

**Assessment of Factors Affecting Quality of Hararge Coffee (*Coffea arabica* L.) in  
Coffee Value Chain: A Case Study of Darolabu District, Eastern Ethiopia**

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## DEDICATION

*I dedicate this thesis work to my beloved wife Mafuza Usmael Kasim, and to my mother Saniya Kalil and father Amin Ameyu whose unqualified encouragement and support made it possible for me to commence and complete this training by their continuous prayers.*

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## LIST OF ACRONYMS

CBD	Coffee Berry Disease
CFC	Common Fund for Commodities
CLR	Coffee Leaf Rust
CQCAC	Coffee Quality Control and Auction Center
CWD	Coffee Wilt Disease
DADO	District Agriculture Development Office
DCPO	District Cooperative Promotion Office
DDT	dichlorodiphenyltrichloroethane
DLADO	Daro Labu Agriculture Development Office
ECQIC	Exported Coffee Quality Inspection Center
ECX	Ethiopia Commodity Exchange
ETB	Ethiopian Birr
EU	Europe Union
GDP	Gross Domestic Product
ha	Hectare
HPLC	High Performance Liquid Chromatography
ICO	International Coffee Organization
ISO	International Standard Organization
ITC	International Trade Center
kg	Kilogram
m.a.s.l	Meter above sea level
Max	Maximum
MARC	Mechara Agricultural Research Center
Min	Minimum
MOT	Ministry of Trade
Nº	Number
OTA	Ochratoxin A
PAs	Peasant associations
qt	Quintal
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences
SWOT	Strength, Weakness, Opportunities and Threats
US\$	United State dollars

## **ABSTRACT**

*Although, Hararge coffee was known by its high-quality specialty coffee types., however, coffee quality is declining due to several improper pre-and post-harvest management practiced by the majority of coffee farmers and traders as a result price of coffee fluctuating. Hence, this study was designed to identify the pre and postharvest factors affecting the quality of dry processed Hararge coffee along the chain for further good agricultural practice. The study was based on data generated from 31 coffee producers and 11 other actors. SPSS and excel sheet were employed for analyzing. Chain map and SWOT analysis were made for analyzing coffee value chain in the district. The result showed that, the major stakeholders in coffee value chains in the study area are farmers, collectors, primary farmer cooperative, traders/processors, cooperative union and exporters as the actors and ECX, ECQIC, MARC, DADO, DCPO and MOT as supporters. Results obtained from the study indicated that among the pre-and post-harvest factors; low level of education, limited use of coffee shade tree, unpracticed of recycling of old coffee trees by stumping, prevalence of disease and insect pests, coffee farm size, coffee farming experience, bad harvesting, drying, packaging and storing practices and shortage of extension services were found to be significant factors affecting coffee quality. In addition, result obtained from interviews showed that, involvement of illegal coffee traders in coffee collection, mixing of different quality coffee, absence of primary coffee transaction center in village town, complexity and bureaucracy of ECX, unfair coffee grading system and limited number of farmer cooperative for coffee marketing were also among major factors affecting quality of coffee in the district as a result to fluctuation of coffee price. Absence fixed coffee selling price; less number of imported country and a shortage of infrastructure is a problem resulted to low price of coffee. Therefore, the findings of the study underscore improve coffee pre- and post-harvest management and harvesting and processing practices strengthen coffee research area of climate mitigation and coffee value chain; establish the primary coffee transaction center in a village town with full infrastructure, link farmers with markets, creation of pre-cooperative farmer coffee producer group association by the means of farmer coffee cooperatives and finally give emphasize for conducting direct specialty trade (DST) as important strategy to improve coffee quality as well as quantity and marketing in the study area.*

**Key words:** Coffee quality, coffee producers, chain map, value chain, value chain actors.

# CHAPTER 1. INTRODUCTION

## 1.1 Background

Ethiopia is one of African least developed countries with about 85% of its population living in the rural areas. Its economy depends majorly on agriculture, which accounts for almost 50% of the GDP, 60% of the exports and 80% of the total employment. This sector frequently suffers from drought and poor cultivation practices. This shows still agriculture is considered as the country's most promising resource and source of income (Focus Africa, 2014). Coffee is critical to the Ethiopian economy that generating about 25% of Ethiopia's total export earnings and about 15 million people directly or indirectly deriving their livelihoods from it (Abu and Teddy, 2013).

## 1.2 Coffee Production

Among 100 *Coffea* species, only *Coffea arabica* is the species naturally occurring in Ethiopia (Yigzaw, 2005). Thus, Ethiopia produces only Arabica coffee, which is believed to have originated in the rain forests of southwestern Ethiopia. Hence, Ethiopia is known as "the home of Arabica coffee. *Coffea arabica* is one of the principal species used by far the most significant in the production of coffee in commercial production (ICO, 2012). Coffee is the world's favorite beverage and the second most traded commodity after oil on international trade exchanges, representing a significant source of income to several developing countries in Africa, Asia and Latin America. Thus, it represents one of the most important traded commodities in the world (Vieira et al., 2006). World coffee production is accounted for exports worth an estimated US\$ 15.4 billion, when some 93.4 million bags were shipped, with total coffee sector employment estimated at about 26 million people in 52 producing countries. Arabica coffee is cultivated in more than 80% of the countries coffee grower, tends its most significant diffusion in the American continent. Accordingly, Brazil is the world's first largest coffee producer whereas Ethiopia is the sixth largest producer in the world, and first producer in Africa (ICO, 2012).

Coffee is the most important export item for Ethiopia, accounting for 25-30 percent of total export revenues in the last two years. Its area covered by coffee is estimated more than 0.53 million ha from which about 0.4 million tons of clean coffee was annually produced. Ethiopia's annual coffee export is around 0.22 million tons valued at around US\$ 1.75 billion (USDA, 2012). Ethiopia also well known for its very fine quality coffee acclaimed for its aroma and flavor characteristics. The coffee types that are distinguished for such unique features include Sidamo, Yirga Chefe, Hararge (Harar), Gimbi and Limu types (Workafes and Kassu, 2000). Especially coffee from Hararge and Yirgacheffe is always sold at a premium price both domestic and international markets because of its unique excellent quality (ITC, 2002).

A Hararge coffee is characteristics by medium sized beans with greenish-yellow color, medium acidity and full body, and a distinctive mocha flavor. Internationally known and recognized as Harar Trade Brand Name and highest superior coffee in the world (FDREMT, 2012). Therefore, this characteristic excellent quality coffee type of these regions are currently known by the name of specialty coffee in the international market. On the other hand, agronomically and economically sustainable coffee production is feasible by applying best practices of crop production and post-harvest processing (Ven Der Vossen, 2005).

Hararge is one of coffee growing zones in the Oromia Regional State located in the eastern part of Ethiopia. In this region, coffee was observed to grow as early as 850 A.D. Thus, coffee was grown in homesteads under intensive management system with an estimated average holding of less than 0.5 ha of land per household. The major coffee growing districts of west Hararge zones are Darolabu, Habro, Boke, Oda Bultum, Gemmeachis, Chiro, Hirna, Doba and Messala; and east Hararge zones are Malaka Bal'o, Bedeno, Dader, Kurfachalle, Gurawa, Harar Zuria

and Gursum are known for production of best quality Hararge coffee (Brownbridge and Eyassu, 1968). The share of Hararge coffee is 10% of the total country's coffee land and 8% of the country's coffee export. As reported by Desse (2008), Hararge coffee fetches premium prices in the world market since it was known by best mocha quality coffee type across the world, and it is said "king of flavor." However, although Hararge coffee is one of the specialty coffees with unique inherent quality, which can fetch enough foreign currency to the country its production is reported to be generally small. These low average yield of the crop was mainly attributed due to low intensity and erratic rainfall distribution pattern; the lack of improved varieties, lack of improved agronomic technologies and prevalence of diseases and insects pests. Moreover, physiological problems such as branch dieback, absence of shade trees, minimum use or lack of agricultural inputs in the smallholder coffee orchards, and similar other reasons might contribute to the low coffee yield (MARC, 2011). As reported by zonal agriculture office (2010) reported, in west Hararge only out of 1.76 million hectares of 60 thousand hectare of land were covered with coffee. Farmers of the area grow more than four coffee landraces having their characteristic features including *shumbure*, *abadir*, *kubaniya*, *buna guracha*, *buna kella* and so on (Bayeta *et al.*, 2000).

### **1.3 Research Problem**

In Hararge, despite the variety of local coffee types that were known by high quality specialty coffee type, the coffee quality is declining due to several improper pre-and post-harvest management practiced by the majority of coffee farmers and traders. As a result, the coffee price has been fluctuating, which leads to low price (USDA, 2012). Moreover, this quality problem is mainly related the poor agronomic management and postharvest management practices, particularly poor harvesting, processing and handling of coffee beans. This shows that, merely having potential will not bring a significant contribution to farmers and country's income.

Inadequate production management practice such as improper use of fertilizer, weed control, pests and disease attacks, etc., bad harvesting (harvesting time and inadequate harvesting methods); and severe post-harvest processing such as drying, storing, transporting practiced by farmers of the region are highly affecting coffee quality as a result the price is becoming low from time to time (MARC, 2011). Furthermore, so far, there was no extensive coffee quality research conducted in the country, particularly in Hararge thus there is a strong interest in producing and marketing coffee of higher quality to alleviate financial difficulties encountered by coffee farmers. With these two reasons, the priority in research is on coffee quality, paying much attention to quality improvement and maintenance in the area. Therefore, interventions in the coffee sector in this regard remain of critical importance for both producers and the government as to maintain Ethiopian coffees in occupying a unique place in the world coffee trade (Scanagri, 2005).

### **1.4 Problem owner**

Mechara Agriculture Research Center (MARC)

### **1.5 Research Objective**

In order to recommend proper agriculture (pre- and post-harvest) practices that can maintain and improve coffee quality, thereby, add value for the actors, this study was conducted for the objective:

- To identify the pre- and post-harvest factors affecting the quality of dry processed Hararge coffee along the chain for further good agricultural practice.

## **1.6 Research questions**

### **1. What are pre- and post-harvest management practices that can affect coffee quality within the existing coffee value chain?**

- 1.1 What are the key stakeholders that have an effect on the quality of coffee?
- 1.2 What are the current agronomic management practices of coffee?
- 1.3 What is the post-harvest handling and processing methods at different level in the chain?
- 1.4 What are the constraints farmers faced in related to quality coffee production?

### **2. What are the coffee quality control strategies within the coffee marketing channels?**

- 2.1 What type of quality standard parameters is needed in the supply chain for the export market?
- 2.2 What are the current criteria used to tested coffee quality at central market?
- 2.3 What are the costs and selling prices of different quality graded coffee?
- 2.4 What are the major constraints that affecting the current coffee market?

## **1.7 Significance of the Study**

This study was undertaken in potential coffee supply area and investigates the contribution of actors in coffee value addition along the supply chain that would be a foremost asset to design and implement appropriate coffee quality maintaining and improvement along chain. The study also provides valuable information to stakeholders who are interested to help coffee farmers in the study area to meet standards and even harness opportunities to add value to their products thereby improve quality of their product. Furthermore, this study attempts to fill the gap in the literature by providing empirical evidence to the existing body of knowledge in technical, allocative and the potential productivity improvement in the study area for the smallholder coffee producers.

## **1.8 Scope and Limitations of the Study**

The study focused on assessing factors affecting coffee quality in a coffee chain by interviewing major stakeholders in the coffee value chain in Darolabu district. Since the study was conducted in limited sampled interviewee and PAs it could not be guaranteed generalization for the region in the general, and in the zone in particular. Nevertheless, recommendations could be applicable for identical locations having comparable agro-climatic and socioeconomic characteristics. Additionally the data and information obtained, and used in this study may expect to have some errors. Nevertheless, despite some expected limitations of the study, the results of the study can be used to develop a formal research system in the area with beginning from the farmers' knowledge dynamics and can also be used as a reference for other similar areas.

## **1.9 Organization of the Thesis**

Entire thesis has six chapters of different components. In the first chapter, an overview of background information and production of coffee was given. A review of the literature about coffee quality and related factor dealt in chapter two. Chapter three introduces background information about the study area and verifies the methods of data collection and data analyses; chapter four presents the results of the study followed by chapter discussion of the result. Lastly, chapter six offers a conclusion and recommendations.

## **CHAPTER 2. LITERATURE REVIEW**

### **2.1 Coffee Quality**

Quality is the main determined of coffee consumption globally. ISO 2000 defines quality as the ability of a set of natural features of product, system or process to meet requirements of the customer's interest. These inherent characteristics can be called "attributes." However, regarding coffee each end-users country defines its own organoleptic qualities at different level; for example, at the consumer level: coffee quality deals with price, taste and flavor, effects on health and alertness, geographical origin, environmental and sociological aspects: organic coffee, fair trade, etc. Coffee has only one value to give the consumer pleasure and satisfaction through flavor, aroma and desirable physiological and psychological effects (Yigzaw, 2005). Therefore coffee quality, determines both the relative price and usefulness of a given quantity of coffee. Cup qualification, often referred to as drinking quality or liquor quality, is an essential attribute of coffee and acts as a yardstick for price determination (Agwanda *et al.*, 2003).

Moreover, for Ethiopian coffee quality defines whether the coffee will be bought at a standard commodity price or may acquire a "specialty" price that is much higher. According to the current context of overproduction and low prices of the coffee market, improving and valorization of coffee quality could provide the coffee chain with a new impetus (Leroy *et al.*, 2006). Production and supply of coffee with excellent quality seems more crucial than ever before for coffee exporting countries. Consequently, it is important, consider assessment of coffee quality as important as disease resistance and productivity in their coffee variety development program (ITC, 2004). In view of the present situation, making efforts to overcome challenges and threats only through expansion of production does not seem visible for countries like Ethiopia. Thus, it has been repeatedly mentioned in various forums that providing good quality coffee is the only way out and viable option to get into the world market and to remain competitive (Behailu *et al.*, 2008). Therefore, for Ethiopia coffee market, CQCAC was established with the principal objective of maintaining coffee quality control, which in turn facilitates the coffee marketing system to be standard based, and for the betterment /proper functioning of the long coffee supply chain of Ethiopia (Endale, 2008).

### **2.2 Factors Affecting Coffee Quality**

In Ethiopia, the quality of coffee produced by farmers has been deteriorating due to numerous factors through the entire journey from the field to the final drinking cup. As reported by ITC (2011), farmers mostly affect coffee quality at the farm level, especially during harvesting and post-harvest management of the coffee cherry. Furthermore, coffee quality expression depends on a multifactorial integration, including pedo-climatic conditions, physiology and agronomic management, postharvest treatments and genetics factors (Lorey *et al.*, 2006). Therefore, the coffee cup quality depends on a series of factors such as the genetic, environmental, agronomical practices, harvesting and post-harvest handling such as drying system, storage conditions, industrial processing, roasting system, preparation of the beverage and taste of the consumer (Leroy *et al.*, 2006; Behailu *et al.*, 2008; Damanu, 2008). However, inadequate systems of harvesting and post-harvest management are responsible for the widespread failure to maintain the inherent quality of coffee produced in Ethiopia (Alemayehu *et al.*, 2008). Hence, in the next subchapter the detail of so far research finding on those factors was presented one by one. This finding will enrich researcher for more information about factors affecting quality in general and will be used for comparing for his result.

### **2.2.1 Genetic factors**

The coffee plant genetic origin (species and genotype) significantly influences coffee quality (Leroy *et al.*, 2006). For instance, coffee produced from *C. arabica* is known to have a good quality. This characteristic is clearly established for classical varieties like Caturra, Mundo Novo, and other pure lines obtained from pedigree selection. Agwanda (1999) compared four traits (acidity, body, flavor and overall standard) for their suitability as selection criteria for the genetic improvement of overall liquor quality. The trait showed high genetic correlation with preference, was easy to determine organoleptically and had relatively high sensitivity in discriminating different coffee genotypes.

Hence, while selecting a variety to be planted; cup quality must be the priority to be considered. Based on organoleptic evaluation, introgressed lines of Arabic were found to produce good beverage quality that was similar to the non-introgressed standard (Lorey *et al.*, 2006). For example, cultivar, SL28 had big sized beans (46% AA) and excellent cup quality, while catura and rume Sudan had small sized beans, lower cup quality and chemical content (Van der Vossen, 1985). Selvakumar and Sreenivasan (1989) observed that, the genotype is a major factor since it determines to a great extent important characteristics such as the size and shape of the beans as well as their color, chemical composition and flavor.

### **2.2.2 Pedo-climatic**

As reported by Decasy *et al.*, (2006) most importance pedo-climatic factors affecting coffee quality are geographical location, daily temperature amplitude fluctuations, amount and distribution of rainfall and the physical and chemical characteristics of the soil. Coffee grown at higher elevations with lower air temperatures take more time for completing its bean filling. This allows a slow-down ripening process of coffee berries that gives denser flavor than coffee grown at lower altitudes (or under full sunlight) (Vaast *et al.*, 2006). Slower maturation processes, therefore, play a central role in determining high cup quality (Silva *et al.*, 2005). For instance, with elevation chlorogenic acids and fat content have been found to be increased (Bertrand *et al.*, 2006). Similarly, the beneficial effect of longer maturation duration of the bean, a larger leaf area-to-fruit ratio (better bean-filling capacity) may also be linked to superior cup quality (Vaast *et al.*, 2006).

Lower temperatures and their longer daily amplitudes tend to induce slower growth and uniform ripening of the berries, and produce larger and denser beans. These ensure coffee bean size and density, which correlated to excellent aroma, flavor and beverage quality. Furthermore, altitude tends to have a positive effect on acidity by reducing bitterness (van der Vassen, 1985). For example, in coffee arabica chlorogenic acids and fat content have been found to increase with elevation. In addition to this Yigzaw (2005) said that if other factors are kept constant, better quality coffee can be found at higher altitudes while lowland coffee were found to be somewhat bland, with a considerable body. Rainfall and sunshine distributions have their strong influence on flowering, bean expansion and ripening (Harding *et al.*, 1987). Besides slope of the land has its own role on coffee quality. For instance, probably due to superior exposure to morning sunlight, east facing slopes were found beverages with more acidity with a score of about 3 out of 5 (Avelino *et al.*, 2005). Soil also the main factors responsible for affecting coffee quality. It is acknowledged that the most acidic coffee quality grows on fertile volcanic soils (Harding *et al.*, 1987).

### **2.2.3 Coffee shade tree**

Shade tree is one the main factors responsible for affecting the quality of coffee bean. For example, fruits from coffee grown under shade are characterized by larger bean size than those grown under full sun conditions. Another study found that sensory characteristics were affected



negatively, and physical attributes were influenced positively by shade tree depending on altitude (Geromel *et al.*, 2008). However, shade has different effects depending on the geographical location of coffee tree. For example, in higher altitudes shade had an adverse effect on fragrance, acidity, body, sweetness and preference of the beverage, while no effect was found on the physical quality of the bean. At lower elevations, shade did not have a significant effect on sensorial attributes but significantly reduced the number of small beans. Shade was found to mitigate negative attributes in coffee quality like bitterness and astringency while positive attributes like high acidity were found to be significantly in shade grown beans (Bosselmann *et al.*, 2009). Moreover, the shade led to a significant reduction in sucrose content and to an increase in reducing sugars (Geromel *et al.*, 2008).

Muschler (2001) indicated that the shade improved the appearance of green and roasted coffee beans as well as the acidity and body of the brew by promoting slower and balanced filling and uniform ripening of berries. Higher sucrose, chlorogenic acid and trigonelline contents in sun-grown beans pointed towards incomplete bean maturation and explained the higher bitterness and astringency of the coffee beverage. Higher fruit loads reduced berry size owing to the carbohydrate competition among berries during bean filling. Furthermore, Yilma (1998) observed that the shade increased sugar concentration, which is an important factor in creating the aroma of coffee.

#### **2.2.4 Management practices**

In Ethiopia still there is no adequate research evidence was found in coffee quality regarding management practices, especially the effect of fertilizer application has on coffee quality. However, Yigzaw (2005) reported that in South America, coffee grown with heavy application of nitrogen fertilizer had poorer, lighter and thinner quality than that from unfertilized fields. An excess of nitrogen increases the caffeine content, resulting in a more bitter taste of the brew. However, the caffeine and chlorogenic acid contents of the beans are not affected by the levels of phosphorus, calcium, potassium and magnesium in the soil. A lack of zinc will lead to the production of small light grey colored beans, which will produce inferior liquor (Wintgens, 2004). On the other hand, magnesium deficiency had an adverse effect on cup quality (Mitchell, 1988). The highest concentration of calcium (>0.11%) and potassium (>1.75%) in the beans is associated with a bitter and “hard” taste. On the other hand, there is no correlation between the phosphorus content and the physical and organoleptic quality of the bean. On the contrary, repeated use of elephant grass or livestock manure resulted in an increased percentage of undesirable brown-colored bean and, thus, poor roasting characteristics. This effect was associated with a magnesium deficiency induced by the high potassium content of elephant grass as well as high concentration of potassium and calcium in manure.

