MARKET CHAIN ANALYSIS OF FRUITS FOR GOMMA WOREDA, JIMMA ZONE, OROMIA NATIONAL REGIONAL STATE

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AYELECH TADESSE

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MARKET CHAIN ANALYSIS OF FRUITS FOR GOMMA WOREDA, JIMMA ZONE, OROMIA NATIONAL REGIONAL STATE

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Ayelech Tadesse

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APPROVAL SHEET
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HARAMAYA UNIVERSITY

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Moti Jaleta (PhD)	_____	_____
Major Advisor	Signature	Date
Jema Haji (PhD)	_____	_____
Co-Advisor	Signature	Date

DEDICATION

This thesis is dedicated to my husband Dr. Girma Tesso for his dedicated partnership in the success of my life, my daughters Abgiya and Rebekha and my sons Zerubabel and Yoseph for their affection and love.

STATEMENT OF AUTHOR

I the undersigned, hereby declare that the thesis- M**arket Chain Analysis of Fruits, for Gomma Woreda, Jimma Zone, and Oromia National Regional State** is the outcome of my bonafide work and all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for M. Sc. degree at the Haramaya University and is deposited at the University Library to be made available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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Name: Ayelech Tadesse Tokkon
Signature: _____
Place: Haramaya University, Haramaya
Date of Submission: August, 2011

BIOGRAPHICAL SKETCH

The author was born on August 5, 1962 in Oromia National Regional State, Bedelle, Ethiopia. She attended her elementary and secondary education in Bedelle town. She joined Awassa College of Agriculture in 1979 and obtained her Diploma in Plant Science Technology in 1981. Then she has served at Ministry of Rural and Agriculture Development in different parts of the country at various positions. Then she joined Jimma University in 2002 to pursue her B.Sc study and graduated in Horticulture in 2006. Finally, she joined the school of Graduate Studies of the Harmaya University in 2007 to pursue her M.Sc degree in Agricultural Economics.

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ACRONYMS AND ABBREVIATIONS

CC	Contingency Coefficient
CGS	Council of Graduate Studies
CIAT	Centro International de Agricultural Tropical
CSA	Central Statistical Authority
DAO	District Agricultural Office
DGC	Departmental Graduate Committee
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization
FAOSTAT	Food and Agricultural Organization Statistical Division
FGD	Focus Group Discussion
FYM	Farm Yard Manure
GTP	Growth and Transformation Plan of Ethiopia
GMM_{Lc}	Gross Marketing Margin of Local collectors
GMMp	Gross Marketing Margin of Processors
GMM_F	Gross Marketing Margin of Farmers
GMM_R	Gross Marketing Margin of Retailers
GMMw	Gross Marketing Margin of Wholesalers
HAD	Horticultural Development Agency
HHH	Household Head
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institution
IPMS	Improving Productivity and Marketing Success
JARC	Jimma Agricultural Research Center
MoARD	Ministry of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development
NGOs	Non Governmental Organizations
NMM	Net Marketing Margin
OLS	Ordinary Least Squares
PAs	Peasant Associations
PPS	Probability Proportional to Size

ACRONYMS AND ABBREVIATIONS (*Continued …*)

SCP	Structure Conduct and Performance
SPSS	Statistical Packages for Social Sciences
SRS	Systematic Random Sampling
SWOT	Strength, Weakness, Opportunity and Threat
TGMM	Total Gross Marketing Margin
VIF	Variance Inflation Factor
WB	World Bank

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ABSTRACT

In support of stimulating growth, economic development, food security and alleviating poverty, the analysis of the marketing performance of fruits plays an important role in an on-going or future fruit development plan. In spite of the policy options provided by the Ethiopian government, there is very little empirical evidence on the fruit marketing system to design appropriate policies for its improvement of fruit marketing in the study area. Therefore, this study was aimed at analyzing the market chain of fruit for Gomma woreda, Jimma Zone of Oromia National Regional State with the specific objectives of identifying the major fruit marketing channels; quantifying the costs and margins for key fruit marketing channels and identifying factors influencing fruit marketable supply in the study area. In order to attain these objectives the study made use of primary and secondary data. The data were generated by individual interview schedules and focus group discussions using pre-tested semi structured questionnaires and checklists respectively. This was supplemented by secondary data collected from different published and unpublished sources. Structure, Conduct and Performance (SCP) approach was used to evaluate avocado and mango market and Multiple Linear Regression Model was fitted to identify factors influencing the marketable supply of avocado and mango in the study area. Structure of the market indicates that licensing and years of avocado and mango trade experience did not hinder entry into avocado and mango trade, but capital, education and market information were barriers to enter into the trade. Analysis of marketing costs and margins revealed that processors (juice house) received the highest (88.73%) marketing margin and producers received the least (11.27%) marketing margins in avocado and mango trade business. Based on regression model, the study has identified the main determinants of avocado and mango quantity supply. Quantity of avocado produced, experience, education and price of avocado in the previous year are factors that significantly affect quantity of avocado supplied to the market positively at 1%, 5%, and at 10% level, respectively while lack of market access affects the supply negatively at 10% level. Similarly quantity of mango produced, education and extension contact are factors that significantly affect quantity of mango supplied to the market positively. Therefore one of the most important variables influencing the market supply of avocado and mango is avocado and mango quantity produced due to this, extension work should focus on encouraging farmers to participate in avocado and mango production. This particularly includes, capacity building, technological applications, improved extension and plant breeding activities, there is also a need to increase new varieties that are disease resistant and disseminate these technologies to potential areas. The findings suggests that, effective market information service has to be established to provide accurate and timely market information to farmers and traders on current supply of avocado and mango output, demand and prices at national and regional levels. Infrastructural development is also a key to support the sub-sector. In this arena, emphasis should be given to improved storage and transportation system, offering credit and other services to improve effective production and marketing of avocado and mango.

1. INTRODUCTION

1.1. Background

Fresh tropical fruits are on winning ground in world markets as to recent statistical figures (Anonymous, 2001). Its production has risen by 7% annually since 1997; and the bulk of these fruits (98%) are grown in developing countries. As Yeshitla (2004) indicated the latest figure shows that pineapple accounts for 44% of the total traded volume, followed by mangoes (27%), avocados (12%) and papayas (7%). The main reason for increase in demand of tropical fruits is the growing familiarity of consumers with tropical fruits; their taste, nutritional value and cooking qualities.

As Lumpkin *et al.* (2005) pointed out worldwide production of fruit and vegetable crops has grown faster than that of cereal crops. Between 1960 and 2000, the area under horticultural crops worldwide has doubled. Among the main reasons attributable to the growth, high return from horticulture as compared to cereals was the prime one. Per capita farm income from horticulture has been reported up to five times higher. Promotion of the production of, and trade in, fruit and vegetables has recently become one of the key objectives of developing countries. IFAD's regional strategy for sub-Saharan Africa focuses on enhancing the income of small holders within the context of trade liberalization. Smallholder production and the marketing of fruits and vegetables is a key focus (IFAD, 2003). Most fruits are perennial trees and can live more than fifty years (eg. mangos). Apart from their economic importance, they are forest and environmentally friendly to fight against drought, use as shade, fire wood, food security, agro industry, export, etc.

Ethiopia is agro-ecologically diverse and has a total area of 1.13 million km^2. Many parts of the country are suitable for growing temperate, sub-tropical or tropical fruits. For example, substantial areas in the south and south-western parts of the country receive sufficient rainfall to support fruits adapted to the respective climatic conditions. In addition, there are many rivers and streams which could be used to grow various horticultural crops. Despite this potential, however, production-market chore of fruits has remained immature in Ethiopia (Joosten, 2007) mainly due to traditional focus which was in favor of cereals. Serious lack of

information and ‘on and off’ productions have also played their deterring role (Naamani, 2007). Realizing these gaps, lately however, the government of Ethiopia has launched enabling environment to encourage chain actors. As a result, the Ministry of Agriculture has elevated the horticulture sub-sector from a small section to a level of agency (World Bank, 2004; Joosten, 2007; Kahsay *et al.,* 2008).

More than 47 thousand hectares of land is under fruit crops in Ethiopia. Bananas contributed about 60.56% of the fruit crop area followed by Mangoes that contributed 12.61% of the area. Nearly 3.5 million quintals of fruits was produced in the country. Bananas, papaya, mangoes and orange took up 55.32%, 12.53%, 12.78% and 8.35% of the fruit production, respectively (CSA, 2009). However, less than 2 % of all the produce is exported (Joosten, 2007). These fruits are typically cultivated to supplement household income from their main crops. The few state farms with about 3,000 ha mainly grow tropical fruits (banana, avocado, mango, orange, and papaya) and are mainly located in the eastern Rift Valley (Seifu, 2003). Apples are mainly grown in the highlands of Chencha, in the south, and are expected to expand to other highland areas in the country (Joosten, 2007).

Oromia has diverse agro ecology and many areas are suitable for growing temperate, subtropical or tropical fruits. Substantial areas receive sufficient rainfall and many lakes, rivers and streams could also be used to support fruit production. Despite this potential, the total land area under fruits is very small and mainly smallholder-based. According to CSA (2009), the area under fruits is about 18313 hectares.

Gomma Woreda is endowed with diverse natural resource and has the capacity to grow different annual and perennial crops. There are about five rivers in the Woreda. Even though available land and water resources offer high potential for irrigation development in Gomma, the present utilization level is very poor (IPMS, 2007). Fruit production in the Woreda is mainly for market. The production is very fragmented and uncoordinated where all growers produce similar type of crop resulting in glut typically in harvest season (mainly avocado and

mango). Avocado, mango, orange, banana and papaya are the major types of fruits which are grown in the area.

1.2. Statement of the Problem

In Ethiopia, the existing income generating capacity of fruits as compared to its immense potentials at the macro and micro level is not encouraging. Thus, from the total 3.5 million quintals of fruits produced in Ethiopia, only less than 2% is exported (Joosten, 2007; MoARD, 2005).

According to Yilma (2009), the production potential of fruits is not widely and evenly distributed across the various regions of the country. The cultivation is also seasonal and the supply is scanty and volatile even in areas where irrigation is possible. The knowledge gap on fruit production techniques and processing technologies is wide. Also, knowledge of domestic consumers of the benefits of fruits is confined to very few varieties of fruits. Hence, domestic demand, with the exception of few widely known tropical fruits, is generally small and, various studies show that people generally consume fruits and vegetables on a daily basis, without considering them as basic. These factors have adversely affected the growth and expansion of the fruit sub-sector in Ethiopia.

Additionally Bezabih and Hadera (2007) stated that a production of horticultural product is seasonal and price is inversely related to supply. During the peak supply period, the prices decline. The situation is worsened by the pershability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled.

Development needs of fruit in general and that of avocado and mango in particular is poorly addressed in Ethiopia. But these days efforts have been stepped up to improve and support the sector. With this line, the current Growth and Transformation Plan of Ethiopia (GTP) prioritizes intensive production and commercialization of horticulture as a sector for attention. Thus, the development policy initiates the need to accelerate and lucid the transformation of the sub-sector from the subsistence to business and market-oriented agriculture. But, the

existing restraints of post-harvest and marketing infrastructures such as: packaging, pre cooling, warehousing cold storage, pre-package and distribution have played their deterring role on trade and consumption of fruits in Ethiopia (Seifu, 2003).

According to World Bank Group (2006), lack of concerted public support, scanty information, poor understanding of how the market chain works; and lack of systematic documented knowledge are main threats that hampered the benefit of the sector. Thus comprehensive data collection along the chain is a must envisage the direction of input-output flows (Tsegaye *et al.,* 2009). If these jeopardize are not well addressed right onwards, it is obvious the country's competitiveness would trail far behind the existing stage.

Fruit production in Gomma woreda is mainly constrained by seasonality where surplus at harvest is the main characteristics of the product (mainly avocado and mango). The nature of the product on one hand and lack of organized marketing system on the other often resulted in low producers' price.

Even though fruit is economically and socially important, fruit marketing channel and their characteristics have not yet been studied and analyzed for the target study area (Gomma woreda) where great potential of fruit production (Avocado and Mango) exists. Therefore, this study has the purpose of investigating fruits marketing chains and factors affecting fruit supply to the market in Gomma woreda, which will narrow the information gap on the subject and will contribute to better understand on improved strategies for reorienting marketing system for the benefit of small farmers and traders.

1.3. Research Questions

This study attempted to answer the following research questions:

1. What are the major fruit marketing channels in the study area? and what is the role and linkage of marketing agents;
2. Through which actor large percent of the products enter to the market?

3. Who gets the major share of the marketing margins in avocado and mango marketing channels at the study area?
4. What are the constraints and opportunities of fruit marketing in the study area?
5. What are the major technological, institutional and socio economic determinants of market supply of avocado and mango in Gomma woreda?

1.4. Objectives of the Study

The general objective of the study is to analyze the avocado and mango marketing chain in district.

The specific objectives of the study are:

1. To identify the major fruit marketing channels in Gomma woreda;
2. To quantify costs and margins for key fruit marketing channels in Gomma district;
3. To identify factors affecting marketable supply of fruit in Gomma woreda.

1.5. Scope and Limitations of the Study

The study focused on identifying major fruits (Avocado and Mango) marketing channels, estimating the marketing margins and costs for key marketing channels, and identifying factors influencing marketable supply of fruits in Gomma woreda. The area coverage of this study is limited to three PAs found in Gomma Woreda based on the level of production of the two fruits and the fruits are limited to Avocado and Mango for their increasing coverage and the marketing problem they used to face. The markets are purposively selected based on their relative importance for avocado and mango market. However, the study is focused only in Gomma Woreda due to budgetary and time limitations. Congruently, lack of record keeping by chain actors was a challenging to collect relevant information in the channel. Thus, key informants and secondary sources are extensively used to complement preliminary information and to understand rationality behind the status of the market chains.

1.6. Significance of the Study

This study generated useful information in order to formulate fruit marketing development projects and guidelines for interventions that will improve the efficiency of fruit marketing system. The potential users of the findings are farmers (producers), traders, government and non-government organizations, that have interest in improving fruit marketing system. Researchers who want further investigation on fruit marketing will use the result from this study.

1.7. Organization of the Study

Chapter one has enveloped introductions, statement of the problem, objectives, research questions, scope and limitations and significance of the study. The second chapter has intensely reviewed the available literature by entailing general concepts of market chain and empirical research results executed elsewhere. The third chapter has enveloped components of the research methodology including description of the study area, types of data and its collection method and method of data analysis; while the fourth chapter discerned the credential of the survey results by discussing it in comparison with the results of other studies. Brief narrations of important findings of the study are presented in chapter five.

2. LITERATURE REVIEW

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

2.1. Theories and Basic Concepts

2.1.1. Marketing and marketing concepts

Market: A market is a point or a place or sphere within which price-making force operates and exchanges of title tend to be accompanied by the actual movement of the goods affected (Backman and Davidson, 1962; Andargachew, 1990). The concept of exchange and relationships lead to the concept of market. It is the set of the actual and potential buyers of a product (Kotler and Armstong, 2003). A market can be described as simple arrangements to facilitate exchange of one thing for another (Bain and Howells, 1988). The most observable features of a market are its pricing and exchange processes and it is more than a physical place. No need to meet physically for a market to operate especially in today's information and communication technologies.

Agricultural marketing: The term marketing has been a very debatable concept and defined in so many different ways by different scholars. This is because marketing, or more specifically agricultural marketing, projects different impression to different groups of people in a society, like farmers, traders and consumers (Kohls and Uhl, 1985). Marketing can be described as the performance of all business activities involved in the flow of food products and services from the point of initial agricultural production until they are in the hands of consumers (Kohls and Uhl, 1985; Bain and Howells, 1988). According to Kotler and Armstrong (2003), marketing is a societal process, by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services and value with others. Marketing is essentially a process like farming, manufacturing, mining or construction (Backman and Davidson, 1962).

2.1.2. Marketing system

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

2.1.3. Marketing efficiency

It refers to the efficient allocation of resources to achieve the greatest possible consumer satisfaction (Raymon, 2003). Efficiency of agricultural marketing according to Scarborough and Kydd (1992) refers to the efficiency with which resources are used in marketing, in terms of physical input and output ratios. An efficient firm or market produces the maximum possible output from the input used, given location and environmental constraints, and it minimizes resource inputs for any given output. There are numerous ways of estimating the performance of agricultural marketing. However, two aspects of market efficiency are mostly mentioned in agricultural marketing these are: operational efficiency and pricing efficiency (Jesse, 1987).

Operational efficiency: It is defined as the provision of goods and services at least cost and at a level of output, or combination of inputs, which ensures that, the value of marginal product equals marginal factor costs. Sometimes it is also referred to as firm level allocative efficiency. The fundamental question is assessing the static operational efficiency of market and of marketing firms, are whether, the level of output per combinations of inputs are such that marginal revenues equate with marginal costs (Scarborough and Kydd, 1992).

Pricing efficiency: It is concerned with accuracy, precision, and speed with which prices reflect consumers' demands and are passed back through the market channels to producers. Pricing efficiency is, thus, affected by rigidity of marketing costs and the nature and degree of competition in the industry. Activities that may improve pricing efficiency are improvement of market news and information, and competition (Cramer and Jensen, 1982). If markets are perfectly competitive, and prices reflect real costs of production, it can be shown that markets will lead to an optimal allocation of resources reflecting the scarcity of resources relative to consumer demand (Scarborough and Kydd, 1992).

The objective of pricing efficiency is thus to improve the operation of buying, selling, and pricing aspect of the marketing process so that it remains responsive to consumer's preference (Kohls and Uhl, 1985). Pricing inefficiencies arise when markets contain monopoly elements, governments intervene by introducing restrictions on trade, and the cost of information is zero, and so on.

2.1.4. Marketing channel

It is a business structure of interdependent organizations from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstong, 2003). The analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to their final destination (consumer). This knowledge is acquired by studying the participants in the process, i.e. those who perform physical marketing functions in order to obtain economic benefits (Getachew, 2002). This channel may be short or long depending on the kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam *et al.,* 2001).

2.1.5. Market chain analysis

A marketing chain is used to describe the numerous links that connect all actors and transactions involved in the movement of agricultural products from the farm to the consumer

(Lunndy *et al.,* 2004). It is the path one good follow from their source of original production to ultimate destination for final use. Functions conducted in a marketing chain have three things in common; they use up scarce resources, they can be performed better through specialization, and they can be shifted among channel members (FAO, 2005). According to Hobbs *et al.* (2000), the term supply chain refers to the entire vertical chain of activities: from production on the farm, through processing, distribution, and retailing to the consumer. In other words, it is the entire spectrum, from gate to plate, regardless of how it is organized or how it functions.

Market chain is the term used to describe the various links that connect all the actors and transactions involved in the movement of agricultural goods from the producer to the consumer (CIAT, 2004). Commodity chain is the chain that connects smallholder farmers to technologies that they need on one side of the chain and to the product markets of the commodity on the other side (Mazula, 2006). Market chain analysis, therefore, identifies and describes all points in the chain (producers, traders, transporters, processors, consumers), prices in and out at each point, functions performed at each point/ who does what?, market demand/ rising, constant, declining, approximate total demand in the channel, market constraints and opportunities for the products.

2.2. Peculiarities of Agricultural Production and Marketing

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

Agricultural production is tied to specific locations due to the resource base is not best suited at other locations. The scale of agricultural production tends to be small, seasonal, and agricultural products exhibit natural variation (Van der Laan, 1999).

Due to the above characteristics put by Van der Laan (1999) agricultural products demand marketing activities to be performed separately. Location specificity demand collection followed by distribution, small-scale activity urges assembling, collecting and bulking. Seasonality forced storage and stock holding. The natural variation of products creates the need for sorting and standardization. Yet, by virtue of the spatial dispersion of producers and consumers, the temporal lags between input application and harvest, the variable perishable nature and storability of commodities, and the political sensitivity of basic food staples, agricultural markets are prone to high transactions costs, significant risks and frequent government interference.

Compared to most other products, agricultural products are both bulkier and more perishable. Bulk affects the marketing functions concerned with physical handling. Products that occupy a lot of space in relation to their value are expensive to transport and store. Pershability also influences the marketing of farm products. All biological products ultimately deteriorate. Even the most storable agricultural products, however, are usually more perishable than industrial products (Kohls and Uhl, 1985). According to Kohls and Uhl (1985) these product characteristics have their effect on the facilities necessary to market farm products. Bulkiness requires large storage capacities. Perishable products require speedy handling and perhaps special refrigeration.

According to Moti (2007) the existence of large number of farmers (sellers) and limited number of merchants (buyers) particularly in the perishable product market, the bargaining position of farmers is usually weak. Besides the market structure, farmers and merchants may not have equal information from central transactions.

