

**COFFEE (*Coffea arabica* L.) MARKET CHAIN ANALYSIS IN
GOLOLCHA DISTRICT, ETHIOPIA**

MSc THESIS

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DEDICATION

I dedicated this Thesis manuscript to my beloved mother for the valuable contribution she made in the success of my life.

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is the result of my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this thesis. Any scholarly matter that is included in the thesis has been given recognition through citation.

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ACRONYMS AND ABBREVIATIONS

CSA	Central Statistical Agency
DoAFF	Department of Agriculture, Forestry and Fisheries
ETB	Ethiopian Birr
ECX	Ethiopian Commodity Exchange
GDOoANR	Gololcha District Office of Agricultural and Natural Resource
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
M.a.s.l	Meter above Sea Level
NBE	National Bank of Ethiopia
NPC	National Planning Commission
OLS	Ordinary Least Square
SNNP	Southern Nation Nationality People

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Coffee (*coffea arabica* L.) Market Chain Analysis in Gololcha District, Ethiopia

ABSTRACT

Coffee is the major income generating cash crop for smallholder farmers in Gololcha District. However there were no information on market actors, determinants of coffee market supply, market margin and outlet choice. Therefore, objectives of the study were to identify structure-conduct-performance of coffee market, factors affecting market supply of coffee by smallholder farmers and determinants of coffee producer market outlet choice. The primary data were collected through personal interviews from a total of 213 respondents (154 producers, 22 traders, 11 processors and 26 consumers) using structured and semi-structured questionnaires. Focus group discussion was formed and interviewed prior to household survey to generate qualitative data. Both descriptive and econometric model were used to analyze. The study revealed that the main coffee market chain actors were producers, cooperatives, wholesalers, agent middlemen, rural collectors, processors, retailers and consumers. Producers' gross marketing margin is highest in channel III where coffee sold directly to cooperatives and lowest in channel VII and VIII where coffee is sold to boilers and retailers. Barriers to entry (capital and license), price agreement by traders, cheat on weight and higher margins for traders implied that coffee market in Gololcha district was inefficient. The result of two stage least squares showed that amount of coffee produced, sex of the household heads, educational level, family size, land allocated to coffee production and access to market information had positively and significantly influenced amount of coffee supplied to the market. The result from MVP showed that sex of the household head, level of education, means of transport ownership and access to information had positively influenced choice of wholesaler and negatively influenced choice of agent middle-men. Level of education was significantly and negatively related with agent middle-men, and significantly and positively influenced cooperatives and wholesalers channel choice. The study recommends that emphasis should be given on controlling illegal traders and enhancing market infrastructure, promotion of farmers cooperatives, increasing level of coffee production (through extension of improved varieties, fertilizer application, irrigation, pruning and other agronomic management) and expansion of education facilities.

Key words: Coffee, SCP, Gololcha, Marketing margin, Market outlet

1. INTRODUCTION

1.1. Background of the Study

Agricultural sector has been the priority of Ethiopia since the early 1990s, when the Agricultural Development-Led Industrialization (ADLI) and related policy frameworks were adopted (FAO, 2014). Share of agriculture fell to 34.9 percent in 2017/18 from 36.3 percent during the same period (NBE, 2018). Despite its declining contribution to GDP over the years, agriculture remains the leading sector in terms of contribution to the country's overall economy. It is a major source of food for domestic consumption, of raw materials for the domestic manufacturing industries and of primary commodities for export. Moreover, the sector contributes 73% of employment, and supplies 70% of the raw-material requirements of local industries (Admit *et al.*, 2016).

Ethiopia is mainly characterized by low output rain-fed mixed farming with traditional technologies. The presence of an unproductive class, lack of capital, poor infrastructure, absence of access to markets, a shortage of skilled manpower, land degradation, population pressure, culture, deforestation, tenure regimes and policies, poor land management practices and varied but interrelated natural factors could be mentioned as important factors of rural poverty (Temesgen, 2017). Agricultural production in Ethiopia remains exposed to various risks (disease outbreaks, agricultural output price volatility and uncertainty in input-output price ratios), (IFAD, 2016). The major factor for the short fall in achieving the planned level of agricultural productivity is related to the coverage and quality of implementation of the agricultural extension system (NPC, 2016).

Ethiopia is the birth of *Coffee arabica*. It is grown by over 4 million smallholder farmers and employs 15 million people or roughly 15% of the country's population at different points along the value chain (Francom, 2018). Ethiopia produces and exports one of the best highland coffees in the world (Samuel and Eva, 2008). Total earnings from goods export grew by 3% in 2018 over the same quarter of last year on account of the rise in export earnings from coffee (19.1%), oilseeds (4.9%), leather and leather products (27.7%), fruits and vegetables (16%), meat and meat products (10.1%), flower (8.1%), electricity (23.8%) and other exports (35.1%). The share of coffee in total merchandize export earnings was increased from 27.5% in 2016/17 to 31.8% in 2017/18 (NBE, 2018). The area share of coffee under all crops in the country was increased from 4.94% in

2016/17 *meher* season to 5.09% in 2017/18 *meher* season (CSA, 2018). Coffee plays a vital role in both cultural and social life of Ethiopian community. Among coffee producing countries in the world, Ethiopia is the first in consumption of coffee (Melkamu, 2015; Alemayehu, 2014).

Coffee is backbone of the Ethiopian economy. But, Ethiopia has not yet fully exploited its position as the producer of some of the best coffees in the world. Coffee production in Ethiopia is constrained by lack of competitiveness, poor access to market, lack of infrastructure, inadequate access to services, low value addition, and in adequate technology transfer and research (Jose, 2012). Coffee sector is highly dependent on international prices and affected by the structure and workings of the world coffee market. Ethiopia is one of the countries mostly affected by the crisis in world coffee prices (Nicolas, 2007). Notwithstanding the severe price shocks that have been shacking its value chain, coffee remains a fundamental component of the Ethiopian economy and export. Nevertheless, the prolonged price decline has substantially weakened its production basis and prospects so that appropriate financial services are urgently needed to sustain rural communities (Bastin and Matteucci, 2007).