Furthermore, proper growth conditions (weed control, appropriate planting density and pruning) usually have a positive effect on bean size and flavor. Disease and insect attack (such as leaf miner and mites) may also result in lower quality beans. Pests and disease attacks can affect the cherries directly or cause them to deteriorate by debilitating the plants, which will then produce immature or damaged fruits. For instance, the coffee berry borer *Hypothenemus hamper* feeds and reproduces inside the coffee beans and causes their quality to deteriorate (Wintgens, 2004). OTA is a form of *mycotoxin*, produced as a metabolic product of *Aspergillus ochraceus*, *A. carbonarius* and strains of *A. niger* reported to exist on coffee dried on bare ground (Eshetu and Girma, 2008).

#### **2.2.5 Harvesting methods**

The main factor affecting natural coffee quality is harvesting method. Hand picking coffee beans is one method for accomplishing high quality of produces by picking red cherries only.

Therefore, it widely agrees that selective hand picking, as opposed to traditional strip and mechanical harvesting, produce the best quality green coffee by decreasing the percentage of defects in coffee batches. Maturation also has a strong influence on coffee quality, and it vary with coffee species. *C. arabica* early picking of red cherries gives the best coffee cup and physical quality (Bertrand *et al.*, 2006). This can be seen in bean size, chemical contents, and cup quality. On the other hand, Endale *et al.* (2008) pointed out that low caffeine content was found in bean harvested at an immature stage (unripe) and in over-ripe coffee beans with conventional analysis using HPLC. According to their findings, this could be associated with a slow metabolism of caffeine and its biodegradation at the immature and over ripe stages of fruit development, respectively.

### **2.2.6 Post-harvest processing and handling practices**

The chemical composition of green coffee and thus the final coffee quality are correctly determined by the mode of post-harvest treatment, i.e. the wet and dry processing. As recently shown, there are specific differences in the chemical composition of various processed coffee beans (Bytof, *et al.*, 2007). Thus, processing is a crucial activity in coffee production and plays a crucial role in quality determination (Mburu, 1999). It includes dry and wet (semi-washed and washed) processing. Coffee is either prepared by these methods, which vary in complexity and expected quality of the coffee (Wrigley, 1988). In general, only mature fruits are used for wet processing, whereas the dry processing includes fruit from different maturation stages (Selma *et al.*, 2002). Likewise, the composition of low molecular flavor precursors, i.e. carbohydrates (Knopp *et al.*, 2006) and free amino acids (Selmar *et al.*, 2002) are different in different processed green coffees. From this, it can be reasoned that the metabolic status of differently processed coffees is different.

In Ethiopia both dry and wet processing methods are operated, which accounts for 70% and 30% of coffee production respectively (Jacquet *et al.*, 2008). However, in Hararghe only dry processing is practiced which was frequently deteriorated their coffee quality. According to Bytof *et al.* (2007), the specific ambient conditions of any post harvest processing can have significant impacts on the time course of the metabolic reactions that occur during that processing period. The substantial differences in flavor between wet and dry processed coffees are the result of differences in the metabolic activities that take place in each processing type.

Similarly Knopp *et al.* (2006) states that, flavor differences in part have to be attributed to differences in the thoroughness applied to either method of post-harvest processing as well as the fact that only the fully ripe coffee cherries are typically used for wet processing as opposed to dry processing where fruits of varying stages of ripeness are commonly used. In his description of processing, the sugar content in green Arabica coffee beans was profoundly influenced. In addition, there is a close correlation between the type of post-harvest processing and the content of fructose and glucose in the coffee bean. Recently, it has been shown that the variation in the drying procedure in the course of dry and wet processing strongly affects the abundance of various sugars, representing significant aroma precursors (Kleinwächter and Selmar, 2010).

#### **2.2.6.1 Dry processing**

In these processing methods, the soft pulpy part of the cherry together with the skin is 'turnoff' to open sun as soon as harvested. This is a natural process and is the simplest and the harvested cherries classified then are dried in their entirety, most usually in the sun (Clark, 1985) or the fruit is allowed to remain on the tree past the full ripe stage and is partially dried before harvesting (Sivetz and Desrosier, 1979). As a result, the dry processed cherries are less aromatic but with greater body (Clifford, 1985). It is a natural coffee, since it always dries in

contact with its mucilage. As already reported by Knopp *et al.* (2006), the concentrations of glucose and fructose is markedly higher than in wet-processed beans. However, still in all of this study area (Hararge) coffee is prepared using a dry processing (natural sun-dried) system, which is the first method by which the fresh cherries are harvested and sun-dried as a whole. After drying, the cherries are sold to local collectors, wholesalers or cooperatives, which are operating the secondary processing facilities (CFC, 2004).

#### **2.2.6.2 Wet processing**

In this method, the harvested ripe red coffee cherries are pulped, and the mucilaginous residues of the pulp are degraded by fermentation. Wet processed Arabica is aromatic with fine acidity and some astringency, since it is used underwater fermentation as opposed to dry accentuates the formation of acids (Clark, 1985). Fermentation enhanced glucose turnover from anaerobic fermentation in the coffee endosperm thereby decreases in glucose and fructose concentration (Knopp *et al.*, 2006). The perceived acidity of washed coffees is also significantly higher than the acidity found in naturally processed coffees (Yigzaw, 2005). Similarly, coffees prepared by wet methods showed higher contents of chlorogenic acids and trigonelline and lower content of sucrose, however, regarding caffeine, no difference was observed between both methods (Duarte *et al.*, 2010).

With washed coffee processed, final quality among others is greatly dependent upon the fermentation process (Woelore, 1993). It has been confirmed that underwater soaking following 'dry' fermentation, i.e., two-stage fermentation enhances the appearance of both raw and roast coffees compared to 'dry' fermentation only (Behailu *et al.*, 2008). Also, the authors report that post fermentation, soaking for 24 hours produced better raw and roast appearance than either 8 or 16 hours soaking, but extending the soak for 48 hours did not cause any further improvement to the raw and reduced the roast quality. Similarly, underwater soaking of washed wet parchment for a specified period was reported to improve raw and liquor quality of coffee by way of leaching some of the chemical compounds (diterpenes, polyphenols, tannins etc.) responsible for bitterness and browning of coffee beans (Velmourougane, 2011).

Natural fermentation of coffee is the function of many parameters, such as environmental, pH, temperature, microflora and the level of pollution in the water used, variety difference in the ripe cherries used for pulping, its geographical and cultural origin, the standard of picking and minor variations in the processing method (Behailu *et al.*, 2008). Furthermore, Behailu and Solomon (2006) reported that coffee, fermented under shade takes more time, shaded fermentation tanks help to achieve uniform fermentation process and better quality coffee than unshaded one. However, the assessment made on wet processed Jimma coffee by Brownbridge and Eyassu (1968) revealed that it is very heterogeneous, containing bones of all shapes, sizes and plain liquor, probably because of such a mixed type characterized by small beans of a lovely green color and exquisite aroma.

#### **2.2.6.3 Coffee cherry and bean storage**

Length and condition of bean storage also affect cup quality (Yigzaw, 2005). Long time storage under high relative humidity and warm conditions increase bean moisture content and consequently reduce quality in terms of raw and roasted appearance as well as liquor (Woelore, 1995). Regardless of the post-harvesting process, the beans are stored with a moisture content of 11–12%, and at this stage, they are suitable for roasting. Thus, this process is considered one of the most important steps in the development of the characteristic flavor and aroma of coffee. During storage, the relatively high content of glucose present in dry and wet processed green coffees stored beyond 4 to five months decreased markedly (Woelore, 1995).

## CHAPTER 3. METHODOLOGY

### 3.1 Description of study area

The study was conducted in Darolabu district, west Hararge zone of Oromia Regional State in eastern Ethiopia (Figure 1). The area is situated between 7°52'10" and 8°42'30" N and 40°23'57" and 41°09'14" E. Mostly flat and undulating land features characterize it with altitude ranging from 1350 up to 2450 m.a.s.l. The ambient temperature of the district ranges from 14 to 26 °C with an average of 16 °C. Average annual rainfall is 963 mm/year. The pattern of rainfall is bimodal, and its distribution is mostly uneven. There are two rainy seasons: the short rainy season 'Belg' lasts from mid-February to April whereas the long rainy season 'kiremt' is from June to September. The rainfall is erratic; onset is unpredictable, its distribution and amount is also quite irregular. Consequently, most PAs frequently face shortage of rain; hence, moisture stress is one of major production constraints in the district.

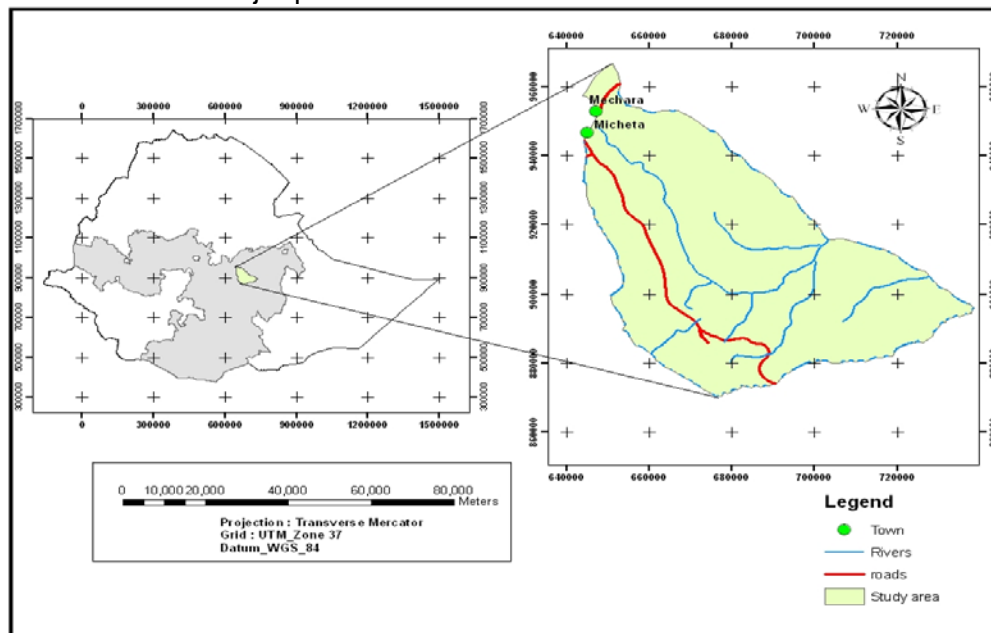


Figure 1. Map of study area

Source: DADO [District Agriculture Development Office (2010)]

Farmers in the study area give due and equal priority to food and cash earnings crops. Land allocation for different crops, mainly follows market situation. Most part of farming land is meant for production of coffee, groundnut and 'khat' (*Catha edulis* L.). Other crops are mostly intercropped in coffee or 'khat' farms. They prefer to buy food crops in addition to what they produce from their small plots. The resource bases in the district are deteriorating from time to time. Deforestation is a severe problem in the area that almost all natural forests have vanished, and there is already a chronic shortage of construction materials and fuelwood let alone to consider the environmental value of the forests. Soil erosion, exacerbated by deforestation and land mismanagement, has caused substantial damages to farm and other lands. Consequently, productivity is continuously reducing; springs and rivers are drying up (DADO, 2010).

### 3.2 Research design

A brief description of research design for this project was given in Table 1 below.

Table 1. Table of research design

Research Questions		Key Words	Source of Information	Research Strategy
Main questions	Sub Questions			
1	1.1	Coffee stakeholders involved in the coffee chain	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Coffee value chain documents</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Survey</li> </ul>
1	1.2	Coffee pre-harvest management practices	<ul style="list-style-type: none"> <li>Articles</li> <li>Scientific literature</li> <li>Coffee production manual</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Survey</li> </ul>
1	1.3	Coffee post-harvest and processing management practice.	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> <li>Coffee production and processing manual</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Survey</li> </ul>
1	1.4	Constraints faced by coffee growers	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Survey</li> </ul>
2	2.1	Current coffee quality standard parameter for the export market	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> <li>Coffee quality book</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Interview</li> </ul>
2	2.2	Criteria for coffee quality testing at market level	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> <li>Coffee quality book</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Interview</li> </ul>
2	2.3	Price of different graded coffee	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Interview</li> </ul>
2	2.4	Major constraints of coffee marketing	<ul style="list-style-type: none"> <li>Articles in Journals</li> <li>Scientific literature</li> <li>Coffee production and processing documents</li> </ul>	<ul style="list-style-type: none"> <li>Desk Study</li> <li>Interview</li> </ul>

Source: Author's (2014)

### 3.3 Research strategies

This research was employed in combination of different research strategies in order to come out with its outputs. Therefore, the strategies used were a desk study to find out the relevant information from the related research so far done; survey with small-scale coffee producing farmers to assess pre-harvest and post-harvest factors affecting coffee, and an interview of coffee marketing actors was undertaken.

#### 3.3.1 Desk Study

A desk study was undertaken to find relevant information on the research subject matter. Sources of data for the desk study would be articles in Journals, books and different scientific reports. The information gathered from the desk study was used to compare the field research findings.

#### 3.3.2 Survey

For this research, sampling method used for the survey data collection was simple random sampling. The farmers were randomly selected from the major coffee producing peasant associations (PAs) of the Darolabu district. Thirty (31) farmers were randomly sampled from the coffee producing village in the Darolabu district. Accordingly, Chafe Hara, Jilbo, Serero and

Guddis peasant associations were selected as representative sampling villages. Out of all coffee producers, the drawing numbers sampling technique were used for random farmer selection in order to reduce bias. The survey was used to obtain information from the farmers about their factor affecting coffee quality by interviewing them with semi-structured questionnaire (Appendix 1).

### 3.3.3 Interviews

The interview was conducted from randomly selected stakeholders including; four traders, two processors and two exporters. An interview was also done with the head of Charcar Oda Bultum Cooperative Union and Ethiopia commodity exchange and Dire Dawa inspection coffee quality center (Table 2). Checklist questioners found in Appendix 2-7 were used to guide the researcher for extracting information from respondents. The interview was enabled the researcher to obtain information on post-harvest factors affecting coffee quality, coffee marketing situation, the price of different graded coffee, quality testing standard and methods.

Table 2. Interviewed stakeholder matrix

Stakeholder	Number	Characteristics	Strategy
Farmers	31	Randomly selected farmers	Survey
Traders/collectors	4	Randomly selected traders	Interview
Processors	2	Widely known processors	Interview
Wholesalers	2	Exporters	Interview
ECX	1	Head/ speaker man	Interview
Cooperative	1	Head of the office	Interview
ECQIC	1	Head of the office/expert	Interview
Total respondents	<b>42 different stakeholders</b>		

Source: Author's (2014)

### 3.4 Research Framework

The research was done by desk and field study. The data of the field study were analyzed separately. The results were compared with literature found in the discussion chapter. In the end, Conclusions and Recommendation were made based on the Results and Discussion (Figure 2).

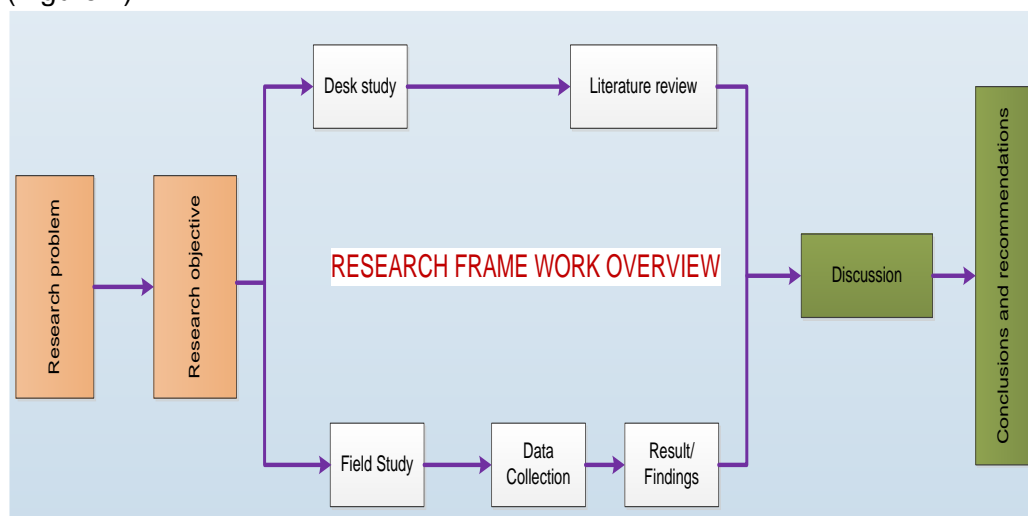


Figure 2. Research framework

Source: Author's (2014)

### 3.5 Conceptual Framework

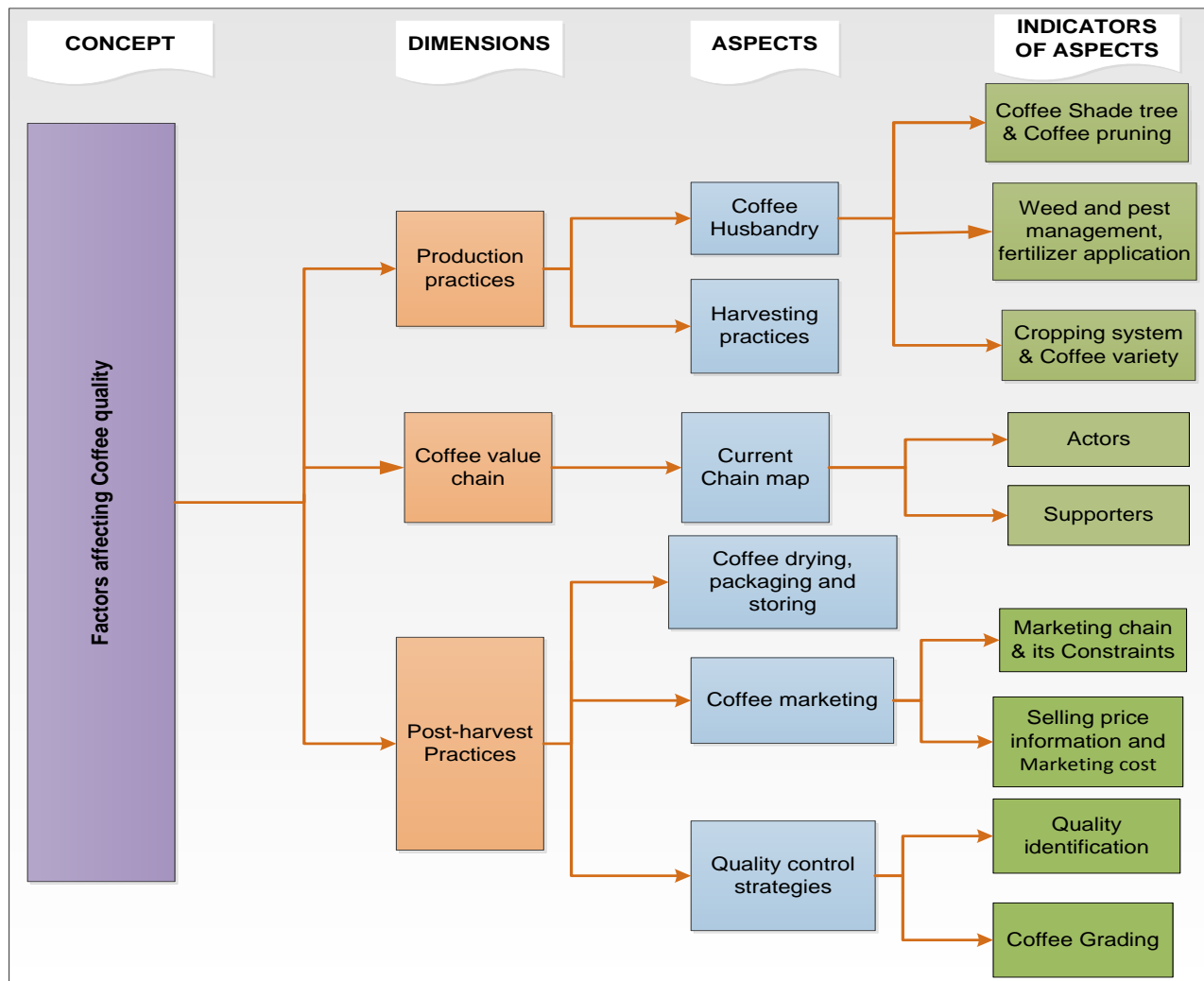


Figure 3. Conceptual framework of the research

Source: Author's (2014)

### 3.6 Data analysis

Both qualitative and quantitative data were collected, organized, summarized, analyzed and where possibly analyzed data were presented with tables and figures/charts. Therefore, data were analyzed separately based on the information gathered from the survey and interview. The result gained from surveys, interviews and desk study from different stakeholder and actors of coffee chain were interpreted and compared with relevant literature.