2.3. Market Supply

Marketed supply refers to the amount actually taken to the markets irrespective of the needs for home consumption and other requirements. Whereas, the marketable surplus is the residual with the producer after meeting the requirement of seed, payment in kind, and consumption by farmer (Wolday, 1994). Marketed surplus is defined as the proportion of output that is marketed (Harris, 1982). Marketed surplus may be equal to marketable surplus, but may be less if the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during the transit (Thakur *et al.,* 1997). In the case of crops that are wholly or almost wholly marketed, the output and marketed surplus will be the same (Reddy *et al.,* 1995). The importance of marketed and marketable surplus has greatly increased owning to the recent changes in agricultural technology as well as social patterns. In order to maintain the balance between demand for and supply of food grains with the rapid increases in demand due to higher growth population, urbanization, industrialization and overall economic development accurate knowledge on marketed and marketable surplus is essential in the process of proper planning for the procurement, distribution, export and import of agricultural product (Malik *et al.,* 1993).

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

2.4. 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.

2.4.1. 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 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.

2.4.2. 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).

2.4.3. 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 (Purcell, 1979).

2.5. Framework for Evaluating Efficiency of Agricultural Marketing System Structure, Conduct and Performance (SCP) model

The basic view of this approach is that, given certain basic conditions, the structure of an industry or market determines conduct of buyers and sellers which influence its performance. The basic conditions refer to characteristics which are exogenous to the market, for example infrastructure, legal and policy environment and available technology. Efficiency factors can be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981). SCP model is one of the most common and pragmatic methods for analyzing marketing system. It analyzes the relationship between functionally similar firms and their market behavior as a group and, it is mainly based on the nature of various sets of market attributes and relations between them and their performance (Scarborough and Kydd, 1992). This analytical method is based on the theory that market structure and market conduct determine the performance of a marketing system.

2.5.1. Structure of the market

The term market structure refers to the number of buyers and sellers, their size distribution, the degree of product differentiation, and the ease of entry of new firms into an industry (Abbott and Makeham, 1981 Cramer and Jensen, 1982; and Branson and Norvell, 1983). Examples of such dimensions include:

a) **Degree of buyers and sellers concentration:** Number and size distribution of buyers and sellers in the market.
b) **Barriers to potential entrants:** Refers to the relative ease or difficulty with which new dealers may enter into market. Technological, economic, regulatory, institutional, and other factors that inhibit firms from engaging in new businesses or entering new markets, and

c) Degree of product differentiation: Refers to the extent to which competing products in a market are differentiated and it is expected to influence the competitive interrelationships of sellers in the market.

Market concentration can be defined as the number and size of sellers and buyers in the market. Concentration is believed to play a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms. The relationships between concentration and market behavior and performance must not be interpreted in isolation. Other factors, such as firms' objectives, barrier to entry, economies of scale, and assumptions about rival firms' behavior, will be relevant in determining the degree of concentration and relationship between concentration and behavior and performance (Schere, 1980). Market structure can also be defined as characteristics of the organization of a market, which seem to strategically influence the nature of competition and pricing behavior within the market (Bain, 1968). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive; monopolistic; or oligopolistic (Scott, 1995; Meijer, 1994). The organizational features of a market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Wolday, 1994).

2.5.2. Conduct of the market

Market conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere? Market conduct also deals with the behavior of firms that are price searchers and are expected to act differently than those in a price-taker type of industry (Abbott and Makeham, 1981; Cramers and Jensen, 1982).

2.5.3. Performance of the market

It is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance. According to Abbott and Makeham (1981), market performance is how successfully the firm's aims are accomplished, which shows the assessment of how well the process of marketing is carried out.

As a method for analysis the SCP paradigm postulates, there exists a relationship between the three levels distinguished. One can imagine a causal relations starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth orientation of marketing firms, efficiency of resource use, and product improvement and maximum market services at the least possible cost) of agricultural marketing system in developing countries (Meijer, 1994). The performance of a certain market or industry depends on the conduct of its sellers and buyers which, in turn, is strongly influenced by the structure of the relevant markets (Scarborough and Kydd, 1992).

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

2.5.3.1. Marketing costs

It refers to those costs which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. Marketing costs includes handling cost (packing and unpacking), costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading

partners (officials) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway and Ehui, 2002).

2.5.3.2. Marketing margin

It is a commonly used measure of the performance of a marketing system (Abbott and Makeham, 1981). It is defined as the difference between the price the consumer pays and the price that is obtained by producers, or as the price of a collection of marketing services, which is the outcome of the demand for and supply of such services (Cramers and Jensen, 1982 and William and Robinson, 1990; Holt, 1993). The size of market margins is largely dependent upon a combination of the quality and quantity of marketing services provided the cost of providing such services, and the efficiency with which they are undertaken and priced. For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling and buying prices (Mendoza, 1995).

Under competitive market conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would be equal to the minimum costs of service provision plus "normal" profit. Therefore, analyzing market margins is an important means of assessing the efficiency of price formation in and transmission through the system. There are three methods generally used in estimating marketing margin.

1. Detailed analyses of the accounts of trading firms at each stage of the marketing channel (time lag method);
2. Computations of share of the consumer's price obtained by producers and traders at each stage of the marketing chain; and
3. Concurrent method: comparison of prices at different levels of marketing over the same period of time (Mendoza, 19985 and Scarborough and Kydd, 1992).

2.6. Fruit Production and Marketing in Ethiopia

Ethiopia has a variety of fruit crops grown in different agro ecological Zones by small farmers, mainly as a source of income as well as food. The production of fruit 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 (2009) the area under these crops (avocado, bananas, guava, lemons, mangoes, oranges, papayas and pineapples) were estimated to be 47987 hectares. Oromia has diverse agro ecology and many areas are suitable for growing temperate, subtropical or tropical fruits. Substantial areas receive sufficient rainfall and many lakes, rivers and streams could also be used to support fruit production. Despite this potential, the total land area under fruits is very small and mainly smallholder-based. According to CSA (2009), the area under fruits is about 18313 hectares.

Avocado: Endowed with wide range of agro-ecological Zones and diversified resources, Ethiopia is amid of the 10 major avocado producing countries of the world (FAOSTAT, 2004 and MoARD, 2009). With Global annual production of two to four million metric tons, avocado is produced in many countries ranging from Asia and South America to Africa. According to Mauro (2006), Ethiopia's international involvement in horticultural trade and production is growing at rate of 7 per cent per year by creating better opportunity to compete on lucrative export market. Owing to these realities, with its shortest introduction to Ethiopia, avocado is now produced by thousands of farmers and the mob has extended, these days, to more than 7000 ha of land with annual production of 80,000 tones (CSA, 2008; FAOSTAT, 2004; Joosten, 2007)). The crop is a bright source of household income and a shade for spice crops (MoARD, 2009).

Mango: It is a perennial tree which can live more than fifty years and it is also the leading fruit produced in most parts of eastern and south-western Ethiopia both in area coverage and quantities produced. There are also ample garden mango trees in different parts of the country at farmer's holdings. The livelihood of most of these farmers is highly supplemented by the sale of mango fruits. The area coverage under mango in eastern Ethiopia has reached about 35% of the total acreage allotted for fruit production (Yeshitla, 2004).

According to FAOSTAT (2010) the total cultivated area for mango in Ethiopia is not more than 12, 000 hectares. The highest annual production estimate in the past five years is 180,000 Mt and more area coverage is expected in the south-western and other parts of the country due to more conducive climatic and edaphic factors. According to Yeshitela (2004) even if the farmer's livelihood is highly supplemented by the income from their mango trees, there is a declining trend in yield and quality of mango due to old age, poor management and seedling originated nature of the trees. However, there are exceptionally good yielding trees with best quality fruits. Apart from its economic importance, it is forest and environmentally friendly to fight against drought, use as shade and fire wood.

In the context of increasing the high value production of agricultural commodities, fruit tree and perennial crops play an important role. This commodity group includes tropical nuts, fruit trees, grapes, bananas, mango, pineapple, papaya, passion fruits, apples and others. Except table banana, tropical fruit trees like mango, avocado and the like were not well known and considered as diet by most Ethiopians (Yilma, 2009).

However, Yilma (2009) indicated that the expansion of state farms in the past command economy and the prevailing expansion of private investors in different regions of the country have contributed a lot on the introduction of fruits as business. Otherwise, areas suitable for growing fruit trees are idle even near riverbanks where there is ample water supply for growth. Because of the long period establishment cost of fruit trees before fruit setting, knowledge limitations of food technology and market information, smallholders are not practicing other fruit trees except banana. In general, fruit production is still backward, the business is under developed and the private sector is not much attracted.

2.7. Empirical Studies on Marketable Supply

Dawit and Hailemariam (nd) stated the importance of horticultural crops for both domestic and international markets as it was increasing at increasing rate from time to time associated with the expansion of small-and large-scale irrigation facilities compounded by national and regional extension service on the production of horticultural crops. They further reported three

options for selling horticultural crops which include selling right in the field/ farm gate; sell at nearby markets and least proportion option to access distance markets where larger (93 percent)of the total produce was sold to wholesalers.

Similar research result by Beyene and Phillips (2007) have designated that, absences of research and market information in Ethiopian honey value chain have wasted the nation's incalculable benefits. This study was further evidenced by Belay (2003) who stated that, lack of government support such as: inadequate research and training, policies and strategies, have increased knowledge gap among the Ethiopian small scale farmers.

A study on green beans by Lusby (2007) has revealed that, lack of crop husbandry skills and limited extension services has constrained the productivity of the sector. Simultaneously, Cormick and Schmitz (2001) have indicated even though firms in a system are formally independent of one another, an increasing network through personal relations and repeated transactions has assisted to inspect and alleviate the chain's core problems by developing their capacity and reducing the cost of the actors.

Abay (2007) identified the major factors that affect the supply of vegetables (onion and tomato) at Fogera District. His study revealed that owned oxen number, family size, and distance from development agent and experience has affected marketable supply of onion and tomato. In similar way, 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.

Unavailability of standardized packing material has forced exporters in Ethiopia to import packing material from Netherlands and Israel (Wiersinga and Jager, 2009). But efforts are now commenced to produce packing material in Ethiopia. According to FAO (2006), mango farmers in Kenya are suffering from poor post-harvest handling which affected their income where farmers are compelled to sell their product immediately after harvest. Thus hastened

ripeness of avocado at room temperature has aggravated ethylene release and necessitated immediate utilization (Crosby, 2008; Stanlich, 2009).

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

Additionally Bezabih and Hadera (2007) stated that production is seasonal and price is inversely related to supply. During the peak supply period, the prices decline. The situation is worsened by the pershability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled.

Pershability is also one of the bottlenecks that hampered easy product flow along the chain and reported to require fervent attention. Price negotiation while the commodity is en route to final market has tiled actors to divert their destination to better price offering markets (Formma and Dubon, 2006). Hence, losses of trust were the main feature reported and often led to disputes among buyers and sellers. Producers are normally price takers and are frequently exposed for cheating by intermediaries.

From these reviewed literatures severe production seasonality, seasonal price fluctuations, poor pre-and post harvest handling, prevalence of pest and diseases, lack of storage are some of the critical problems encountered horticulture production in Ethiopia.

3. METHDOLOGY

3.1. Description of the Study Area

Gomma Woreda is one of the 17 Woredas in Jimma Zone known for predominantly growing coffee. It is located 403 km south west of Addis Ababa and about 50 km west of Jimma town. One of the coffee biodiversity centers in Ethiopia is found in this Woreda. There are 39 peasant associations and 3 urban peasant associations. The number of agricultural households in the Woreda was 45,567 (35,533 male headed (78%)) and 10,034 female headed (22%)) while the total population of the Woreda was 216,662 from which 110,448 are males and 106,174 females (CSA, 2009). Gomma is the second most densely populated Woreda in Jimma Zone with a size of 96,361.72 ha (94.4 km^2) including the two coffee state farms which cover an area of 2704 ha (IPMS, 2007).

The average annual rainfall of the district is 1524 mm with low variability. It is bimodality distributed in which the small rains are from March to April and the main rainy season from June to October. Hence, crop and livestock production is not constrained by the amount and distribution of rainfall. Altitude in Gomma ranges from 1387 to 2870 meters above sea level (masl). Most parts of the Woreda lay between 1387 and 1643; and 1849 and 2067 masl. However, few of the areas in the Woreda have altitudes ranging from 2229 to 2870 masl.

Nitosols is the most abundant covering about 90% of the Woreda. These soils are young soils and are generally acidic soils. However, farmers grow crops that are acid tolerant. The pH of the soils in Gomma ranges between 4.5 and 5.5. However, the commonly observed problem related to aluminum and magnesium toxicity as a result of low pH is minimal. There are about 5 rivers in the Woreda. Even though available land and water resources offer high potential for irrigation development in Gomma, the present utilization level is very poor (IPMS, 2007).

3.2. Types and Sources of Data

In order to address the objectives of the study, both primary and secondary data were used. The primary data were collected using two types of interview schedule (one for farmers and the other for traders). A checklist was also used to guide the informal discussion conducted to generate data that cannot be collected from individual interviews. The primary data collected from farmers focused on factors affecting avocado and mango market supply, size of output, market information, credit access, access to market, number of avocado and mango trees owned, extension service, and demographic characteristics of the household. Moreover, the interview schedule for traders includes: types of traders (wholesalers, retailers, local collectors, etc.), buying and selling strategies, source of market information, demographic characteristics.

Secondary data are collected from different sources, such as: government institutions, the District Agricultural Office, reports, bulletins and websites. Published and unpublished documents were extensively reviewed to secure relevant secondary information.

3.3. Sampling Methods

Preliminary information about the study area was obtained from District Office of Agriculture (DOA) to generate important information for questionnaire preparation for the formal survey and to select sample PAs. An attempt was made to select representative samples in the selection of sampled PAs, fruits (avocado and mango) producers and traders. The surveyed PAs were Chedro Suse, Choche Lemi and Bulbulo fruit producing PAs.

3.3.1. Producers survey

Four stage sampling procedure is employed to select specific avocado and mango producer households. First, by employing purposive sampling method Gomma Woreda is selected. In the second stage, by using Simple Random Sampling technique three PAs are selected from the available 21 avocado and mango producing PAs. Then by employing Probability Proportional to Size (PPS) the number of farmers to be taken from each PAs is determined at the third stage. Finally based on the sampling frame collected from each PAs, Systematic

Random Sampling is used at the fourth stage to select the sample avocado and mango producing farmers (Table 1). The determination of sample size is resolved by means of Slovin's sampling formula with 90 percent confidence level.

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

n= sample size for the research use

N= total number of HHs in three avocado and mango producing PAs

e = margin of errors at 10%

Table 1. Sample distribution of mango and avocado producers

	Chodere Sose		Choche Lemi		Bulbulo		Total	
Chain actors	Popn.	Sample	Popn.	Sample	Popn.	Sample	Popn.	Sample
Farmers	65	14	247	51	266	55	578	120

Source: Woreda Agricultural Office and PA administrations, 2010 and own computation

3.3.2. Traders' survey

The sites for the trader surveys were market towns in which a good sample of avocado and mango traders existed. On the basis of flow of avocado and mango, three markets (Jimma, Agaro and Lemi Choche) were selected purposely, which are the main avocado and mango marketing sites in the study area. Congruently systematic random sampling is employed to select traders. As a result, 34 avocado and mango traders were selected for the purpose of the study.

Table 2. Sample distribution of traders of mango and avocado

	Jimma		Choche Lemi		Agaro		Total	
Traders	Popn.	Sample	Popn.	Sample	Popn.	Sample	Popn.	Sample
Local collectors	3	2	5	3	4	2	**12**	**7**
Wholesalers	7	4	1	1	3	2	**12**	**7**
Retailers	10	8	4	2	8	4	**22**	**14**
Processors	6	4	0	0	4	2	**10**	**6**
Total	**26**	**18**	**10**	**6**	**19**	**10**	**55**	**34**

Source: Woreda Agricultural Office and PA administrations, 2010 and own computation

3.4. Methods of Data Collection

Enumerators who have college diploma and working as development agents were recruited and trained for data collection. Before data collection, the questionnaire was pre-tested on five farmers and three traders to evaluate the appropriateness of the design, clarity and interpretation of the questions, relevance of the questions and time taken for an interview. Hence, appropriate modifications and corrections were made on the questionnaire. Data are collected under continuous supervision of the researcher.

The filled-in interview schedule was thoroughly checked for completeness and exactness. Similarly, informal surveys are employed to study the marketing systems of avocado and mango to obtain additional supporting information for the study.

Purposive sampling is employed to collect data from knowledgeable people (elders, youth, and women farmers and responsible persons of different institutions) on the subject covering three PAs in Gomma woreda and the regional market at Jimma town. The discussions are thus held to access community level information through grounded theory which entailed collection of relevant data until attainments of theoretical saturation (Haggablade and Gamser 1994; and Heisman, 1995). Thus, focus group discussions are held with three groups based on pre-determined checklists (Annex 4) and a total of 20 key informants are interviewed from 6 different organizations and institutions (Annex 6). The time allotted for each discussion was 2 to 4 hours; but extended in some locations. Suitably, the data generated at various levels is supported by field observations and triangulated with other data.

3.5. Method of Data Analysis

Two types of analysis, namely descriptive and econometric analysis are used for analyzing the data collected from farmers and traders in the study area.

3.5.1. Descriptive analysis

This method of data analysis refers to the use of ratios, percentages, means, variances and standard deviations in the process of examining and describing marketing functions, facilities, services, role of intermediaries, market and traders characteristics.

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

The model examines the fundamental relationships between market structure, conduct and performance, and is usually referred to as the Structure, Conduct, and Performance (S-C-P) model. Wolday (1994), Rehima (2006) and Bosena (2008) also used this model to evaluate food grain, pepper and cotton market respectively. Therefore the study used S-C-P model to evaluate mango and avocado market.

3.5.1.2. Market concentration measure

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

$$C = \sum_{i=1}^{r} S_i \qquad r = 1, 2, 3, \cdots, r \qquad (2)$$

Where:

C- is concentration ratio, Si- is market share of the i^{th} firm and

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

Kohls and Uhl (1985) bring into play as a rule of thumb, the four largest enterprises' concentration ratio of 50% or more (an indication of a strongly oligopolistic industry), 33-50 % (a weak oligopoly) and less than that (competitive industry). The problem associated with this index is the arbitrary selection of r (number of firms that are taken to compare the ratio).

3.5.1.3. Barriers to entry

The ease with which potential participants can enter various functions is commonly used as a means of assessing the degree of competition in an industry (Scarborough and Kydd, 1992). Stigler (2005) suggests about four points that can create barriers to entry: legal barriers (license and patents), economies of scale, superior resources, and pace of entry. The modes of entry into trade, means of building capital, means of acquiring marketing skills and contacts, periods of apprenticeship, trader's perceptions of barriers, the origins and levels of initial capital required for traders of different sizes (functions, or commodities), and the degree of mobility between functions and commodities can be used as centre of data to see the barriers to entry (Timmer *et al.,* 1983).

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

3.5.1.4. Marketing margin

Cost and price information is used to construct marketing cost and margin. 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).

$$\text{TGMM} = \frac{End buyer\ price - First\ seller\ price}{End\ buyer\ price} \times 100 \quad (3)$$

Where, TGMM is total gross marketing margin. It is useful to introduce the idea of producers' gross margin (GMMp) which is the portion of the price paid by the consumer that goes to the producer. The producers' margin is calculated as:

$$GMMp = \frac{End\ buyer\ price - Marketing\ \ gross\ \ margin}{End\ buyer\ price} \times 100 \quad (4)$$

Where, GMMp = the producer's share in consumer price.

The net marketing margin (NMM) is the percentage of the final price earned by the intermediaries as their net income after their marketing costs are deducted.

The percentages of net income that can be classified as pure profit (i.e. return on capital), depends on the extension to such factors as the intermediaries' own (working capital) costs. The 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.

$$\text{NMM} = \frac{Gross\ margin - Marketing\ costs}{End\ buyer\ price} \times 100 \quad (5)$$

Where- NMM is the net marketing margin

Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders.

3.5.2. Econometric analysis

This method of data analysis refers to the use of different economic and statistical tools or models for testing hypothesis related to the objective of the study.