Oromia is one of the largest region in Ethiopia that shares largest area coverage of the country. It is known for high production of coffee and, 489799.36 ha of land were allocated and 3101927.33 quintals was produced with average yield of 6.33 quintals/ha in 2017/18 *meher* season (CSA, 2018). From top 25 coffee producing districts in Ethiopia, Oromia dominates with 18 coffee producing districts and the remaining top coffee producing districts are located in SNNP. Arsi zone is one of the Oromia region's zone which has potential of coffee production. In 2016/17 *meher* season, 6606.55 ha of land were allocated for coffee production (CSA, 2017). Gololcha district is found on the 14th from top 18 coffee producing districts in Oromia (James *et al.*, 2015).

To improve coffee production and productivity in the area, development of well-performing marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices is important. But, no attempt has been made to study performance of coffee marketing and determinants of market outlet choice of coffee producers and supply in the study area. The finding of the study can assist in developing improved market development strategies to benefit all stakeholders who are participating in coffee market in the study area.

1.2. Statement of the Problem

The government of Ethiopia has recently embarked upon exploring new knowledge from outside the country in order to accelerate its market-oriented agricultural development. These areas of new knowledge include technologies, biotechnological tools and products, institutional innovations and arrangements for extension, output marketing, input supply and rural finance (ILRI, 2005). It has developed long term and strategic framework to improve the quality of farm product and traded commodities, reduce marketing costs and increase competition in the marketing sector (Tesfaye, 2016).

But, till today agricultural commodity market is not stable. This is because, there is no well-integrated commodity marketing policy that addresses all the processes that involve transport, grading, storage and information facilities for the producer as well as for consumer, and well-equipped institutional establishment which can provide all marketing services to all market actors (Tesfaye, 2016). Limited credit supply, price instability, and market and price information not accessible to producers and local traders are also among major constraints of agricultural marketing in Ethiopia (Mohammed, 2004).

There are structural changes in the coffee export sector in Ethiopia. Cooperatives and commercial farms are increasing with lower concentration ratios in the export sector. On the other hand, the share of the incumbents in the local coffee market is large (Bart *et al.*, 2014). While the Ethiopian Commodity Exchange, which was established in 2008, introduced regulatory, institutional, and organizational innovations in the coffee market, informal norms and conventions remain the primary institutions governing transactions in the local markets (Fekadu *et al.*, 2016). An efficient, integrated, and accurately responsive market mechanism is of critical importance for optimal allocation of resources in agriculture and for stimulating farmers to increase output (Wolday, 1994).

According to Getachew (2011), among the actors in coffee marketing channel, retailers receive the highest marketing margin. Similarly, the study by Zekarias *et al.* (2012) revealed that larger average net profit was obtained by the intermediaries than the producers and producers were less beneficiaries in the chain than the other actors in southwest Ethiopia. According to Engida (2017) producers marketing profit share was highest when they directly sell to cooperative and lowest when they sell to rural collector in south west Ethiopia.

Various studies on performance of coffee marketing (Bizualem, 2014; Getachew, 2011; and Zekarias *et al.*, 2012) and on coffee producers market outlet choices (Samuel *et al.*, 2017; Engida, 2017; Mekonin, 2017; and Solomon *et al.*, 2016) were conducted in different parts of the country. However, past studies conducted on different regions of Ethiopia, did not address the performance, supply and market outlet choice decision of coffee producers in the study area. Therefore, to improve coffee production, knowing of existing and efficient marketing channel, and margin distribution of marketing actors is important. Hence, the study aimed to analyze performance, determinants of supply and market outlet choice decision of coffee producers in the study area.

1.3. Research Questions

- ✓ What did structure-conduct-performance of coffee market in the study area look like?
- ✓ What were the factors affecting market supply of coffee at smallholder farmers level? and
- ✓ What were the factors affecting farmers coffee market outlet choice decision?

1.4. Objectives of the Study

The general objective of the study was to analyze coffee marketing chain in Gololcha district.

Specific objectives of the study were

1. To identify structure-conduct-performance of coffee market in the study area
2. To identify factors affecting market supply of coffee by smallholder farmers and
3. To identify determinants coffee producer market outlet choice

1.5. Scope and Limitation of the Study

The study has been conducted in one district and important information was collected from sample households and market actors involved in the marketing of coffee in the study area. However, there were spatial as well as temporal limitations to make the study more representatives in terms of wider range of area coverage and time horizon. Furthermore, since Ethiopia has wide range of diverse agro-ecologies, institutional

capacities, organizations and environmental conditions, the result of the study might have limitations to make generalizations and make them applicable to the country as a whole.

1.6. Significance of the Study

The study provides information on the determinants of coffee supply to the market, the determinants of market outlet choice decisions, marketing margin, benefit share of actors, and identified opportunities and constraints of coffee marketing in the study area. The information is expected to have valuable input that helps market participants to understand supply potential and performance of coffee marketing and come up with important recommendations that helps in delivering required efforts to enhance the production and marketing of coffee to bring about economic development in the area. The information generated in this study can help a number of organizations including: national and international research institutions, development organizations, traders, producers, policy makers, extension service providers, government and non-governmental organizations.

1.7. Organization of the Thesis

The thesis has been organized under five chapters. Chapter one consists the introduction (background, statement of the problem, research questions, objectives, significance of the study, and scope and limitations of the study). Chapter two presents review of literature which contains basic marketing concepts and empirical reviews. Chapter three deals with description of study area and research methodology. Chapter four presents the results and discussion. Chapter five summarizes the main findings of the study, draws conclusion and provide appropriate recommendations.