After collection of the necessary data, the data were analyzed by using SPSS computer software and Excel sheet. Chain map and stakeholder analysis and SWOT analysis were carried out to find out Strength, Weakness, Opportunity and Threats of the coffee value chain.

## CHAPTER 4. RESULTS

### 4.1 Finding from Field Survey

#### 4.1.1 Respondent characteristics

From the collected sample data, analyses of the farmers' characteristics variables were assessed, and the following results were obtained:

The analyzed survey result obtained from respondent characteristics are summarized in table 3 below. Accordingly the interviewed of the sample farmers exhibited variation in their ages ranging from 25 to 60 years. Most of the farmers 68% were found in the age group between 30 and 50 years. Furthermore, results from this study show that both men and women participate in coffee production with the highest percentage 97% of the respondents being male. Regarding the education level out of 31 sampled farmers, 42% (13) of them were illiterate, and only few farmers (4) are joining the second cycle primary school and high school in their education level. This result revealed that the majority of respondents has joined primary education. Forty-five percent have a category of grade 1-6 education.

Table 3. Analysis of characteristic of respondents of Darolabu district

Variables	Continuous variables				Categorical variables	
	Min	Max	Mean	SD	N <sup>o</sup>	%
Age of the farmers	25	60	37.7	9.8		
Sex						
Male					30	96.8
Female					1	3.2
Educational level						
Illiterate					13	41.9
Grade 1-6					14	45.2
Grade 7-12					4	13.9
Farming experience in coffee	5	35	18.4	7.5		
Coffee land holding in a hectare	0.3	2	0.6	0.4		
Number of coffee trees	100	2500	666	511.3		

Source: Author's (2014)

Survey result revealed that the average farming experiences coffee farmers was 18 years with minimum of 5 and maximum 35 years. This shows that farmers have a wide experience in coffee production. Coffee land ownership status is one of the factors that affect coffee productivity. From this survey, the respondents' coffee farm size ranged from a quarter to two ha. The average farm size was 0.6 ha. On this land coffee tree number, growing by farmers has varies ranged from 100 to 2500. The average coffee tree number was 666 (Table 3). In general, these numbers of the coffee tree population have high diversity between respondents this is due to a shortage of land holding by farmers. Farmers with large farms have a large number of coffee trees. Besides, every interviewed farmer said that if they get additional farm land they have a need to increases coffee farm.

#### 4.1.2 Coffee Production in Darolabu district

From the survey, it is obtained that, in the district average yield of the coffee tree is 11 quintal per hectare of 'jenfal' (unhulled) coffee that low compared to national yield. It was observed that, there is huge yield variation between farmers, which is between 1 and 31 qt/ha. Reason of this



great diversity is due age of coffee tree, management practice, the type of coffee varieties grown and Agro-ecology of the farm. For example, survey results regarding age of coffee tree showed that, 58% (18) of farmers owned old coffee trees (>15 years) while 10% (3) of them owned coffee trees less than eight years old (Figure 4).

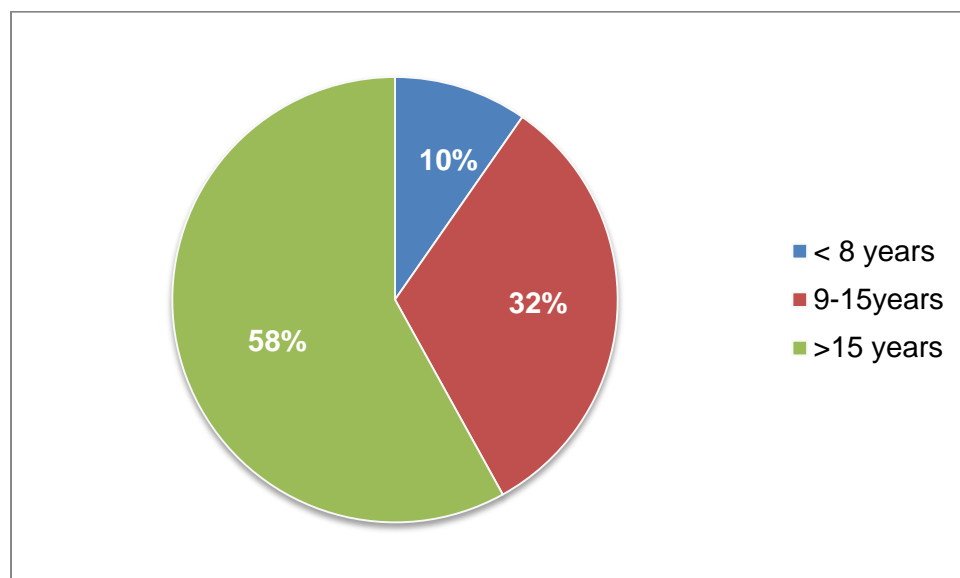


Figure 4. Age of coffee owned by respondent of Darolabu district  
Source: Author's (2014)

#### 4.1.3 Local coffee variety growing

Most interviewed respondents grow one or more variety in a single orchard. Consequently, from this survey, more than 60% of respondents grow variety shumbure followed by variety abadir. Others grow a mixture of kubaniya and buna guracha on a single field (Table 4). However, the preference of this variety by farmers is depending on the farm location, yield and quality. Accordingly, farmers in highland to mid-altitude were mostly preferred to grow abadir but farmers in lowland areas were preferred to grow shumbure than all. Additionally, coffee farmers were able to identify coffee landraces by their general morphological feature and their reaction to the disease such as coffee berry disease (CBD), quality attributes presence or absence of aroma during bean roasting. The survey result revealed that, among the coffee, a local variety grown in Darolabu district, abadir, shumbure and buna guracha coffee landraces are the dominant ones. According to farmers, due to its yielding potential shumbure is most preferable by many farmers, however, in terms sustainable bearing fruits, quality attribute such as an excellent aroma and size of fruit abadir was the most preferred one in district. Important characteristics of the different coffee landraces that are being produced in the area are described below.

Table 4. Types coffee landraces growing by farmers in Darolabu district

Local variety growing	N <sup>o</sup>	%
Shumbure	19	61
Abadir	8	26
Mixture of Abadir and Shumbure	2	7
Mixture of kubaniya and buna guracha	1	3
Mixture of Abadir, Shumbure and kubaniya	1	3

Source: Author's (2014)

#### General characteristics of those varieties:

- **Shumbure:** it is characterized by overbearing in yield hence it has a problem of alternate bearing, good vigorous and compact in growth characteristic habit, small and round with fruit, its leaves are narrow, long and bronze- tipped in color, and comparing with other it is medium to resist to Coffee Berry Disease (CBD).
- **Abadir:** its commonly adapted in midland to highland area, its yield is medium with no behavior of alternate bearing compared to shumbure type, it is characterized by high and irregular in yield, big and round fruit, vigorous, open thin and long, bronze- tipped in leaf color and highly susceptible to CBD disease.
- **Kubaniya:** most farmers do not currently produce it but it is found in some ancient coffee since it recognized by poor and irregular in yield. Beside it is poor vigor characteristics, open and medium in internode branches, small, round and dark red fruits, bronze-tipped, small and poor attention in leaves and susceptible to branch dieback.
- **Buna Guracha:** its yield is poor and irregular; its growth characters are medium vigor, open and long internode branches, green tip in leaf, large and long dark red fruits, resistance to CBD.

#### 4.1.4 Coffee field management practices

Results obtained from survey data collected regarding farmers' coffee field management practices of Darolabu district is described below.

##### 1. Cropping system

In the area, intercropping the major or complementary crops is the most common cropping practiced by coffee producing farmers. This survey reveals that 87% (27) of responding use mixed type of coffee cropping system. Only 13% (4) of respondent not mix coffee with any crops. Reason for their intercrops are most commonly said answer is a shortage of cropland and to overcome risks such as crop failure, crop loss due to erratic rainfall at the same time to incur farmers additional grain yield because of coffee yield is low and to use wide space between rows of coffee. Besides, result showed that, types of produce grown with coffee are maize, haricot bean, 'khat' and sorghum. However, maize (48%) is the most intercrop crop with coffee followed by haricot bean (7%) and 'khat' (4%) other are a mixture of different intercropped crops (intercrop more than one crop with coffee at a time). For example, maize and haricot bean; corn, haricot and chat; maize, sorghum and chat; and maize, sorghum and haricot bean.

##### 2. Fertilizer application

Using fertilizers for crop production is crucial for boosting crop yield. Consequently, all 31 farmers interviewed during his study use organic fertilizers such as farmyard manure and/or compost to their coffee trees. Most farmers (23) apply farmyard manure the other applies a mixture of FYM and compost together, unfortunately; there is no practice of applying compost alone to the coffee farm in the area (Figure 5). The rate of its application varies depends on its

availability by farmers. Therefore, farmers apply from 3 to 31 tons per hectare of farmyard manure and/or compost per hectare of the coffee field. The average rate of organic fertilizer application used by farmers is about 12 ton/ha (Table 5).

This survey additional revealed that, farmer widely not use inorganic fertilizer compared to organic fertilizers. Only 29% (9) farmers apply chemical fertilizer under coffee tree. Accordingly, out of inorganic fertilizers used by some farmers, DAP was widely applied fertilizer than UREA, but farmers equally used UREA and the mixture of them is small amount (Figure 5). They apply from 0.5 qt/ha to 2.5 qt/ha. However, the average application rate calculated from this study was about one at/ha (Table 5).

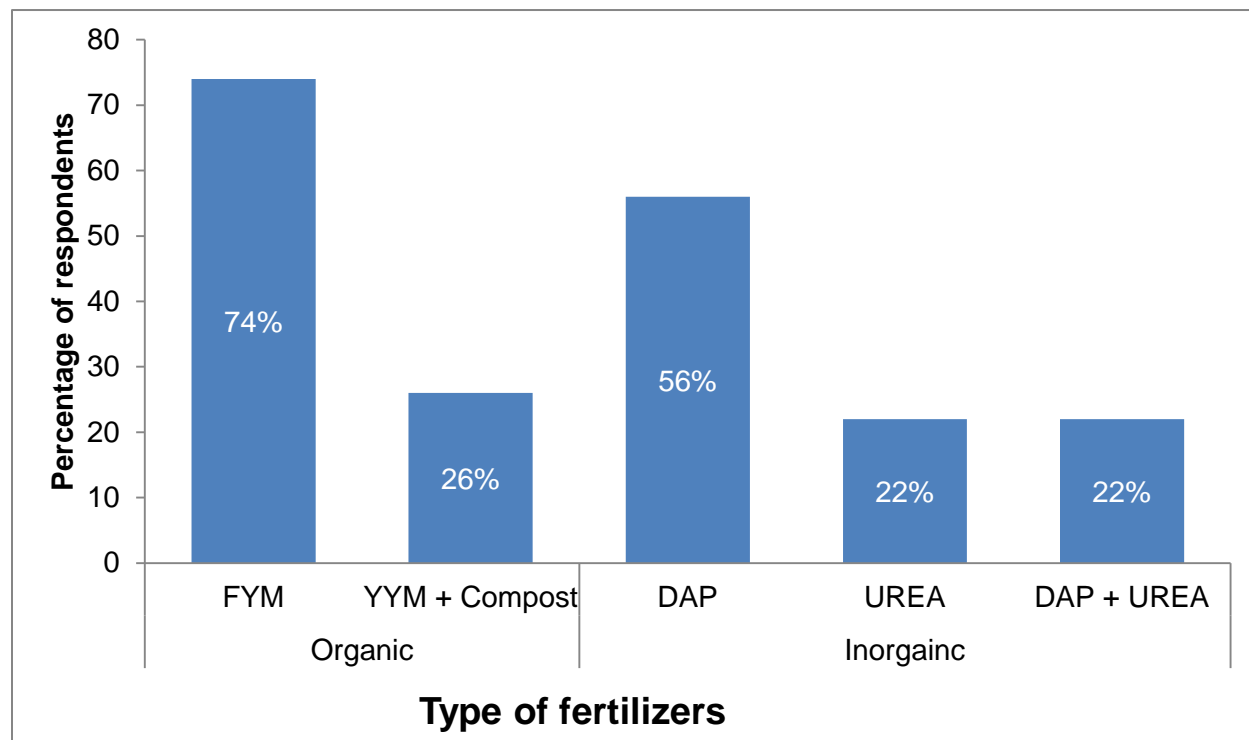


Figure 5. Types of organic and inorganic fertilizers used by farmers in Darolabu district  
Source: Author's (2014)

Table 5. Rate of fertilizers applied by farmers

Fertilizer	Amount applied by farmers (qt/ha)			
	Min	Max	Mean	SD
Organic fertilizer application (ton/ha)	3	31	12.24	7.19
FYM	3	26	12.20	6.77
FYM + Compost	3.2	15	7.90	3.80
Inorganic fertilizer application (qt/ha)	0.5	2.5	1.07	0.76
DAP	0.5	2.5	1.23	0.95
UREA	0.5	-	0.50	0.00
DAP + UREA	1.0	1.5	1.25	0.35

Source: Author's (2014)

### 3. Weed management

In the study area, farmers commonly practice hand weeding, cultivation and hoeing together for controlling weed from their field. Accordingly, this study revealed that most of the farmers' practice hands weeding followed by cultivation followed by hoeing. Besides, many of respondents employed only cultivation and hoeing and the farmer did not use herbicide as well as slashing the method of weed control (Table 6).

Table 6. Weed control methods used in the area

Weed controlling method	Nº	Percentage (%)
Cultivation only	8	26
Hoeing only	6	19
Cultivation followed hoeing	10	32
Hand weeding followed hoeing	4	13
Hand weeding followed cultivation followed hoeing	3	10

Source: Author's (2014)

### 4. Pruning

In this study, it was discovered that more than 90% of farmers practice at least one type of pruning, but the other 10% did not do any type pruning. Besides from survey even though the majority of coffee plantations in the farmer's hand were greater than 15 years old, only 7% of respondent coffee farmers practiced stumping pruning.

### 5. Coffee shade management

Farmers in the area grow coffee with/out shade in the field. This survey revealed that 87% of farmer use shade tree of which only 10% usefully shaded coffee field whereas about 13% of farmers entirely do not use shade (open shaded coffee farmers) the other have partially open shade using (Figure 6).

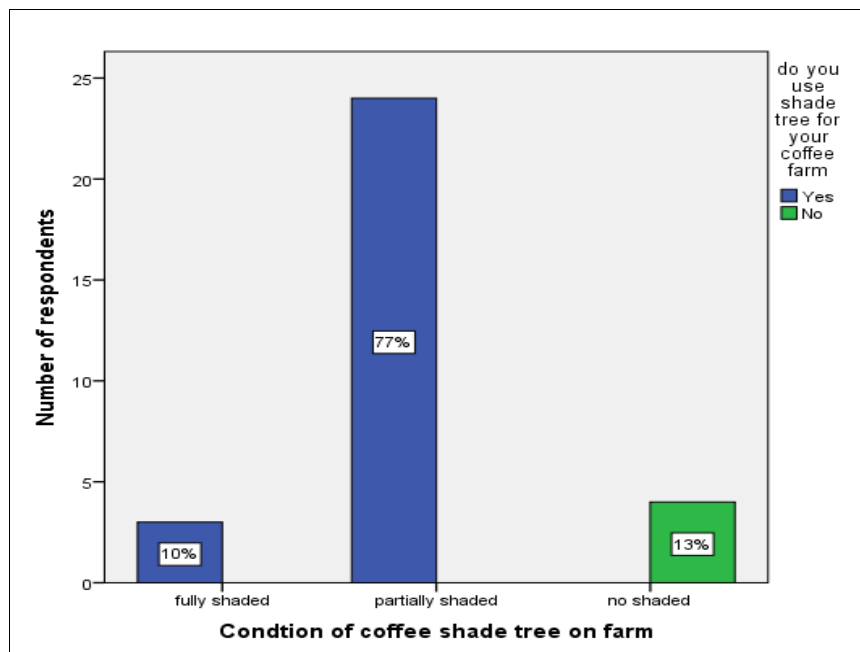


Figure 6. Coffee shade tree practices

Source: Author's (2014)

## 6. Disease and insect pest management

On top of that, it was identified that the majority of coffee farmers (77%) responded the prevalence of disease and insect pests. CBD, CLR and branch dieback are major disease faced by many farmers. Additionally, this survey showed coffee in the area has been widely threatened by branch dieback (28%), followed by CBD and CLR (Figure 7). The surveys also revealed that farmers of Darolabu district are not using any type of chemical control mechanisms. However, farmers have some indigenous knowledge and experience to control the diseases. These include planting coffee seedling in the deeper and wider hole to attain well established tree capable of absorbing ground water so as to make the tree less susceptible to the diseases; planting coffee trees under shade to reduce transpiration and make them less stressed (not to be easily attacked by the disease); application of farm yard manure and/or compost. Frequent cleaning and burning of fallen leaves, fruits and plant debris.

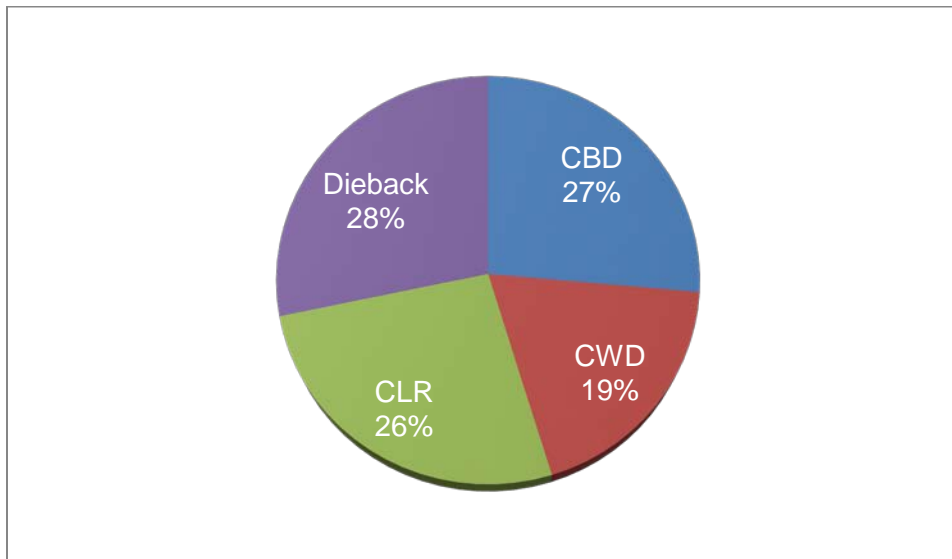


Figure 7. The type of coffee disease observed in the coffee field  
Source: Author's (2014)

Additionally, stem borer, berry borer, ants, leaf miner and some trips are major insect pests attacking the crop. Accordingly, result from this study showed that about 54% of respondents face stem borer followed by ants (18%) insect pest however other such as leaf miner, trips, berry borer are minor insect pests found from this study. Additional respondents said application of different traditional management practices, such as adding ash around coffee trees, flooding or burning or digging mound, and killing the larva manually by inserting sticks into a hole burrow by insects, for the control of ant and stem borer. However, such traditional control methods may not be adequate for effective control.

### 4.1.5 Harvest and post-harvest management

The results obtained from the survey regarding all harvesting and postharvest management practiced were given in table 7 below.

#### 1. Harvesting and drying

Study result revealed that the majority of the farmers were exercising traditional harvesting and post-harvest management practices. As understand from table 5 below in terms of harvesting methods more than half of the farmer's practice strip harvesting. Additionally, figure 8 below shows that, during harvesting by this method, most farmers start harvesting when approximately

fruit maturity stage reach about 75% (i.e. When 75% of fruits on the tree were red) and some farmers start harvesting when 50% of fruits were red. At this, two stages early-matured fruits were dried on the trees and late maturing were not ripe. By stripping farmers collect all ripe, unripe, and dried together at once or twice in harvesting month. However recommended practice like harvesting when red cherry observed, select this red cherry only by collect hand picking (45%) and drying on plastic sheets (74%) that maintain the inherent coffee quality were not commonly practiced by farmers (Table 7).