3.5.2.1. Econometric model specification

Following Green (2003), the multiple linear regression models is specified as $Y_i=F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11})$

Where Y_i= quantity of avocado and mango supplied to market

X_1= Sex of HHH

X_2= Age of HHH

X_3= Education level of HHH

X_4= Family size

$X_{5=}$ Market access

X_6= Experience of the HHH

X_7= Price of avocado and mango in 2008/09

X_8= Extension access

X_9= Information access

X_{10}= Credit access

X_{11}= Size of output

Econometric model specification of supply function in matrix notation is the following.

$$Y = \beta X + U \quad (6)$$

Where: Y_i = fruit supplied to the market

β = a vector of estimated coefficient of the explanatory variables

X = a vector of explanatory variables

Ui = disturbance term

3.5.2.2. Specification of errors

Before fitting important variables into the regression models for analysis, it was necessary to test multicollinearity problem among continuous variables and check associations among discrete variables, which seriously affects the parameter estimates. According to Gujarati

(2003), multicollinearity refers to a situation where it becomes difficult to identify the separate effect of independent variables on the dependent variable because of existing strong relationship among them. The two measures that are often suggested to test the existence of multicollinearity are Variance Inflation Factor (VIF) and Contingency Coefficients (CC). Thus, Variance Inflation Factor (VIF) is used to check multicollinearity among continuous variables. As a rule of thumb, if the VIF is greater than 10 (this will happen if R^2 is greater than 0.90), the variable is said to be highly collinear (Gujarati, 2003). A measure of multicollinearity associated with the variance inflation factors is computed as:

$VIF\ (X_i) = (1\text{-}R_i^2)^{-1}$

Where, R_i^2 is the multiple correlation coefficients between explanatory variables, the larger the value of R_i^2 is, the higher the value of VIF (X_i) causing higher collinearity in the variable (X_i).

Contingency coefficient is used to check multicollinearity or association between discrete variables. The value ranges between 0 and 1, with 0 indicating no association between the variables and value close to 1 indicating a high degree of association between variables.

A popular measure of multicollinearity associated with the CC is defined as:

$$CC = \sqrt{\frac{x^2}{N + \chi^2}} \tag{7}$$

Where, CC is contingency coefficient, χ^2 is chi-square test and N is total sample size. If the value of CC is greater than 0.75, the variables are said to be collinear.

Conversely, test for heteroscedasticity had undertaken for this study. There are a number of test statistics for the detecting heteroscedasticity; According to Guiarati (2003) there is no ground to say that one test statistics of hetroscedasticity is better than the others. Therefore, due to its simplicity, Kroenker-Bessett (KB) test of heteroscedasticity was used for this study. Similar to other test statistics of heteroscedasticity, KB test is based on the squared residuals $\hat{u}_i^2$ However, instead of being regressed on one or more regressors, the squared residuals are regressed on the squared estimated values of the regressand. Particularly, if the original model

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + u_i \quad (8)$$

u_i is obtained from this mode and then $\hat{u}_2$ is estimated as $\hat{u}_i^2 = \alpha_0 + \alpha_1 \hat{Y}_i^2 + u_i$

Where $\hat{Y}_i$ are the estimated values from the original model. The null hypothesis is $\alpha_1 =$ zero.

If this is not rejected, then, one can conclude that there is no heteroscedasticity. The null hypothesis can be tested by the usual t-test or F-test.

3.5.3. Hypothesis and definitions of variables

In order to identify factors influencing avocado and mango marketable supply both continuous and discrete variables were hypothesized based on economic theories and the findings of different empirical studies. Accordingly, in order to investigate the determinants of market supply, the following variables were constructed.

Dependent variable

Quantity supplied (2009/10): It is a continuous variable that represents the marketable supply of avocado and mango by individual households to the market, which is measured in quintals.

Independent variables: The explanatory variables expected to influence the dependent variable are the following.

Quantity of avocado and mango produced: It is a continuous variable measured in quintals. The variable is expected to have positive contribution to the amount of avocado and mango supplied to the market. Farmers who produce more output per tree are expected to supply more fruit (avocado and mango) to the market than those who produce less. Abay (2007) and Adugna (2009) found that the amount of tomato and papaya produced by farming households has augmented marketable supply of the commodities significantly.

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

Price of avocado and mango: This is a continuous variable that measured annual average price of avocado and mango in the reference market in 2008/09 i.e. the one year lagged price of avocado and mango. When avocado and mango price is high in the market in the previous year, farmers are motivated to take their produced to the market. Therefore this makes the supply to be directly related to the previous year market price. The study by Goetz (1992) on household marketing behavior in Sub-Saharan Africa found a significant positive relationship between grain price and the probability of quantities sold.

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

Sex of the household head: This is dummy variable that takes a value of one if the household head is male and zero otherwise. Both men and women participate in fruit production. Male households have been observed to have a better tendency than female household in fruit production and supply of fruit due to obstacles such as lack of capital, and access to credit and extension services. Tshiunza *et al.,* (2001) discussed the determinants of market production of

cooking banana in Nigeria. In their study, male farmers tended to produce more cooking banana than females.

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

Experience of the HH: This is a continuous variable measured in number of years. A household with better experience in avocado and mango farming is expected to produce more amounts of avocado and mango than the one with only less experience and, as a result, he is expected to supply more amounts of avocado and mango to market. Therefore, experience in avocado and mango production is expected to have positive relation with farm level marketable supply of avocado and mango. Abay (2007) discussed that as farmer's experience increases the tomato supplied to market will increase in Fogera, South Gonder.

Access to market information: This is a dummy variable taking value of 1 if the producer had access to market information and zero otherwise. It has been hypothesized that it affects the marketable avocado and mango supply of the household positively. The better information farmers have the more likely they supply fruit to the market. 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 due attention to new market opportunities, changing needs of the consumer and how market trends influence buying (CIAT, 2004).

Access to extension: The objective of the extension service is introducing farmers to improved agricultural inputs and to better methods of production. In this regard, extension is assumed to have positive contribution to farm level marketable supply of avocado and mango. It is a dummy variable with value of one if a household head has access to extension and zero otherwise.

Education of household head: It is a dummy variable and refers to the formal schooling of a respondent during the survey period. Those household heads who had formal education determines the readiness to accept new ideas and innovations, and easy to get supply, demand and price information and this enhances farmers' willingness to produce more and increase volume of sales. Therefore, formal education was hypothesized to positively influence market participation and marketable surplus. Astewel (2010) who 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.

Access to credit: This is a dummy variable, which assumes a value of one if the farmer has credit access and zero otherwise. Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs and increases output. Therefore, it is hypothesized that access to credit would have positive influence on volume of sales.

4. RESULTS AND DISCUSSION

4.1. Socio-Demographic Characteristics of Farming Households

This section presents the profile of the sample respondents with regard to their age, sex, family size and education level. There were only six female headed households from the 120 sampled producers. This is well acknowledged by Bezabih and Hadra (2007) who reported less opportunity to females in Eastern parts of Ethiopia where only two female households have participated from the total of 141 respondents.

4.1.1. Age of the households

The survey on this major demographic factor, measured in years, provided a clue on working ages of households. The average age of the sample households was 44.53 years (Table 3), with a range of 71 years where largest proportions of the household head lie within a productive age i.e. (amid of 15 and 64 years). The survey result further indicated 20.8 percent of the producers are youth viz. amid of 18 and 30 years of age whereas 49.2 percent of them are adolescent (amid of 30 and 50 years). The overall result has thus indicated household heads are prone to use resources with expected positive effect on market participation and marketable surplus.

Table 3. Socio-demographic characteristics of framing households (in average and %)

Indicator	Chodere Sose (N=18)		Bulbulo (N=52)		Choche Lemi (N=50)		Total (N=120)	
	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Age of HHH	40.11	13.33	45.56	12.90	45.06	14.36	44.53	13.61
Family size	5.61	2.50	5.21	2.5	5.90	2.30	5.56	2.24
Experience (avocado)	11.72	3.86	7.40	4.98	6.78	4.99	7.79	5.08
Experience (Mango)	27.05	28.47	30.02	32.58	12.54	4.72	22.29	25.48
Education of HHH								
• Illiterate	10		19		20		18	
• Read and write	17		15		10		14	
• Primary education	35.4		33.9		25.3		32	
• Secondary education	36.2		32.5		30.9		33	
• Certificate & above	3		-		-		3	

Source: Survey result, 2011

4.1.2. Family size

A family size ranging between two and 13 is witnessed in the farming households; the available data indicates that average family size in each household is 5.56. Bigger family size has supported to boost volume of supply in the study areas to impact for better participation in markets (Table 2). Thus existence of larger family size has positively affected the supply of marketable surplus mainly due to lower dependency ratio reported in (Table 3).

The cluster analysis of sex by occupation have depicted 83 percent of the farming household rely on family labor for planting, fertilizing and harvesting of the product. As to the report, the labor for sorting is largely allotted to female while children are involved on fruit harvesting to protect breakage of fragile avocado and mango branches. The assessment in labor employment depicted that larger proportion of the household rely on family labor (especially child labor) for harvesting (Fig. 3).

This is well supported by Wolday (1994) who indicated household size have had significant positive effect on quantity of marketed teff. 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.

4.1.3. Experience

The respondents have an average of 7.79 and 22.29 years of experience in avocado and mango production, respectively (ranging from 1 to 19 years for avocado and 2 to 40 years for mango) (Table 3).

This reality implied that farming experience of more than seven years is witnessed by 85 percent of the respondents in the study area. This is similar to the minimum time required to bear at least a fly crop of avocado and mango though research results from Jimma

Agricultural Research Center (JARC, 1995), certified juvenility of avocado and mango can be reduced to three years through grafting.

4.1.4. Education

About 18% and 14% of the sample household heads were illiterate and can read and write, respectively. However, 32% and 33% had joined primary and secondary school respectively whereas 3% are certificate holders and above. This increased educational entitlement has supported the production and marketing of avocado and mango in the study area and has also improved the ability to acquire new idea in relation to market information and improved production of the households, due to that the educational background of the sample household head is believed to be an important feature that determines the readiness of household heads to accept new ideas and innovations.

4.1.5. Dependency ratio

An average dependency ratio of 0.89 was found in Gomma Woreda; and this is better off compared to the National average (National Household of Ethiopia, 2007). The result indicated that, out of 100 working persons 89 are economically inactive in the study area and more are unable to support income generation process in nationwide. Thus, endowment of family labor by the household has affected participation in the avocado and mango production, given the labor-intensive nature of these fruit especially at harvesting. But the assessment further indicated that, Choche Lemi and Chedro Suse depicted higher dependency ratio, where larger economically inactive family members are reported than Bulbulo (Table 4).

Table 4**.** Average household size and dependency ratio

PAs	Nonworking members	Working members	Dependency ratio (Mean)
Chodere Sose	3.61	2.00	1.81
Bulbulo	1.28	3.93	0.33
Choche Lemi	3.00	2.90	1.01
Total	**7.89**	**8.83**	**0.89**

Source: Survey result, 2011

4.1.6. Means of livelihood

The respondents depend on different means of income generation strategies where coffee production is a major source of income for the majority of the producers. For this reason, about 86.67 % of the respondents earn their living from coffee production as a primary source. Tropical fruit production is also considered as the second major means of livelihood while grain production takes the third in terms of the number of respondents (Table 5). Similarly, mango is the principal tropical fruit crop that supports the livelihood of farming households in Gomma Woreda followed by avocado, orange and banana, respectively.

Table 5. Major means of income for farming households

Principal income sources for HHHs	Best income sources among tropical fruits	Rank
Coffee	Mango	1
Fruit	Avocado	2
Grain	Orange	3
Livestock	Banana	4
Other	Papaya	5

Source: Survey result, 2010

This is in line to Yeshitela (2004) who indicated mango is the leading fruit produced in most parts of eastern and south-western Ethiopia both in area coverage and quantity produced. The author further highlighted that, the existence of ample mango trees in different parts of the country have supported the livelihood of most of these farmers. Congruently The World Bank (2004), and CSA (2009) have also evidenced avocado is now taking the lion share of total tropical fruit production in Ethiopia followed by orange and banana. For this reason mango and avocado are connoted as principal cash crops apart from their role as shade trees.

According to the survey livestock production has limited impact to support household income in the study area. For this reason livestock production is not considered as source of livelihood strategies for about 75 % of the respondents and if at all present, it is not a dependable source of income for the rest of the respondents. But the assessment further indicated that, horses, donkeys and mules have great role to transport the produce from farm area to producers house or from home to market which reduced the transportation costs. Off-

farm activities are also reported as a means of income for the farming households especially at slack production seasons.

4.1.7. Access to extension service

Extension service in Gomma Woreda is fully provided by Woreda agricultural departments. Even though three development agents institutionally assigned to work in crop production, animal science and natural resources, the service is hardly imparted on avocado and mango to impact on production-consumption task. The failure is also accompanied by lack of technical expertise of the agents which ultimately resulted into death to the right of entry of the service on the theme. The result further highlighted that, learning and knowledge imparting has failed to support households to participate in the market chain.

Table 6. Extension contact (in percent)

Description	Percent of households
Totally no	46.3
Monthly	16
Biweekly	10
Weekly	5.7
Twice a year	22
Total	**100**

Source: Survey result, 2010

According to the assessment, the frequency of extension visit to avocado and mango is also considerably lower than other crop. Thus, from all respondents only about 5.7 percent of them are visited once in a week, while 10, 16 and 22 percents of the respondents are entitled to get extension access only once in two weeks, monthly and twice in a year, respectively while 46.3% of the respondents reported that they had totally no extension visit (Table 6). The assessment has therefore indicated the extension service is largely in favor of crop production and is delivered unintentionally.

This is in line with Carlson *et al.* (2005) and Sonko *et al.* (2005) who explained the current extension approach was in favor of cereals but not fruits. Thus, it has negatively affected the fruit production-marketing task. Belay (2003) also indicated agricultural extension service has failed to bring major impact on productivity of fruits due to weak link between stakes and associate workloads of extension agents. Davis (2007) has also stated that dearth of extension service has led to poor linkage to support avocado industry.

4.1.8. Access to and use of credit availability

Credit is important to facilitate the introduction of innovative technologies and for input and output marketing arrangements. Even if one micro-finance and four governmental and private banks are available in the study area no credit is reported by the respondents from formal banks; lack of definite credit service is reputed in the study area. Thus the lack for the delivery has deterred the financial capacity of producers to purchase the necessary input for the crops. For this reason informal credit system has come up as prevailing feature where producers borrow money from wholesalers during slack seasons. And this condition affected farm gate prices since farmers are forced to sell their produce at lower prices for their borrowers which ultimately triggered to lower returns.

4.1.9. Access to roads

Availability and adequacy of road is important prerequisite to link producers with markets in reduced transaction costs. The assessments on this continuum, measured in single feet-hour, revealed 81 and 90 percent of respondents are reasonably nearer to the service where most households can access the entry within half an hour of normal walk Table 7. Paradoxically most of the farmers, have failed to use these accesses.

This is in line with the World Bank (2004) reported that better road density in the study area i.e. 117 km per 1000 square km which is by far better than the national road infrastructure i.e. 30 km per 1000 square km. with significant difference between the three locations at 1 percent level of significance.

4.1.10. Access to markets

This is a distance measured in kilometers to reach the nearest market. The study revealed the infrastructure in Gomma woreda is generally satisfactory and it is comparatively close to nearby fruit markets (Table 7); which in turn has assisted farmers to lessen their transport cost and augment their market surplus and margins. The access has further assisted to increase avocado production by the farming households.

In paradox to abovementioned reality, some farmers explained the road infrastructure is conducive to sell large proportion of avocado at farm gate (41 percent) followed by selling at nearby Agaro market (34 percent). The overall research result highlighted closer markets have prompted farmers to plant high value crops such as avocado and mango since they are not much forced to transport their produce to distant markets where they sell at loss. The prospect has thus assisted to minimize the transport cost and augment their market surplus considerably.

Table 7. Access to services

Indicator	Chodere Sose (N=18)		Bulbulo (N=52)		Choche Lemi (N=50)		Total (N=120)	
	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Distance to market (Km)	3.69	1.70	4.88	1.91	5.40	2.40	4.70	2.53
Dist. to development center (Km)	3.04	2.25	2.66	1.82	2.90	1.71	2.81	1.83
Dist. to all weather road (Km)	1.27	0.76	0.82	0.58	1.52	0.76	1.18	0.65

Source: Survey result, 2010

4.1.11. Market information

Closer look at access to market information depicted; as there is no system in place that systematically collect, analyze and disseminate information relevant to the needs of different actors. The triangulation through Focus Group Discussions has also certified the desperate absence of the scheme which is in line to farmers' complaints to the services. The assessment depicted colleague farmers are the first source of information followed by producers while traders, government extension workers and NGOs are second, third and fourth information

sources in Gomma woreda, respectively. But the overall assessment signified farmers get limited market information than traders with their own efforts. Owing to inequitable access to information, large proportion of market power is captured by traders who have diversified information source including: neighbors, fruit traders, personal observation and better access to mobile technology which favored traders to adverse risks of loss to this product.

4.2. Socio-Demographic Characteristics of Traders

4.2.1. Age of the household

The analysis on this demographic characteristics highlighted that, about 53 percent of traders are youngster amid of 18-30 years of age and all the rest are adolescent with age group of 31-50 years old. Congruently, with an average age of 30.15 years (Table 8) the maximum and minimum age of HHH is reported as 17 and 55 years of age.

4.2.2. Experience

Traders had 5.41 years of experience on average Table 8. The research result indicated that, experience has not much to do on trading as that of farming. According to the result, almost all traders are categorized in productive age group and with this mere reality; the majority of traders in the sampled markets had a mean 1-5 years of experience. This may explain that, there is no barrier to entry in mango and avocado trade with respect to years of experience (Table 10).

Table 8**.** Demographic characteristics of traders

Indicator	Agaro (N=12)		Choche Lemi (N=6)		Jimma (N=16)		Total		
	Mean	STD	Mean	STD	Mean	STD	Mean	STD	t-value
Age of traders	28.83	7.15	24.33	5.99	33.31	9.65	30.15	8.739	20.115***
Experience	5.25	3.03	4.00	2.83	6.06	3.43	5.41	3.93	6.490***

(Units are in years) *** Significant at 1percent

Source: Survey result, 2010

However, the statistical test for homogeneity, which was run to compare means of continuous variable among markets designated occurrence of high significant difference at 1 percent level ($P<0.01$) for age and experience (Table 8).

4.2.3. Education

It is a crucial factor for skill development and enhancing marketing decisions. The assessment in this perspective signified 93.07 percent of traders are entitled to formal education (Table 11). This increased educational entitlement has supported the ability to acquire new idea in relation to market information and new technologies.

4.2.4. Endowments of traders

The research result highlighted traders are privileged to access and use of important services than farmers in the study area. The access of keeping fruit in separate store (64 percent) has supported longer shelf life and thereby reduced the time to rancidness. Similarly, 64 percent of traders are honored to mobile access while 26.5 percent of them are endowed with landline telephone towards enhanced information (Table 9).

Table 9**.** Economic realities of traders

Endowments	Percent
Separate Store	64.71
Mobile access to market information	64.71
Land line telephone	26.50
Weighing scale	64.70
Juicer	23.50
Shop/shed	50.00
Motorbike	5.90
Bicycle	8.80

Source: Survey result, 2010

Among all surveyed traders, 64.7 and 23.5 percent of them are endowed with weighing scale and juicers respectively. Congruently, 50 % had shop (shade) while 5.9 and 8.8 percent of traders have motorbike and bicycle, respectively. The accesses assisted traders to govern the chain through buyer driven approaches where relationships with actors remained personal.

This is in line with Kaplinsky (2004) who indicated participation in market is influenced by particular competitors who has the upper hand to access important for the chain functions. Thus, the "glue" holding producers is not equal to other actors where traders excessive power as chain governor in buyer driven markets.

According to the assessment, most traders (64.71 %) are experiencing additional trading activities other than fruits. Due to this very reason, 58.82 percent of these actors are involved in fruit trading merely in main supply season. Simultaneously 41 percent of the traders are involved in fruit trading seven days a week; while 14 and 44 percent of them are involved up to five and three days a week, respectively.

4.3. Characterization of Fruit Production in Gomma Woreda

4.3.1. Average trees owned by households

The assessment on average trees on the farming household depicted the existence of large difference between total average number of avocado and bearing trees owned by individuals i.e. 17.24 and 6.23 (Table 10) numbers of avocado trees, respectively. The existence of this remarkable range indicated the potential of large number of Juvenile avocado trees which

Table 10. Mango and avocado trees owned by growers

Indicator	Chodere Sose (N=18)		Bulbulo (N=52)		Choche Lemi (N=50)		Total (N=120)	
	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Avocado								
Bearing tree number	8.44	2.12	3.32	0.23	8.38	2.05	6.23	2.40
Non bearing tree	13.28	5.16	4.22	1.70	18.08	6.60	11.26	7.44
Number of died trees	1.06	0.92	0.54	0.48	0.62	0.53	0.67	0.60
Total trees	21.72	7.50	6.48	2.77	7.86	11.17	17.24	6.73
Production (q/tree)	3.61	1.82	2.78	1.05	2.86	1.33	2.99	1.37
Mango								
Bearing tree number	6.60	4.60	5.03	3.16	5.27	4.09	5.37	3.84
Non bearing tree	2.33	2.41	4.33	15.46	1.74	2.20	2.81	9.71
Number of died trees	1.00	2.57	0.23	0.87	0.30	2.02	0.37	1.77
Total trees	8.60	3.85	7.08	3.21	7.00	4.61	7.26	4.02
Production (q/tree)	1.50	0.77	1.39	0.86	1.26	0.93	1.39	0.85

Source: Survey result, 2010

even didn't commence its contribution in economical terms these days but with bright future for the coming moment. But this reality is contrasting to the case in mango where almost all existing trees are exhaustively exploited and their ages are too old to bear quality mango produce.