2. LITERATURE REVIEW

2.1. Definition and Basic Concepts

Smallholder Farmers: Often the term smallholder is interchangeably used with small-scale, resource poor, and sometimes peasant farmer. In general terms smallholder only refers to their limited resource endowment relative to other farmers in the sector. Smallholder farmers are also defined as those farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labor (DoAFF, 2012). The differences in smallholder farms between countries can be significant, and often reflect differences in the stages of development across countries. This is because the evolution of the small farm is intrinsically related to the process of economic development (FAO, 2015).

Marketing: Marketing is a social and managerial process by which individuals and organizations obtain what they need and want through creating and exchanging value with others. In a narrower business context, marketing involves building profitable, value-laden exchange relationships with customers. Hence, marketing is the process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return (Armstrong and Kotler, 2015). Marketing as a process by which individuals and groups obtain what they need and want by creating and exchanging products and value with others. It is the process of building profitable customer relationships by creating value for customers and capturing value in return (Kotler *et al.*, 1999).

Market channel: It is the path of commodity from its raw form to finished form or a path of a product as it moves from the producers to the final consumers (Saleh *et al.*, 2016). Marketing channel is a set of interdependent organizations involved in the process of making a product or service available for use or consumption (Anne *et al.*, 2006).

Intermediaries or middle channel members: According to Palmatier *et al.* (2015), the term intermediary refers to any channel member other than the manufacturer or the end user. We differentiate three general types: wholesale, retail and specialized. Wholesalers include merchant wholesalers or distributors, manufacturers' representative, agents and brokers. A wholesaler sells to other channel intermediaries such as retailers or to business

end users, but not to individual consumer end users. Unlike purely wholesale intermediaries, retailers sell directly to individual consumer end users. Specialized intermediaries enter the channel to perform specific functions. They are not heavily involved in the core business represented by the products being sold. For example, insurance and financing companies involved in financing, information technology firm may participate in ordering or payment functions and marketing research firms generate marketing intelligence that can support the performance of many functions.

Market chain: A market chain is used to describe the numerous links that connect all the actors and transactions involved in the movement of agricultural goods from the farm to the consumer. The efficiency of the market chain is generally a factor of how well information flows between these actors (Hobbs *et al.* 2000). According Lundy *et al.* (2004), market chain has three components. These are; production, post Postharvest management processing and marketing.

2.2. Actors of Coffee Market Chain and their Functions in Ethiopia

The supply of coffee for Ethiopia is characterized by a long-chain with several intermediaries (Boansi and Crentsil, 2013). According to Alemayehu (2014), Teshale (2017) and Belay (2017), participants (actors) involved in the coffee value chain are coffee producers, collectors, primary cooperatives, processors, cooperative union, wholesalers, exporters, retailers, consumers and supporters.

Coffee Producers: At the beginning of the coffee marketing chain are the producer farmers, who plant and manage coffee trees and sell the dried coffee cherries to wholesalers or collectors at farm gate or nearby market. They are responsible for growing and harvesting coffee, thereby determining the amount and quality of coffee produced (Getachew, 2011). The sector segmented as small-scale coffee farmers and coffee farmers' service cooperatives (90%), medium-sized producers (5%), and large scale commercial private enterprises (5%) produce for local and global market depending on the graded standard of coffee quality inspection body (Teshale, 2017).

Collectors: The main actors in the coffee market chain who receive coffee from the producers (Zekarias *et al.*, 2012). Buy coffee from smallholder farmers at their locality and supply to processors and have a crucial role in the coffee assembly and transfer the

collected coffee to the processors (Teshale, 2017). According to Jema (2014), assemblers perform marketing functions such as collecting the produce from farm households (buying), drying (partially), transporting to processors and selling to processors.

Primary Cooperatives: Smallholder farmers in developing countries are often encouraged to get organized into cooperatives mainly to overcome production and marketing constraints that usually hinder the improvement of their livelihoods (Dagne *et al.*, 2017). Primary or village cooperatives purchase members' coffee, sell it in bulk to a processor or exporter (Alemayehu, 2014). Members' collect coffee together as well as purchase other coffee in the village town as a group and supply to a cooperative union (Teshale, 2017).

Processors: Both dry and wet processing is carried out at processing station by processors. It includes hulling and pulping of coffee and sorting, grading packing and weighing is carried out here. In large scale producers and cooperatives all processing work is accomplished by the producers by their own processing plants (Teshale, 2017).

Cooperative Union: Cooperative unions purchase, process, and export coffee on behalf of their member cooperatives (Alemayehu, 2014). Their main functions are to assist in developing producer/buyer linkages (by facilitating organic and fair trade certification for example), to export members' coffee directly, provide warehouse and transport services, promote high-quality coffee production, and provide saving and credit services as well as training and education programs for members (Nicolas, 2007). Cooperative unions with sufficient capital export directly without necessarily getting their produce to the auction markets (Boansi and Crentsil, 2013).

Wholesalers: They directly collect coffee from the producers by their agent (commission men) and then transfer this product to the exporter in Addis and Ethiopian commodity exchange (ECX) market (Zekarias *et al.*, 2012). Licensed wholesalers operate mainly in the domestic market that is, trading non-export quality coffee by buying coffee from the ECX (Girma, 2011). Suppliers acquire red coffee cherries from collectors or producers (before 1999, they could not buy coffee directly from producers), they then have to process their coffee before bringing it to auction. They are not allowed to export on their own account. Some have storage facilities as well as their own hullers or pulperies (Nicolas, 2007).

