interviewed in district indicated that they did not have access to market information, especially in respect of market price. These farmers lack information about products prices, as well as quality requirements, the best place and time to sell their products, and potential buyers.

# 5. SUMMARY , CONCLUSION AND RECOMMENDATIONS

## 5.1. Summary

The study aimed at assessing the structure, conduct and performance of vegetables (potato and cabbage) marketing system, identify the major determinants of marketed supply in Kombolcha district, identify and characterize the opportunities and constraints on market participants which influence its performance. The specific objectives addressed by the study included; to identify the major determinants of marketed supply ; assess the structure, conduct and performance of the vegetables markets and marketing system; analyze market integration between the secondary and the reference markets and also to identify the Constraints faced by traders in the vegetables( potato and cabbage) marketing in Kombolcha.

The research questions answered by the study were ; how the structure, conduct, performance of the vegetables marketing system is; what are the major determinants of the marketed supply ; what does the market integration looks like ;What the existing and new opportunities for value-addition for vegetables( potato and cabbage) that may influence the competitiveness of the vegetables industry are and the constraints faced in vegetables marketing, in Kombolcha district .

Data used for analysis in this work was collected using a formal survey from 123 sampled potato and cabbage farmers and 25 vegetables traders during 2014. Data collected included information on vegetables (potato and cabbage) participants and the level of their participation; the flow of information on market conditions; the degree of partnership and relationship between buyers and sellers; frequency of transactions; the points of transaction in vegetables buying and selling; quantity and price of the traded vegetables product; marketing costs and margins; and information on perceived strength and weakness of the vegetables business operation. The study also used field visits and qualitative data collected from traders through informal discussions and secondary information gathered from alternative sources.

The study utilized descriptive statistics and econometric model in analyzing the data collected from Potato and cabbage farmers and traders in the study areas. In descriptive statistics, ratios, percentages, means, and standard deviations were used in the process of comparing socio-economic and institutional characteristics of the potato and cabbage traders of the study areas.

Structure-Conduct-Performance (S-C-P) model was also used to examine the causal relationship between market structure, conduct, and performance. This is the most frequently used model in agricultural economics for evaluating market performance and is based on the industrial organization model. To identify the major determinants of the marketed supply of vegetables (potato and cabbage) and the extent of market participation for the participant traders in the study area Heckamn two stage model was used.

## 5.2. Conclusion

The results showed that vegetables (potato and cabbage) trade is very highly concentration and it is controlled by few traders. The results show that, overall, the vegetables market is very concentrated with a concentration ratio of ---% was observed for the Kombolcha district markets.

In terms of market transparency 60%, 24%, 12% and 4% of the sample potato traders got price information through personal observation, telephone, other traders and brokers, other traders and telephone, other traders and telephone respectively. 56 %, 24 %, 12% and 8% of the sample cabbage traders got price information through telephone, personal observation, other traders and brokers ,other traders and telephone ,other traders and telephone and personal observation respectively.

Analysis of market conduct was analyzed based on traders price setting, selling and purchasing strategy. Result indicates that 60% of purchasing price was set by negotiation, 28% was set by the market and 12 % was set by the sellers. While 44%, 32%, 12% and 12% of the purchasing price set one day before the market day, at the evening of the market day, early in the morning of the market day and at the time of purchase respectively. 36%, 32%, 20% and 12% of selling price was set one day before market day, at the time of selling, at the evening of market day and early in the morning of market day respectively.

According to the survey result, 36%, 32%, 16% and 16% of the sample traders was purchased potato from farmers, farmers and urban wholesalers , farmers, retailers, wholesalers and urban assemblers and wholesalers respectively, and 60%, 24%, 12% and 4% of traders was purchased cabbage from farmers, farmers and wholesalers , farmers, retailers , wholesalers and urban assemblers and wholesalers respectively. While 36%, 32%, 24% and 8% of the sampled potato traders was sell to wholesalers, wholesaler, retailer, urban assembler and consumer, consumer and urban assembler respectively, and 52%, 24%, 16% and 8% of the cabbage traders was sell to wholesalers, consumers, retailers and urban assemblers respectively.