The assessment further indicated higher ranges of total avocado trees among the respondents (range=68) which is big figure not yet reported in any avocado exporting countries in Africa.

This is in line to Wasilwa *et al.* (2004) who pronounced Kenyan farmers have experienced less opportunity with minimum current ranges of avocado trees; 22 in numbers for avocado. The result has thus figured out the opportunity of Ethiopian avocado farmers than any other African country.

4.3.2. Production and productivity of avocado and mango

Average productivity of 466 quintal per hectare of avocado is reported in the study area which is exclusively larger than the national average i.e. 66 quintal per hectare (CSA, 2008). This productivity is well evidenced by Woyessa and Berhanu (2010) and Zekarias (2010) who reported better average yield of 156-780 qt per hectare, which is parallel to the current appraisal.

This is analogous to Gillard and Godfroy (1995) who reported parallel average yield in Kenya (332 quintal per hectare) but worse in Coted'Ivore and Cameroon who failed to conquer prospects due to decreasing productivity which is less than 180 quintal per hectare. Edossa (1997) has reported this yield difference could come from variation in cultivar, age of trees and weather conditions.

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[1]This is a yield computed by assuming 156 trees are planted in one hectare (with spacing of 8m X 8m) for avocado and mango.

The research result also indicates that average productivity of 217 quintal per hectare of mango is reported which is larger than the national average i.e. 150 quintal per hectare (FAOSTAT, 2010). The total number of trees per hectare is 156.

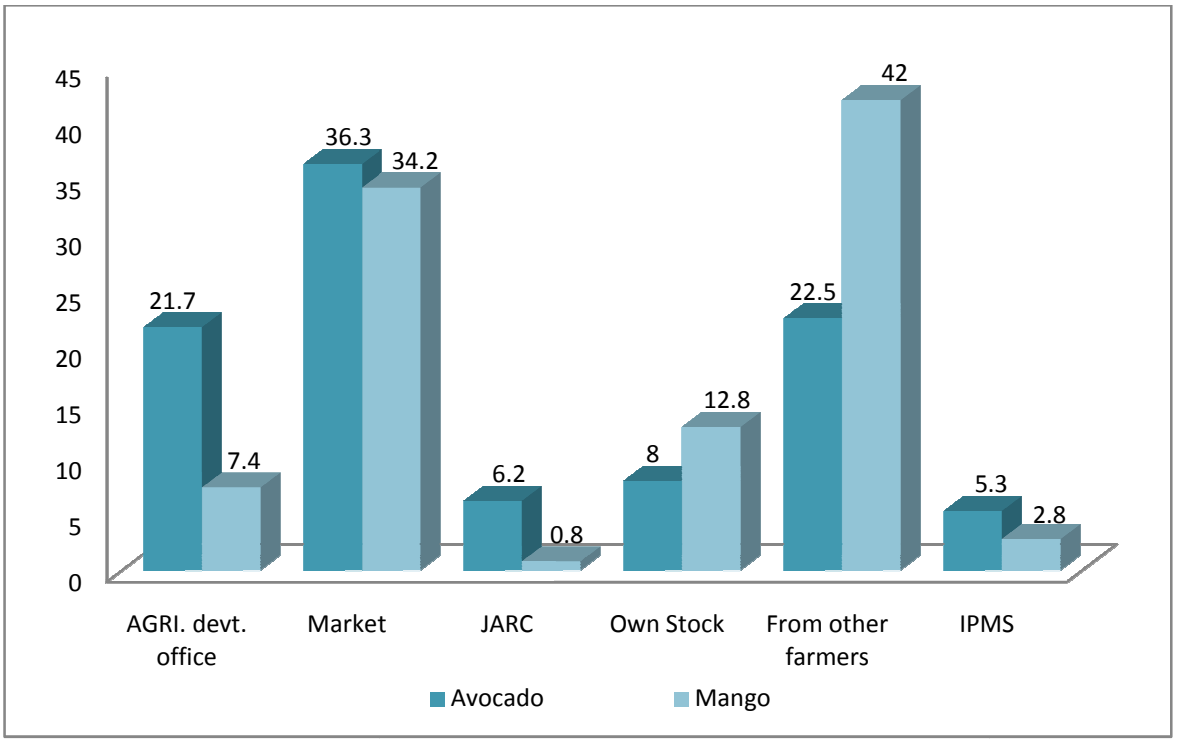
Inputs used for avocado and mango production

Agricultural inputs are important elements for production and productivity. As a result the typical inputs utilized for production of the two crops were seed/seedling, labor, land, and compost/manure.

Planting material

With entire absence of improved varieties, mango and avocado production in Gomma Woreda is exclusively based on distribution of mixed materials; which are mainly procured from unknown sources such as: juice houses available in Jimma and Agaro towns. But its dearth has little impact on its productivity. For this reason 42 and 36.3 percent of respondents have acquired planting materials of mango and avocado from other farmers and markets, respectively Fig. 2. These sources are the principal planting material sources in the study areas followed by agricultural offices and own endeavors to produce the materials. The envisaged result discerned the local seed system has come out as best-bet arena for planting material distribution.

Unavailability of planting materials and seedlings from known origin are the principal jeopardize in the study area. This is in line with Elfring *et al*. (2007) who indicated producers are complaining about unavailability of planting materials in terms of quantities and qualities.

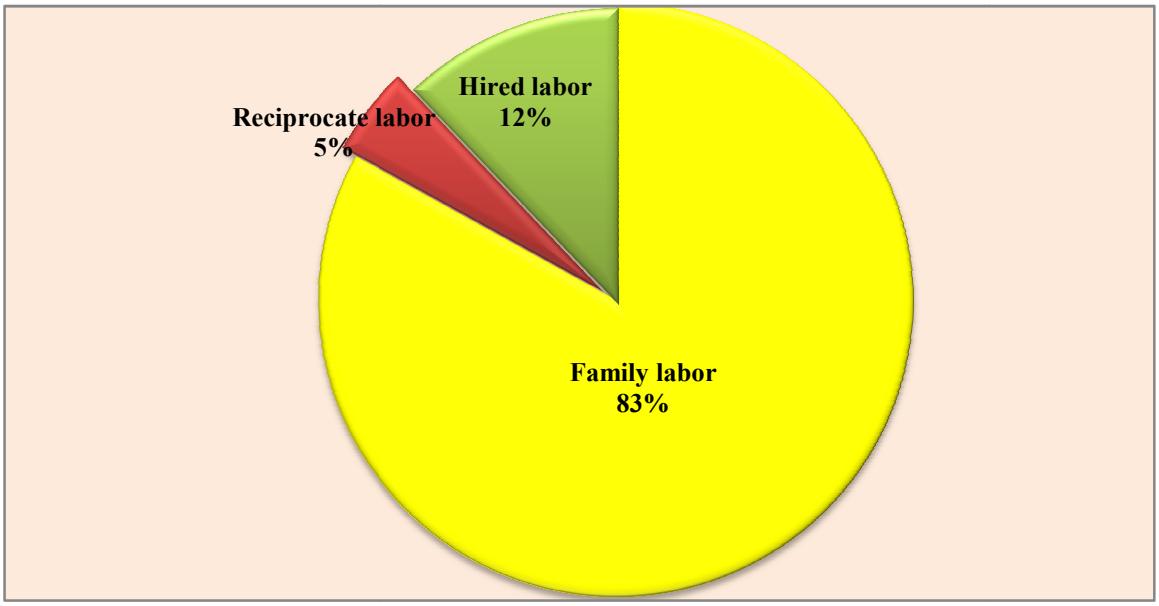


Source: Survey result, 2010

Figure 1**.** Source of planting materials for mango and avocado

Labor

The cluster analysis of sex by occupation have depicted 83 percent of the farming household rely on family labor for planting, fertilizing and harvesting of the product. As to the report, the labor for sorting is largely allotted to female while children are involved on fruit harvesting to protect breakage of fragile avocado and mango branches. Thus, the entire labor cost for the above functions are covered by the family as opportunity cost but the cost for subsequent seasonal work such as: loading and unloading is covered by the traders. The assessment in labor employment depicted that larger proportion of the household rely on family labor (especially child labor) for harvesting followed by hired labor (12 %) Fig. 3.



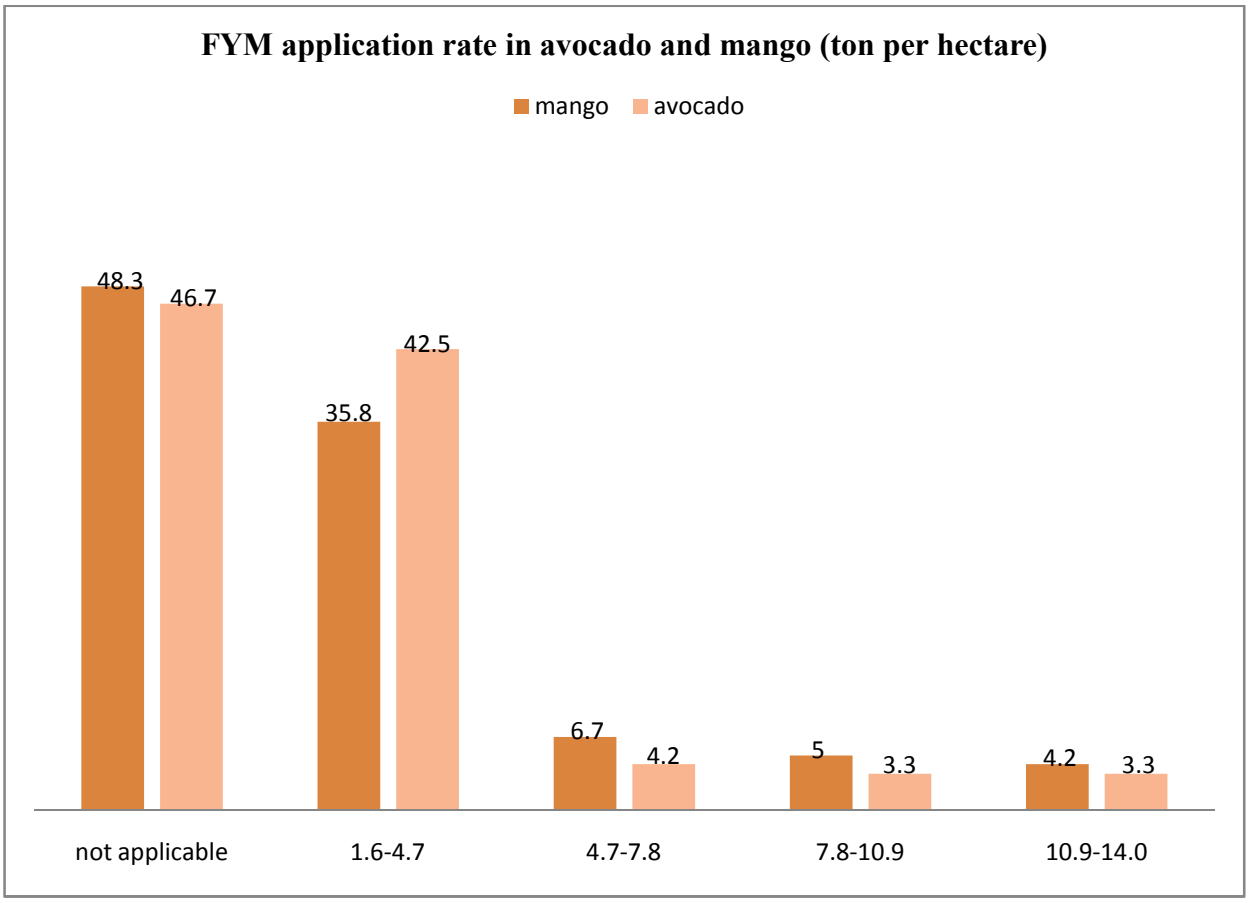
Source: Survey result, 2010
Figure **2.** Sources of labor for avocado and mango production

Farm yard manure and compost application

Avocado and mango production in Gomma Woreda is well characterized by low input utilization; and wherever applied, its utilization is completely embarked by Farm Yard Manure (FYM) which of course is highly dependent on livestock availability. Thus, FYM is principally transported from homestead to the field mostly during the dry season and spread in the bottom of each tree in circular form. The assessment highlighted chemical inputs are entirely evaded neither for fertilization nor for pest treatment. Thus, its (FYM) rate of application is minimal to improve soil fertility but with positive impact on environment i.e. reduction of soil pollution, and check on air and water pollution.

The survey assessment indicated that about 47 and 48 percent of the respondents do not apply FYM for mango and avocado, respectively; while 36 and 43 percent of the respondents have reported as they applied too little amount of FYM (1.6-4.7 ton per hectare) for mango and avocado, respectively. The maximum application rate reported was 10.9-14 tons per hectare but this much amount was reported by lower proportion of the respondents i.e. below 4 percent. Even though this rate is drastically lower than the national recommendation; the total

FYM applied in the study sites is still better to the virtually practiced elsewhere in Ethiopia (Fig. 4).



Source: Survey result, 2010

Figure 3**.** FYM applied per tree per season for avocado and mango

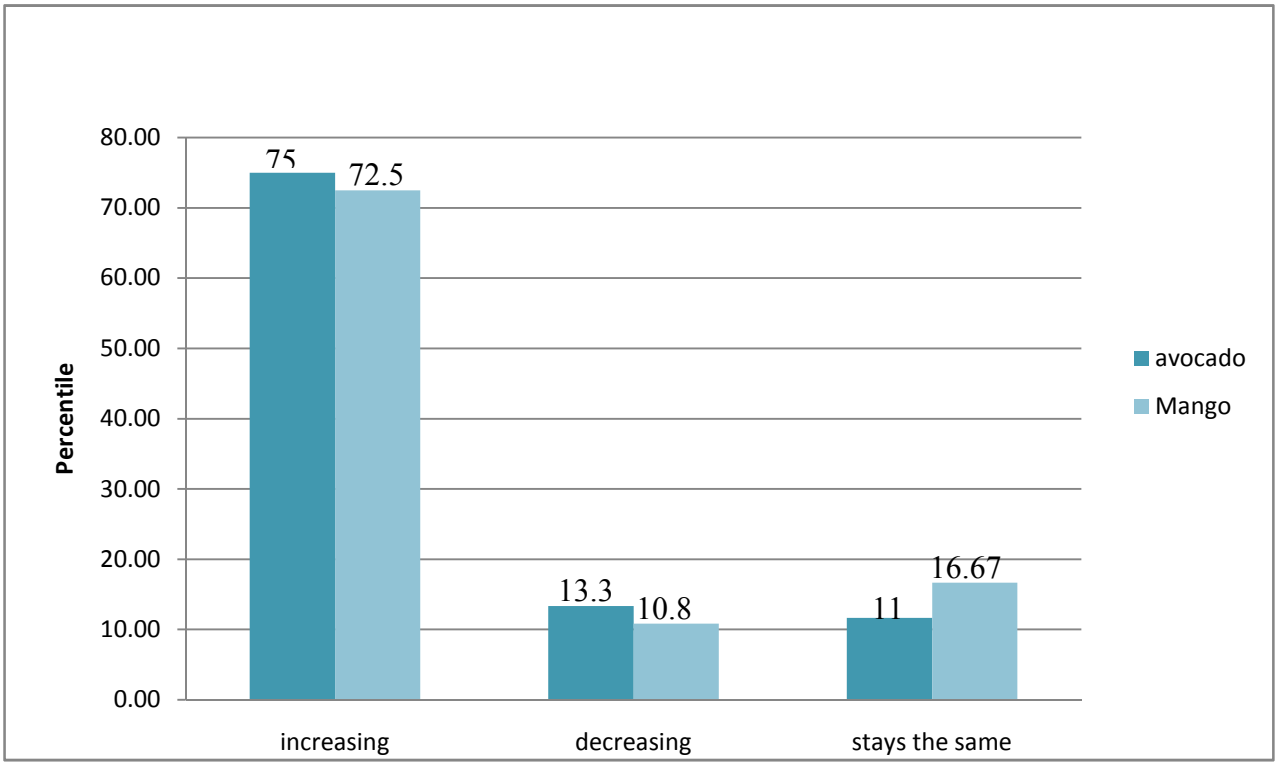
This in line with Davis *et al.* (2007) who stated the current FYM application rate in Ethiopia is negligible in that only 0.55 ton per hectare is applied; despite the national requirement (29.84 ton per hectare).

Production system in practice (trend and inter-cropping)

According to the report 75 and 72.5 percent of the respondents were replied that, the trend of avocado and mango production is apparently increasing across time, respectively (Table 5).

This is reported by Woyessa and Berhanu (2010) who have indicated that the existence of increasing trend of avocado production in the last several years.

However, the benefits earned from the production and marketing of both fruits is drastically draining because of ever declining prices due to glut of production.



Source: Survey result, 2010

Figure 4. Production trend for the past five years

Congruently, 29.58 and 42.70 percents of respondents reported as they intercrop avocado and mango with maize, taro, ginger, chat, cabbage and banana at early stage. This is line with Gilliard and Godfroy (1995) who reported intercropping of avocado with short cycled crops; which is very common in sub-Saharan Africa and most welcomed to utilize the empty space during the first few years. The research result is also granted by Albertin and Nair (2004) who reported similar parallel experiences in Coast Rica where avocado is well intercropped in coffee production.

Cropping calendar

The cropping calendar of avocado and mango is almost similar across the study areas where majority of respondents (95%) have reported as they plant the seedlings from June to late July and starts harvesting after 5-7 years after planting.

Attributable to its climacteric nature, avocado fruits do not ripe while it is attached to the tree. Thus harvesting usually start after fruit dropping-which is principal maturity index in the study areas. In consent to this line, 79.2 percent of the producers conduct harvesting subsequently to the maturity index. This nature has assisted 20.8 percent of producers to let hang the fruit on the tree before harvest unto best search for markets that can pay better prices. The assessment further depicted harvesting in the study area is largely executed by child labor by climbing on the tree. But use of picking hooks, shaking of trees and knocking down fruits with wooden sticks are also exercised in the study areas; but at lower rate. The later practices cause fruit droppings that may cause physical injury at any time.

The research result is in line with FAO (2005) which indicated cuts, punctures and bruises has increased ethylene production and hastened fruit softening and ultimately caused mechanical injuries and decay. Bower and Cutting (1998); Gilliard and Godfroy (1995) and Maru *et al*. (in press) have also reported climacteric nature of avocado have allowed fruits to cling on the tree up to 1.5 months.

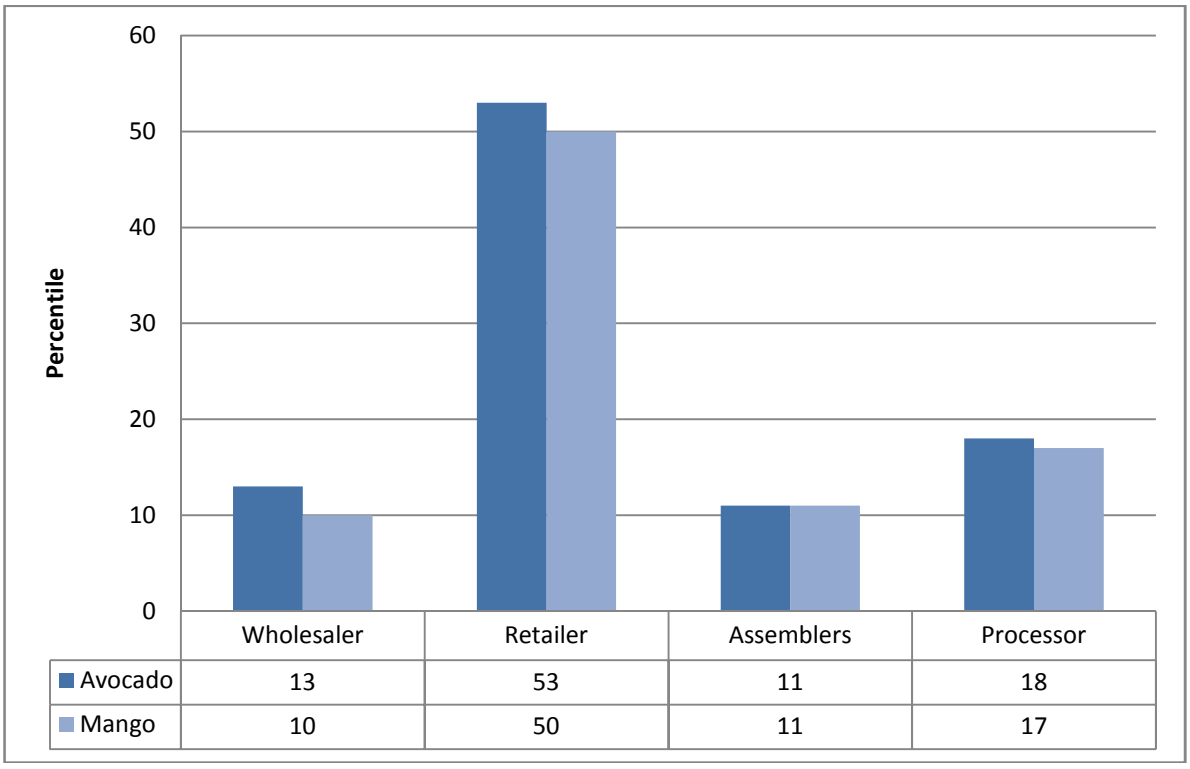
Sorting and loading are principally carried out on farm gates and at primary procurement centers through premises of primary procurers (Local collectors). Thus it is sorted according to consignment needs of collectors where under-grades such as: Shrunken, smaller sizes, with splits and punctures are reasonably expelled from transactions. But under-grads are commonly consumed in farming household as best child foods and culinary uses.