Exporters: Exporters are clearly the most powerful of the private intermediaries as they hold the contacts with international buyers. They are centralized in Addis Ababa and own their processing plants where coffee is transformed into export quality green beans (Girma, 2011). At the auction markets, exporters purchase coffee, process it to export standard and then export it to destinations abroad. Some of the processed product are however sold to local wholesalers and retailers and then to consumers from there (Boansi and Crentsil, 2013). Involved in the international transaction marketing operations buying the coffee from wholesalers at ECX and export the finished clean and standardized coffee bean (Teshale, 2017).

Retailers: The retailers purchase coffee from the large scale producers, exporters and cooperative for the international market and the rejected and lower graded coffee supplied to the domestic market (Boansi and Crentsil, 2013).

Consumers: Ultimate users of coffee that can be international or domestic users (Gemoraw, 2011).

Service providers at each market chain: The service provider in coffee value chain actors in the country are like Ethiopian commodity exchange main and its branch, input supplying government organizations, Woreda level administration bodies, development agents, transporters, commercial bank of Ethiopia, saving and credit association, and other non-governmental organizations (Alemayehu, 2104). The Ethiopian Commodity Exchange (ECX) was established in April 2008 with the objective of improving market efficiency by better linking smallholder farmers to markets, encouraging reliable trading relationships and increasing market information. In December 2008 it became mandatory to trade all coffee through the ECX (Hernandez *et al.*, 2015). However, According to FAO (2014), the introduction of ECX in 2008 has not changed the market structure. It appears that ECX has failed to bring about more balanced domestic prices. First, the ECX has reduced the number of middle men but this has increased the market power of the coffee suppliers and probably allowed them to inflate prices by creating shortages. Indeed, although ECX is now the main wholesale structure for coffee in the country, the coffee still has to go through local wholesalers before reaching regional ECX level. Second, inefficient and non-transparent grading contributes to excessive losses at wholesale-exporter level, and raises their costs significantly.

2.3. Approaches to Study Agricultural Marketing

There is some disagreement as to how the study of marketing may be best approached (Beckman *et al.*, 1957). According to Olukosi (2017), Jema (2014) and Jema *et al.* (2011), there are five major approaches to the analysis of marketing problems. These are: the functional approach, the institutional approach, the commodity approach, the behavioral system and the structure-conduct-performance approach. All are merely ways of breaking down a complex marketing problem into its parts so that it can be better understood.

2.3.1. Functional Approach

One method of classifying the activities which occur in the marketing processes is to break the processes down into functions. There are three general types of functions performed in any marketing system. These are exchange functions (buying and selling), physical functions (storage, transportation, processing, manufacturing, handling and packing), facilitating functions (standardization, financing, risk bearing and market information) (Kohl, 1955). Duplication and repetition are reduced to a minimum, and a better understanding of the marketing system can be obtained within a relatively short period of time. The major defect of this method of approach is abstractness, which can be overcome by an appropriate selection of illustrative material (Beckman *et al.*, 1957).

2.3.2. Institutional Approach

Instead of dealing with specific commodities, attempts have been made to deal with classes of commodities that are closely related. Where the functional approach attempts to answer the question of who does what, the institutional approach to marketing problems focuses attention on the who (Kohl, 1955; Beckman *et al.*, 1957).

2.3.3. Commodity Approach

Under this method, both the functional and institutional aspects of marketing are analyzed in detail for particular commodity (Kohl, 1955; Jema *et al.*, 2011). It is extremely useful to the person who is interested in only one product since it does allow in depth analyses. However, it has also a disadvantage because it ignores the relationship between product and market alternative and also the multi-product firms. As opposed to the analysis of general equilibrium or any other sort of that kind, this approach deals about the marketing of a

single commodity or certain commodity groups such as grain marketing, food marketing. Thus, it is difficult to see the interaction and interrelationships that exist among commodities which could have important implications governing the behavior of the market and market agents (Jema, 2014).

2.3.4. Behavioral System Approach

The marketing process is continually changing in its organization and functional combinations. A major problem faced by a market analyst is understanding and predicting change. The behavioral systems approach is used to analyze the behavior of firms as it affects their decision under different market structures. It examines the market, its operators or the organizations involved as a system of behavior. This enables one to understand anticipated but unforeseen changes in the marketing system (Olukosi, 2017).

2.3.5. Structure-Conduct-Performance Approach

The Structure, Conduct, Performance (S-C-P) framework was an early attempt at this, developed by the Industrial Organization school for application to markets in industrialized nations (Magrath, 1992). The S-C-P paradigm was first developed by Edward Mason and Joe Bain in the 1940s and 1950s (Jema *et al.*, 2011). Market structure analysis emphasis is the nature of market competition, and attempts to relate the variables of market performance to types of market structure and conduct. According to the model, the performance of the market is determined by the conduct (behavior) of market participants, which is in turn determined by the structure (organization) of the market. Market structure is a description of the number and nature of participants in a market. Market conduct deals with the behavior of firms. Firms that are price-makers are expected to act differently from those in a price taker type of industry. Market performance is a reflection of the impact of structure and conduct on product prices, costs, the volume and quality of output. If the structure of a market is that of monopoly rather than pure competition, then one could expect poor market performance (Olukosi, 2017).