The result indicate that traders set selling price 36%, 32%, 20% and 12% one day before market day , at the time of sell, at the evening of the market day and early in the morning of the market day respectively.

Market performance was analyzed based on the marketing costs and margins. The results indicated that Transport represented by far the largest component of marketing costs, accounting for more than 50% of the total market cost.

The cost and difficulties of transporting perishable goods within volatile markets, using poor roads, present the traders with many risks. In order to cover these risks, traders include for themselves high profit margins. This often means that farm-gate prices bear little relation to retail prices.

The major determinants of the quantity supply of vegetables were analyzed using Heckman two-stage model. Based on the Heckman two-stage model, the study had identified the determinants of participation decision on vegetables market and its effect on the quantity supply.

Age , family size, access to credit , total land owned , frequency of irrigation and frequency of extension contact is the most important and significant variable influencing the decision to

Participate in vegetables market positively. However, education and non- farm income affected vegetables market participation adversely.

Moreover, family size and frequency of irrigation are the significant determinant factors of the quantity of vegetables supplied positively. However, frequency of extension contact is the significant determinant of the quantity of vegetables supplied negatively. The coefficient associated with the inverse Mill’s ratio was significant, indicating that the influence of unobservable factors in the farmers’ decisions to participate was significant.

The study used time series monthly secondary data that contains from September 2010 up to January 2014 of 52 months to analyze the relationship between Harar and Jigjiga cabbage price to identify the long run and short run market integration of the two cabbage markets. In order to answer these objectives, econometric analysis such as Augmented Dickey Fuller unit root test, Engel-Granger cointegration and causality tests as well as Error correction model have been used. Based on this, the result indicated that in general cabbage price in both markets have been seen as the upward movement trend in the study periods. Moreover, the ADF stationerity test confirmed that the prices were not stationary at level. However, at first difference prices became stationary and leading to the Granger causality and Error Correction Model (ECM) tests that was performed accordingly.

## 5.3. Recommendations

In view of the above conclusion, this study makes the following recommendations about

Vegetables marketing in the study areas:

results of econometric analysis indicate that vegetables market participation decision is positively and significantly affected by access to credit , farm size , frequency of irrigation and frequency of extension contact . Therefore, these factors must be promoted in order to increase the amount of vegetable production and also marked supply. Increasing the production and productivity of vegetables per unit area of land is better alternative to increase marketable supply of vegetables. Introduction of modern technologies for the efficient use of the irrigation water, controlling disease and pest practices should be promoted to increase production. Strengthening the supportive activities such as information centers and input supply systems would also boost vegetable supply. In addition to that, building the asset base of the farmers and developing the skills what farmers have through experience increases vegetable supply to the market.

Marketed surplus is significantly and negatively affected by to extension service. Therefore, strengthening efficient and area specific extension systems supporting DAs by giving continuous capacity building trainings and separating DAs extension work from other administrative activities increases vegetable supply to the market

Proper method of handling, storing, transporting can keep quality of vegetables. Hence, it is recommended to assign efficient extension system, updating the producer’s knowledge and skill with improved production, handling, storing and marketing system that enables to increase benefits of producers.

The finding of this study reveals that Harar and Jigjiga cabbage markets have been cointegrated that indicates the positive long run relationship between the two markets. In addition, granger causality test confirmed that Jigjiga cabbage market have been playing the leading role in price formation and affects Harar cabbage price setting in the specified study period. This result implies that cabbage price is determined by the level of demand created in an international market because the export market via Jigjiga is the main driving factor to cabbage production in Ethiopia as there is a very limited domestic use of the crop which could be affected by policy issues and other external factors. On the other hand, the speed of price adjustment for Harar market is about only 40.5% per month, this indicates that price adjustment performance is low. This situation might be due to current price information distortion particularly for rural cabbage markets. Finally, further research is needed on determinant factors of the speed of price adjustment between different cabbage markets when there exists the price shocks.

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