4.4. Structure, Conduct and Performance of Fruits Marketing

4.4.1. Market participants, their roles and linkages

In this study, different avocado and mango market participants were identified in the exchange functions between farmer and final consumer. Market participants in the study areas include: producer, local collectors, wholesalers, retailers, processors and final consumers of the product. Even though, each participant was involved in different activities (wholesale, retail, assembly etc), based on major activity undertaken, the sampled market participants were categorized into different categories.

About 53 and 50 percent of avocado and mango traders respectively have reported that, retailing is principal functions in the chain. Similarly about 18 and 17 percent of the respondents indicated that, as they are functioning in processing task (Fig.6).



	Wholesaler	Retailer	Assemblers	Processor
Avocado	13	53	11	18
Mango	10	50	11	17

Source: Survey result, 2010

Figure 5. Proportions of market actors of avocado and mango in the study area

Producers: These are the primary or first link actors who cultivate and supply avocado and mango to the market. The land for the abovementioned commodities was on its own plot to produce the already mentioned crops. Since the products are very perishable in nature, producers sell their produce right after harvest either at PA and/ or *Woreda* market.

The process of avocado and mango selling had similar selling procedures; where matured fruits are collected once every week or on more intervals for almost four months. But, right after collection, the products are taken either to road side, nearer PA market, Choche, Agaro or Limu Shay; and it will be handed over to the local collectors, processors, retailers and a limited amount is sold directly to consumers. Similarly, due to lack of adequate, reliable and timely market information, farmers are forced to dispose their produce within limited period at low selling price. Basket *'Kirchat'* and containers made of plastics sacks '*madaberia'* are the customary packaging material for collection and product delivery of avocado and mango in the study areas. Thus, due to limited production and supply of avocado and mango, storage was not a problem at the moment, because what is produced now is marketed immediately right after harvest. But it would be a critical problem in the near future when production and productivity of avocado and mango is intensified and supplied to market within the study area.

Local collectors: These are farmers or part time traders in assembly markets who collect avocado and mango from farmers in village markets for the purpose of reselling it to wholesalers, retailers and consumers in Agaro and Jimma market. They use their financial resources and their local knowledge to bulk avocado and mango from the surrounding area. They play important role and they do know areas of surplus well. They often receive cash from wholesalers after or before sell.

Wholesalers: These are known for purchase of bulky products with better financial and information capacity. They are major actors in the channel and they purchase avocado and mango either directly from farmer or Local collectors. They procure and consign large amount of avocado and mango to the regional market (Jimma) and to terminal markets (Addis

Ababa). They had two market outlets: they sell to terminal market and processors at regional markets (Fig.7).

Retailers: Are known for their limited capacity of purchasing and handling products with low financial and information capacity. Besides, these are the ultimate actors in the market chain that purchase and deliver avocado and mango to consumers. But the assessment indicated, all respondents in the study area were not licensed to sell avocado and mango.

Processors: Avocado and mango processing in the study area is apparently limited to juice making where cafés, restaurants and juice houses takes the leads in cuisine preparation. Albeit ample source of raw material for cosmetic industries; little is pursued on these fruits in the study area. Thus there is only one agro-processing plant (Kaliti food complex) that underpin on avocado, and it has already ceased its endeavor of blending avocado to produce pasta and macaroni. But with recent nominations, the local Cosmetic Industry "*Zenit Gebse Eshet*", has launched producing of hair pomade by using avocado as raw material.

Consumers: From the consumers' point of view, the shorter the marketing chain, the more likely is the retail price going to be affordable. Consumers for this particular study mean those households who bought and consume avocado and mango. They are individual households; they bought the commodity for their own consumption only.

Marketing channels

According to Mendoza (1995), marketing channel is the sequence of intermediaries through which whole avocado and mango passes from farmers to consumers. The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to the final destination (consumer).

The avocado and mango market channels, depicted in Figures 7 and 8, were constructed based on the data collected in three markets. The result revealed that there are 6 and 8 major

marketing channels for avocado and mango respectively which obtained from traders' survey. Informal survey suggested that there are also possibilities that farmers sell their products directly to consumers and retailers (channel I and VI). The estimated volume of production of avocado was about 39668 quintals and the corresponding figure for mango was 45535 quintals in the year 2009/2010 from which about 38468 and 44235 quintals of avocado and mango were sold respectively. Each followed their own channels, they are treated separately, and the result obtained was the following.

4.4.1.1. Avocado market channel

Six marketing channel are identified for avocado of which two have went out of the region. The channel comparison was made based on volume that passed through each channel. Accordingly, the producer-Wholesaler-Terminal market channel carried the largest volume i.e. 10772 qt of avocado which is 28 percent of the total volume followed by Producer-Local collector-Wholesaler-Terminal market channel which carried a total volume of 7693 qt of avocado and is about 20 percent of the total marketed (Fig 7).

I. Producer-Retailer-Consumer channel: This channel represented 15% of total avocado (5770 qt) marketed during the survey period. The channel was found to be the fourth important marketing channel in terms of volume.

II. Producer-Processor-Consumer channel: It accounted for 19% of total avocado (7309 qt) marketed in the study area during the survey period. The channel was found to be the third most important channel in terms of volume.

III. Producer-Wholesaler-Terminal market: Represented 28% of the total avocado (10771 qt) marketed during the survey period. It is the first most important channel in the study area in terms of volume.

IV. Producer-Local collectors-Wholesaler-Consumer (Terminal market): The channel accounted for 20% of total avocado (7693 qt) marketed during the survey period. The channel was found to be the second most important in terms of volume.

V. Producer-Local collector-Wholesaler-Processor-Consumer channel: It accounted for 7% of total avocado (2693 qt) marketed during the survey period. The channel was found to be the least important in terms of volume and the longest in terms of intermediaries in avocado marketing channel in the study area.

VI. Producer-Consumers channel: This channel represented 11% of the total avocado marketed volume (4231 qt) of avocado during the survey period. The channel is the second least important avocado marketing channel in the study area in terms of volume.

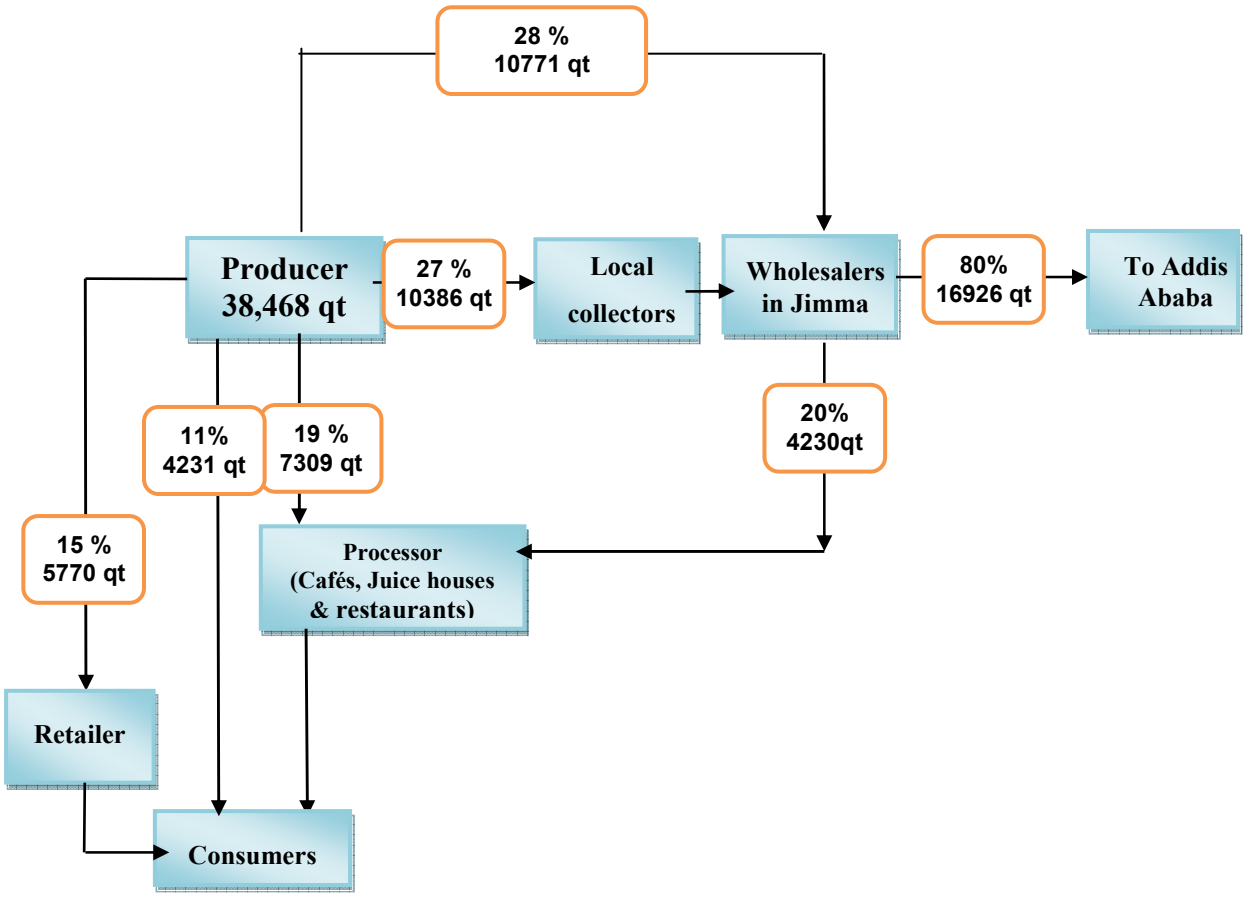


Figure 6. Avocado marketing channels of three markets, 2009/2010 (percentage and quintals)
Source: Survey result, 2011

4.4.1.2.Mango market channel

Eight marketing channels are exhibited in the study areas where all channels remained in the region. According to the report, Producer-wholesaler-Retailer-consumer channel procured largest volume of products (40 percent) followed by Producer-Local collector-Wholesaler-Retailer-Consumer channel which accounted for 20 percent of the total mango marketed from the market. The volume that passed through, Producer-Wholesaler-Retailer-Consumer channel has the most important since it accounted the largest marketed volume (40%) Fig. 8.

I. Producer-Retailer-Consumer Channel: It represented 10% of the total mango marketed (4424qt) during the survey period. The channel was identified to be the fourth important mango marketing channel in the study area in terms of volume.

II. Producer-Processor-Consumer Channel: It accounted for 15% of total mango marketed (6635 qt) in the study area during the survey period. The channel was found to be the third important channel in terms of volume.

III. Producer-Local collectors-Processor-Consumer Channel: It accounted for 3% of total mango marketed (1327qt) during the survey period. The channel was found to be the least important in terms of volume.

IV. Producer-Wholesaler-Processor-Consumer Channel: It accounted for 4% of total mango marketed (1769qt) during the survey period. The channel was found to be the second least important in terms volume.

V. Producer-Local collectors-Wholesaler-Retailer-Consumer Channel: It represented 20 % of total mango marketed (8847) during the survey period. The channel was found to be the second most important marketing channel in terms of volume.

VI. Producer-Wholesaler-Retailer-Consumer channel: It accounted for 40% of total mango marketed (17694 qt) during the survey period. The channel was found to be the first important in terms volume.

VII. Producer-Local collector-Wholesaler-Processor-Consumer channel: It represented 3% of total mango marketed (1329) during the survey period. The channel was found to be the least important marketing channel in terms of volume and accompanied by large number of intermediaries in the market.

VIII. Producer-Consumer Channel: Represented 5% of the total mango marketed which amounted about 2212 qt of mango during the survey period. The channel is the fifth important mango marketing channel in the study area in terms of volume.

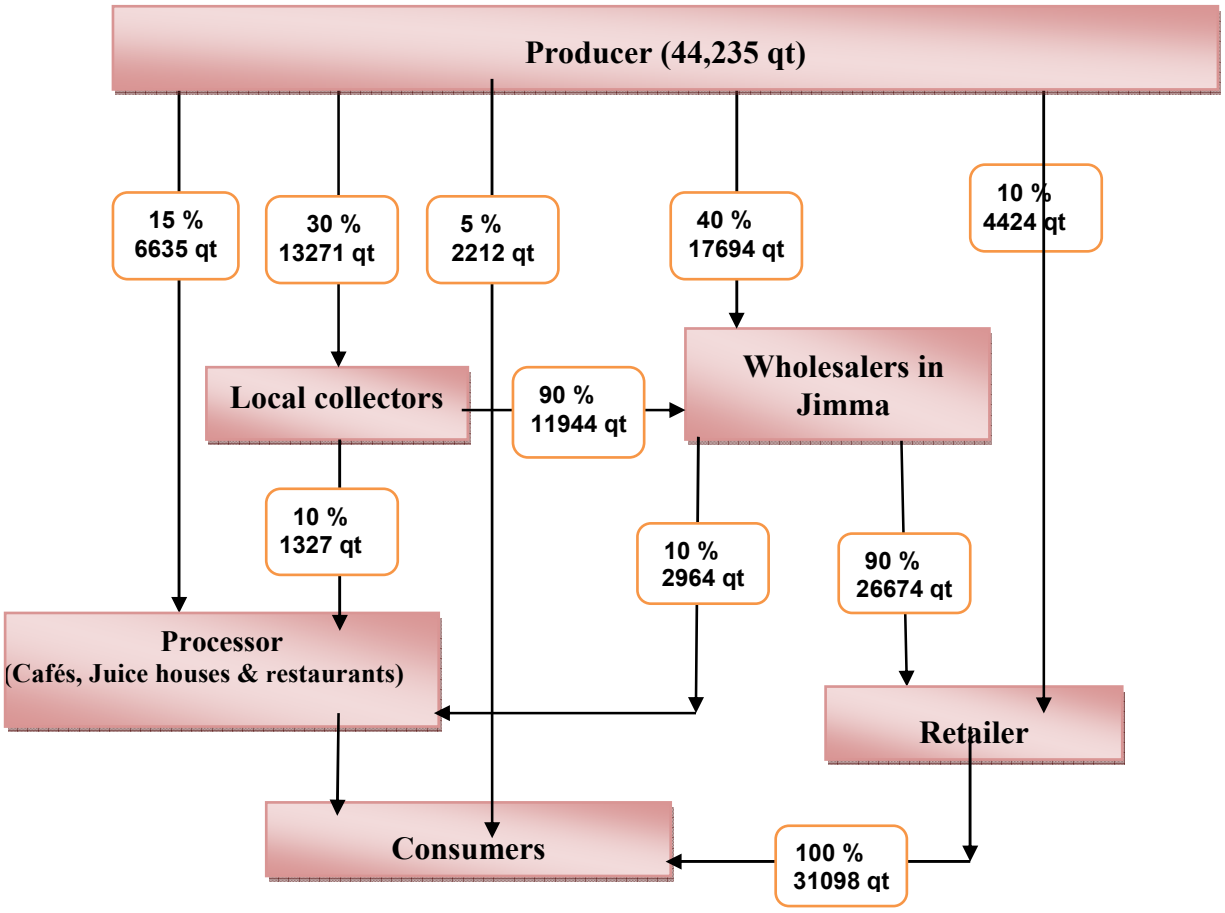


Figure 7. Mango marketing channels of three markets, 2009/2010 (percentage and quintals)
Source: Survey result, 2011

4.4.2. Market structure

Market structure in food marketing is analyzed based on the number of buyers and sizes of enterprises within the system, the degree of market transparency (market information), and the condition of entry to and exit from trade (Scarborough and Kydd, 1992; Pender *et al.,* 2004).

In this study the market structure of avocado and mango is assessed using market concentration ratio, degree of market transparency, flow of market price information within markets and condition of entry into and exit from trade. For this reason, educational level, trade experience, licensing procedure, lack of working capital and policy barriers are used as a clue to examine the fruit market structure in Gomma Woreda. The result is listed as follows:

4.4.2.1. The degree of market concentration

Market concentration refers to the number and relative size distribution of buyers and sellers in the market. For an efficient market, there should be sufficient number of firms (buyers and sellers); firms of appropriate size are needed to fully capture economies of size; there should be no barriers to entry into and exit from the market and should have full market information. Concentration ratio was not calculated for avocado and mango due to low number of the sampled wholesalers.

4.4.2.2. Degree of market transparency

The degree of market transparency refers to the timeliness and reliability of market information that the traders have for their marketing decision. In a transparent market, participants have adequate information about their competitors regarding their source of supply and buying prices for better decisions.

Based on this essence, the assessment on the continuum indicated, only 26 and 47 percent of producers and traders respectively have reported as they have adequate, timely and reliable information in the study area. The research result has implied that, the market of the study area is well characterized by lack of transparency in timeliness and reliability. The result has also ascertained that traders have more privileged in information access than producers. The reality assisted traders take hold of better market information through cellular phones (64.7 percent). The traders' survey result has also indicated that about 75 % of the sample traders got price information through combination of telephone, personal observation and other traders. The rest (25 %) of the traders reported that they could guess market information from the acts of other traders (e.g. interest to buy large volume of avocado and mango at higher prices).

4.4.2.3. Barriers to entry and exit

Managerial know-how, working capital, legal and policy constraints are used to analyze barriers of avocado and mango market entry and exit. Table 11 summarizes barriers to entry and exit of fruit traders expressed in terms of education level attained, experience in fruit trade, main sources of capital, access to credit and licensing of the sampled avocado/mango traders across the sample markets.

i. Managerial know-how

Managerial know how is assessed to measure the ability and knowledge of avocado and mango traders. The continuum is therefore examined by level of traders' formal education and their trade experiences.

a) Level of education

The result of traders' survey in Table 11 indicated that, about 6.93 percent of the respondents were illiterate; while the remaining 36.8 and 56.27 percent of trading household heads have attended primary and secondary education, respectively. Since the majority of the traders are

entitled to secondary education which confirmed that traders' educational background seem to be a barrier to entry into avocado and mango trade.

Table 11. Barriers to entry and exit of mango and avocado traders (%)

Barriers	Agaro (N=12)	Choche Lemi (N=6)	Jimma (N=16)	Average (%)
i. Managerial Know-How				
a. Education				
Illiterate	16.70	16.70	12.50	6.93
Read and write	-	-	12.50	12.50
Primary (1-6)	8.30	33.30	31.30	24.30
Secondary education (7-12)	75.00	50.00	43.80	56.27
b. Business experience				
1-5 years	66.70	66.70	68.80	67.40
6-10 years	25.00	33.30	12.60	23.63
10-20 years	8.30	-	18.90	9.07
Lack of working capital				
a. Main source of fund				
Own capital	72.20	75.40	68.30	71.97
Borrow from informal sources	3.80	-	7.70	5.25
Relatives and friends	25.00	24.60	24.00	24.53
b. Access to credit				
Did not have access	56.00	98.00	32.00	62.00
Easy to get credit	32.00	-	46.00	26.00
Did not need	12.00	2.00	22.00	12.00
ii. License				
Not licensed	85.20	90.00	72.70	82.63
Licensed	6.80	2.80	19.50	9.70
No response	8.00	7.20	7.80	7.67

Source: Survey result, 2011

b) Business experience

Business or trade experience refers to the number of years that avocado and mango trader engaged in trading activity where their business experience plays crucial role in decision making activity. The traders' survey results in Table 11 showed that, most of the traders are not well experienced in avocado and mango trading business for more than 5 years. Out of the surveyed traders about 67.4%, 23.63%, and 9.07% of the traders had an experience of 1-5; 6-10 and 10-20 years of business experiences, respectively. The majority of traders in the

sampled markets had 1-5 years of experience. This may explain that there is no barrier to entry in mango and avocado trade with respect to years of experience.

ii) Lack of working capital

a) Source of working capital

Working capital refers to the amount of money required by avocado and mango traders to enter into the trading business. From the survey result, it was observed that the majority of avocado and mango traders (71.97%) had their own source of capital for the respective trading activities; while 24.53 percent of the traders have got their working capital from their relatives and friends. But the remaining 5.25 percent of the traders have borrowed their capital from informal credit sources (Table 11).

b) Access to credit services

However, traders' survey result revealed that about 62% of avocado and mango traders responded that they did not have access to credit where 26 percent of the traders are not willing to get the service from the available formal credit sources due to collateral and other complicated processes. The abovementioned factors are reported as constraining reasons to expand the scale of operations and achieve greater efficiency in credit services. This implied that, lack of capital discourages entry into avocado and mango trading.

iii) License of avocado and mango traders

In many business activities licensing is a major barrier. As a rule, a trader who has license in one business is not allowed to perform any other businesses other than the business for which he/she is licensed. However, this was not the case as most of the traders operating in the study area who had no fruit trade license. Based on the survey result, about 82.63 % of the respondents are not licensed in fruit trading while only 9.7 % of the traders had licenses. However, the remaining 7.67 % of them were not volunteer to respond to this sensitive

question (Table 11). The assessment implied that, absence of trading license for both avocado and mango trading activities had not restricted traders to enter and exit in avocado and mango trading businesses.