Some have declared the triad outmoded, because causation can be reversed: a firm's superior performance can raise its market share. However, empirical research so far has not established reverse causation as the norm. The evidence linking structure with probable effects on prices, profits efficiency, and innovation is much stronger and more

general (Jong and Shepherd, 2007). The structure of a market may provide the conditions for potential types of firm behavior, but there is no necessary fulfillment of these, and therefore structure cannot be held to be absolutely deterministic of conduct and performance. For example, aggressive rivalry between a few firms may ensure that structurally oligopolistic markets exhibit characteristics of conduct and performance akin to those of the perfectly competitive model. Similarly, where significant scale economies exist, oligopolistic market structures may provide for better economic performance than atomistic and competitive ones. However, within this paradigm, there has been a tendency for inference to be accepted as proof- i.e. to leap from structural categorizations to performance characteristics (Scarborough and Kydd, 1992).

a) Market structure

The structure of the market is defined as those characteristics of the organization of the market that seem to exercise strategic influence on the nature of competition and pricing within the market (Scarborough and Kydd, 1992). Important elements of market structure describe how nearly a market satisfies the assumptions that define a perfectly competitive market. In a perfectly competitive market, there are many small buyers and sellers of standardized product. Among elements of market structure, it is therefore neutral to look at the numbers and size distributions of buyers and sellers. There is also a free and easy entry into and exit from a perfectly competitive market. Barriers to entry (costs of entry) characterize the investment needed for an enterprise to begin to supply a market (Martin, 2010). If the market structure is characterized by high barriers to entry, it may result in only a few traders profitably maintaining the business activities. These few traders may engage in non-competitive behaviors such as collusion and exclusionary or predatory price setting behavior, and non-competitive behavior in turn can result in excessive profit and widened marketing margin for traders. The major structural elements which are most critical to performance analysis are the following (Jema, 2014).

1) Market concentration: It reflects the importance of the largest firms in some particular industry or market. In some cases, it may also be relevant to measure buyer concentration, in order to assess the importance of the largest buyers. This might arise in the case of an industry which supplies a specialized producer good, for which the market includes only a very small number of buyers (John *et al.*, 2017). Among the many market characteristics thought to influence market performance, the number and size distribution of the firms is a

key element of industry structure. Any specific measure of seller concentration at industry level aims to provide a convenient numerical measure reflecting the implications of the number and size distribution of firms for the nature of competition in the industry concerned. In empirical research in industrial organization, concentration is probably the most widely used indicator of industry structure (Martin, 2010).

Three measures of seller concentration are commonly used in SCP studies. These are the Herfindahl-Hirschman index, concentration ratios and Gini coefficient (Church and Roger, 1999; Luis, 2002). A concentration ratio closer to 100% or a Herfindahl index closer to zero meant an industry structure closer to the many small firms of perfect competition (Martin, 2010).

N-Firm Concentration Ratio: Usually denoted CR_n measures the share of the industry's n largest firms in some measure of total industry size. The most widely used size measures are based on sales, assets or employment data. If we order firms by market share in descending order—firm 1 is the largest, 2 is the second largest, etc.—then, $S_1 \geq S_2 \geq \dots \geq S_N$, and the m firm concentration ratio is the sum of the market shares of the largest m firms:

$$CR_m = \sum_{i=1}^m s_i \quad (1)$$

Common examples are the four-firm concentration ratio CR_4 and the eight-firm concentration ratio CR_8 (Church and Roger, 1999). There are no set rules for the choice of n , the number of large firms to be included in the calculation of CR_n . However, CR_n for $n = 3, 4, 5$ or 8 are among the most widely quoted n -firm concentration ratios. For most practical purposes, both the choice of n and the choice of size measure may not be too crucial (John *et al.*, 2017).

Herfindahl-Hirschman Index: HHI is simply the sum of the squares of market shares for all firms in the industry (N) (Church and Roger, 1999). Working independently, both Hirschman (1945) and Herfindahl (1950) suggested a concentration measure based on the sum of the squared market shares of all firms in the industry (John *et al.*, 2017). The Herfindahl index provides a better measure of market concentration. However, it is more difficult to compute: It requires knowledge of the market share of all firms in the industry,

whereas C4, for example, requires only knowledge of the market shares of the four largest firms (Luis, 2002).

$$HHI = \sum_{i=1}^n s_i^2 \quad (2)$$

Gini coefficient: According to John *et al.* (2017) the Gini coefficient is the area between the line of perfect equality and the observed Lorenz curve, as a percentage of the area between the line of perfect equality and the line of perfect inequality. The maximum possible value of $G = 1$ corresponds to the case of one dominant firm with a market share approaching one and the minimum value of $G = 0$ corresponds to the case of N equal-sized firms.

The formula definition for the Gini coefficient can be specified as the follows;

$$G = \left\{ \frac{\sum_{n=1}^N \sum_{i=1}^n X_i}{0.5 [N+1] \sum_{i=1}^N X_i} - 1 \right\} \quad (3)$$

G = is Gini coefficient

$\sum_{i=1}^n X_i$ = is cumulative sales up to firm n

$\sum_{i=1}^N X_i$ = is total sales of N firms

2) Barriers to Entry: Barriers to entry, which might have been better labeled cost of entry, characterize the investment needed for an enterprise to begin to supply a market. They convey information about the possibility of rivalry between potential and actual sellers (Martin, 2010).

b) Market conduct

Market conduct refers to firms' behavior, for example pricing and selling policies and tactics; overt and tacit inter-firm cooperation, or rivalry, and research and development activities (Scarborough and Kydd, 1992). According to Olukosi (2017), market conduct refers to the actions which firms follow in adopting or adjusting to the market in which they buy and sell. It includes the method employed by groups of firms in determining

price and output, sales promotion policies, policies that are directed at altering the nature of the product sold and various selling tactics that are employed to achieve specific market results.