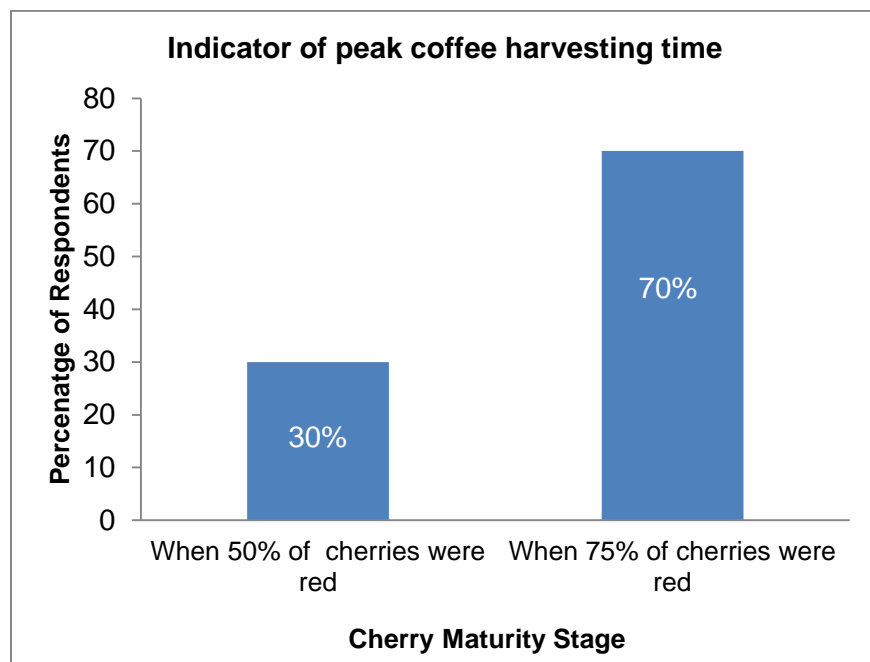


Figure 8. Indicator of the coffee maturity stage by farmers of Darolabu district  
Source: Author's (2014)

## 2. Packaging and storing

Farmers in the study area use both sisal sack and plastic or polyethylene bag as packing materials. The result showed that 94% of the interviewed farmers lacked the sisal sack and forced to use polyethylene bag since it is easily affordable and cheap to farmers (Table 7). Moreover, survey results showed that, most farmers lacked storage facilities like warehouse instead they used their residence house and stored their coffee for more than three months, which is considered as coffee quality deteriorating factor (Table 7). Accordingly, 96% of interviewing farmers face weight loss of their coffee after a long period of storage. They said 2 to 5 kg/qt loss was observed. On average about 7 kg/qt loss with a standard deviation of 3.9 was recorded.

Table 7. Harvesting and post-harvest management of coffee in Darolabu district

<b>Variables</b>	<b>Nº</b>	<b>%</b>
<b>Coffee flowering months</b>		
April	18	58
March and April	10	32
April and May	3	10
<b>Peak harvesting months</b>		
October	2	6
November	16	52
December	13	42
<b>Harvesting frequency</b>		
Once per two weeks in harvesting month	9	29
Every time when cherries ripe	3	10
Once per harvesting month	15	48
Twice per harvesting month	1	3
Three times per harvesting month	3	10
<b>Harvesting methods</b>		
Selective peaking	14	45
Strip harvesting	17	55
<b>Drying methods</b>		
On the bare floor	8	26
On plastic sheet floor	23	74
<b>Packaging material</b>		
Sisal/jute sack	2	6
Polyethylene bag	29	94
<b>Storage period</b>		
Sale immediately after harvest and dried	7	23
1-3 month	3	10
3-6 month	13	42
Up to one year	2	6
Wait until the price increases	6	19
<b>Storage place</b>		
Residence home	24	90
Warehouse	3	10

Source: Author's (2014)

#### 4.1.6 Coffee marketing

The result obtained from this study was presented in table 6 below; from the table farmers in the area sell red, not well-dried and well-dried coffee to local collectors, legal traders and primary cooperative. Most farmers sell dried coffee to local traders in their village market. However, currently only few farmers sell red coffee. Most farmers (64%) sell their coffee portion by portion rather selling once in bulk because they want to wait until higher price come (Table 8). The respondents said, price of coffee was very low and fluctuated from time to time, which moving out the farmers from producing coffee. Additionally, a result showed that the price unhulled dried coffee in 2013/14 is between 23 ETB to 37 ETB with average 31 ETB per kg. This price is low when compared to the price of previous year (2012/13) which is in average 45 ETB /kg.

Table 8. Analysis of coffee marketing in Darolabu district

<b>Variables</b>	<b>Nº</b>	<b>%</b>
<b>Selling red cherry</b>		
Yes	7	23
No	24	77
<b>Selling place</b>		
Village market	22	71
District Market	6	19
Both Village and District market	3	10
<b>Sell to whom</b>		
Local collectors	16	52
Traders/Processors	13	42
Primary cooperative	2	6
<b>Selling type</b>		
In bulk	10	32
Portion by portion	20	65
Both in bulk and portion by portion	1	3

Source: Author's (2014)

#### 4.1.7 Coffee Production Constraints

Coffee production constraints at the producers' level were identified with coffee producers during the survey. Table 9 presents major constraints identified by farmers of the Darolabu district.

Table 9. Major problems faced farmers of Darolabu district

<b>Major constraints</b>	<b>Frequency</b>	<b>%</b>
Lack of improved variety (low yield of local variety)	8	26
Climate change (Drought & irregularities in rainfall)	22	71
Diseases and pests	19	61
Price fluctuation	25	81
High cost of fertilizer and shortage of chemical in the market	3	10
Cheating of weight by local traders	4	13
Shortage of land	5	16
High price of drying and packaging materials	4	13

Source: Author's (2014)

#### 4.1.8 Extension service provided to farmers

Survey results revealed that 67% of the sampled coffee farmers had received extension services such as advice on production management and improved coffee variety in general and in maintaining coffee quality in particular while remaining 33% did not get any type of service. These services were given to them mostly by DAs (85%) representing district agriculture office, research center (10%) and 5% from the model farmers of the area.

## 4.2 Findings from the interviews

This section mainly focuses on the coffee marketing channel and current exported coffee quality controlling strategy used. The study findings from the interviews with the traders/processors, cooperative union, exporters and ECX office and coffee quality inspection center were presented in the next section.



#### **4.2.1 Characteristics of marketing actors**

Response from traders/processors showed that, all actors have license from ministry of trade (MOT) for conducting coffee business in the areas. Their average year of experience in the coffee business is about eight years. Accordingly, they can buy coffee from any area of the western Hararge zone. Traders mostly buy coffee from farmers, both in the village and district market of Darolabu, Habro and Boke districts of west Hararge. Some of them buy coffee in the village through their representative local collectors (unlicensed traders) who collect coffee in a remote area at village town and supply to the district town to the traders. In general, according to current rules of the coffee marketing regulation of Ethiopia both coffee collector and processors are legal traders. Therefore, licensed traders can buy and process and supply coffee to the central market for selling to exporters through the ECX transaction floor.

On the other hand, exporters also have an exporting license from MOT and work as a current rule of ECX. This interview was made on two exporters called Birra and Milki coffee export Private Limited Company. Their average experience year is six years. Exporters buy coffee from trader/processors at ECX bidding floor at Dire Dawa. In addition, since the past five years the cooperative union has been purchasing limited amount of coffee from legally established primary coffee cooperatives in villages. Cooperative union then, process and supply coffee either directly to foreign buyers or to exporters through ECX auction center.

#### **4.2.2 Post harvest practice by marketing actors**

Out total interviewed traders, 67% of traders in the area buy both red and dried coffee from farmers and local collectors. However, 33% of traders do not buy red cherry except some who buy 'lazaza' (not well-dried cherry) otherwise they buy only dried coffee. The red and 'lazaza' coffee bought by traders then dried on recommended cemented ground floor with great care by following drying recommendation told them by coffee quality experts in order to maintain product quality. For creating value addition, all traders practice post-harvest practice such as drying, hulling (processing), clearing from the inert material like coffee husk, small and shrink bean before packaging for transporting to the central market by using daily labor. Then after district expert of coffee quality, inspection will check and give approval and confirmation letter of transporting to the ECX transaction center.

With regard to packaging, in order all interviewed traders use packing material sisal bag for hulled green bean ready to transport to central markets, however, they use a both sisal sack and polyethylene bag for collecting coffee from farmer and local collectors and also for storing coffee until hulling. Furthermore, traders said that all local collectors use unrecommended packaging material called polyethylene bag rather than using recommended sisal sack (Figure 9). By using this packaging material, all interviewed traders store coffee on average for about two months to facilitate drying process before processing or hulling in their own recommended coffee warehouse. Nevertheless, the result also showed that, all traders will no longer store the hulled and processed over one to two days as they immediately transport within one or two days of hulling to the central markets. Their reason of doing an the immediate transport of processed coffee aimed to benefit from the current coffee price and at the same time, to keep the quality of the produce as green bean coffee will loss quality from longer storage.

Besides quality loss, during storage all traders face losses of coffee weight. They responded that, coffee stored up to two months can cause the lose weight from one to eight kg/qt and on average the loss of 4 kg/qt was reported. As they said, reasons for this loss, buying not well-dried coffee, using sisal-packaging material and storing for long periods. One trader with many years of coffee trading experiences said, *"Although the quality of the coffee was highly affected by using a polyethylene bag, the weight loss of coffee with it is very low when compared to*

*recommend packaging material. Therefore, he additionally said I prefer to use polyethylene bag sack for storing coffee if I planned to store it for extended periods, but during this storing period in order to keep quality of the product I use well-aerated warehouse".* However, most traders for controlling such loss by practicing immediate processing and selling and purchasing well dried coffee only.



Figure 9. Packed and stored unhulled coffee by traders in Darolabu district  
Source: Author's (2014)

#### **4.2.3 Mixing of different quality coffee**

From the interview, it was observed that, the problem of mixing different quality coffee by traders. All interviewed traders mix all types of different quality coffee purchased from different local market of west Hararge zone and other actors. Coffee grown in the area are different in quality depending on agro-ecology where the coffee was grown, coffee variety, methods of harvesting and drying. It is not possible for the traders to handle coffee by its quality separately in order to get large quantity enough to transport to the central market to exporters. They believe that, if these different types of quality coffee were handled separately the quality as well as the price would improve, however, since the current quality controlling system by ECX was classify coffee based on only the area where coffee was grown, it has no value for them to keep coffee separate coffee collected from the same agro-ecology.

Accordingly, currently ECX classified Hararge coffee into three different types based agro-ecology where coffee was grown. For example they classify all coffee produced in eastern Hararge zone and some district of west Hararge zone like a Hirna, Mesela and Gemmachis as 'Harar A' coffee type which is premium coffee quality. Whereas all other waster Hararge districts including Darolabu, Habro, Boke and others as 'Harar B' coffee type and all Bale and Arsi coffee sold through Dire Dawa as 'Harar C' coffee type (ECX, 2010). Therefore, regarding 'Harar B' type all coffee is equally treated, whether it keeps separately from a place or handled. This is the main reason of mixing different quality coffee together by traders/processors. However, if this practice is not controlled early it will completely result deterioration of coffee quality both at farmer and traders levels.

#### 4.2.4 Coffee quality identification

All interviewed traders have their own judgment for identification of quality product while purchasing coffee from their customer. They check coffee by taking samples from a middle of full sack and observe physically whether coffee free from black and red cherry, presence of white mold fungus and size of cherries. During this they also observe other inert material like maize, leaf of coffee and soil and make test of flavor by their nose in order to identify smells of fungus occurred during drying. Besides, they try to hull a small number of cherries by their hand and teeth to see color, moisture content and size of a bean. If coffee has this aforementioned type of quality problems, they pay low prices for the supplier. At the same time, they also estimate amount of green bean may obtain from it after hulling by hulling machine. According average green bean obtained from one quintal of unhulled coffee was about 46 kg. Nevertheless, if quality of the produce is keep (harvesting only red cherry) well it is possible to get up to 60 kg. With this reason it can say by practicing recommended harvesting technique it is possible to increase quantity of produce in addition to maintain quality.

#### 4.2.5 Quality control strategy

In Darolabu district, coffee quality was controlled by the district agricultural office at farmer's and traders level. At farmer level as most farmers from interview said during harvesting and dried season, coffee expert from agricultural office come to them and give advice on harvesting and drying method. They make monitoring once two weeks in the district for checking harmful drying method and during monitoring, in case they found farmers who dry red cherry on bare ground they charge him/her. Additionally, interviewed traders responded that, district agriculture coffee quality inspection experts follow traders who have license for coffee trading by going to the trader's warehouse and check whether it is drying, packaging and storing as per the recommendation if not they give advice and charge him as well as not giving permission to send their coffee to central the market. Even starting from last year as one respondents said, *"There is proclamation for not storing coffee for longer time by any farmer and trader. They should sell their coffee immediately after harvested or purchased and dried."* This system is the appropriate way of controlling and maintaining coffee quality in the district with its quality attributes and also help in stabilizing price of coffee. Mostly believed by many actors involved in coffee, quality control is typically left up to the coffee traders/processors or exporters at which point they are powerless to improve it except by removing beans through sorting, cleaning, and grading. At this final pre-export stage, low-quality coffee is separated and re-sold at a discount on the domestic market.

However, traders additionally responded that during processing, clearing, packaging and loading on transporting truck, district coffee quality experts, monitor all processing their activities in order to confirm the traders with a certificate or letter of support for transportation. Once coffee reach the ECX warehousing center, the ECX coffee quality inspection experts review the coffee for its quality first by testing the moisture content by using moisture tester of coffee before unloading coffee from the truck. Therefore, if the moisture content of the sampled sack is more than 11.5% they force to stay the coffee at least for three days on the truck. Within this, three-day traders should give enough air for their coffee for being recommended moisture content. Therefore, after three days again ECX experts make a check and allow unloading coffee from the truck to ECXs' warehouse in Dire Dawa. Upon receipt, they take samples from randomly selected sack and take a sample to an ECX coffee quality laboratory for further quality evaluation and making grades of coffee.

However, some traders said, sometimes there are no fair grading system at central market. As example one traders said that, *"once a time me and my friend supply differently handled coffee during practicing value creation (e.g. clearing and sorting for creating uniformity) I prepared my*

*coffee carefully like by making addition cost of clearing and sorting in order to get good grades and but my friend not as such manage his coffee very well compared to me even there is significant different found while physically observed by us, but when final grade was given to us both our coffee get the same grade 5 of Harar B type".* A grading system and procedure of by current ECX was presented in Appendix 9.

#### **4.2.6 Price information and setting**

Price decision is a great measure of market transparency. In this study, respondents were asked to comment on who decided buying price. They expressed price setting was by them themselves for price decision. Exporters are the main source of foreign information and traders/processors were the main sources of information that transfer to local collectors or farmers a chance to set a price. Accordingly, now depending on market information passed by ECX, the traders make their own price of the day and transfer the price to their customers. Even some traders responded use of international daily coffee market price from New York coffee marketing information and ECX regular market data price. However, although currently ECX transfer information throughout the country with a market Information ticker, a free mobile SMS message upon request by individual in addition to country's mass media such as TV, radio and newspaper and internet website but most farmers do not follow this information only they wait for trader's price. This is mostly due to most farmers have no such technology like mobile phone, radio, TV and so on, also their knowledge skill limit them to access the services.

#### **4.2.7 Coffee marketing cost and selling price**

Marketing costs are costs for value located on the product at different level by market players along channels. The result obtained from the interviews market coffee actors revealed that a major cost involved for coffee after purchasing from producers. These costs include the cost of transport, loading and unloading, drying, processing costs such as hulling, clearing and sorting and transaction costs including the cost of ECX warehousing and auction. For these all costs in average trader paid about three ETB/kg whereas exporter paid up to 15 ETB/kg.

Concerning the purchasing price, interviewed traders said that in this year (2013/14) their average unhulled coffee purchasing price from the producer and local traders in Darolabu district is 36 ETB per kg. This price is low as compared to last year price (Birr 45 per kg). Similarly, market data collected from ECX office showed that in the last three years (2011/12-2013/14) the selling price of green bean coffee was highly varied from time to time. Accordingly, as shown on figure 9 below data computed from daily marketing of three consecutive years selling price of green bean at the Dire Dawa ECX warehouse. Similarly, the selling price of the last year, coffee was very small as compared to 2011/12 and 202/13.

According to current ECX, coffee grading system commercial exported Harar coffee grade is starting from grade three representing the highest quality and grade nine representing poorest quality products. However, most west Hararge coffee grades were between grade 4 to 9. The traders responded that, at the central market always their coffee get a grade between four, which coded as UHRB4 to nine, which coded as UHRB9 (Figure 10). Market data computed from the EXC data record, in the past three consecutive years the average selling price is 1649, 1619, 1615, 1554 and 1387 ETB per farasula (17kg bag) for grade 4, 5, 6, 7, 8 and nine respectively. These shows big variation in price between two consecutive grades which on average 53 ETB per farasula.

The coffee prices exhibited high inter-year fluctuation from season to season. The variations are a combined effect of the factors reflecting domestic supply and the periodic trends of the global

coffee demand and supply situations. In Harar coffee, these differences can be seen between different quality grades of the coffee.

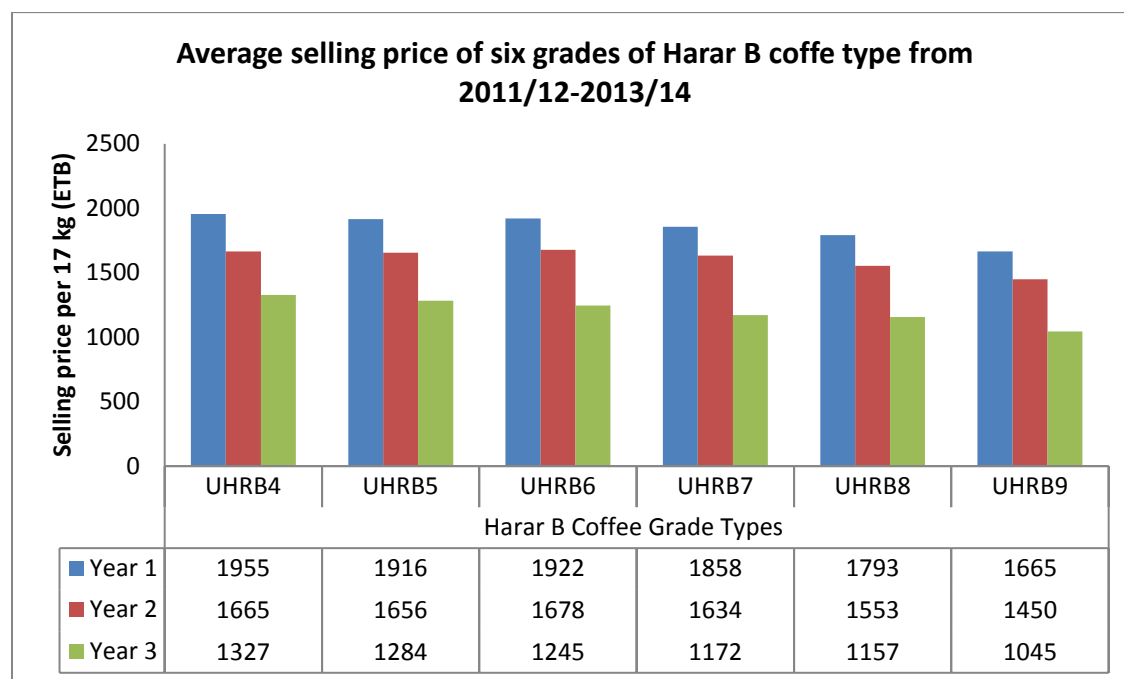


Figure 10. Green bean coffee selling price at central market during 2011/2-2013/4  
Source: Computed from ECX market data (2014)

#### 4.2.8 Coffee marketing constraints

Result from the interview made with coffee marketing actors in order to identify major coffee marketing bottlenecks: absence of a primary transaction center, which makes the presence of illegal collectors in a village town as a result affecting quality of the coffee. Adulteration of different quality coffee having various moisture contents and storing coffee for a long time by farmers and local traders without supplying to market and shortage of working capital and poor road infrastructure are also other problems raised by many traders. High marketing cost, bureaucracy and complexity of ECX transaction systems and limited number of imported country were identified as constraints.