4.4.3. Market conduct

Market conduct refers to the patterns of behavior of firms. This implies analysis of human behavioral patterns that are not readily identifiable, obtainable, or quantifiable (Pomeroy and Trinidad, 1995). There are no agreed upon procedures for analyzing the elements of market conduct. Rather, some points are put to detect unfair price setting practices and the conditions under which such practices prevail. In this study conduct of avocado and mango market is analyzed in terms of the traders' and price setting, purchasing and selling strategies.

4.4.3.1. Producers' market conduct

The research result pointed out that, supply of avocado and mango occurs mainly from April to October. But February and March are the months when prices of avocado reach at peak; while July up to September are the months when avocado prices drains at rock bottom prices.

Similarly the assessment has highlighted that, November to March are months when prices of mango reaches highest, while May to June are months when mango prices are lowest. According to the assessment avocado was highly supplied to market from June to October while for mango it was in the months of May and June. Respondents also reported that, there were no significant sales in the months of December to March for both crops; but it extends up to May for avocado.

It is also reported that, all farmers supply their avocado and mango produce only once in a year. Simultaneously, 84 and 60 percents of mango and avocado producers sold their on cash basis, while the remaining payment is conducted through advance payment for both crops.

The lack of modern post harvest handling practice and lack of facilitated storage facilities have compelled producers to sell the fruits at prevailing prices. Knowing this, wholesalers put pressure on producers to sell at low price. Starting from production up to marketing, every farmer produces and sells on individual basis. This affected their bargaining power during the sale of avocado and mango.

Price setting and terms of payment

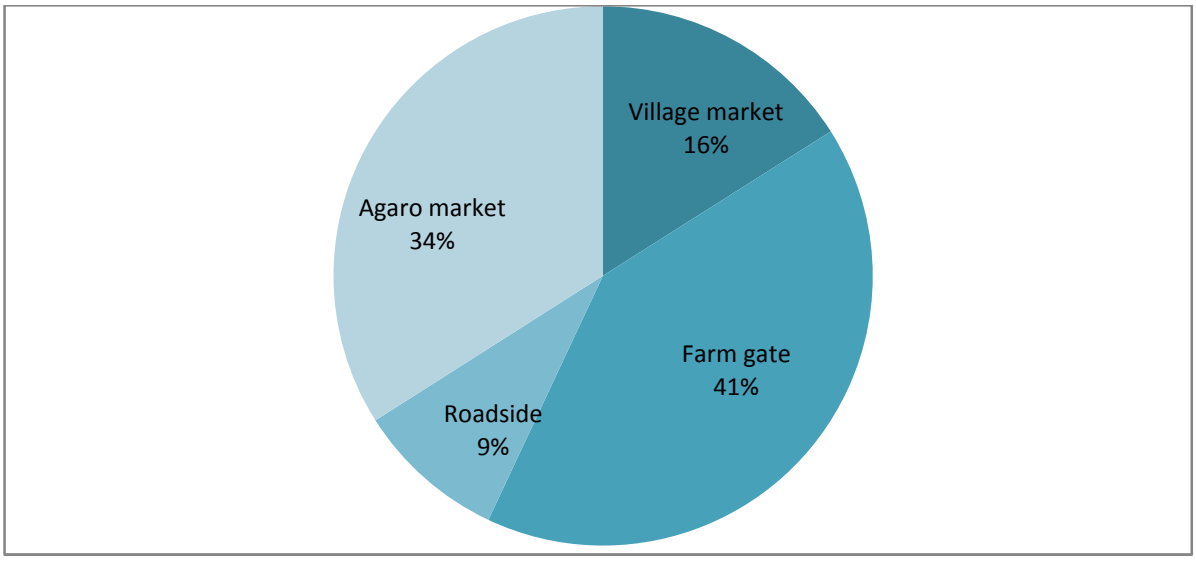
The assessment indicated among all respondents, 92.5% of the farmers have reported as they don't negotiate on price to sell their produce; indicating this large amount of producers are price takers. But 98.3 percent of the respondents stated the term of payment is conducted through cash in hand system.

The selling strategy of the respondent farmers was open to any buyer. Thus, all producers sell their produce to anybody as far as they offer better price.

4.4.3.2. Traders' market conduct

Place to sell

The survey result indicated that, almost all transactions made on avocado and mango marketing took place with direct contact between sellers and buyers. Large proportion of avocado traders (41%) purchase the fruit directly from farmers at farm gate, while 34 and 16% of the traders purchase the fruit from Agaro and other village markets, respectively Fig. 9. Similarly 38 percent of mango traders purchase the fruit directly from the farmers at farm gate, while 25, 20 and 17 percents of mango traders purchase the fruit at village markets, roadside and Agaro market, respectively.



Source: Survey result, 2011

Figure 8. Market place to buy avocado

This is in line with Dawit and Hailemariam (2004) who stated that three different selling options for horticultural crops which include: right in the field, sell at nearby markets, and least proportion option to access distance markets.

Price setting and terms of payment

Table 12**.** Method of price setting and term of payment

Price setting strategy	Agaro (N=12)	Choche Lemi (N=6)	Jimma (N=16)	Average
Negotiation with farmers	33.30	16.70	31.30	27.10
Set by demand and supply	41.70	50.00	25.00	38.90
Myself	25.00	33.30	43.80	34.03
Term of payment				
As soon as you sold	50.00	66.70	56.30	55.90
After some hours	8.30	16.70	12.50	11.80
On the other day after sale	41.70	16.70	31.30	32.40
Method of attracting suppliers				
Giving better price	58.30	100	43.80	58.80
By visiting them	8.30	-	43.80	23.50
Fair scaling /weighing	8.30	-	-	2.90
Giving pre-payment	16.70	-	-	5.90
Offering credit service	8.30	-	12.50	8.80

Source: Survey result, 2011

The method of price setting is crucial importance in avocado and mango trading activity. Accompanied by expediency of 38.9 percent of market demand and supply, 34 percent of traders reported, as they set price by themselves. Simultaneously, larger proportion of traders (55.9 percent) earn their money instantly after transaction while some of them (32.4 percent) receive their money on the other day after sale (Table 11).

Selling and buying strategy

About 61.8 percent of the wholesalers are related to their buyers as clients (*dembegna*) while other traders such as: Local collectors, retailers and processors are poorly related with their clients with a value of 17.6, 23.5 and 14.7 percents, respectively. This indicated that, wholesalers have better transaction relationships than other market actors. In other perspective, most processors (73.5%) have better relationship with their suppliers while other actors such as: wholesalers, retailers and Local collectors exhibited poorer relationship of 17.6, 14.7 and 11.8 percents, respectively. These premises indicated that, except for processors, transactions with suppliers are conducted through non-regulars. The research result has also signified that, 100 percent of purchasing of fruits from the study has taken place without the interference of brokers.

The data in Table 11 showed that, avocado and mango traders have used different methods to approach their clients. According to the assessment 58.8 and 23.5 percents of traders attracted their suppliers by paying better price and by visiting them, respectively. Congruently, offering credit service, giving pre-payment and fair scaling are the approaches often used by traders to attract their suppliers with a value of 8.8, 5.9 and 2.9 percents, respectively.

4.4.4. Marketing performance

4.4.4.1. Marketing costs

Table 13 indicates different types of marketing cost related to the transaction of avocado and mango by local collectors, wholesalers, retailers, and processors. The arrangement of

marketing cost revealed that storage loss is the highest cost for each marketing agents except for processors who incur large cost for processing (manufacturing). This is due to the perishable nature of both products. Thus, the storage loss is the amount highest followed by transportation cost. Processors incur highest cost of all other traders because they incur additional cost for processing.

Table 13. Marketing cost for different marketing agents (Birr/qt)

Cost of marketing	Agents				
	Wholesaler	Retailer	Local collectors	Processor	Mean
Sack	3.50	3.00	4.00	4.00	3.63
Fill and stitch	3.00	3.00	1.50	3.50	3.67
Load/Unload	4.00	4.00	4.00	4.00	4.00
Transportation cost	20.00	-	12.00	12.00	14.67
Storage cost	3.00	2.00	2.50	2.00	2.38
Storage loss	11.50	11.50	11.50	20.00	13.63
Manufacturing cost	-	-	-	250.00	250.00
Telephone	1.00	0.50	1.00	1.50	1.00
Guard	1.00	3.00	1.50	2.00	1.88
Personal expense	10.00	5.00	8.00	10.00	8.25
Total cost	**53.00**	**32.00**	**46.00**	**307.00**	

Source: Survey result, 2011

4.4.4.2. Marketing margin

A. Avocado

Table 14 gave an overview of the marketing margin among different actors in different channels. The total gross marketing margin (TGMM) is highest in Channel II and V which is 88.73% for each followed by channel I which accounts for 54% of the consumers' price. Of

all avocado traders, juice houses (processors), get the highest gross marketing margin which accounted for 88.73% and 69.61% respectively of consumers' price. In general, producers share in consumer price is less than 20% percent in all channels except in channel I.

Congruently, among different actors, processors obtained remarkably highest NMM of consumer's price in channel II which accounted to 58.63% followed by retailers in channel I which is accounts 42.1 percent of consumers' price.

B. Mango

The computed marketing margin among different actors and channels indicated, the total gross marketing margin (TGMM) of mango is highest in Channel II, III, IV and VII which accounted for 88.89 percent for each; followed by channel V which accounted for 75.71% of the consumers' price. Similarly of all mango traders, juice houses (processors), get the highest TGMM which accounted for 88.89, 77.78 and 67.32% of consumers' price. In general producers share in consumer price is less than 20% percent in all channels except in channel I, V and channel VI.

Table 14. Marketing margins of traders in different marketing channels

Marketing margins	Avocado marketing channels					Mango marketing channels						
	I	II	III	IV	V	I	II	III	IV	V	VI	VII
TGMM	54	88.73			88.73	57.5	88.89	88.89	88.89	75.71	66	88.89
$TGMM_R$	54					57.5				28.57	32	
$TGMM_P$		88.73			69.61		88.89	77.78	77.78			67.32
$TGMM_w$					9.8				11.11	21.43	50	9.8
$TGMM_{LC}$					9.32			11.11		25.71		11.77
$TGMM_F$	46	11.27			11.27	42.5	11.11	11.11	11.11	24.29	44	11.11
NMM_R	41.2					41.5				19.43	19.2	
NMM_p		58.63			39.51		48.76	37.65	37.65			27.19
NMM_w					4.61				4.18	6.29	12.8	2.88
NMM_{LC}					4.8			5.10		12.57		5.75

Source: Survey result, 2011

Similarly, among different market actors, juice houses' obtain relatively highest NMM of consumer's price in channel II which accounted to 48.76% followed by retailers in channel I which accounts for 41.5% of consumers' price.

4.4.4.3. Marketing profit

A. avocado

Marketing profit of traders is summarized in Table 15. Profit of retailers was highest (Birr 103 per quintal) in channel I. This profit was made possible because of the direct purchase from farmers through total elimination of intermediaries (local collectors, wholesalers), and direct sale to consumers. The profit obtained by wholesalers was highest in channel V (Birr 47 per quintal). Local collectors are benefited in channel V because of direct purchase from farmers. In general, all marketing channels are profitable.

Table 15. Marketing profit for different agents (Birr/qt)

Agents		Avocado marketing channels					Mango marketing channels						
		I	II	III	IV	V	I	II	III	IV	V	VI	VII
Retailers	Purchase price	115.00					85				250	170	
	Market cost	32.00					32				32	32	
	Selling price	250.00					200				350	250	
	Market profit	103.00					83				68	48	
Processors	Purchase price		115			310		85	170	170			250
	Market cost		307			307		307	307	307			307
	Selling price		1020			1020		765	765	765			765
	Market profit		598			403		373	288	288			208
Wholesalers	Purchase price					210				85	175	85	175
	Market cost					53				53	53	53	53
	Selling price					310				170	250	170	250
	Market profit					47				32	22	32	22
Local collectors	Purchase price					115			85		85		85
	Market cost					46			46		46		46
	Selling price					210			170		175		175
	Market profit					49			39		44		44

Source: Survey result, 2011

Processors obtain relatively highest profit per quintal in channel II and V which amounted to 598 and 403 per quintal respectively. Profit is somewhat high in channel II this is due to direct purchase from farmers. Next to Channel II (i.e. sales direct purchase from farmers), channel V (i.e. sales through local collectors) were comparatively the top three profitable (efficient) channels for sale of avocado in the study areas.

B. Mango

The computation of marketing profit of traders indicated that, profit of retailers was highest in channel I (Birr 83 per quintal) followed by channel V and VI which amounted Birr 68 and 48 per quintal respectively. Profit is higher in channel I this profit was made possible because of the direct purchase from farmers through total elimination of intermediaries (local collectors, wholesalers), and direct sale to consumers. The profit obtained by wholesalers was highest in channel IV and VI (Birr 32 per quintal) while the profit obtained in channel V and VI 22 Birr per quintal due to purchase from local collectors. Profit of wholesalers is higher in Channel IV and VI due to direct purchase from farmers.

Local collectors are benefited in channel III, V and VII which accounted Birr 39 and 44 (channel V and VII for each) because of direct purchase from farmers at farm gate while at channel III they got lower profit than channel V and VII due to the lower quality mango purchased. In general, all marketing channels are profitable (efficient).

Processors obtain relatively highest profit per quintal in channel II, III, IV and VII which amounted Birr 373, 288 (III and IV for each) and 208 respectively. Profit is somewhat high in channel II which is due to direct purchase from farmers. Next to Channel II (i.e. sales direct purchase from farmers), channel III and IV (i.e. sales through local collectors and wholesalers) and channel VII (i.e. sales through local collectors and wholesalers) were comparatively the top four profitable (efficient) channels for sale of avocado in the study areas.

4.5. Determinants of Avocado and Mango Market Supply

Avocado and mango are produced mainly for market and both crops are important cash crops in Gomma Woreda farmers in general and for the three PAs in particular. According to the research report, all sample households are good suppliers of the commodity to the market. Analysis of factors affecting farm level marketable supply of avocado and mango was found to be important to identify factors constraining avocado and mango supply to market. In this respect, 11 variables were hypothesized to affect farm level marketable supply of avocado and mango. Multiple linear regression models were employed to identify the factors. For the parameter estimates to be efficient, assumptions of Classical Linear Regression (CLR) model should hold true. Hence, multicolliniarity and heteroscedasticity detection test were performed using appropriate test statistics for each as follows.

Test for multicollinearity: All VIF values are less than 10. This indicates absence of serious multicollinearity problem among independent continuous variables (Annex 9). Contingency coefficient results indicated absence of serious multicolliniarity problem among the independent dummy variables (Annex 10).

Since there is heteroscedasticity problem in the data set, the parameter estimates of the coefficients of the independent variables cannot be BLUE. Therefore, to overcome the problem, Robust OLS analysis with heteroscedasticity consistent covariance matrix was estimated (Table 16).

Eleven explanatory variables were hypothesized to determine the household level marketable supply of avocado and mango. Among these variables, only five variables namely (quantity produced, age and market access, experience and price) were found significant for avocado. While (education, quantity produced and extension access) were found significant for mango.

Avocado

Table 16. Determinants of avocado quantity supplied to the market

Variables	Coefficients	Robust Std. Err.	t	P-value
(Constant)	-381.581*	195.225	-1.95	0.053
Sex of HHH	26.038	18.121	1.44	0.154
Age of HHH (in years)	31.012	19.752	1.57	0.120
Education level of HHH	2.642*	1.353	1.95	0.054
Total family size of HHH	3.516	2.973	1.18	0.240
Market Access in km	-3.912*	2.119	-1.85	0.068
Avocado quantity produced in quintal	0.939***	0.237	3.97	0.000
Years of experience in avocado production	5.980**	2.995	2.00	0.049
Price of avocado in 2008/09 (Birr/quintal)	0.249*	0.137	1.81	0.073
Extension access	38.097	23.673	1.61	0.111
Information access	14.620	13.114	1.11	0.268
Credit access	30.794	26.994	1.14	0.257

Note: Dependent variable- is avocado quantity supplied to the market

*** Significant at 1 percent ** Significant at 5 percent * Significant at 10 percent

N=120 $R^2 = 0.876$, $\overline{R}^2 = 0.858$

Quantity of avocado produced: As hypothesized, the multiple linear regression result shows that marketed surplus was significantly affected avocado quantity supplied at 1% level. The positive coefficient indicates that a unit increase in quantity of avocado produced will increase the marketable supply of farmers. The result also implied that, a unit increase in the quantity of avocado produced has caused an increase of 0.939 qt of marketable avocado.

This is in line with Abay (2007); Adugna (2009); who illustrated an increase of tomato and papaya production by farming households has augmented marketable supply of the commodities significantly.

Access to market: Distance to market was expected to adversely affect the volume of total sales. As hypothesized, this variable is negatively related to marketable surplus of avocado. The result shows that access to the market was significantly and negatively affected marketable surplus at 10% level. An increase in one kilometer indicated a decrease in the quantity supplied by 3.912 quintals. This is in line with Holloway *et al.* (1999) and Wolday

(1994) who indicated that distance to market caused market surplus of milk and food grain to decline.

Price of avocado: The coefficient of price of avocado which shows a positive relation to the quantity of avocado sold or supplied to market. Producers checked the price of avocado for their best benefit and this directs to the determinant to be significance at 10% level. The positive and significant relationship between the variables indicates that as the price of avocado at market rises, the quantity of avocado sold at the market also rises, which in turn increases quantity of avocado sold per household per year. The coefficient of the variable also confirms that a unit price increase in the avocado market directs to the household to increase yearly avocado sales by 0.249 quts.

Education level of HHH: Education has showed positive effect on avocado quantity sold with significance level at 10%. On average, if avocado producer gets educated, the amount of avocado supplied to the market increases by 2.642 quintal. The result further indicated that, education has improved the producing household ability to acquire new idea in relation to market information and improved production, which in turn enhanced productivity and thereby increased marketable supply of avocado and mango.

This is in line with Astewel (2010) who illustrate 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.

Experience: The result has showed significant effect at 5% significant level for avocado with expected positive sign. Thus, the result implied that, as farmer's experience increase by one year, the avocado supplied to market increased by 5.980 quintals. This is in line with Abay (2007) who illustrated as farmer's experience increased the volume of tomato supplied to the market has increased in Fogera, District which is found in South Gonder.

Mango

Table 17. Determinants of mango quantity supplied

Variables	Coefficients	Robust Std. Err.	t	p-value
(Constants)	-34.049**	26.479	-2.29	0.0201
Sex of HHH	2.724	2.903	0.94	0.350
Age of HHH in years	0.169	0.226	0.75	0.455
Education level of HHH	9.644**	4.759	2.03	0.045
Total family size of HHH	1.934	1.733	1.12	0.267
Market Access	0.593	0.440	1.35	0.181
Mango quantity produced in quintal.	0.816***	0.059	13.62	0.000
Years of experience in mango production	0.075	0.093	0.8	0.425
Price of mango in 2008/09 (in Birr/quts.)	0.014	0.022	0.61	0.545
Extension access	9.595**	4.244	2.26	0.026
Information access	4.049	4.195	0.97	0.337
Credit access	2.036	4.833	0.42	0.674

Note: Dependent variable- is mango quantity supplied to the market

N=120 $R^2=0.887$, $\overline{R}^2=0.886$

*, ** and *** are significant at 10 percent, 5 percent and 1 percent, respectively

Source: Survey result, 2011

Quantity of mango produced: The result was as hypothesized it indicates that households who had produced more amount of mango had also supplied more amount of mango to market than those who had produced less amount of mango due to insignificant consumption of mango at home. The value of the coefficient for production of mango implies that an increase in production of mango by one unit per hectare resulted in an increase in farm level marketable supply of mango by 0.816 quintals.