Firms behavior in turn feeds back to influence market structure. Incumbents' advertising and spending on research and development may influence the cost of entry. Incumbents' pricing policies may influence the profit a potential entrant would expect to earn. Firm conduct also feeds back to influence basic conditions on the demand side of the market (for example, advertising may affect the price elasticity of demand). Market structure is thus directly and indirectly (through the conduct-demand conditions link) affected by firm conduct (Martin, 2010; Luis, 2002).

c) Market performance

This is a concept that is related to structure and conduct. It is defined as the strategic end result of market adjustments engaged in by buyers and sellers. In other words, market performance is the appraisal of the extent to which the interactions of buyers and sellers in a market stimulate results that are consistent with social purposes (Olukosi, 2017). Market performance is the reflection of the impact of structure and conduct on product prices, costs, and volume and quality of output. If market structure in an industry resembles monopoly, then one can expect poor market performance (Cramer *et al.*, 2001). As conceived in the S-C-P framework, conduct determines the various dimensions of market performance. These include productive efficiency and neoclassical measures of consumer and social welfare. It also determines, among other things, the rate of technological progress. Firms operating in industries that are supplied by few firms, and into which it would be costly for new firms to enter, earned higher rates of return than firms in other types of industries, all else equal (Martin, 2010). Performance refers to the results of an industry's activities measured in terms of profits, margins, innovativeness, etc (William, 1993).

Performance is, as always, defined variously and much debated (Scarborough and Kydd, 1992). Given these different perspectives there are several contrasting measures which are commonly used in assessing the performance of a marketing system. These are: the farmer's/grower's share of the retail price paid by the end user or consumer, the gross

marketing margin or farm-retail price spread, and the proportion of a consumer's income which must be spent on food (Crawford, 1997).

Producers Share: Regardless of the interest group, attention is usually focused on the farmer's share of the consumer's food dollar. An increase in the share is taken as evidence that farmers are the real cause of rising food prices. A decrease in the share is taken as clear proof that middlemen are getting rich off the farmer again. In an elementary sense, the farmer receives what the consumer pays for food after the various costs of marketing are taken out. This residual amount expressed as a percentage of the retail food dollar is referred to as the farmer's share (Kohl, 1955).

Marketing Margin: It is the difference between the price received by farmers and that paid by consumers. Both producers and consumers have expressed concerns about the size of margins and have asked why marketing margins change. Moreover, if a marketing margin increases, what is the incidence of the change on farm and retail prices should be considered (Tomek and Kaiser, 2014). The marketing margin, or the farm to retail price spread, is the difference between the farm value and retail price. It represents payments for all assembling, processing, transporting, and retailing charges added to farm products (Gardner and Rausser, 2001).

The difference between the price which the consumers pay for a product and the price the producer of that product receives is generally referred to as the marketing margin. This margin includes all of the costs of moving the product from the point of production to the point of consumption, of any processing which may be undertaken, and of handling at all levels in the marketing machinery. The marketing margin can be broken down in many ways. Two of the most common classifications are on the basis of specific cost items and on the basis of jobs performed at the various levels in the marketing channel (Kohl, 1955).

Modern marketing system is often based on complex multistage framework. A detailed marketing margin study aims at estimating the difference between the cost of and the receipts from handling the commodity at every stage. This difference should not exceed the normal return for the service by the respective stages to fulfill the conditions of efficiency (Bipradas, 2014).

2.4. Review of Empirical Literature

2.4.1. Empirical Review on Structure-Conduct-Performance

Bizualem (2014) used structure conduct and performance approach to study coffee market performance in Jimma Zone, Ethiopia. The analysis of the largest four firms' concentration ratio showed that the market was characterized with strongly oligopolistic market structure. The licensing procedure, huge capital for start-up and buying trade seat from ECX, the nature of the coffee business itself were identified as the major challenges as entry barriers. The market conduct analysis detected that unfair price setting practices are followed by suppliers while purchasing coffee from the poor farmers. Regarding market performance, gross margin and profit margin were used and farmers were found to receive very smaller portion of profit shares.

Hunegnaw (2017) also conducted research on the performance of haricot bean market in Enbise Sar Midir District, Northern Ethiopia. The market concentration ratio of the four largest firms indicated that markets were found to be strongly oligopolistic and inefficient in structure (with wide final consumers' price spread). Gross marketing margin was maximum for city wholesalers (38.60%) and minimum for farmer traders (13.22%) of the consumers' price). Net marketing margin was maximum (11.52%) for processors and minimum (7.36) for rural assemblers.

Tizazu *et al.* (2017) studied structure-conduct-performance analysis of honey market in Shebedino District, SNNPR, Ethiopia and concluded that honey market in the study area was inefficient. Structure of honey market in the district was strong oligopoly with four firms' concentration ratio of 58.18%. Market conduct was inefficient in that some traders were price makers and the price was affected by individual firms and from marketing margin analysis it was observed that large margins were going to middlemen.

Solomon *et al.* (2017), examined structure-conduct-performance of beef market in Duga District, Ethiopia. The result of the study indicated market structure was strong oligopoly. Trading license, initial working capital, the risk of seasonal variation in demand and price offered were considerable barriers to entry to beef trading in the study area. The market conduct on the other hand indicated there was no selling activity on credit basis, and the negotiation tool between sellers and buyers was mostly used for price determination in the

study area. The marketing margin analysis indicated butcheries and hotels received highest profit followed by small feedlot operators.

On the other hand, Joseph *et al.* (2018) conducted a structure-conduct-performance analysis of tomato marketing in Loitoktok, Kajiado County, Kenya by using Herfindahl-Hirschman indices and Gini Coefficients. Accordingly, Herfindahl-Hirschman indices of 0.038, 0.076, and 0.2 for retailer, wholesaler and producer levels respectively were obtained, indicating that market was competitive at retail and wholesale but uncompetitive at producer level. Additionally, Gini coefficients of 0.6505, 0.5258, and 0.4524 for producers, wholesalers, and retailers were obtained showing inequity in income distribution, indicating that the market was imperfect.

2.4.2. Empirical Review on Determinants of Market Supply of Agricultural Products

Different scholars have studied on factors influencing market supply on different crops. Engida (2017) studied factors influencing the volume of coffee supply in southern Ethiopia using multiple linear regression model. The model indicated that, quantity of coffee produced, educational level of household head, cooperative membership and ownership of means of transport were found to be significant variables influencing volume of coffee sold positively. Distance to the nearest local market was also significant with a negative sign.