#### 4.3 Coffee Value Chain

This study show, the current actors involved in the coffee value chain in the study area include input suppliers, small-scale coffee producers, local collectors, primarily farmers' cooperative, trader-processors, cooperative union and exporters. Accordingly, current coffee value chain in the study area is relatively not straightforward directly, but is branched from producer to consumers through traders or cooperative union. The chain, however, is characterized by a number of relatively local/illegal transactions by illegal traders, particularly in the remote village area with producers. Thus, largely at the producer level, there is little transparency in the market information. Farmers typically harvest their crop, dry it and market to local collectors. Most farmers, especially who live in far remote area sales their coffee usually in small quantity to local/illegal collectors and the producer take the price offered by the local collectors. Local collectors then sell to legal traders. The products are then channeled to processors and finally reach either domestic or international consumers through the exporters. The coffee through this channel is inefficient due to fragmentation, small transactions for producer sales and the large number of collectors. Below figure 11 shows the current coffee chain map in the study area.

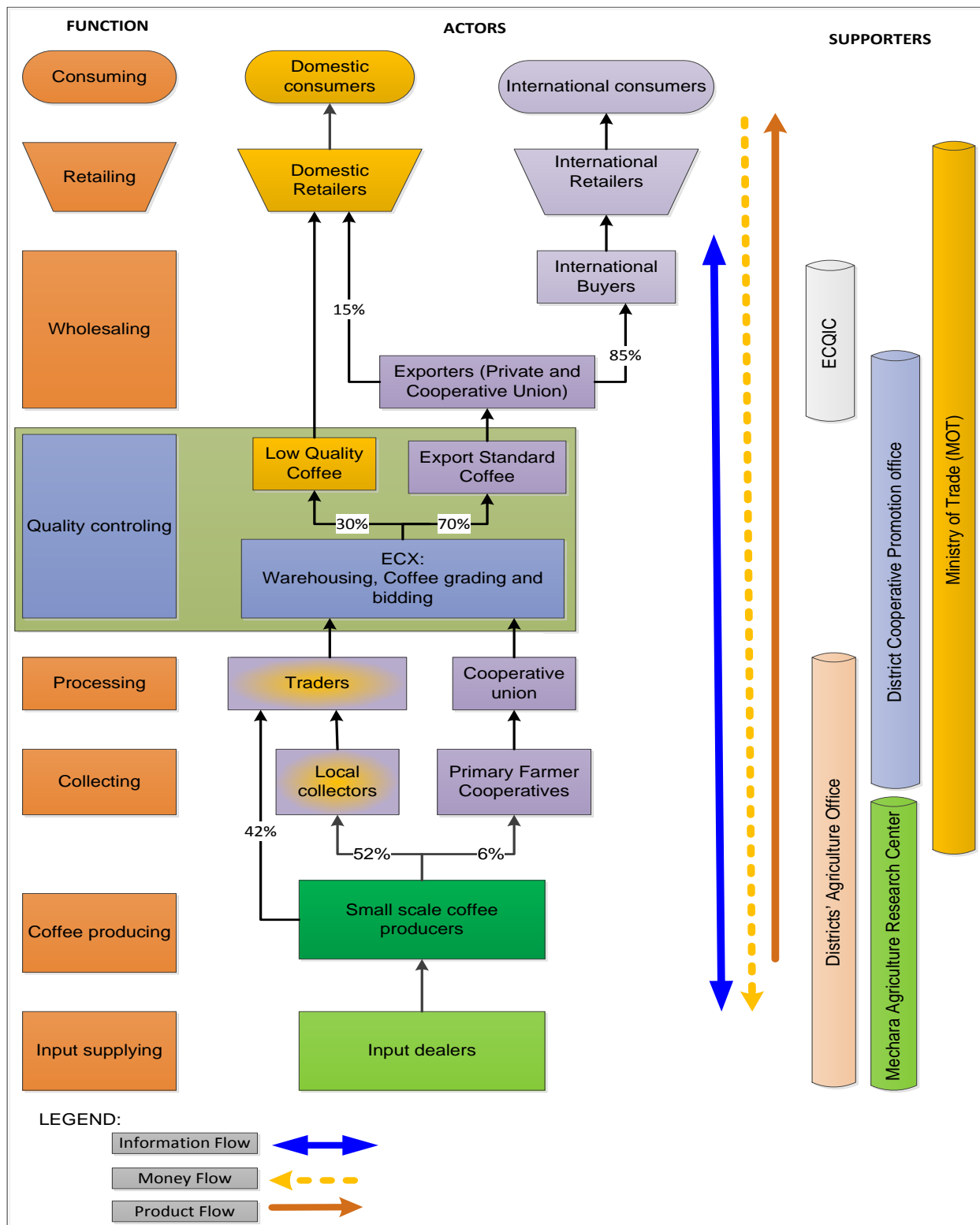


Figure 11. Current Hararge Coffee Chain Map  
Source: Author's (2014)

In another mode, currently there is primary farmer cooperative established in some coffee producing PAs by district cooperative promotion office. With this cooperative few farmer who make himself or herself a member of cooperative and willing to supply high-quality coffee by using all recommended production, harvesting and drying practices collect their coffee together and send to cooperative union. Finally, this cooperative union purchase coffee only from primary cooperative and practice value creating, such as hulling, clearing, sorting and export to a foreign country like Korea (Figure 11). The coffee chain through this cooperative channel is efficient for the easy transaction and transparency in information.

#### **4.3.1 Actors and their Functions in the Chain**

##### **Input Suppliers**

In study areas, all input dealers for coffee are a government organization such as district agriculture office (DAO) and research center which provide the coffee farmers with some sorts of agricultural inputs. Currently, primary cooperative and cooperative union supplies to the producers all agricultural input such as fertilizers, chemical and packaging material. Besides, some traders provide some input like the sisal sack and other for some model farmers.

##### **Coffee producers**

These are small-scale producers of coffee as garden production system in the chain of coffee and the majority of them are located in the rural areas where access to the market is very difficult. Farmers' average holdings are less than a hectare from which they produce about 11 quintal of unhulled coffee. Farmers will often harvest the green and black cherries, particularly late in the season, knowing that even though these will provide poor quality beans, they will nevertheless contribute to the overall weight. It is the weight of their coffee harvest that most determines what they are paid. Farmers have little access to the necessary skills, infrastructure, and technology to make such improvements and therefore may not feel that it is economically feasible to improve their quality levels.

Marketing information for the farmers is very scarce. Farmers usually depend on previous week market information or if available, the information that they get from the nearby markets. The marketing behavior of farmers varies from place to place. Farmers in study area add value to their coffee by engaging in activities like drying their coffee bean and storing. Farmers in the area supply their coffee in the form of '*lezaza*' (coffee not well dried) and dried cherry and in rare cases women's also provide red cherry to the market in small quantity to meet urgent cash needs.

##### **Local collectors**

They are an actor who purchases coffee from farmers in their locality and remote areas and supply to traders. They often mix different qualities having various moisture contents, and this would affect the whole stock because they purchase and sell either in red or dry cherry forms. Their essential role is to bring coffee from very remote areas or village town to the district market. They perform little value addition practices. They have no warehouses of their own and therefore they immediately transfer the coffee to legal traders. Collectors don not give much attention for the coffee quality rather they give attention to quantity, hence they buy defective for low price and mix with better quality coffee to get the highest price even sometimes they supply coffee with pebbles in order to increase weight. Although current new ECX marketing system does not allow them to engage in collecting coffee from the farmer but still they do not stop to do it therefore this profoundly affecting coffee quality as well as market share of actors legally involved in the coffee business. However, some collectors are working illegally in the village

town by the name legal traders as an agent. Based on the developed personal trust, some collector often receives cash advances from their buyers to fund their activities. The basis of the trust is usually some family relationships. Therefore, they operate as agents for legal traders or processors on a commission basis. In this case, the commission for their services is ETB 0.10–0.25 per kg.

### **Primary Farmer Cooperatives**

This is currently established, highly legalized and recommended farmer cooperative working with some major coffee producing PAs of districts of the west Hararge zone. They are organized and controlled by district cooperative promotion office. The main function of primary cooperative is to collect members' coffee together as well as purchase others coffee in village town as a group and supply to a cooperative union called the Charcher Oda Bultun Union. They responded that, in last cropping season (2013/14) the price of the coffee was highly fluctuating from season to season. Hence, the cooperative incurred loss because of price fluctuation. For example, during the coffee harvesting season the price of coffee was high, therefore they collect coffee from their member and others by purchasing price of 42 ETB/kg and immediately after one month the price of coffee start declining due to imbalance between demand and supply in world market thus they force to store coffee for some months but the price become more declining. Finally, after they wait for about six months, they forced to sell at the low price of 39 ETB/kg. This shows the loss three ETB per kg, but the opposite of this is true in a good coffee marketing year. Additionally, they also no more practice of value addition, except drying and storing however the coffee collected and supplied by them is a high-quality coffee when compared to all other collectors because they collect coffee produced, harvested and dried by using good agricultural practice only. They did not mix different quality products together. Financially they have no more own capital, but they get credit service and other inputs from cooperative union.

### **Traders**

Traders are importantly legally licensed market actors. They can collect coffee from any area of the west Hararge zone by themselves or through their local agents and supply usually to the central market through the ECX auction center to exporters. They used to buy in small amounts from surrounding farmers and local collectors through all districts at the roadside. To some extent, they often place orders with trusted local collectors. Most traders dealing with farmers and local collectors reported serious quality problems with large percentages of foreign matter and high moisture content. Some have storage facilities as well as their hulling machine. They loaded one or more truck of 51 quintals of green bean coffee to the central market per week depending on the season. They have to hull their coffee with using private or rented hulling machine. The cost for hulling for one kilo of coffee is ETB 0.3. After hulling, for value creation they clear and sort coffee beans by using hired daily labor from defect berries, inert matter and small berries in order to get good quality which get good grades that meet export standard before transporting to ECX auction center during this activity district coffee quality inspection expert check for approval. Finally, the cleared coffee bean were packed in the sisal sack and transported to the Ethiopia Commodity Exchange warehouse of Dire Dawa deliver center for inspection of quality, grading and selling to the wholesalers.

### **Ethiopia Commodity Exchanges (ECX)**

The ECX was launched in May 2008 as a new initiative for Ethiopia and the first of its kind in Africa. Its mission is to connect all buyers and sellers in an efficient, reliable, and transparent market by harnessing innovation and technology. It was used as a replacement for the auction houses, previously used by exporters to procure coffee. Therefore, it was a current marketplace, where buyers and sellers come together to trade, assured of quality, delivery and payment. It



works based on membership. Members buy seats that allow them to trade using ECX. By law, only members can trade on the Exchange; this simply means that nonmembers must use the services of a member to conduct trading. Commodities in ECX warehouses are graded, weighed, and certified. ECX guarantees the grading of the products and maintains a central depository of warehouse receipts. ECX transmits changing price information directly in real-time to producers, consumers, and traders using electronic price tickers and the website. It creates trust and transparency through aggressive market data dissemination to all actors, through clearly defined rules of trading, warehousing, payments, and delivery and business conduct. From ECX warehousing and graded center export standard coffee was sold to an exporter and low-quality coffee that not meet export standard was sold to domestic retailers.

### Exporters

Form this interviewed two exporter private company namely Birra and Milki were interviewed. These participants buy coffee for export and domestic market at ECX trading floor through the auction market from traders. According to the ECX marketing system, both coffee buyers and sellers need to register as a member or agent to trade through ECX. After the exporters buy coffee through their respective agent in Dire Dawa, they transport their coffee from the ECX warehouse of Dire Dawa to their storehouse. They are often guided by the prices offered by the ECX to make their purchases. Exporters add value to coffee by further reprocessing, sorting, cleaning, and blending different quality coffee to increase quality, re-graded, and take samples back to Dire Dawa coffee quality inspection center for re-inspecting and certifying for export confirmation. Re-graded and export certified green bean (85%) coffee was finally packed in sisal bags of 50 kg, labeled with coffee type, grade, date and month of preparation for fulfilling traceability rule and transport to Djibouti by long international truck and then after transfer coffee into containers and ship to imported country mostly Saudi Arabian wholesalers. After coffee reach in hand of international wholesaler, some value addition practices such as roasting, grinding and repacking were conducted and finally distributed to various retailers.

Additionally, exporters, coffee that does not meet export standard (15%) make practice such as roasting, grinding, packaging in a one kilo pack and sell to mostly local retailers and institutional consumers like University (Haramaya and Dire Dawa), Hotels and other GO's ad NGO's (Figure 12). The domestic market exporters are an individually organized their means of transport to the retailer's sites.

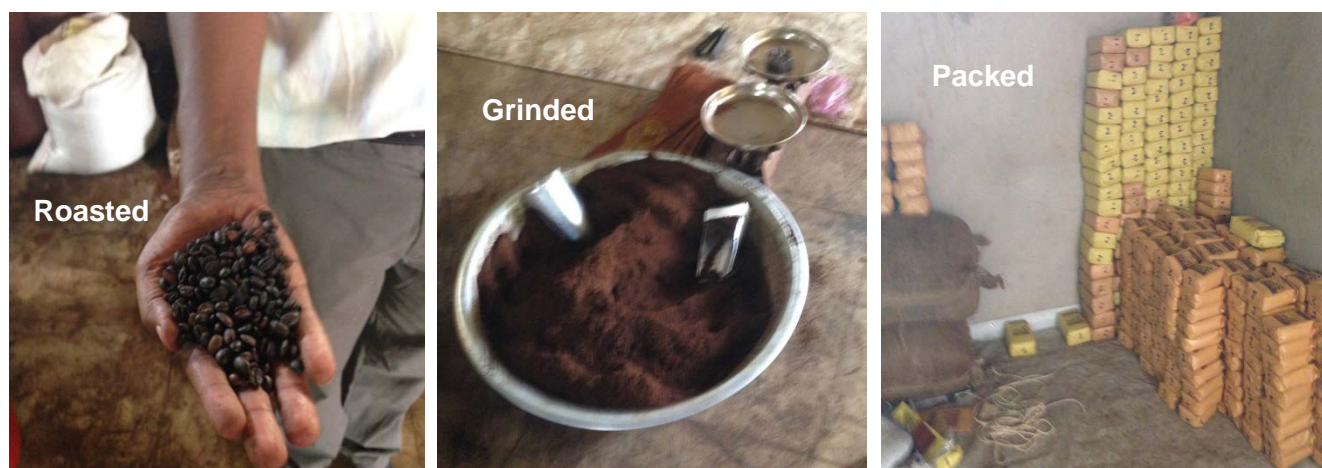


Figure 12. Coffee prepared to distribute to domestic retailers by the exporters  
Source: Field photos (2014)

### **Cooperative Union**

This is recently established cooperative union by the zonal cooperative promotion office. It is located in Oda Bultum district for representing all districts of West Hararge zone. It was known by the name Charcher Oda Bultum Union. It is a fully licensed organization for purchasing any types of agriculture commodity, including coffee from its primary cooperative members and supplies to where there is scarcity of products. With regarding coffee, it has a strong link with primary coffee cooperative established in each coffee producing district. It provides training service on coffee production and quality management, credit service and input supplies to all primary cooperatives working in all districts. It directly buys dried coffee from the primary cooperative members in bulk, makes value addition practice such as hulling/processing, clearing, sorting and packaging, and takes samples to ECX quality control and quality inspection center for getting grading and certifying and directly export to international buyers currently working in Korea.

The coffee supplied by cooperative union is not sold to domestic exporter through ECX traction/auction center because it has its own link with international buyers with guarantee to supply quality products. Cooperative has responsibility for maintaining and improving quality of coffee. Therefore, they mostly focus on purchasing high-quality coffee prepared by using all good agricultural practices. However, in district, quantity coffee supplied by primary cooperative-to-cooperative union is only 6 % of total coffee supplied by districts. This shows since most farmers are not members of the cooperative still most coffee sell to local collectors and traders working districts. This can deteriorate the quality of products since most farmers; local collector and traders are not great care for quality instead they give the attention quantity.

### **Retailers**

The retailers purchase their coffee from the wholesalers who bring the coffee from the ECX delivery center. After purchased, they sold their coffee in supermarket, shops, to the all types of customers in small quantities. Retailers are part of an integrated system called the supply chain of coffee. They purchase coffee in large quantities from wholesalers, and then sell smaller quantities to the consumer for their profit.

### **Consumers**

There are different types of consumers in the coffee chain. They are the the one who often gets the coffee from the domestic market and the institutional consumers like different type of the coffee shop, hotel cafe, university and high school who gets it from the retailers and sometimes from wholesalers (exporter). On the other way, coffee exported to the international market were sold to a different coffee shop and supermarket where the consumer gets their coffee.

## **4.3.2 Supporters and their Functions in the Chain**

### **Districts' Agricultural Development Office (DADO)**

This is the government organization who worked under MOA in closely with the farmers through the district. They prepare the quality seeds and sow them on the nursery site, and when the seedling reaches the transplanting stage, they distribute to the farmers. Besides, they have a development agent worker who is living in each peasant association with farmer and give advice for the farmer every time in his day-to-day activities. The district extension workers are also going to the farmer in order to give any extension service, including distributing the fertilizer, improved seeds, advising the farmer. Especially during coffee harvesting season, most employers of this office are staying with the farmer in the village in order to control coffee quality. Additionally, they are working on coffee marketing for controlling illegal collectors whom going to collect coffee from farmers without trade license. They check quality, whether the

coffees properly hulled, cleared and sorted as well as they check from adulteration if another coffee type is mixed during processing and packaging for certifying them with a letter of support to transportation.

#### **Mechara Agriculture Research Center (MARC)**

Mechara is a regional research institute that directly involves in coffee research in the area. It is the only research organization through all Oromia regions who working on coffee research. It carries many coffee research activities that help all coffee sectors. The center provides support to the farmers through improving agricultural technology, multiplication, distribution of improved technology. The center has recently released four improved specialty Hararge coffee varieties. The varieties, since they were released, are under multiplying and distribution to the farmers. In addition, the center regularly gives training on coffee production, processing and marketing for the farmers, extension and development workers.

#### **District Cooperative Promotion Office (DCPO))**

It's an office established for chain upgrading purposes. Its function in the district to give awareness creation about farmers cooperative in order tiling farmer directly in the market with their products. It established primary farmer cooperative in major coffee production PAs of the district in collaboration with cooperative union and made them strong linkage to the cooperative union. Therefore, depending on the awareness they create current farmers in the study area organizing them together and trying to supply high-quality products to cooperative union.

#### **Exported Coffee Quality Inspection Center (ECQIC)**

This is another supporter participates in coffee quality controlling system. The main function of the organization is to inspect exported coffee quality for meeting export standard and provide traders with a certificate of exportation. They use inspection standard criteria for checking the quality of the product given to them by exporters (Appendix 10). By using this criterion all exporters prepare their coffee, and re-grade give samples to the quality inspection center for confirmation.

#### **Ministry of Trade (MOT)**

MOT has the mandate to all agricultural marketing activities, especially in the licensing business actors. The collect and pass all market information to the stakeholders. The ministry has a direct relation with trader, exporter, ECX and until the international market by collecting necessary information about domestic and international market and pass this information between all actors. Additionally, they have linked with National Bank of Ethiopia in controlling currency rate.

## CHAPTER 5. DISCUSSION

### 5.1 Characteristics of respondents

Regarding respondent characteristic age, education level and farming experience are the major factors required in coffee quality. Accordingly, the age of the farmers is considered as a crucial factor since it determines whether the farmers benefits from the experience of an older person or has to base its decisions on the risk-taking attitudes of younger farmers. Older farmers have many year experiences in coffee production, processing and marketing. Consequently, this has a significant effect on coffee quality management. Similarly, Coelli and Battese (1996) reported that, he Age of the farmers might have effect upon the size of the adopting agriculture technology. The older farmers are likely to have had more farming experience that result to maintain quality by practicing good agriculture practice.

About sex of household, the survey result shows that male farmers are highly dominating the female in the Darolabu district. This result confirmed the prior expectation that male-headed households have more access to improved technology, updated information, credit and extension services than female-headed household. This result is consistent with other findings. For instance, the results of Doss and Morris (2000) showed that females have less access to an improved agricultural technologies and extension services, which contribute to lower adoption rates. In addition to, male-headed households have better access to information than female households do that helps for adoption of improved agricultural technologies. Therefore, it said to be on improving and maintaining coffee quality male-headed household can have better than female headed.