Education level: On average, if mango producer gets educated, the amount of mango supplied to the market increases by 9.644 quintal. This suggests that education improves level of sales that affects the marketable surplus.

Extension access: the other significant variable was extension contact, which affected positively the marketed supply of mango. On average, if a mango producer gets extension

contact the amount of mango supplied to the market increases by 9.595 quts. This suggests that access to get extension service avails information regarding technology which improves production that affects the marketable surplus.

However, all the other remaining variables such as: age of the household head, sex, total family size, extension access, credit access, and market information access did not significantly influenced the market supply of avocado in the study area as they expected. While sex, age, family number, years of experience, extension, information, market, and credit accesses were not significantly influenced the market supply of mango in the study area as expected.

4.6. SWOT analysis

In light of the stakeholder analysis, mixed focus group discussions are executed with farmers and traders to draw points of interventions and to address constraints by promoting the strength of the chain. For this purpose, internal weakness and strengths of actors and external opportunities and threats are analyzed under categories of economic, social, technological, demographic and institutional themes. The main results of the SWOT analysis are listed under (Table 18).

Table 18. SWOT analysis matrix

Strengths	Weaknesses
Resources: • Improving road access • Increasing telecom service • Potential for growth production • Accumulated traditional knowledge • Organic input utilization • Self preparation of seedlings	**Production:** • Shortage of agronomic management practices • Poor value addition activities • absence or poor Post harvest Technology • Low price
Marketing • High supply (import substitution) • rare informal communication • Multiple customers • Payments received at delivery • Employment	**Marketing** • Poor Market information • Inability to join in groups for marketing • High number of market functionaries • Lack of organized information catering • Lack of credit services
Opportunities	**Threats**
Production: • Potential to increase area and productivity • Scope for processing industries (Juice pharmaceuticals, cosmetics, food, etc) • Cooperatives can organize input supply **Business Environment:** • High value crop • Prospect to provide assistance in technology and market information • Transformation and development plan **Market:** • Scope of value added Niche product • Big scope for import substitution • Premium revenue among tree crops	**Production:** • Lack of appropriate varieties. • Increased supply of avocado and mango • Farmers not satisfied with the price they receive. • Epidemic fungal disease • High supply driven channel • Wild animals • Prevalence of heavy rainfall at maturity **Marketing** • Adversarial, with hiding of information • Punitive i.e. no credit extended • Delays in price payments • Low price **Institutional** • Resource and capacity Constraints • Lack of coordination • Excessive local lending rate (10% per month). • Poor Technology generation & dissemination • Lack of reliable statistics on production • Weak extension support service

Source: Survey result, 2011)

4.6.1. Challenges along the market chains

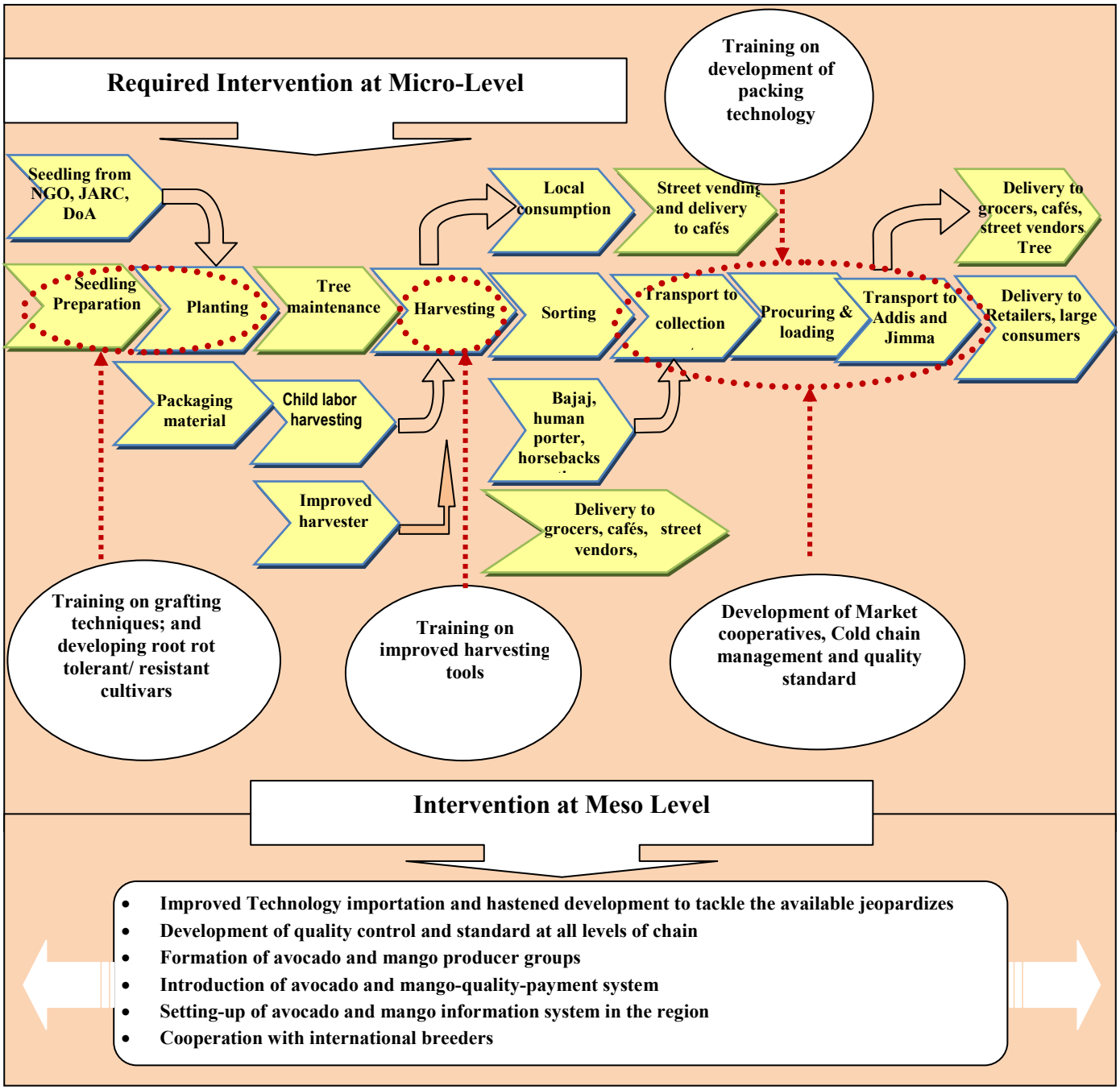
Avocado root rot (*P. cinnamomi*) is the major constraining factor reported in all the study areas by all most all of the surveyed avocado producing households. Shortage of plantings materials and lack of pre and post harvest management technologies are also principal setbacks hampering production of avocado and mango in smallholder producers. The overall activities created power imbalances among actors which are largely controlled by intermediaries and it has resulted into under priced outputs and discouraged the total volume of production. Owing to lower socio-economic characteristics and high perishable nature of the product, farmers' bargaining power is too low to influence price.

Accompanied by dearth of technical expertise, the existing extension service has failed to support and bring major impact on productivity of avocado and mango; this in turn has paved the way for accessing to inequitable information where large proportion of market power is captured by elite traders which favored them to govern the markets. Denial to access to formal credit is also one of the major setbacks which ultimately affected farm gate prices drastically.

Transportation and quality problem are also among the priority jeopardizes identified by avocado and mango traders. Compared to the other parts of Ethiopia, the transport service in the study areas is relatively better but what is rather difficult is the way fruits are handled and transported, which exposed the products to drastic weathering and physical damage. Thus most of the spoilage occurs at the level of packing into sacks, loading and transporting on the rural rough road. The absence of specialized transportation facility has made avocado and mango hauling to become customary and compelled the transportation system to rely on traditional system just like transporting any other commodity on trucks or taxi.

4.6.2. Area of intervention required at micro and Meso-level

Business services that are feeding crucial information and governing the avocado and mango market chain are mapped to illustrate potential interventions outside the market chain.



Source: Survey result, 2011

Figure 9. Area of Intervention Required at Micro and Meso-level

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary and Conclusions

Given the large potential for fruit production in the country, their contribution to the total GDP has been extremely low for many reasons. The most cited reasons include lack of market oriented production which is too traditional and poorly supported by scientific recommendations, excessive margin mainly due to inefficient and costly transport, absence of fruit market information, inadequate government interventions and absence of market regulations and legislations and its marketing activity is principally attributed to poor actors skill. As a result, fruit marketing needs due attention in any on-going or future fruit development plan.

Although comparative rewards such as: suitable agro-ecology, proximity to national market and cheap provision of labor are opportunities, but declining prices, occurrence of deadly fungal disease , poor market integration, absence of improved technologies and provision of extension packages are major factors that hindered production-marketing task of avocado and mango. With existing prominent organic production the product is not yet certified in the study area.

Constraints hindering the development of avocado and mango are found in all the stages of the chain. At the farm-level, lack clean seedlings and grafted seedlings have compelled farmers to use inferior and low yielding materials. Storage facilities and absence of collective bargaining power has also forced individual farmers to accept unfavorable deals.

Due to entire absence of improved varieties, avocado and mango production is exclusively based on distribution of mixed materials; consequently the local seed system has come out as best-bet arena and is now a common route for seedling dissemination in Gomma woreda.

Even though most payments are made instantly, in some areas payment in small part are some of the marketing malpractices reported in the study area. Small scaling deduction, quoting of lower prices and lack of market information are also common market malpractices in the study area. Simultaneously, deficiency in capital and credit availability is also reported as major problems that badly compelled farmers to sell their produce at whatever price given by traders who have borrowed them earlier.

Absence of organized institution and system group marketing has made traders in a better position to dominate the roost in pricing. The research result also indicated the existence of six avocado and eight mango channels in Gomma Woreda. Producers-Consumer channel was important to producers and consumers to get acceptable prices; while Producers-Local collector-Wholesaler-Terminal market channel and Producer-Wholesaler-Retailer-Consumer channel was the most important channels in terms of total volume marketed for avocado and mango respectively.

Despite closeness of four governmental and private commercial banks and one (micro finance) non-banking institution, denial to formal credit is prevalent. Thus informal credit system is customary feature in the study area. Similarly large proportion of avocado is consigned to terminal markets; while the remaining portion and all mangos which are procured to the market is consumed at local markets on rock bottom price.

Therefore, a number of actions need to be undertaken in order to promote the development of avocado and mango market chain. This particularly includes, capacity building, technological applications, improved extension and plant breeding activities. Infrastructural development is also a key to support the sub-sector. In this arena, emphasis should be given to improved storage and transportation system and offering credit and other services to improve effective production and marketing of the crops.

5.2. Recommendations

Based on the results of the study the following recommendations are made

- Generally, traders are capable of sourcing price information from different sources whereas poor farmers rely on other farmers and government extension staff for the same information. Therefore, there is a great need to make information available to farmers at the right time and place in response to this challenge; it is also good to develop an integrated agricultural marketing information system that will be linked to Woreda information center, and to link them to government's program.

- The quantity of avocado and mango produced at the farm level affected marketable supply of avocado and mango positively and significantly. However, farmers are working under limited plots of land by natural as well as socio-economic factors without using improved technologies and agricultural inputs. Avocado and mango producers in Gomma Woreda used little inputs (like FYM). Hence, increasing production and productivity of avocado and mango per unit area of land is better alternative to increase marketable supply of avocado and mango. Introduction of improved varieties, application of chemical fertilizers, using of modern technologies, controlling disease and pest practices should be promoted to increase production.

- The results of the study indicates provision of extension service improve market participation of avocado and mango. Farmers have to linking production with marketing. And also it is good to enlightening farmers to produce based on market signals, consumer preferences and to direct or advice on the proper methods of handling, storing, transporting, and above all improving quality of avocado and mango. Hence, it is recommended to assign efficient extension system, updating the extension agent's knowledge and skills with improved production and marketing system.

- Changing the attitudes of farmers is a crucial factor in improving the marketing performance of households. If farmers have awareness about the benefit of the specialty

market, they do not need only immediate economic advantages from the sale of their product. In case of production, household heads with very limited education encounter in successfully managing, fertilizer and pesticide applications, and also what to produce in line with taste and preference of consumers demand, especially in the presence of ineffective extension services. So stakeholders' and Agricultural and Rural Development Offices have to create awareness about the specialty of market. Continuous education and training on production and marketing will have a positive impact on their attitudes.

- Promoting potentially collective organizations (cooperatives) which are assumed to play important role in improving the bargaining position of the producers and creating, lowering transaction costs, reducing the level of oligopolistic market type by creating competitive market

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6. APPENDICES

ANNEX 1. Producers' Interview Schedule

Remark: The personal profile obtained from respondents with regard to the theme will be kept confidential and will not have any consequence on the respondent in any ways. Please give correct answers to the following questions.

Instructions to Enumerators

- *Make brief introduction before starting any question, introduce yourself to the farmers, greet them in local ways and make clear the objective of the study.*
- *Please fill the interview schedule according to the farmers reply (do not put your own feeling).*
- *Please ask each question clearly and patiently until the farmer gets your points.*
- *Please do not use technical terms and do not forget local units.*

Objectives of the study

- To identify the major fruit marketing channels in Gomma Woreda;
- To quantify costs and margins for key fruit marketing channels;
- To identify factors affecting marketable supply of fruits in Gomma Woreda.

I. Demographics

1. Name of household head_____ Sex _____ Age _____ years.
2. Marital status of household head _____. 1. Single 2. Married 3.Divorced 4.Widows
3. Religion of the household _____. 1. Orthodox 2. Protestant 3. Catholic 4. Muslim
4. Total number of family members' _____.
   1. Blow 15 years _____ 3. 30-50 years _____
   2. 19-64 years _____ 4. Above 64 years _____
5. Education level of household head _
   1. Illiterate 3. Primary school (1-6)_____ 5. Certificate and above ____
   2. Read and write 4. Secondary school (7-12) _____

II. Area Information

6. Woreda ---------- Name of Rural Peasant Administration ----------
7. Distance of your residence from the nearest market center.
   1. For avocado _____ Km or _____ walking time (minutes/hrs).
   2. For mango _____ Km or _____ walking time (minutes/hrs).
8. Distance of your residence to the nearest development center _____walking time (minutes).
9. Distance to all weather road _____ Km or _____hours walk.

10. Major means of income (in rank)

For all crop production (in rank)	For perennial fruit crops (in rank)
Coffee production _____	Avocado _____
Grain production _____	Mango _____
Fruit production _____	Orange _____
Livestock production _____	Papaya _____
Petty trading _____	Pineapple _____
Other sources _____	Banana _____

11. Total number of avocado and mango trees under production, in 2010.

Fruit crop	**Production system in practice 1= Sole 2= Intercropping 3=Backyard garden 4=Plantation**	**No of trees**				**Months of harvesting ----- to---**	**Average Production per tree (K.gs/quts)**
		Non-bearing	**Bearing**	**Died**	**Total**		
Avocado							
Mango							

12. Type of planting material in use in 2010.

Crop	**Type of material 1= Local 2=Improved 3= Both**	**Sources of material 1=Agri. Development Office 2 =Market 3=NGOs 4= JARC 5= Own stock 6=From other farmers**	**Name of improved varieties in use**	**Problem on use of improved materials 1=Availability 2= Low quality 3=High price 4=Unknown origin 5=Others (Specify)**	**Future plan 1=to increase 2=to decrease 3= remain the same**
Avocado					
Mango					

13. Experience on avocado production _____ years.
14. Experience on mango production _____ years.

III. Production

15. Production of fruit (Avocado and Mango) and food grains in 2010.

No	Type of Crop	Area in timed	Quantity produced (qt)	Quantity consumed (qt)	For seed	Quantity sold (qt)	Average selling price/(qt)	Quantity purchased in 2010/qt
1	Teff							
2	Maize							
3	Wheat							
4	Sorghum							
5	Number of avocado trees							
6	Number of mango trees							

16. What was your input for fruit (Avocado & Mango) production & their sources in 2010?

Inputs used for	**DAP**		**Urea**		**Compost**	**Manure**	**Pesticide (Lt/kg) specify**
	Kg	**Source***	**Kg**	**Source***	***(amount in local unit)***	***(amount in local unit)***	
Avocado							
Mango							

17**.** Trend of production and cropping pattern during the past 5 years? (Tick √)

Crop	Trend of production			**If increasing, why?**	**If decreasing, why?**
	Increasing	**Decreasing**	**Same**		
Avocado					
Mango					

18. Is supply of labor a problem during production? 1. ☐ Yes 2. ☐ No

19. What is the labor source for?

1. Avocado 1. ☐ Family labor 3. ☐ Labor exchange
   2. ☐ Hired labor 4. ☐ Cooperation
2. Mango 1. ☐ Family labor 3. ☐ Labor exchange
   2. ☐ Hired labor 4. ☐ Cooperation

20. What are the constraints of production? Rank horizontally*

Crop	**Insects**	**Diseases**	**Weeds**	**Seedling Shortage**	**Fertilizer shortage**	**Wild animals**	**Theft**	**Defruiting/ aborting**
Avocado								
Mango								

IV. Access to Services

21. Did you have extension contact in relation to fruit (avocado and mango) production in the year 2010 cropping season? 1= Yes 0=No

22. If yes, how often the extension agent contacted you specifically for fruits production and

marketing purpose in the year 2010?

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

23. What was the extension advice specifically on fruit production? _

1. Seed bed preparation 3. Fertilizer (compost) applications 5. Harvesting
2. Transplanting 4. Marketing of fruits 6. Post harvest handling
7. Others (specify)

24. Type of information/ services do you need in fruit production? Rank vertically*

No	extension service is required on;	Rank	
		Avocado	**Mango**
1	Seedling/ planting material preparation		
2	Weed control method		
3	Disease management		
4	Field management after plantation		
5	Post harvest treatments and storage		
6	Marketing		

25. Did you need credit in the year 2010? 1=Yes 0=No
26. If yes, have you received credit in 2010 for fruit production purpose? 1= Yes 0 =No
27. If yes, how much did you take for fruit production purpose? ----------Birr
28. For what purpose did you take the credit in relation to fruit production? _

1. To purchase fertilizer for fruits 4. To rent in land to extend fruit production
2. To purchase seed/seedlings of fruits 5. Others (specify)
3. To purchase transporting animals

29. From whom did you get credit for fruit production? _

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

V. Marketing Aspect

30. Amount of avocado and mango fruit supplied to the market and market agents in 2010?

Crop	**Place to sell** 1=Farm gate 2=Local market 3=Town	**Distance to market (km)**	**Means of Transport** *1= On donkey* *2= Vehicle* *3=On foot (Being carried)*	**To whom do you sell?** 1. Wholesaler 2. Retailer 3. Consumer 4. Processors 5. Brokers 6. Local collector	**Terms of sell** 1=cash 2=credit 3=advance payment
Avocado					
Mango					

31. How do you get market price information of fruits? _____
32. Did you know the market prices before you sold your fruits in 2010? 1=Yes 0=No
33 Did you know the nearby market price before you sold your fruit? 1=Yes 0=No
34 Did you know Jimma market price before you sold your fruit? 1=Yes 0=No

35. What is the trend of price for the last 5 years?

Crop	Trend of price (Tick✓)			If increasing, why?	If decreasing, why?
	Increasing	Decreasing	The Same		
Avocado					
Mango					

36. Does your produce have preferred quality by buyers in 2010? 1= Yes 0=No
37. If no, what interventions are needed to attract better price 2010? _____
38. What are the problems of marketing in 2010? Rank horizontally*

Crop	Lack of market	Low price	Storage	Lack of transport	Lack of market information	Brokers hinder fair sales	Pershability	Tax	Others (specify
Avocado									
Mango									

** 1 =most severe 2= Second severe, etc.*

39. How do you make decision as to when to harvest the crop `in 2010?
    1. Maturity 3. Fear of theft
    2. Market price 4. Others (specify) _____
40. What determines to sell the products to your customers?
    1. Price 3. Fair Scaling
    2. Proximity 4. Others _____
41. Do you negotiate on price in 2010? 1= Yes 0= No
42. Average return of crops at individual farmers

Crop	Selling Price Br/qt	Total cost (in birr/qt)								
		Packing Material	Loading/ Unloading	Transport	Broker	Damage	Weigh t loss	Store rent	Revenue	Tax
Avocado										
Mango										

43. How did you sale your produce in 2010? _
    1. Direct to the purchaser 3. Through commission man to the purchaser
    2. Through broker 4. Others (specify) ----------
44. What was /were problem/s created by brokers in 2010 on fruit trade? _
    1. Took to limited client 3. Charged high brokerage fee 5. Others (specify) --
    2. Cheating on scaling (weighing) 4. Wrong price (market) information
45. On average how long did it take you to sale your avocado fruits? _
    1. On the farm ----------hrs/ ---------- days.
    2. Village market ---------- hrs/ ---------- days.
    3. Aggarro market ---------- hrs/ ---------- days
    4. Jimma market ---------- hrs/ ---------- days
46. On average how long did it take you to sale your mango fruits? _
    1. On the farm ----------hrs/ ---------- days.
    2. Village market ---------- hrs/ ---------- days.
    3. Aggarro market ---------- hrs/ ---------- days
    4. Jimma market ---------- hrs/ ---------- days
47. Did you face difficulty in finding buyers when you wanted to sell avocado and mango?
    1= yes 0= No
48. If yes, in Q 47 is it due to: _
    1. Inaccessibility of market? 3. Lack of information?