Mohammed (2012) identified the major factors that affect the supply of coffee in Nensebo district of Oromiya region using 2SLS regression econometric model. The results of his econometric analysis shows that output, access to market information, family size and distance to market as the main factors affecting coffee supply to the market. Family size and market distance affect the quantity supply negatively.

Zekarias *et al.* (2012) used multiple regression model to identify determinants of forest coffee supply in south western Ethiopia. Result from market structure analysis revealed that producers, assemblers and wholesalers are the major actors involved in the market chain of coffee. The local coffee Wholesalers' concentration index revealed that there is a threat of oligopoly in the market structure of coffee area. The market conduct analysis revealed that price setting mechanism is largely determined by the benevolence of buyers and the existing market force in the producers and exporters market respectively.

The margin analysis indicated that exporters take the largest profit margin in the coffee market chain. Result of the model also pointed out that price, educational level of households, transportation cost and level of production were found to have a significant impact on the supply of the coffee in the study area.

Addisu (2016) examined determinants of quantity of vegetable supplied to the market in Ejere District. The result of two-stage least square regression model showed that productivity of potato, sex of household head, distance to nearest market, off/non-farm income and area of land allocated for potato did significantly affect the volume of potato supplied to the market. Productivity of onion, education level, farming experience and land allocated for onion significantly affect the volume of onion supplied to the market.

Sultan (2016) analyzed the determinants of wheat supply to the market in Sinana District by using two-stage least square regression model. The model indicated that size of landholding, livestock ownership, family size and quantity of wheat produced influences amount of wheat supplied to market significantly.

Muhammed (2011) assessed the determinants of marketed supply of *teff* and wheat in Halaba Special District and multiple linear regression model was employed to estimate the result. Four variables namely; quantity produced, access to market information, access to extension service and sex of the household head significantly affected the volume of *teff* supplied to the market. On the other hand, quantity produced access to credit and price of other (pepper) crop significantly affected volume of *teff* supplied to the market.

Ali *et al.* (2017) studied factors affecting milk market supply and level of supply in Dessie Distirct, Ethiopia by Heckman two stage estimation model. The results of the model indicated that level of participation of households in milk market supply were affected significantly by age of the household, educational level, number of milking cows owned, and technical training, family size and access to market information positively, and distance from market/urban centers and sex of the household negatively.

2.4.3. Empirical Review on Determinants of Market Outlet Choices

Mekonin (2017) employed multinomial logistic model to examine the major determinants of market outlet choice of coffee producing farmers in Lalo Assabi District of West

Wollega zone, Ethiopia. The model showed that the choice of end consumer outlet is positively and significantly affected by access to transportation facilities, access to price information and access to credit compared to private trader outlet, whereas the quantity of coffee sold and access to extension services negatively affected the main choice of end consumer outlet. Similarly, the choice of cooperative outlet is positively and significantly affected by distance to the market, access to transportation facilities, access to price information and access to training compared to private trader outlet.

Similarly, Hailu and Fana (2017) used multinomial logit model to analyze determinants of market outlet choice for major vegetables crops in Ambo and Toke-Kutaye Districts, West Shewa, Ethiopia. The result indicated that family size and access to market negatively affecting choice of retailer channel. In the same manner, dummy model farmer, education level, and access to credit decrease the probability choice of retailer channel while it increases probability choice of wholesaler channel. Livestock in TLU and access to market decreases the probability choice of wholesaler channel.

Similarly, Samuel *et al.* (2017) studied share of coffee market outlets among smallholder farmers in western Ethiopia by employing multinomial logistic regression model. Consumers, brokers, cooperatives, urban, and rural traders were found to be the main coffee market outlets in the area. They further noticed that sex was positive and significant which implies that male farmers prefer cooperatives to sell their coffee as compared to female farmers. According to the study, the logic behind this could be male farmers have more resource for transportation and time to sell their coffee product to markets even when the markets are far away from their residence.

Mekonin (2017) on his study of determinants of market outlet choice of coffee producing farmers in west wollega zone, Ethiopia, used multinomial logistic regression model and the result of the model showed that the choice of end consumer outlet is positively and significantly affected by access to transportation facilities, access to price information and access to credit compared to private trader outlet, whereas the quantity of coffee sold and access to extension services negatively affected the main choice of end consumer outlet. Similarly, the choice of cooperative outlet is positively and significantly affected by distance to the market, access to transportation facilities, access to price information and access to training compared to private trader outlet

On the other hand, Oliyad *et al.* (2017) identified factors affecting market outlet choices of groundnut producers in Digga District of Oromia State, Ethiopia by using multivariate probit model. The result of the model identified that variables like educational level, distance to the nearest market, access to extension service, size of land allocated for groundnut, quantity of groundnut produced, transport facilities, buyers' trust and access to off/nonfarm income affected the choice of appropriate market outlets of producers.

Efa and Tura (2018) also employed multivariate probit model to analyze determinants of tomato smallholder farmers' market outlet choices in West Shewa, Ethiopia. The result of the study revealed that distance to nearest markets, access to credit, family size, age of household head, education status, farming experience and volume of tomato produced significantly influence choices of tomato market channels. Retailer market outlet choices were negatively affected by age of household head, education status and distance to the nearest market where as access to credit affected positively at different levels of significance. However, wholesaler market outlet choices were negatively affected by access to credit, family size and amount of tomato produced at different level of probability.

2.5. Conceptual Framework of the Study

Resource endowment (economic factors) such as ownership of market transportation, size of land allocated to coffee production, quantity of coffee produced and non-farm income have an influence on producers market outlet choice and quantity of supply. Figure 1 illustrates the key variables used in the study and how they influence market outlet choice and quantity supply of coffee in the study area.