Besides, level of education can have a significant effect on coffee quality because illiterate farmers are not well adopting improved technology. Similarly, the finding of several studies revealed that the level of education is a strong and important determinant of farmers' adoption of improved agricultural technologies (Zemedu, 2004). Besides, as reported by Deressa *et al.*(2009) that, years of schooling positively influenced farmers' adoption decisions on improved agricultural techniques. Therefore, education is crucial for the farmers understand and interpret the information coming from any direction to them. Farmers' education is also pivotal to the effective work of promoting the extension service, because if the farmer has a better education, they can have the capability to read and interpret easily the information transferred from extension personnel and Development Agent (DA) to them. The more a farmer is educated, the more competent s/he is in management of the intensive system of coffee production and marketing. Thus, there need usually to keep records on production activities, income and expenditure to appropriately utilize the benefit of the business.

Moreover, farming experience of the farmers is also an important factor, which enables farmers to make better decisions that reduce crop failure in terms of both quantity and quality. Since farming, experience in coffee production has been considered to contribute positively to coffee production and marketing from accumulated knowledge and skills. In the study area, it is obvious that the farming activities have gained from life longer experience rather than from formal training and education. This study reveals farmer of the area has many years of experience in coffee production. It was known that, farmers with longer farming experience are expected to be more knowledgeable and skillful. Similarly Senkondo et al. (2004) reported that, experiences in farming were positive significant in explaining adoption of agricultural technology that can improve quality products. Therefore, such long experience is a fertile ground to build upon the accumulated knowledge and skills of the farmers in enabling them to utilize improved agricultural practices.

## 5.2 Coffee production overview

Coffee production was known in this study area since many decades. Age of the coffee tree is one of the pre-harvest factors that have an effect on the quality of coffee in addition to production and productivity of the tree. As understood from the result of this survey coffee currently owned by farmers are mostly above ten years. This implies that the majority of the coffee plantations in the study areas is physiologically declining as their yield, and quality might decrease as reported by Clifford (1985). Similarly, Yigzaw (2005) reported that samples from young trees are likely to be mild and thin, but fine in flavor. Beans from old trees produced strong taste and a harsh characteristic brew. Medium aged trees, 15 to 20 years old, beans with good flavor as well as acidity and body. Thus, in this study the variable is hypothesized to have inversely related to coffee quality. Hence, one can conclude that, age of the coffee tree is one of the main factors that can affect the quality of the produce.

## 5.3 Coffee husbandry

The coffee management practices in Hararge are different and specific as compared to the practices in other coffee growing areas of the country due to climatic and edaphic factors. Hararge coffee farmers do know when to cultivate their coffee field and why they do at that time. The same holds true for other coffee management practices. The availability of such diverse coffee genotype and farmers' indigenous knowledge, which is not studied in depth and documented so far, provide immense opportunity for the coffee improvement program in the area. In the following sections, the coffee husbandry practices were discussed:

### 5.3.1 Coffee variety

The results of the study revealed that farmers of the area grow different coffee types having their own characteristics. Farmers give names to landraces based on several reasons. For instance, based on the names of the place from where it was first obtained, habit and mode of branching, names of individuals and other reasons. For instance, the coffee landraces known by name 'kubaniya' referring to the Belgium coffee plantation company, from which it had been introduced to the district. The Belgium coffee plantation company was operating in Arsi Zone, neighboring West Hararge. On the other hand, the coffee Landrace 'Abadir' was named after the name of an individual that was a famous religious leader in Hararge region.

Based on the color of their young leaves, coffee landraces grown in Darolabu district can be categorized into two major groups namely bronze-tipped and green-tipped. Most landmarks including abadir, buna kella, shumbure, kubaniya and cherchero have bronze-tipped young leaves, and they seem to match with one of the two botanical varieties of coffee Arabica namely *Coffea arabica* L.var. *arabica* (syn.var. *typicacramer*). On the other hand, coffee landraces buna guracha is characterized by their green-tipped young leaves and seem to match with botanical variety of coffee known as *C. arabica* L.var. *bourbon* (Anteneh *et al.*, 2010). Also all these varieties have their own different character in quality attributes and quantity. Accordingly, most farmers prefer to grow shumbure in terms of yield and abadir in terms of quality of the bean. However, if both managed as their recommended management practice can fulfilled both required quality and quantity. Similarly, Selvakumar and Sreenivasan (1989) observed that, the variety is a major factor since it determines to a great extent important characteristics such as the size and shape of the beans as well as their color, chemical composition and flavor<sup>5</sup>.

### 5.3.2 Cropping system

Cropping system of coffee in the study areas is mostly mixed type of cropping than sole type. Therefore, farmers have their reason of using this mixed type of cropping. Especially farmers

who have large coffee orchard use the same farm for coffee and grains. Similar results were reported, farmers of the area grow a variety of crops simultaneously with coffee in order to overcome different production risk. Hence, a major advantage of growing many crops at a time is to maintain a steady food supply for the family, secure cash or the purchase of farm inputs and other family needs (Anteneh *et al.*, 2010).

Although they have their own reason of using intercropping type coffee production system, however, this practice can affect coffee production and quality directly and indirectly. The farmer uses a different type of chemical fertilizer and pesticides for the intercrop crop with coffee in order to boost the yield of crops. However, this chemical has a positive or negative effect on coffee quality. For example, if the farmer uses pesticide and insecticide for controlling crop disease and insect pests, since this chemical is not recommended for coffee, the coffee bean was highly affected by chemical residue. Thus, the bean chemical properties, physical appearance and flavor of coffee bean were affected and indirectly affect the health of the consumer. However, in contrast, as research conducted in Mexico by (Bustos *et al.*, 2008) shows, intercropping herbs crop like basil, sage, spearmint and oregano in coffee plantations seems to be a promising approach for higher income and increasing yield and quality production in coffee farms. Therefore, this study gap requires further research specially for area like Hararge where most grain crops intercrop with coffee.

### **5.3.3 Fertilizer application**

Since naturally coffees produced in this area are said to be organic, all coffee producing farmers use organic fertilizers. A type of organic fertilizer they use is locally prepared farmyard manure (FYM) alone and/or a mixture of farmyard manure and locally prepared compost. However, composed solely is not applied by farmers due to technical preparation of it is difficult in addition to a shortage of labor. However, farmers prepare local compost by mixing farmyard manure, crop residue, litters, and use it for their field. Use of farmyard and local compost improves the action of microorganisms and improves macro—and micro- nutrient availability. It works as a beneficial soil conditioner and improves the physical, chemical and biological attributes of the ground. This has a positive effect on the quality of coffee bean because bean produced from the fertile field big in size and its physical appearance also attractive. Similarly, Wintgens (2004) reported that good growth conditions usually have a positive effect on the coffee bean size and flavor. Some farmer believes that if a coffee field is sufficiently manured once, it can nourish the plant for two to three consecutive years compared to commercial inorganic fertilizers, which needs yearly application. Nevertheless, in the absence of adequate amounts of organic sources and abundance of competition from other crops intercropped with coffee, farmers manure their coffee field every year.

With regard to inorganic fertilizer high cost, scarcity and timely unavailability of inorganic fertilizers force most farmers not to apply mineral inorganic commercial fertilizers to their coffee farms. However, some farmer who has a large number of farm apply DAP, UREA and/or mixture of DAP and UREA. Farmer believes that applying mineral fertilizer to coffee was expected to be increase yield as well as physical appearance of coffee bean, but since it is very expensive, it is difficult to apply rather they prefer to use organic which is locally available in the area. Similarly Anteneh *et al.* (2010) reported that due to timely unavailability of inorganic fertilizer and absence of credit system farmers forced not use mineral fertilizers. Instead, they depend more on organic fertilizer for their coffee field. Using chemical fertilizers in coffee highly affect chemical contents of coffee bean since Ethiopian coffee is organic in nature; it is not recommended using chemical fertilizer highly. However, it is recommended to use it in a small amount.

#### **5.3.4 Weed management**

Farmers of the study area control weeds in coffee by combination of different method of weed controlling. Therefore, weed was controlled by cultivation, hoeing and hand weeding by using family or community labor. However, for coffee no any farmers use herbicide chemical for weed controlling due to its high cost, scarcity and unavailability of recommend herbicides. A similar result was reported from a survey conducted in the areas by Anteneh et al. (2010); according to their report, coffee field in this study area is kept free of weeds throughout the year using cultural practice such as digging, hoeing, pulling out the weed by hand and sometimes cultivation. However, slashing which is the most common weed control method in other coffee growing areas is not implemented in this study area. In addition, farmers do not use herbicide because it is not affordable for them, and farmers do not practice slashing as a means of weed controlling. Cultural method of weed control is recommended indigenous knowledge practiced by all farmers of the area as a result it improve the quality attributes of coffee because if they use herbicide its residue has an effect on the quality of products. This is confirmed by Wintgens, (2004) report, proper control of weed control usually have a positive effect on bean size and flavor.

#### **5.3.5 Coffee pruning**

Coffee tree pruning is an extremely important pre-harvest activity for reducing incidences of diseases, modifying air movement within the plantation, which in turn reduces leaf-drying time thereby improve a physical quality of the coffee bean. Most farmers in the area, as got from interview, practice handling and desuckering, remove dead branches, cut the top of the tree while harvesting for tree height management when needed to be arisen are the major type of pruning practiced in the district. However, stumping or rejuvenation that changes the cycle of a productive old coffee tree that helps the tree in improving its yield and bean quality does not highly practiced by farmers. This result confirm with research conducted by the Anteneh et al. (2010). They reported most respondents of the area practice stumping to change the productive cycle of their coffee tree. In addition, Wintgens, (2004) reported that, coffee pruning can usually have a positive effect on bean size and flavor.

#### **5.3.6 Coffee shade tree**

Coffee is naturally shade-loving crop in order to bear fruit and live for long periods. This study revealed that, practice of growing coffee under shade did not common practice by farmers of the area. Most of them grown coffee without shade or partially shaded. Although they believe the importance of shade for coffee, but due to different reason they did not practice it as recommend. This is mainly because they believe that shade tree competing with coffee and other intercropped crops for the limited soil moisture. Besides shade trees occupy space, which could have, been used for growing other crops. Consequently, biannually (alternate) bearing habit, overbearing and branch dieback thereby shorten of product life cycle are a common problems of coffee in Darolabu district. Besides the wide spacing between tree and the absence of shade, increase the risk of soil erosion by wind and water. On the other hand, some farmers live in the highland area plant coffee tree under naturally established shade trees. They responded that they chose these shade trees for their ability to boost coffee yield, ameliorate soil fertility and provide feed for livestock as well as improve their bean size and flavor. Similarly Anteneh et al. (2010) reported that, almost all farmers in Serero area plant their coffee tree under naturally established shade trees for the purpose of increase yield and improve the quality of the bean. This shows shade is high important factor that can affect the coffee quality in the district. Similarly, as reported by Geromel *et al.* (2008), shade tree is one the main factors responsible for the quality of coffee bean. For example, fruits from coffee grown under shade are characterized by larger bean size than those grown under full sun conditions. Also they reported that, shade has different effects depending on the geographical location of coffee tree.

### **5.3.7 Coffee diseases and insect pests**

Coffee disease and insect pests are also another factor that can affect coffee yield as well as quality of it. Study result showed that, in the area since a long time ago coffee has been highly threatened by different type of disease and insects. Recently major diseases identified by farmer in the area are dieback, CBD, CLR and CWD in order from highest to lowest of its importance whereas among insect pests stem borer followed by ants are most important. Besides, farmers believe that the problem have been aggravated by the absence of locally screened coffee variety resistant to the disease and lack of improved cultural practice to control them. As the consequence of this, the quality and quantity of coffee have affected considerably. The coffee tree becomes more susceptible to the pests when there is a prolonged dry season during production years. There are no any recommended pesticides, but recently some farmers responded that as they apply DDT for controlling problems of ants.

When observe the effect of diseases on coffee quality it can say that, the occurrence of disease could lead to poor quality coffee that gives off and distasteful odor. This result confirmed by a study reported by Wintgens (2004). He said diseases attacks can affect the cherries directly or cause them to deteriorate by weakening the plants, which will then produce immature or damaged fruits that affect its quality. In addition, Eshetu and Girma (2008) reported that, when CBD attacks the fruit in its most advanced stage of growth causes severe damage to the crop and coffee quality.

### **5.4 Harvest and post-harvest management**

Inadequate harvest and post-harvest systems result in excessive losses and a lower quality coffee. Major problems in areas are bad harvesting, drying, packaging and storing coffee.

#### **5.4.1 Coffee harvesting and drying**

Result of the study showed that, most farmers practice strip harvesting in which collecting red, unripe and dried cherries together once or twice in harvesting months. The harvested cherries, then sun-dried on bare floor or plastic sheet. They did not widely practice selective red picking techniques. Their reason for this is, the selective harvesting required a lot of labor thereby increase of cost of production, also whether they harvest by strip or selective the price of the product finally sell to traders are the same thus since there is no different price for differently handled coffee for quality improvement. This practice widely affects the quality of the product in the area. Similarly, according to Wintgens (2004), whether to achieve coffee quality by harvesting ripe cherries or harvesting a mixed product and complementing with proper post-harvest treatment is a cost-benefit decision that coffee growers will have to face. If only ripe cherries are picked, the quality beans are higher, but the harvesting cost is higher too. If mixed product is picked, the quality beans are smaller, but harvesting costs fall. The decision facing the farmer is whether saving in harvesting cost offset the loss of income from less quality coffee. If they do, the farmers should move away from selective hand picking and into stripping harvesting systems to maximize their profits.

Besides, while drying, although farmers of the area aware that, drying coffee on bare ground can highly deteriorate the quality of the product still some farmers practicing it. This survey result also approves it. Additionally, since few adopt the practice of turning or rotating the mass of cherries, drying time is increased as is the likelihood of uneven drying, mold, and fermentation. Therefore, by this bad drying method still practiced by some farmer quality of the produce affecting. Besides, farmers in the study area experience crop losses and reduced income simply because of inadequate pre and post-harvest measures. Poor harvesting practices, such as stripping and collecting dropped fruits from the ground; improper post-harvest processing and handling practices such as drying on bare ground and improper storage reduces



quality and increases losses by promoting uneven moisture levels, inducing fungus and ferment, and introducing foreign matter. Most farmers have inadequate drying areas. Coffee harvesting by strip may contribute to the deterioration of coffee quality due to careless harvesting of ripe and unripe green berry collectively. This may be one of the factors that can contribute to the decline of coffee quality due to premature and over dried harvesting of coffee.

#### **5.4.2 Coffee packaging and storing**

Apart from harvesting and drying methods, packaging and storage place and duration are the other most important and essential factor required for maintaining and improving quality of products. Its goal is to achieve and maintain its commercial value as long as possible by preserving the integrity of the bean with all its characteristics. Hence, the need for using the correct packaging material and adequate storage is essential since the coffee beans are living entities in which their viability depends mainly on the storage condition and food safety has now become an extremely important issue since the effects of toxic substances, which would develop during storage, can cause significant harm to human health. Coffee quality influenced by packing materials because different packaging materials can have adverse effects on coffee quality.

Accordingly, the study result showed that, currently farmers use sisal sack or polypropylene bag as packaging materials. But most farmers have been used polypropylene bag since scarcity, high cost and unavailability of the recommended sisal sack. Besides this, due to the inherent imbalance between supply and demand, especially during peak harvesting time, it is sometimes necessary to store coffee for a long period in which the length of storage affects the quality of coffee. Additionally, if farmers are not in need of money, they store the dried cherry until the price of the produce attains better price. In general, storage place and time of storing together has an effect on coffee quality.

From the survey, most respondents store their coffee in their residence home for more than three months. This mean coffee is living with family members in the house for a long time, which is highly affecting quality of it, because in the house many things that can affect the quality of coffee were carried out for the purpose of family member without considering coffee. For example, in the house family members may use the item of different smell like perfume and gum and incense. This later can change the flavor and smell which are major criteria used for quality assessment during coffee grading. Furthermore, stored coffee may present the flavor damage, and the incidence of the existing damage may become more serious during storage. This coincided with another result that, potential damage caused during storage, which affects cup flavor are baggy, moldy, earthy, onion (as a result of storage under humid condition in which prop ionic acid is generated which give “ onion “ flavor, old crop and contaminated. Long time storage under high relative humidity and warm conditions also increase bean moisture content and consequently reduce quality in terms of raw and roasted appearance as well as liquor (Wintgens, 2004). In addition, storing coffee for a long time can reduce the weight of the products by losing its moisture content to below 11.5%. This show storing coffee for a long period can affect both quantity and quality of the product.

#### **5.5 Coffee Marketing**

Coffee marketing is one of the common problems that can affect the quality of coffee in the area, because, without no fair price for differently prepared coffee quality, the producers are not worrying about the quality, but they worry about the quantity of the product. Furthermore, coffee traders are the only decider of coffee price by their judgment. This was the main attribute to the production of poor quality coffee by the farmers of the study areas, thereby fluctuation of the price of the produce. According to study results, most farmers sell their produce to local

collectors and traders, however, only very few farmers start to sell their coffee to primary cooperatives. This shows that still a farmer are not well organized and aware about the importance of cooperative for them and the problem of illegal collector (local collectors) although the current coffee marketing policy was supported this system of marketing. Even some farmer sometimes responded women or child sold red or dried coffee on market day in small quantity without knowledge of household headed. This mainly for covering minor daily house expenses, but household head sells large quantities, mostly men to local collector or traders-processors.

In addition, result obtained, regarding farmer current selling price, from the survey showed that coffee price was highly fluctuation and low. Especially in the last year (2012/14) price of coffee was low compared to previous years. The reason for this is due to imbalance between demand and supply as well as low quality supplied coffee to the central market. This discourages farmers not to harvest and process their coffee as per recommendation to maintain quality of produce. This behavior, if not controlled it is very likely that the genetic basis of the typical Moka flavor of Hararge coffee will face irreversible quality deterioration. Furthermore, farmers complain that they could not get fair share that would cover their cost of production. Also, the premium price is not paid for good quality harvested and dried coffee separately. As a result, most farmers tend to shift their coffee land to Chat. If this condition is not reverted, both the culture and coffee germplasm of the area will be lost in a short life span.

## **5.6 Extension services**

Extension services supposed to have a direct influence on the behavior of farmers to intensify and improve their production and productivity through resolving problems and improving efficiency to make use of opportunities. When there is contact with extension agents, the greater is the possibilities of farmers being influenced to adopt agricultural innovations and improve their productivity in terms of quantity and quality. The Development Worker (DA) is one of the most important sources of information on agricultural technologies to farmers. On this line, the farmers were inquired about extension services they deliver on coffee production and marketing.

However, there are no other services such as supplementary input credit services in order to reduce selling red cherry to local traders that can help the farmer to maintain their coffee quality. Therefore, absences of these are highly affecting quality of products. Similarly, Mulugeta (1999) said that, access to credit, additional inputs, technical and institutional support as an extension service determining the adoption of improved agricultural technologies. Result of survey revealed that, most farmers the area get extension support from some stakeholder widely from DAs as well extension experts from agriculture office and research center, however support they get from them is not enough in order to help. Even some farmers of Cafe Hara and Jilbo PAs do not have any support on coffee production from anybody recently they use their knowledge passed to them from their ancestor. However, DAs working in their area give another extension service on other crop production. It is believed that its reason is; this area is taken as a minor coffee producing PAs compared to Serero and Guddis PAs where almost all farmers get an extension on coffee especially on quality maintaining and improving.

Generally for a country like Ethiopia where the majority of the farmers are poor and illiterate agricultural extension would play a significant role in assisting them in identifying and analyzing their production and marketing problems and helping them with awareness of opportunities for improvements. Effectiveness of the other inputs in production, as well, partly relies on the availability of sound extension service at the community level.

## **5.7 Major coffee production and marketing constraints**

The result indicated that though there are variations in ranking of constraints, similar constraints were identified in all the sampled PAs. Shortage of improved varieties in terms of yield, quality and disease resistance, market problem such as price fluctuation and market information, climate change resulted to prolonged drought and irregular rainfall, pest and disease like dieback, coffee leaf rust and coffee berry disease, high cost of inorganic fertilizer and lack of recommended chemical like pesticides, fungicides and insecticides were reported as the major constraints. Lack of fair weight due to the cheating of weight of coffee while buying coffee by local traders in the village from farmers were raised by some farmers and listed as another constraint. At trader's level absence of primary transaction center, presence of number of illegal collectors in village town and others were identified as marketing constraint that is directly or indirectly affecting quality of produce. Farmers of the study area largely depend on the informal communication among themselves and local collectors to make marketing decisions.