2. Low price offered? 4. Others (specify) ----------

49. What do you do if you didn't get the expected price for your fruit supply?
    1. Took back home 3. Sold at lower price
    2. Took to another market on the same day 4. Sold on other market day
50. Who sets your selling price for fruits in 2010? _
    1. Yourself 3. Set by demand and supply 5. Others (specify) ------
    2. Buyers 4. Negotiations
51. When did you get the money after you sell to local collectors in credit?
    1. As soon as I sold 3. On other- days
    2. After some hours 4. Others (specify) ----------
52. When did you get the money after you sell to retailers in credit?
    1. As soon as I sold 3. On other- days
    2. After some hours 4. Others (specify) ----------
53. When did you get the money after you sell to wholesalers in credit?
    1. As soon as I sold 3. On other- days
    2. After some hours 4. Others (specify) ----------
54. What is the average cost incurred to collect avocado fruit from the tree? --------
    Birr/day/all trees.
55. What is the average cost incurred to collect mango fruit from the tree? ----------
    Birr/day/all trees.
56. What are the average costs incurred for transporting and handling 1 qt of avocado to the nearby market ---- birr?
57. What are the average costs incurred for transporting and handling 1 qt of mango to the nearby market ------ birr?
58. Indicate if there is any loss while transporting 1 qt of avocado fruit from production area to the nearby market ---------- k.gs.
59. Indicate if there is any loss while transporting 1 qt of mango fruit from production area to the nearby market ---------- k.gs.
60. Specify if there are any other costs incurred --------- birr.

End of the interview

Thank you very much for responding to the questions.

Name of the Enumerator: _____ Date of Interview: _____

ANNEX 2. Traders' Interview Schedule

Remark: The personal profile obtained from the respondents with regard to the theme will be kept confidential and will not have any consequence on the respondent in any ways. Please give correct answers to the following questions.

Instructions to Enumerators

- *Make brief introduction before starting any question, introduce yourself to the farmers, greet them in local ways, and make clear the objective of the study.*
- *Please fill the interview schedule according to the farmers reply (do not put your own feeling).*
- *Please ask each question clearly and patiently until the farmer gets your points.*
- *Please do not use technical terms and do not forget local units.*
- *Put the answer on the space provided.*

Objectives of the study

- To identify the major fruit marketing channels in Gomma Woreda;
- To quantify costs and margins for key fruit marketing channels;
- To identify factors affecting marketable supply of fruits in Gomma Woreda.

I. Socio-demographics

1. Name of trader---------- Sex---------- Age --------Years. Educational level ----------
2. Marital status of trader? 1. Single 2.Married 3.Divorced 4. Widows
3. Total family size----------
4. What different languages do you speak? 1. Oromiffa 2. Amharic

II. Area information

5. Woreda ---------- Name of Market---------- 1.Village market 2.Aggarro market 3. Jimma market
6. Distance from residence to the market----------Km /walking time in minutes

Multiple answers is possible

7. Main occupation

1. Wholesaler	4. Farmer trader (village collector)
2. Retailer	5.Urban assembler
3. Processor	6.Others (specify) --------

8. How do you undertake avocado/mango trade activity in 2010?
   1. Alone 2. With partner
9. How long have you been in avocado /mango trading? ---------- years.
10. Do you participate in avocado/mango trading year round? 1= Yes 0= No

11. If no, at what period of the year do you participate?
    1. Year round 2. When purchase price becomes low
    3. During high supply 4. Other (specify) ----------
12. Do you practice trading other than fruits? 1= Yes 0=No
13. Number of market days in a week? _____
14. What percent of the total produce is sold on local market in 2010?
    1. Avocado _____ % 2. Mango _____ %.
15. What percent of the produce will goes to domestic market (Jimma) in 2010?
    1. Avocado___ %. 2. Mango _____ %.
16. What was the amount of your initial working capital when you start this fruit trade business? ----------Birr.
17. What is the amount of your current working capital in 2010? _____ Birr.
18. What is your source of working capital? _____
    1. Own 2. Loan 3. Gift 4. Share 5. Others (specify)
19. If it was loan, from whom did you borrow? _
    1. Relative/family 3. Private money lenders. 5. NGO. 7. Friends.
    2. Other traders 4. Micro finance institution. 6. Bank. 8. Others (specify) ------
20. How much was the rate of interest? _____ Birr for formal, ---------- for informal.
21. What was the reason behind the loan? _
    1. To extend fruit trading. 2. To purchase fruit transporting vehicles/animals.
    3. Others (specify) ----------.
22. How was the repayment schedule? _
    1. Monthly 3. Semi-annually 5. Others (specify) -----
    2. Quarterly 4. When you get money
23. Is there change in accessing finance for fruit trade these days?
    1. Improved 2. Deteriorated 3. No change
24. Who will buy avocado/mango fruits from you in 2010?
    1. Wholesaler 2. Retailers 5. Others _____
    3. Household consumers 4. Brokers
25. From where did you purchase avocado/mango in 2010?
    1. From village, name of village (specify) ----------
    2. From market, name of market (specify) ----------
26. For whom do you purchase avocado/mango? 1. For own 2. For others
27. How did you sale your produce in 2010? 1. Direct to the purchaser 2.Throug broker
    3. Other (specify) ----------
28. Who sets the price in 2010? 1. Myself 2. Set by demand and supply 3. Buyers 4.Other ----
29. How did you set price? 1. Set at time of advance given 2. Negotiated at delivery
    3. At time of delivery 4. Others_____
30. If purchasing price was set at the time of advance given, how did you agree?
    1. Orally 2. Written agreement 3. Other (specify)_____
31. When did you get the money after sale?
    1. As soon as you sold 2. After some hours
    3. On the other day after sale 4. Other (specify) _____
32. Do you carry out any physical treatment to maintain product quality? 1. Yes 0. No
33. What do you do, if the product is not sold on time?
    1. Took back home 2. Took to another market

3. Sold it at lower price 4. Sold on other market day

34. How do you attract suppliers? 1. Giving better price 2. By visiting them
3. Fair scaling /weighing 4. Other

35. Who purchase fruits for you in 2010?
1. Myself 2. Broker 3. Commission agent
4. Family members 5. Friends 6. Others____

36. What are the tricks that traders use when selling fruits to intermediaries?
_____

37. Assets owned in 2010

Asset		**No.**
Store	Separate house	
	Residence	
Mobile telephone		
Land line Telephone		
Weighing scale		
Juicer		
Shop (shed)		
Motor cycle		
Bicycle		

III. Purchase practice

38. From which market and supplier did you buy avocado and mango in 2010?

Purchased from Market (Location name)	**Purchased from**	**Quantity purchased on market day (KG)**	**Average price per KG**		**%age share of fruit purchased from specific source**	**Term of payment 1= Cash 2= Credit 3= Advance payment**
			Avocado	**Mango**		
Where _____ ___ _____ ___ _____ ___ _____ ___	1. Farmers 2. Retailers **3.** Wholesaler 4. Collector 5. You don't know					

39. How do you measure your purchase?
1. By sack 2. By basket 5. Others (specify) _____
3. By weighing (kg) 4. By 'feresula'

40. Is obtaining sufficient volume is a problem in 2010? 1= Yes 0= No

41. From which market (s) do you prefer to buy most of the time in 2010? From _____ market.

42. Why do you prefer this market? 1. Better quality 3. High supply
2. Shortest distance 4. Others _____
43. Which are the months of the year when prices are lowest? 1. Avocado___ 2. Mango ____
44. Which are the months of the year when prices are highest? 1. Avocado ___ 2. Mango ___
45. Is your purchasing price higher than your competitors? 1= Yes 0= No
46. If yes, what was the reason?
1. To attract suppliers 2. To buy more quantity 5. Others (specify)
3. To kick competitors 4. To get better quality
47. How many regular suppliers do you have 2010?
1. Producer _____ 3. Assembler _____ 5. Processors _____
2. Wholesalers _____ 4. Retailers _____ 6. Others (specify)

48. The reasons for low prices in 2010 are due to:

Reasons for low prices	Yes	No
- Favorable growing conditions/ excess supply	1= ☐	0= ☐
- Poor production	1= ☐	0= ☐
-Trade regulations	1= ☐	0= ☐
- Increase in supply of substitutes	1= ☐	0= ☐

Other_____

IV. Selling practices

49. To which market and to whom did you sell avocado and mango in 2010

Sold to Market (Location name)	Sold to buyer	Quantity sold on market day (KG)	Average price per KG		%age share of buyers	Term of payment 1= Cash 2= Credit 3= Advance payment
			Avocado	Mango		
Where _____ _____ _____ _____	1. Farmers traders 2. Retailers **3.** Wholesaler 4. consumers 5. you don't know					

50. How did you attract your buyers?
1. By giving better price relate to others 3. By visiting them
2. By fair scaling (weighing) 4. Others (specify)
51. How many regular buyers do you have 2010?
1. Wholesalers_____ 3. Consumers_____ 5. Processors _____
2. Assembler _____ 4. Retailers _____ 6. Others (specify) _____
52. What is your packaging material? 1. Sisal sack 2. Plastic sack
3. Basket 4. Others_____
53. Do you know the market prices in different markets (on farm, village market, Aggaro market, Jimma market) before you sold your fruits in 2010? 1=Yes 0= No
54. What is your source of information? _____

55. How do you qualify the reliability, timeliness and adequacy of the information you got? regarding the nearby local and Jimma market.
    1. It was reliable 3. It was timely
    2. It was adequate 4. Others (specify) ----------
56. Are you willing to pay for market information if it is available? 1= Yes 0= No
57. Accessibility to market roads in rainy seasons for vehicles is
    1. Difficult 2. Easily accessible
58. If difficult, for how long? _____Months
59. Do you have other branch shops/ shades to sell your avocado/mango in 2010?
    1= Yes 0= No
60. What are the opportunities to expand fruit trading?_____
61. Are there problems on fruit marketing? If yes what are the problems, and your suggestion to overcome each Problem in 2010?

No.	Problem faced	1=yes 0=No		What do you think are the causes of this problem?	What is your suggestion to solve?
		Avocado	Mango		
1	Credit				
2	Theft				
3	Price setting				
4	Scaling/ Weighing				
5	Shortage of supply				
6	Storage problem				
7	Lack of demand				
8	Information flow				
9	Natural quality problem				
10	Government policy				
11	No government support to improve fruit marketing				
12	Others (specify)				

62. Are there restrictions imposed on unlicensed fruit traders? 1= Yes 0=No

63. Indicate your average cost incurred per quintal in the trading process of avocado and mango fruits in 2010.

Cost of Marketing	Birr/qt.	
	Avocado	Mango
Purchas price per kg.		
Labor employed to fill one qt and stitch/Packaging		
Load/ unload		
Brokerage		
Transportation: Vehicle		
Sorting		
License and Taxes		
Storage cost		
Storage loss		
Manufacture cost/processing cost		
Telephone expense		
Watching and warding		
Personal travel & other expense		
Others (specify)		
Total costs		
Selling price (per Kg)		

V. Marketing Services

64. Did you pay tax for the avocado and mango fruit you purchased in 2010? 1=Yes 0=No
65. Did you pay tax for the avocado and mango fruit you sold in 2010? 1=Yes 0=No
66. What was the basis of tax for the avocado and mango fruit you purchase in 2010?
    1. Per sack_____ birr 3. Per basket _____ birr 5. Per kg _____ birr
    2. Per quintal _____ birr 4. Fixed payment _____ birr 6. Others (specify) _____
67. What was the basis of tax for the avocado and mango fruit you sell in 2010?
    1. Per sack_____ birr 3. Per basket _____ birr 5. Per kg _____ birr
    2. Per quintal ____ birr 4. Fixed payment _____ birr 6. Other (specify)_____
68. What is your opinion regarding the marketing fee paid in this market as compared to your transaction?
    1. Low 2. High 3. Average 4. You don't Know
69. Is fruit trading in your locality needs a trading license? 1=Yes 0=No
70. If yes, how do you see the procedure to get the license? 1. Complicated 2. Easy
71. Did you have fruit trade license? 1=Yes 0= No
72. How much did you pay for fruit trade license for the beginning? _____Birr
73. How much is the yearly renewal payment? _____Birr
74. Did you store avocado and mango before you sold in 2010? 1= Yes 0= No
75. If yes in Q 74 for how long did you store avocado fruits in the store?
    Maximum for -------- Hrs or/days.
76. For how long did you store mango fruits in the store?
    Maximum for ---------- Hrs/days.

77. Amount of avocado fruits lost due to storage ---------- k.gs/quts.
78. Amount of mango fruits lost due to storage ---------- k.gs/quts.
79. Are you organized in any of the following organization?

Organization	1=Yes 2=No	Options set for benefits
Social association: 'Iqub'		1. ☐ Access to credit 2. ☐ Encourage to save 3. ☐ Facilitate joint marketing 4. ☐ No benefit 5. ☐ Got market information 6. ☐ Coordinate purchase and sale 7. ☐ Credibility 8. ☐ Other (specify
Trade association		
Marketing cooperative		

End of the interview
Thank you very much for responding to the questions.
Name of the Enumerator: _____ Date of Interview: _____

ANNEX 3. Checklist for Farmers' Group Discussion

1. Group members should:

- *Respect others and their views*
- *Strive to be honest and transparent*
- *Recognize and acknowledge social reactions*

2. The Moderator should

- *Act as catalyst between individuals of the group*
- *Strive to enhance capacity of rural people in analysis of problems and opportunities*
- *Find ways of integrating dominant and quiet people and makes sure that all group members are able to express their opinions*
- *Make sure that the group keeps to the topic but flexible in handling additional information*
- *Take care of time management*
- *Listen carefully to any group member and does not much*

1. Evaluation matrix for SWOT analysis

Woreda	
Kebele	
Total number of participants	
Date	

Strengths of production and marketing of avocado and mango	**Weakness of production and marketing of avocado and mango**
• • •	• • •
Opportunities on production & marketing	**Threats on production & marketing**
•	• •

2. What is your possible solution to rectify the above problems?

_____
_____
_____
_____
_____

ANNEX 4. Checklist for Traders Focus Group Discussion

1. Group members should:

- *Respect others and their views*
- *Strive to be honest and transparent*
- *Recognize and acknowledge social reactions*

2. The Moderator should

- *Act as catalyst between individuals of the group*
- *Strive to enhance capacity of rural people in analysis of problems and opportunities*
- *Find ways of integrating dominant and quiet people and makes sure that all group members are able to express their opinions*
- *Make sure that the group keeps to the topic but flexible in handling additional information*

1. How do traders influence farmers' participation in avocado and mango market/value chain?
2. What are the major problems in marketing of avocado and mango?
3. Who is responsible for the above problem?
4. What is the quality trend of avocado and mango improving or deteriorating? Who is responsible for the problem?
5. How these problems can be solved?
6. From whom do you purchase fruits at reasonable price?

ANNEX 5. Key Informant Discussion with Hort. Experts (Woreda and Zone)

Woreda_____

Kebele _____

Date _____

Name of interviewee _____

Title of the interviewee _____

1. What are the threats for avocado and mango extension service and input supply?
2. What are the most important constraining infrastructures affecting avocado and mango production?
3. What are the possible solutions to correct these problems?
4. What is the role of FTCs on avocado and mango production? How?
5. What outputs are achieved on dissemination of avocado and mango technologies?

Table 6. FGD and key informants in the study areas

S. No	Farmers Group Discussion	Number of interviewee
1	Chedro sose	5
2	Bulbulo	6
3	Choche Lemei	7
Total		**18**
	Key Informants	
1	Jimma Zone Agricultural Office	1
2	Goma Woreda Agricultural Office	1
3	Jimma Agricultural Research Center	3
4	Jima Agric. Mechanization Research Center	3
5	Ethio-Telecom, South-Western Region	2
6	IPMS/ILRI Agaro knowledge Center	1
7	Juice house owners, hotel and restaurant owners	9
Total		**20**

Source: Survey result, 2011

ANNEX 7. Production area of Major Tropical Fruits (Ha in year)

	Avocado		Oranges		Papayas		Pineapple		Mango	
	Area (ha)	Yield (Hg/ha)	Area (ha)	Yield (Hg/ha)	Area (ha)	Yield (Hg/ha)	Area (ha)	Yield (Hg/ha)	Area (Hg/ha)	Yield (Hg/ha)
2002	10,000	80,000	2100	71,428	11300	200,000	120	5,000	10600	159600
2003	10,160	80,000	2533	49,790	11127	207,189	160	5,000	10887	163305
2004	8,000	81,250	3098	56,084	12500	208,000	200	5,000	11500	175000
2005	8,000	81,250	2761	90,546	12500	208,000	240	5,000	11500	175000
2006	4,716	73,886	5000	93,166	12500	208,000	280	5,000	11500	175000
2007	7,000	78,571	5200	92,307	12500	208,000	320	5,000	12000	180000
2008	6,473	66,196	3397	126,014	12500	208,000	87	5,172	12000	180000
2009	5,067	64,045	2440	120,250	-	208,000	-	5,172	12000	180000

Abridged from FAOSTAT | © FAO Statistics Division 2010 | 16 September 2010

ANNEX 8. National Production and Yield of Major Tropical Fruits in Ethiopia

Crop	Number of holders	Area in hectare	Production in quintal	Yield (qt/ha)
Avocado	820,712	6,473	428,492	66
Banana	1,963,514	39,426	2,610,592	66
Mango	695,030	6,731	484,361	72
Orange	420, 706	3,397	428,073	126
Papaya	696,835	4,003	572, 745	143
Pineapple	12,018	86.74	449	5

Abridged from CSA of Ethiopia, 2008

ANNEX 9. Avocado Production across Administrative Regions of Ethiopia

Region	Zone	Number of holders	Area in hectare	Production in quintal	yield (qt/ha)
Amhara region	West Gojam	9047	13	*	*
Oromia (total)		169972	1759	108530	62
Oromia	West Welega	33276	317	20864	66
	Illubabor	6625	*	*	*
	Jimma	63341	*	*	*
	West Shewa	3737	*	*	*
	North Shewa	7848	39	*	*
	East Shewa	1707	5	101.69	20
	Borena	18545	244	15254.04	62
	Southwest Shewa	2952			
	Guji	22036	438	27368.43	62
	Kelem	1381	*	*	*
	West-Arsi	5065	*	*	*
Benshangul Gumuz	(total)	1106			
	Asosa	1077	*	*	*
SNNP (total)		634163	4653	319757	69
SNNP Zones	Gurage	50728	233	10487	45
	Hadiya	72783	452	31592	70
	Kembata-Tembaro	66428	463	28138	61
	Sidama	144018	12156	87629	72
	Gedeo	53063	526	39779	76
	Wolayata	148457	1272	97112	76
	South-omo	699	*	*	*
	Sheka	9370	37	1906	52
	Kefa	16425	107	5334	50
	Gamo-gofa	6698	14	357	26
	Bench-maji	10312	54	2900	54
	Silitie	20215	55	3137	57
	Dawro	15267	111	6486	59
SNNP special Woredas	Yem	1045	5	*	*
	Amaro	5777	45	4097	92
	Burji	690	24	*	*
	Basketo	5120	28	*	*
	Konta	4401	24	803	33
	Alaba	2242	6	*	*
Gambela Region	Mezhenger	4918	35	*	*

* Data not available

Source: abridged from CSA of Ethiopia, 2008

ANNEX 10. Multi-collinearity test with VIF

Variables	**Tolerance**	**VIF**
Sex of HHH	0.777	1.287
Age of HHH	0.350	2.855
Education of HHH	0.341	2.932
Total family number	0.734	1.362
Access to market	0.902	1.108
Avocado output	0.340	2.939
Experience on avocado production	0.436	2.292
Avocado price in 2008/09	0.488	2.050
Extension access	0.913	1.095
Access to market information	0.727	1.375
Credit access	0.731	1.368

ANNEX 11. Contingency Coefficient

	Credit Access	Market inf. access	Ext. access	Sex
Credit access	1			
Market inf. access	0.070	1		
Ext. access	0.050	0.101	1	
Sex	0.039	0.047	0.056	1