According to the respondents, market information available to coffee producers was only limited to village level in rural markets and the neighboring village markets. In the area, there was no formal institution that provided information on the prevailing market situation of other urban centers including central markets to the coffee producers. Information transfer from exporter upstream to the producer is also poor and adversely affects the quality. There were no identified and applied quality standards that resulted in the absence of discriminatory pricing accounting for quality and grades. In general, poor access to information and know how makes it difficult for chain operators, especially poor farmers to meet/comply with the standards and other product requirements. Producers do not earn a better premium price for the highest quality coffee; they prepared and supply and therefore they do not give attention to quality.

## **5.8 Viewpoint of marketing actors**

Under this sub-chapter, information collected from market actors such as traders/processors; cooperative and exporters were discussed.

Accordingly, information obtained from interviewed of marketing actors showed that, currently there is no more farmers involved in coffee marketing; the coffee in the district was collected by mostly local collectors followed by traders. Although first the current best coffee marketing is through primary cooperative but collection capacity shared by primary cooperative is very low (>10%). This shows most farmers sell their produce to the illegal traders. Most traders responded that, the problem of the prevalence of these illegal collectors is due to the absence of legal coffee transaction center in village towns. As a result of this quality of coffee was affected, high since these collectors do not consider the quality of the product. Furthermore, in the face of the growing integration of global markets, a number of factors in the enabling environment play a critical role in promoting or preventing small holding farmers from integrating into markets.

From interviews, coffee handling practice by traders is a better when compared to local collectors and farmers because traders give attention for coffee quality as the main issue than quantity because in the central market quality controlling body would test their coffee carefully. If their coffee not meet quality standard, it would reject therefore they highly consider quality of the product. Accordingly, they use recommended drying and hulling practices, but regarding packaging and storing coffee, they all not equally practice full-recommended practice such as the use of packing materials and stored coffee for a short period. Even some traders want to store their coffee for an extended period by using polyethylene bag type of packaging materials especially when the price of produce is low. This practice is highly affecting quality of the product because coffee packed by polyethylene bag makes bad flavor and smell. As a result,

their coffee gets low grade in the central market even sometimes rejected by EXC quality controller.

Furthermore, result obtained from interviews also showed that, traders have their own methods of quality identification. They use physical appearance of coffee for changing good or bad quality coffee. According to their experience coffee with small size, black and color as well a number of empty beans are considered as low-quality coffee. This is confirmed by Viani (2000) result report, coffee with big bean, free from black and foxy bean, no empty bean as character of coffee quality identification. However, at traders' level in case local collectors or farmers supplied coffee with such kind of problems, they buy them at low price without rejecting from buying it. Then finally, they mix it with another good quality coffee. As a result, their final coffee quality was affected. Similar result was reported by (Anteneh et al., 2010), he traders simply buy low coffee quality with low price and high quality by high price and finally mix this all coffee together as result quality of coffee was deteriorated thereby get low grades. However, if this problem is observed by cooperative they reject coffee with such type of problem because this can affect the quality of another coffee later when they mix. Finally, there is high quality different between coffee supply by private traders channel and cooperative channels.

The marketing channel of coffee was through the interconnection of different actors namely producing farmers, primary collectors, traders/processors, cooperative union and exporters. Processors seemed to control the whole channel (because of asymmetric market information). Among the different actors, processors were the main actors in the system. However, current coffee marketing channel as ECX reported, Ethiopian laws governing the trade of coffee allow producers directly to export the coffee produced on their own farm without having to sell it to collectors and processors who then sell it to exporters. However, due to the small scale and weak capacity of most Ethiopian coffee producers and their geographic dispersion, shortage well organized and functional coffee farmer cooperative (producer group) there is a difficult for small farmers and international buyers to find each other and directly transact (ECX, 2010). Market information is a system needed to disseminate up-to-date market information to keep all coffee market participants at the same level of access for market information, from interviewed it was understood that, in coffee marketing system, information is held as a private property and not equally shared among the different participants in the value chain. Thus, quality and quantity requirement demanded by the end-user does not properly go down to the lower ends of the chain.

As a point of view of the interviewee, although current rule of EXC is better for controlling coffee quality and market information however most actors complaining this system because of the complexity of its working style and bureaucracy of the system. In contrast, exporters agreed with the systems. However, result conducted on impact of ECX by Gemoraw (2011) show that, both suppliers and exporters have good awareness on the operations of ECX in the coffee sector and their impact on the coffee marketing system but most of the interviewed farmers confirmed that they do not have good knowledge on the ECX operations in the coffee sector as well as its significant contributions. In addition, traders said that, even though, one of the main objectives of the establishment of ECX is for reducing number of coffee channel by reducing number of small transactions across the chain but still there is a number of illegal collectors moving in the area especially in the village area. This showed ECX are not working for village only their focus is to control coffee in the hand of traders but this has not value for maintaining coffee quality because most coffee quality was affected at farmers and local collectors hand before supplied to traders/processors.

## 5.9 SWOT analysis of Hararge Coffee

This analytical tool was used to analyze SWOT analysis of coffee. Accordingly, during the study strength, weakness, opportunities and threats of coffee chain were identified. The result showed that, the strengths of the coffee chain are at all actors of coffee, however, its weaknesses of the chain was observed in coffee quality management at production and supply level. Most interviewed actors rose about weakness and threat of current coffee supply chain (Table 10).

**Table 10. SWOT Analysis of Hararge coffee**

INTERNAL	
STRENGTHS	WEAKNESS
<ul style="list-style-type: none"> <li>• Availability of quality controlling policy</li> <li>• Availability of coffee research</li> <li>• Availability of market information</li> <li>• Presence of specialty coffee</li> <li>• Market accessibility</li> <li>• Indigenous knowledge to produce coffee in district</li> <li>• Producing organic coffee</li> <li>• Good means of social communication</li> <li>• Presence of more genetically diverse local variety</li> </ul>	<ul style="list-style-type: none"> <li>• Shortage of improved agricultural technology</li> <li>• Shortage of coffee supporting organization</li> <li>• Shortage of organized coffee farmers cooperative for legalized standardized coffee marketing</li> <li>• Low yield per hectare of land</li> <li>• Seasonal coffee price fluctuation</li> <li>• Shortage of land</li> <li>• Low quality due to inappropriate harvesting and post-harvest management</li> <li>• Susceptibility to harsh climate condition</li> <li>• Absence drought resistance varieties</li> <li>• Low ability to adapt to new areas</li> <li>• Variation on quality with growing soil and areas</li> <li>• Susceptibility to different disease and pests</li> <li>• High labor consuming commodity</li> <li>• Presence of illegal collectors in chain</li> <li>• Mixing of different quality coffee</li> </ul>
EXTERNAL	
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>• Priority given to coffee production, processing and marketing for investment by country's government</li> <li>• High export earnings</li> <li>• Presence of favorable climate condition for its production since Ethiopia is the birthplace of Arabica coffee</li> <li>• High demand in the global market</li> <li>• Availability of high domestic consumer</li> <li>• Being specialty coffee that fetch premium price</li> <li>• Well-known in the international market</li> <li>• High acceptability to global populations</li> <li>• Presence of ingenious knowledge</li> <li>• Availability of Improved cultural practices</li> </ul>	<ul style="list-style-type: none"> <li>• New country start producing similar quality coffee</li> <li>• New international coffee market strategy</li> <li>• World coffee prices fluctuation</li> <li>• Market economic inflation</li> <li>• Increasing the cost of inputs required for coffee production</li> <li>• Decrease of demand at consumer level.</li> <li>• Expansion of competent cash crop like 'khat' farm</li> <li>• Prevalence of diseases and pests</li> <li>• Climate change</li> <li>• Outbreak of new disease and insect pest problem</li> <li>• Disappeared of genetic resource</li> </ul>

Source: Author's (2014)

## CHAPTER 6. CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion

The primary aim of this thesis was to examine the factors affecting coffee quality for further technology improvement in the coffee value chain. To achieve this objective two main research questions with four sub-questions each about pre-and post-harvest practices and current coffee quality controlling strategies, were produced. A number of actors and stakeholders at most points in the chain were interviewed for answering the research questions. The analysis was prepared with the help of employing SPSS software and excel sheet, chain map and SWOT analysis tools. Summary of results obtained from the study were concluded as follows:

Inadequate coffee production and marketing technologies and mostly ineffective extension services, price fluctuation due to the quality of the produce farmers unable to capture considerable required value from the crops. Poor coffee processing infrastructure, primarily for drying and hulling, tends to reduce the quality and diminish the incomes further. Low productivity aggravated by climatic change contributes to low quality and subsequent high levels of lost value. The limitation on the quality of extension service was among the strong problems cited apart from pest and disease challenges, price instability and lack of reliable market information. In the study region, coffee productions as well as quality are in precipitous decline. This is mainly due to lower productivity, non-availability of improved coffee varieties, limited production and marketing support, unorganized input delivery, imperfect pricing system and, significantly, too competition with '*khat*', which fetches larger economic returns for farmer. In addition, illegal traders in coffee collection, mixing of different quality coffee, absence of primary coffee transaction center in village town, complexity and bureaucracy of ECX coffee quality controlling system, unfair coffee grading system and limited number of a farmers' cooperative were among major factors affecting quality of coffee in the district.

In coffee value chain, still there is a large number of relatively small transactions, particularly close to the production area, are involved in the chain. Furthermore, the supplying share through cooperative was very low since most farmers not aware the importance of selling coffee through cooperative. Therefore, farmers typically prepare their crop and market to local collectors in small or large quantity to collectors. Local collectors then sell-on to legal traders for consolidation. The product is then channeled to processors and finally to either the domestic or exported market. Thus, the value chain is inefficient due to fragmentation, small transactions for producer sales and the large number of collectors. Nevertheless, although there is the good marketing policy of direct coffee trading but still no such change observed.

Generally, results of this study indicated that, among the pre-and post-harvest factors; low level of education, limited use of the coffee shade tree, unpracticed of recycling of old coffee trees prevalence of disease and insect pests, coffee farming experience, bad harvesting, drying, packaging and storing practices and a shortage of extension services were found to be significant factors affecting coffee quality. Furthermore, current coffee quality controlling strategies of coffee is clearly described, although sometimes its assessment evaluation is not clear to some traders. As per recommendation exporters and cooperative union are already adapting the system and working with it for creating value for their produce. However, still farmers and traders do not adopt this standard clearly. Traders knew the criteria for coffee quality assessment like cup value, raw value, moisture contents and screen size. On the other hand, still there is no any quality standard format for assessing and grading unhulled coffee while purchasing coffee from farmers and collectors at district level therefore it is difficult to identify and purchase good and bad quality coffee.

## **6.2 Recommendations**

From the finding and conclusion given above the major factors that affect the quality of coffee and thereby reduce price of coffee in Darolabu district were identified. Therefore, based on the major findings of the study the following recommendations were drawn as short and long-term strategy:

### **1. Improve coffee pre-harvest management practices**

Since, coffee from the area is one of the specialty coffees where Ethiopia has comparative advantage in the international coffee markets. Enhancing the quality and production of this coffee bring benefits for all actors as well as for the country. Hence, among the possible measure to be considered to improve the system by paying high attention by farmers to following coffee field management practices:

- Improve shade tree practices by using improved recommended shade tree species currently selected by research center.
- Practice stumping old coffee tree for recycling its life or re-plant
- Use improve specialty coffee variety recently released by research center

### **2. Improve coffee harvesting and post-harvest processing practices**

Since some coffee farmers in the study area still use the traditional method of coffee harvesting by strip method, drying on the bare ground, packed with polyethylene bag, and stored in a residential home for a long time. Hence, every effort has to be exerted as it is at this stage coffee quality is highly affected by contaminated by taking a taste of anything it comes into contact. This helps the coffee to be free of undesirable tastes, which it picks if dried on the ground. Thus, providing adequate trainings on a continuous basis to producers on pre-and post-harvest management practices are vital. These will further increase the quality; thereby increase the price because good quality coffee gets good grades that earn high price As a result, increases volume of export coffee and the number of Hararge coffee imported country. Moreover, although different coffee research centers recommended appropriate coffee preparation procedures for either wet or dry processing methods with respect to coffee growing ecologies, farmers/traders mostly practice their local preparation way. Therefore, extension intervention could be the best possible approach to enhance awareness among coffee producers to keep the typical coffee quality profile of their garden through processing that finally adds value to their crops. Research center and agriculture should take responsibility of providing sustainable training with careful attention. Thus, the recommended measures include:

- Improve harvesting techniques by only harvesting red cherry at the farm level
- Improve drying techniques by stopping drying coffee bare ground
- Improving packaging materials (use only sisal sack) and store coffee after it welly dried in appropriate warehouse only for a short period, unless sold immediately after drying.

### **3. Strengthen coffee research**

In order to improve farmer productivity, reduce risk, and increase market efficiency, a focus on practical farmer-relevant and market-oriented research and efforts to develop a systematic understanding and characterization of coffee varieties in the area should be supported and improved. Since it determines what varieties have market demand for its attributes such as the morphology and size, color and flavor of the bean as well as production advantages, such as drought, diseases and insect tolerance and high yield. Furthermore, since this research was only focus on coffee quality it did not cover all deep coffee production constraints in study areas, therefore further research should be proposed and conducted on coffee production and productivity especially issue climate mitigation and carbon sequestration.

For implementing, Mechara Agriculture research center should participate and train its researchers by willing to propose a participatory project. Because only conducting research on production based is not full package technology.

#### **4. Establish the primary coffee transaction center in a village town with full infrastructure**

Currently, all coffee trading system in the district is conducted in the primary coffee transaction center only at district town Mechara and Michata. However, in the district many areas with high coffee production potential are far from district town. Therefore, traders are major agents reach the farmers. Moreover, the locations where they reach farmers in a village town indicate lack of access to the market by the producers and indicate the need to open up new primary market centers for easy collecting coffee from producers. In these inaccessible rural areas, they also serve as a means to transmit market information from the center to the farmers. Besides, hand, illegal collectors who widely participate in coffee collection with legal traders. These illegal collectors are collect and mixing of coffee of different quality coffee and supply to market as a result further quality deteriorated. They are also distorting market information according to the interest of their source and their own benefit. Thus, designing and implementing reliable information dissemination mechanisms is essential in order to develop significant levels of trust and cooperation among producers and other market actors in the remote areas and further quality of products would maintained. The implementation should responsible for district trade and marketing office in collaboration with agriculture office. They should select appropriate trade center in each village area and make the place secure for only legal traders and take a legal action on illegal collectors/agents.

#### **5. Link farmers with markets**

Currently established direct coffee trade by ECX addresses this problem. District cooperative promotion offices give training of awareness creation for producers and develop a number of farmer coffee cooperatives and then link them with cooperative union. At the same time research center and other input supplier should provide producers with all good agriculture practice training on coffee production, processing and marketing as well as multiply and distribute improved coffee varieties recommended for their agro-ecology. Once farmers produce and prepare coffee that meet export standard the quality guarantee certificate would provide by responsible organization. Then, all member of cooperative should agree to produce good quality coffee that meet export standard and supply to his or her cooperatives union in large quantity and intend to offer directly to the international market. The existing ECX is providing the usual services of quality certification and inventory management for them. Beyond quality control and inventory management, ECX would conduct a bidding session where sellers (producers) and international buyers meet to bid on prices. The information on demand, quality and price reach all actors from cooperative union to producers.

#### **6. Creation of pre-cooperative farmer coffee producer group association by the means of farmer coffee cooperatives**

It was remarkable that a small-scale coffee producer is the only stakeholder, who not represented during the ultimate vital decisions of coffee sectors. That means; coffee growers associations could be very useful to members by attending various meetings, defending and dealing with coffee issues on behalf of members. Moreover, farmer's 'associations useful in improving the quality and quantity of the product. Associations could also buy their coffee at the right price and weight which would automatically remove traders and their wrong weighing and payment practices (such as wrong prices and weighing, speculation loans) that have been fatal to farmers 'earnings. In the long-run, associations could not only be limited to take part in the buying, storage and transport facilitation activities, they could even grow their own plantations,



organize their own buying/selling centers and similar other systems for many other farm activities that farmers would need at reasonable price, on the basis of credit grants.

This would allow producer groups by improving quality and quantity; engage in bulking at the local level and deliver higher-volume quantities to directly exporter or foreign buyers. Consolidating the product in the hands of producers and adding value through improved quality will build market bargaining power and help farmers improve their margins. Building quality compliance upstream into the production network will strengthen coffee industry and the industry's international position.

## **7. Give emphasize for conducting direct specialty trade (DST)**

Current government policy controlled by ECX allows that, any actors can trade direct specialty trade (DST). ECX (2010) defined specialty coffee as *"coffee, from a known geographic origin that has a value premium above commercial grade coffee due to its high quality in the cup and to particular attributes that it possesses."* The importance the system is by improving the quality of the product through using all required specialty criteria mentioned, it is possible to get special international market. In addition, this region coffee was known among one of naturally specialty coffees, producing area, which is internationally known by trade name called *'Harar specialty'* which given by international fair trade organization. Therefore, this coffee has a special market differently from commercial coffee hence its price is higher than that of others coffee, thereby it can make the possibility to increase income from coffee for producers and could make market coffee stable.

Moreover, demand for specialty coffee is increasing; hence, it is a strategically critical market segment for the Ethiopian coffee industry. However, the problem currently facing this system from the implementation is shortage of right to coffee meet those specialty standards for coffee growing by farmers previously is only depending on local cultivar produced by using the only endogenous knowledge it does not fulfill specialty criteria. However, the current four Hararge specialty coffee released by Mechara agriculture research center in collaboration with Jimma agriculture research center solve above specialty mentioned problem soon. The released varieties were tested with all parameters required for specialty and currently under growing by some farmers. Therefore, there is a high opportunity that gives hope for future specialty traders. Therefore for this purposes research center and agriculture office together with other coffee supporters should hasten the multiplication and distribution of those varieties by creating awareness for producers and certify them with specialty coffee producers.

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## APPENDICES

### Appendix 1. Survey questionnaire for farmers

Date of the interview: \_\_\_\_\_ Peasant Association (PA) \_\_\_\_\_

1. Name of the interviewee \_\_\_\_\_
2. Age of the interviewee \_\_\_\_\_ years
3. Sex    1. Male    2. Female
4. Educational status of the interviewee
  1. Illiterate   2. Grade 1-6   3. Grade 7-12   4. Collage /University

### Coffee Production

7. Experience on coffee production (in years): \_\_\_\_\_
8. Total land allocated for coffee in a hectare \_\_\_\_\_
9. The current number of coffee trees do you have \_\_\_\_\_
10. Age of your coffee trees?
  1. Below 8 yrs   2. 9-15yrs   3. Above 15yrs
11. Yield of your coffee in the past three years (2011-2013) in quintal (qt)  
2011 \_\_\_\_\_ qt , 2012 \_\_\_\_\_ qt & 2013 \_\_\_\_\_ qt

### Coffee local variety grown

12. What is/are the coffee landrace you grow and their characteristics?
  1. Abadiro   2. Shumbure   3. Buna Guracha   4. Kubaniya   5. Charcharo   6. Others specify \_\_\_\_\_
13. Characteristics of your coffee landraces
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
14. Which one is preferable among them and in terms of what? \_\_\_\_\_
15. How can you rate this variety you are growing in terms of quality?
  1. Excellent quality   2. Very good   3. Good   3. Not bad   4. Bad

### Coffee field management practice

15. What is a Coffee Cropping system you practice?   1. Mixed   2. Sole
16. If a mixed cropping system what is your reason of intercropping?  
\_\_\_\_\_
17. If a mixed cropping system what crop type do you grow as an intercrop with coffee?
  1. Maize   2. Sorghum   3. Sweet potato   4. Haricot bean   5. Chat   6. Teff   7. Others: \_\_\_\_\_
18. Do you apply organic fertilizer to your coffee field?    1) Yes    2) No
19. If Q # 18 Yes, what type of organic fertilizer?
  1. Manure   2. Compost   3. Manure + compost   4. Other specify \_\_\_\_\_
20. The amount you use for the above Q # 19 fertilizer:  
Manure \_\_\_\_\_ kg; Compost \_\_\_\_\_ kg   Manure + composts \_\_\_\_\_ kg
21. Do you apply inorganic fertilizer to your coffee field?    1) Yes    2) No
22. If Q # 21 is yes, what type of inorganic fertilizers?



1. DAP 2. UREA 3. DAP + UREA 4. Other specify\_\_\_\_\_
23. The amount you use for the above Q # 22:  
DAP \_\_\_\_\_kg UREA \_\_\_\_\_kg DAP + UREA \_\_\_\_\_ kg
24. Which weed control method do you practice?  
1) Hand weeding 2) Slashing 3) Cultivation 4) Hoeing 5. Other \_\_\_\_\_
25. Do you use herbicide for weed control? 1) Yes 2) No
26. If Q # 25 is yes, what type of herbicide you used? \_\_\_\_\_ and amount \_\_\_\_\_
27. Do you practice coffee pruning? 1) Yes 2) No
28. If Q # 27 Yes, which coffee pruning type do you practice?  
1) Rejuvenation 2) Stumping 3) Desuckering 4) Height management 5) Others \_\_\_\_\_
29. Do you use shade tree for your coffee farm? 1) Yes 2) no
30. What coffee shade tree condition looks like on your farm?  
1. Fully shaded 2. Partially shaded 3. No shaded
31. Do you face disease and insect pest problem in your coffee farm? 1) Yes 2) no
32. If Q # 31 Yes, What are the major coffee diseases?  
1) CBD 2) CWD 3) CLR 4. Branch die back 5. Other (specify): \_\_\_\_\_
33. What is controlling mechanism you used for these diseases?
34. Major coffee insect pests? 1. Stem borer 2) berry borer 7) others (specify): \_\_\_\_\_
35. What insect pest control mechanisms: \_\_\_\_\_
36. What you culturally practice to control the disease & insect pests?  
\_\_\_\_\_
37. Do you use chemical to control the diseases & insect pests before? 1) Yes 2) No
38. If Q # 37 Yes, which type of chemical you used? \_\_\_\_\_

### **Harvesting and Post-Harvest Handling**

39. In what month coffee, flowers? (Tick appropriate month)

Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

40. When do you (months) harvest coffee? (Tick appropriate months)

Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

41. What is the peak time of coffee harvesting? (In months) \_\_\_\_\_
42. How do you know this peak-harvesting month? \_\_\_\_\_
43. What is the frequency of harvesting?  
1) Once a week 2) once per two weeks 3) once a month 4) every time when cherries, ripe/red 5) once a harvesting season/year 6) others (specify) \_\_\_\_\_
44. How can you harvest coffee?  
1) Selecting & picking red cherry only 2) Collecting ripe, unripe and others together 3) others (specify) \_\_\_\_\_
45. How do you dry your coffee after harvested?  
1) On bare land 2) on plastic sheet 3) On cement ground 4) On mesh wire bed 5) 75cm-1m above ground drying bed 4) other specify: \_\_\_\_\_
46. What packing material do you use for storing coffee after dried?

1. Jute sack 2. Plastic sack 3. Other (specify) \_\_\_\_\_
47. Do you store your coffee before sell? 1) Yes 2) No
48. If Q # 49 Yes yes, where did you store?
1. In residence home 2. In warehouse 3. Anywhere free space is available 4. Other, specify \_\_\_\_\_
49. After a long period of storage is it the loss weight of your coffee 1) Yes 2) No
50. If Q # 51 Yes, out of one quantal of your coffee how many kg losses? \_\_\_\_\_
51. For how long do store your coffee after harvested and dried?
- 1) Sale immediately after harvest 2) 1-3 month 3) 3-6 month 4) Up to one year 5) 1-2 year 6) Wait until the price increases
52. To whom you are selling your coffee this year?
1. Local trader/collectors 2) Local retailer 2. Cooperative (name \_\_\_\_\_) 3) Traders, 4) Processors 5) Other specify \_\_\_\_\_
53. Where do you sell your coffee?
- 1) Village market 2) District market 3) Zonal market 4) Specify others \_\_\_\_\_
54. How do you sell your coffee product? 1) In bulk 2) Portion by portion 3) Both
55. What is the price per Kg of dried coffee at market in 2013/14? Min \_\_\_\_\_ Max \_\_\_\_\_
56. Do your coffee preferred qualities by your customers? 1 Yes 2. No
57. Reason for Q # 61 above? \_\_\_\_\_
58. How can you know high quality coffee for your home consumption? \_\_\_\_\_

### **Extension service gained**

59. Did you get any extension service on the coffee in the past three years? 1. Yes 2. No
60. If Q # 64 Yes, what type of extension service you get?
- 1) Advice 2) fertilizer 3) credit service 4) improved variety 5) others \_\_\_\_\_
61. Who provide this extension service?
1. ADO 2. DAs 3. Model farmers 4. Research center 5. NGO 5. Specify others \_\_\_\_\_
62. Which specific type of advice the stakeholders give to you every year? 1. Quality management 2. Field management 3. Disease management 4. Other, specify \_\_\_\_\_

### **Coffee production constraints**

63. What are the problems currently facing you in coffee production?
- No 1 Problem: \_\_\_\_\_
- No 2 Problem: \_\_\_\_\_
- No 3 Problem: \_\_\_\_\_
64. What do you think should be done to solve them in the future?
- No 1 Problem?
- No 2 Problem?
- No 3 Problem?

**THANK YOU SO MUCH!!**

## Appendix 2. Checklist for Traders

Name of traders \_\_\_\_\_ Date of Interview \_\_\_\_\_

1. When do you start the business of coffee trading?
2. From where and whom you purchase a coffee?
3. Do you provide any type of support to your coffee supplies, if so what type of support?
4. To whom and where you sell your coffee?
5. Do you purchase both red cherries and dried coffee?
6. If you buy red cherries, how and where you dry it?
7. How price of the kg of coffee of the day was decided?
8. How do you identify the qualities of the product you purchase and product from another source whether adulterated or not?
9. What cost involved after your purchase?
10. Do you mix product of different qualities?
11. If you mix the product what are the reason for doing that?
12. Who and how coffee quality controlled in the district?
13. How much is the average your purchase and sale of coffee in good time per week?
14. What is your average profit from one kilo of coffee?
15. Do your coffee preferred qualities by your customers?
16. If yes, in terms of what?
17. If no mention the reasons?
18. What are the constraints in coffee marketing?
19. Where to store coffee after purchase?
20. Is there any storage loss of your coffee?
21. If yes, mention cause for the loss and is there any practice to avoid the loss?
22. For how long do stay your coffee in store?
23. If you sell, immediately after purchase, what is/are the reasons behind?
24. For the last 12 months, did you take any training about coffee quality?
25. Do you have a market advisor?
26. Do you have moisture tester to estimate the level of dryness coffee before storage?
27. What are the criteria used at central market for giving grades for coffee?
28. Who are the current actors involved in the coffee marketing channel and their function?
29. What are Problems, Opportunities and Threats for actor involved in the coffee business?
30. Do you get any extension service on coffee trading?

31. If yes, what type of extension services you get?
32. Who provide the above mentioned extension services?

### **Appendix 3. Checklist for Processors**

Name of processors \_\_\_\_\_ Date of Interview \_\_\_\_\_

1. When do you start the business of coffee processing and supplying (Year)?
2. From where and whom you purchase a coffee?
3. To whom and where you sell your coffee?
4. Do you purchase both red cherries and dried coffee?
5. If you buy red cherries, how and where you dry it?
6. What is your average purchase price for one kilo in this year 2013/14?
7. How price of the kg of coffee of the day was decided?
8. How do you identify the qualities of the product you purchase and product from another source whether adulterated or not?
9. What are the current quality standard required for export coffee?
10. Where do you process your coffee?
11. What is the processing cost per kg?
12. After you hulled coffee, what type of quality improvement practice you carry out?
13. Do you mix product of different qualities after hulled and why?
14. How coffee quality controlled during processing, packaging and transporting in the district?
15. How much is the average your purchase of coffee in good time per week?
16. One quantal of dried cherry coffee gives how much kilo of green coffee bean?
17. How much coffee bean you supply to central market per year in a good year?
18. What is your average profit from one kilo of coffee?
19. Most of the time your coffee was getting which grade and why?
20. What is the price of different grade of coffee at ECX transaction center in the past three years?
21. What are the constraints in coffee marketing?
22. Do you store coffee before and after the process and why?
23. For how long you store coffee before supplying to central market?
24. Where to store coffee after purchase?
25. Is there any storage loss of your coffee?
26. If you sell, immediately after processed, what is/are the reasons behind?
27. Do you provide any type of support to your coffee suppliers, if so what type of support?

28. For the last 12 months, did you take any training about coffee quality?
29. Do you have a market advisor?
30. Do you have moisture tester to estimate the level of dryness coffee bean?
31. What are the criteria used at central market for giving grades for coffee?
32. Who are the current actors involved in the coffee marketing channel and their function?
33. What are Problems, Opportunities and Threats for actor involved in the coffee business?
34. Do you get any service on coffee trading?
35. If yes, what type of extension services you get?
36. Who provide the above mentioned extension services?

#### **Appendix 4. Checklist for Exporters**

Name \_\_\_\_\_ Date of Interview \_\_\_\_\_

Name trade of company \_\_\_\_\_ address \_\_\_\_\_

1. How many years old you are in coffee exporting business?
2. From whom you are purchasing coffee?
3. Where do you sell Hararge coffee?
4. To whom you sell coffee in the exported/domestic country?
5. What is your one-kilo purchasing average price per grade for the last three years?
6. How can you purchase coffee from a supplier?
7. How can you decide this purchasing price with your supplier?
8. Which criteria do you consider while buying coffee for export market?
9. What is your cost for one kilo until it reaches the hand of your customers?
10. What are your payment methods?
11. What kind of activities you do for creating added value for exporting coffee?
12. What packing material do you use for export?
13. How do you transport coffee into international market?
14. What is critical coffee quality control point across the chain?
15. Do you provide any type of support for your supplier for bringing you good quality coffee?
16. What type of support you provide?
17. What is your way of communication for information gathering and delivering to your customers?
18. What factors influence the quality of coffee during packing and exporting?
19. How coffee grading carried out at central market?

20. Where grading carried out?
21. What type of criteria considered for making grades?
22. Which grade type is mostly preferable for the export market and why?
23. What are the quality parameters that most importers consider?
24. From where do you get marketing information about quality standards, price and demand?
25. What are losses in your coffee after reached hand of retailers?
26. What do you do with the losses?
27. What is the factors influencing the quality of coffee during transport to export market?
28. What are your main problems, opportunities, and threats to your coffee business?

### **Appendix 5. Checklist for Cooperative Union**

Name \_\_\_\_\_ Date of Interview \_\_\_\_\_

Name trade of company \_\_\_\_\_ address \_\_\_\_\_

1. When this cooperative union started coffee trading?
2. From whom you are purchasing coffee?
3. From where you purchase?
4. Who are your members?
5. Do you buy coffee from any non-cooperative members? And why?
6. Where do you sell coffee?
7. To whom you sell?
8. How your coffee quality was controlled:
9. Who control quality of your coffee:
10. How your coffee grading carried out?
11. Where grading carried out?
12. What type of criteria considered for making grades?
13. What is your one-kilo average purchasing price for the last three years?
14. How can you purchase coffee from a supplier? What is your average selling price in the exported country per grades?
15. How can you decide this purchasing and selling price with your supplier?
16. Which criteria do you consider while buying coffee from your suppliers?
17. What is your cost for one kilo until it reaches the hand of your customers?
18. What kind of activities you do for creating added value for exporting and domestic market?
19. Most of the time how many percent of your coffee meet export standard?

20. Do you provide any type of support for your supplier?
21. What type of support you provide?
22. What is your way of communication for information gathering and delivering to your customers?
23. From where do you get marketing information?
24. Do you think the cooperative/s can help reduce the problems in coffee quality? And why?
25. Do you get any support from others
26. What are the problems you encounter in coffee trade in terms of Quantity, Quality, Marketing, Logistics and Relationships with suppliers/farmers

## **Appendix 6. Checklist for Ethiopia Commodity Exchange (ECX)**

Name: \_\_\_\_\_

Position: \_\_\_\_\_ Date of interview \_\_\_\_\_ Address \_\_\_\_\_

1. How current coffee chain is organized in areas?
2. Who are the stakeholders involved in the coffee value chain?
3. What are the external factors affecting coffee chain?
4. What is your main function in a coffee chain as an organization?
5. What are the main problems in the export coffee chain?
6. How do you manage the problem of illegal coffee traders?
7. What are the main constraints of coffee chain?
8. How many exporters are available for Hararge coffee?
9. Who are the most known
10. How transaction of coffee was conducted at central market?
11. Where are the major importers of Hararge coffee?
12. How much coffee exported per year?
13. How currently coffee was collected from producers?
14. How currently coffee quality was controlled across the chain?
15. What is the quality parameter of coffee in the market chain?
16. What are supports you provide to the stakeholders?
17. What type of linkage do you have between the actors?
18. As per current rule of ECX who are the stakeholders involved in the coffee chain?
19. What is the price of different grade of coffee at ECX transaction center in the past three years?
20. What are the main problems, opportunities and threats to coffee sector?

## **Appendix 7. Checklist for Exported Coffee Quality Inspection Center (CQIC)**

Name: \_\_\_\_\_ Organization \_\_\_\_\_

Position: \_\_\_\_\_ Date of interview \_\_\_\_\_ address \_\_\_\_\_

1. How current coffee quality was controlled across the chain?
2. What is your main function in a coffee chain as an organization
3. What are the main problems in the export coffee chain?
4. What is the current method of coffee quality assessment?
5. How and where coffee grade was performed?
6. What criteria should fulfill for export standard of coffee?
7. What are the main constraints of coffee chain?
8. What is the quality parameter of coffee in the market chain?
9. What type of linkage do you have between the actors?



## Appendix 8. List of interviewed actors

S/N	Name	Address	Date of interview	Type of actors
1	Abdurahman Hassane	Café Hara	30/07/2014	Farmer
2	Jemal Ahmeyu	Café Hara	30/07/2014	Farmer
3	Ahmed Teha	Café Hara	30/07/2014	Farmer
4	Ahmedsani Adem	Café Hara	30/07/2014	Farmer
5	Umer Ahmed	Café Hara	30/07/2014	Farmer
6	Beyan kemar	Guddis	03/08/2014	Farmer
7	Hussen Mumado	Jilbo	31/07/2014	Farmer
8	Mika'el Jemal	Jilbo	31/07/2014	Farmer
9	Abdurahman Umer	Jilbo	31/07/2014	Farmer
10	Mohammed Ibro	Jilbo	31/07/2014	Farmer
11	Sultan Hassen	Jilbo	31/07/2014	Farmer
12	Usman Ahimed	Jilbo	31/07/2014	Farmer
13	Mohammed Yussuf	Serero	01/8/2014	Farmer
14	Hassen Skek Hussen	Serero	01/8/2014	Farmer
15	Abdukarim Mukter	Serero	01/8/2014	Farmer
16	Hussen Ahimed Hassen	Serero	01/8/2014	Farmer
17	Mamud Ahimed	Serero	01/8/2014	Farmer
18	Ahimed Abdi	Serero	01/8/2014	Farmer
19	Hassen Abraham	Serero	02/8/2014	Farmer
20	Falahoo Abduqadir	Serero	02/8/2014	Farmer
21	Mohammedsayid Kedir	Serero	02/8/2014	Farmer
22	Mohammed Abdurahman	Serero	02/8/2014	Farmer
23	Jemal Mohammed Kedir	Guddis	03/8/2014	Farmer
24	Amin Abraham Bore	Guddis	03/8/2014	Farmer
25	Ahimednasir Mohammed	Guddis	03/8/2014	Farmer
26	Waliyya Abdella Ahimed	Guddis	03/8/2014	Farmer
27	Abdi Ahimed Ali	Guddis	03/8/2014	Farmer
28	Jamalo Yussuf Abraham	Guddis	03/8/2014	Farmer
29	Abdullahi Mohammed Hussen	Guddis	04/8/2014	Farmer
30	Asado Ahimed Ali	Guddis	04/8/2014	Farmer
31	Saqfi Ahimed	Guddis	04/8/2014	Farmer
<b>Marketing actors</b>				
32	Yehya Abdulbasir	Mecahra 01	29/07/2014	Tarder-Processor
33	Shimalis Ziqe	Mecahara 02	28/07/2014	Tarder-Processor
34	Megarsa Asefa	Arsi Gololcha	28/07/2014	Tarder-Processor
35	Abdujalil Mohammed	Mechara 01	29/07/2014	Tarder-Processor
36	Abraham Shek-Abdulqadir	Mechara 01	27/07/2014	Tarder-Processor
37	Abduqadir Ahimed	Mechara 01	27/07/2014	Tarder-Processor
38	Sadiq Mohammed	Dire Dawa	07/08/2014	Exporter
49	Usman Abduselam	Dire Dawa	08/08/2014	Exporter
40	Nuguse Dachasa	Badessa	10/08/2014	Coop-Union
<b>Major supporters of coffee chain</b>				
41	Abeba Biday	Dire Dawa	07/08/2014	CQIC
42	Fekadu Berta	Addis Ababa	10/08/2014	ECX

## Appendix 9. ECX Coffee Grading system



# ECX COFFEE CONTRACTS

## 2.2 Grading Factors for Unwashed Commercial Coffee

RAW VALUE 40%					
Defects (30%)				Odor (10%)	
Primary (count) (15%)	Point	Secondary (Weight) (15%)	Point	Quality	Point
<5	15	<5%	15	Clean	10
6-10	12	<10%	12	F. clean	8
11-15	9	<15%	9	Trace	6
16-20	6	<20%	6	Light	4
21-25	3	<25%	3	Moderate	2
>25	1.5	>25%	1.5	Strong	0

CUP VALUE (60%)							
Cup Cleaness 15%		Acidity 15%		Body 15%		Flavour 15%	
Quality	Point	Quality	Point	Quality	Point	Quality	Point
Clean	15	Pointed	15	Full	15	Good	15
F. clean	12	M.pointed	12	M. full	12	F. good	12
1 cup defect	9	Medium	9	Medium	9	Average	9
2 cup defect	6	Light	6	Light	6	Fair	6
3 cup defect	3	Lacking/Dull	3	Thin	3	Commonish	3
>3 cup defect	0	Not Detected	0	N.D	0	N.D	0



# Appendix 10. Criteria used in exported coffee quality evaluation system by CQIC

## MISTRY OF AGRICULTURE

### DIRE DAWA COFFEE QUALITY INSPECTION CENTER

### EXPORT COOFFEE CLASSIFICATION WORK SHEET

Date ..... Destination ..... Code..... Grade..... Origin .....

RAW			CUP			
DEFECT POINT	SHAPE & MAKE	ODOUR	CUP CLEANNESS	ACIDITY	BODY	FLAVOR or CHARACTER
GOOD	GOOD	CLEAN	CLEAN	POINTED	FULL	GOOD
F/GOOD	F/GOOD	TRACE	LIGHT	M/POINTED	M/FULL	F/GOOD
AVERAGE	AVERAGE	MODERATE	MODERATE	MODERATE	MEDIUM	AVERAGE
FAIR	FAIR	STRONG	STRONG	STRONG	LIGHT	FAIR

Moisture content (%) .....

Screen ≥ 14 (%) .....

Defect Point .....

Type of Odour .....

Shapes & Make .....

RESULT: Raw ..... Cup .....

OVER ALL RESULT: This coffee is ..... for grade ..... export

General remark .....

KEY	GRADE	DEFECT POINT RANGE					
RESULT = RAW+CUP		GOOD	F/GOOD	AVERAGE	REJECT	Range of Defect	REMARK
G=FG-G+LC/CC+G/FG	1	1	2	3	>3	1-3	
FG=ST/FG+LC/CC +AV/FG	2	4-6	7-9	10-12	>12	4-12	
FG=ST/FG+1CD/CC +AV/FG	3	13-16	17-20	21-25	>25	13-25	
AV=ST+1/2CD=AV	4	26-30	31-38	39-45	>45	26-45	
<AV=REJECT(UNFIT)	5	46-60	61-75	76-90	>90	46-90	

NB: Cup cleanliness and flavor are the two decisive factors for grading and musty, earthy & foul are notaries cup defects.

#### CHACKED BY

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## Appendix 11. Photo gallery



Photos of farmers interview by researcher and his assistances



Maize intercrop coffee



Matured coffee (75% red)



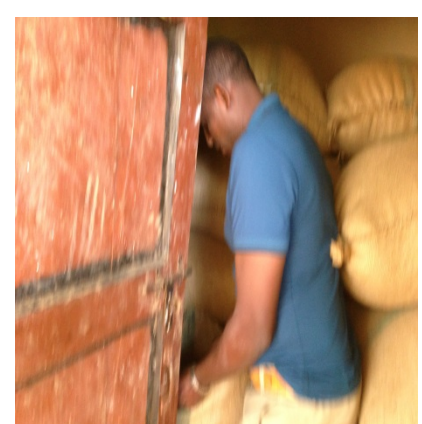
Unhulled coffee at farmers



Transported by illegal collectors



Coffee grinding machines



Model Farmers coffee storage