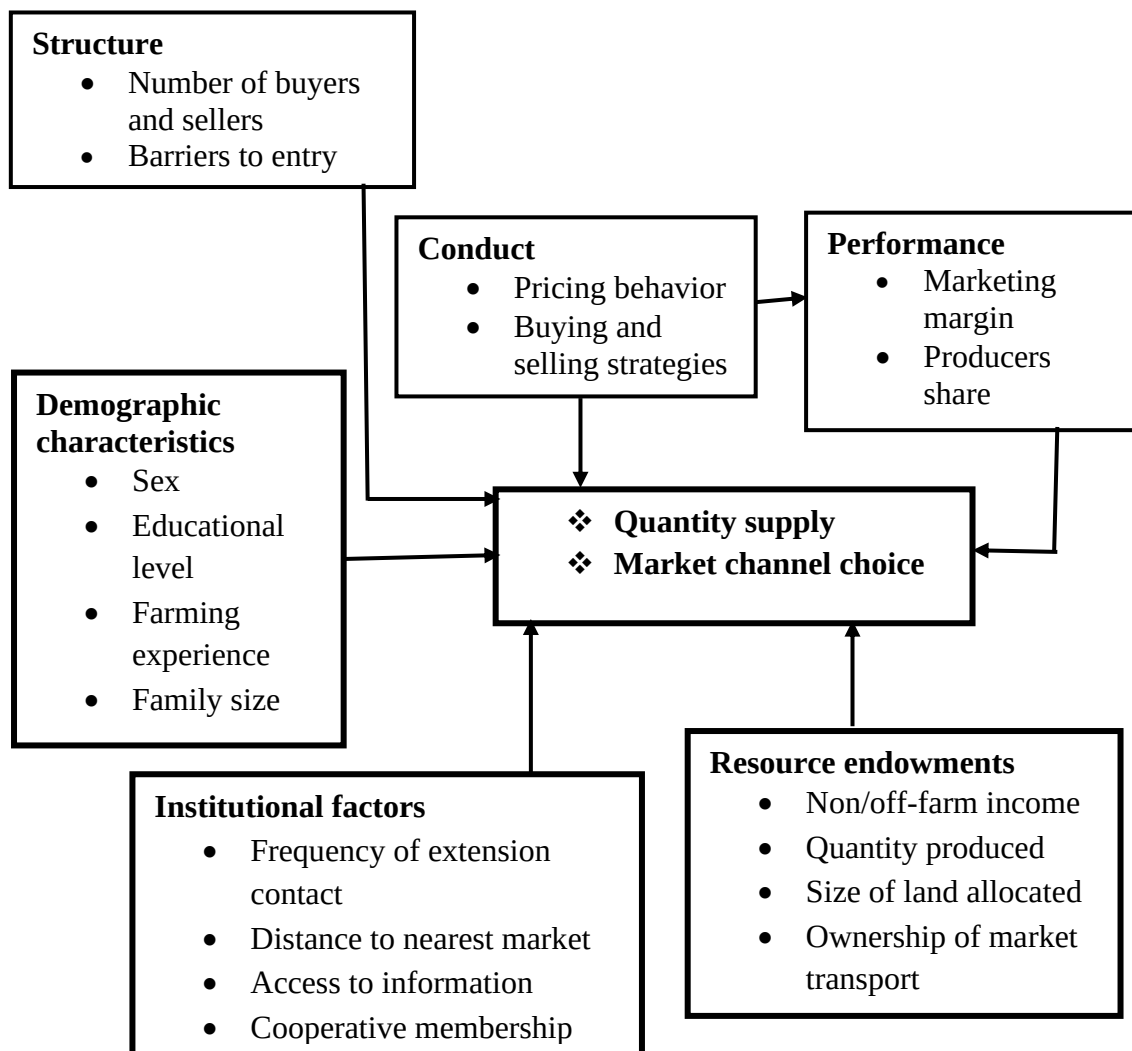


Figure 1: Conceptual framework of the study
Source; Own compilation from literature review

3. RESEARCH METHODOLOGY

This chapter contains descriptions of the study area, types and sources of data, sample size and sampling procedure, method of data collection and analysis, and definition of variables and working hypotheses.

3.1. Description of the Study Area

The study was conducted in Gololcha district. It is one of the districts in Arsi zone with potential of coffee production. Gololcha is located at about 281 km from Addis Ababa, the capital city of Ethiopia and 206 km from Asella, which is the capital town of Arsi zone. It is bordered by Aseko district in the north, Amigna district in the south, Shenan Kolu district in the east and Chole district in the west.

The district has 23 rural *kebeles* and from this 20 *kebeles* are coffee producers. The altitude of the district ranges from 1400 to 2500 m.a.s.l. Generally, the district has a total area of 178102 hectares and is classified into two agro-ecologies, the midland and the lowland with a share of 25% and 75%, respectively. The average temperature of the district is 35⁰c and the average rainfall is 900 mm/year.

Total population of the district is estimated to be 201,247 out of which 102,502 were males and 98,745 were females. The main rainy season of the district is in April, May, June, July, August and September. The soil type of the district is silt soil and sandy soil. Major crops produced in the district are coffee, maize, sorghum, *teff* and groundnut (GDOoANR, 2018).

Figure 2 depicted total output and yield obtained in quintal of coffee clean been (green been) in Gololcha district for the last 11 years. The maximum (35750) quintals were obtained in 2017 and the minimum (18357) quintals were obtained in 2008. The negative value of trend line equation of yield implied that yield has declined over the considered eleven years. The low value of R-square implies that the trend line of yield did not fit the data or there was high variation of yield over the past eleven years. Figure 2 also indicated that yield per hectare was 2.68 quintals in 2017 which is below national average. The national average reported by CSA (2018) was 6.19 quintals per hectare.

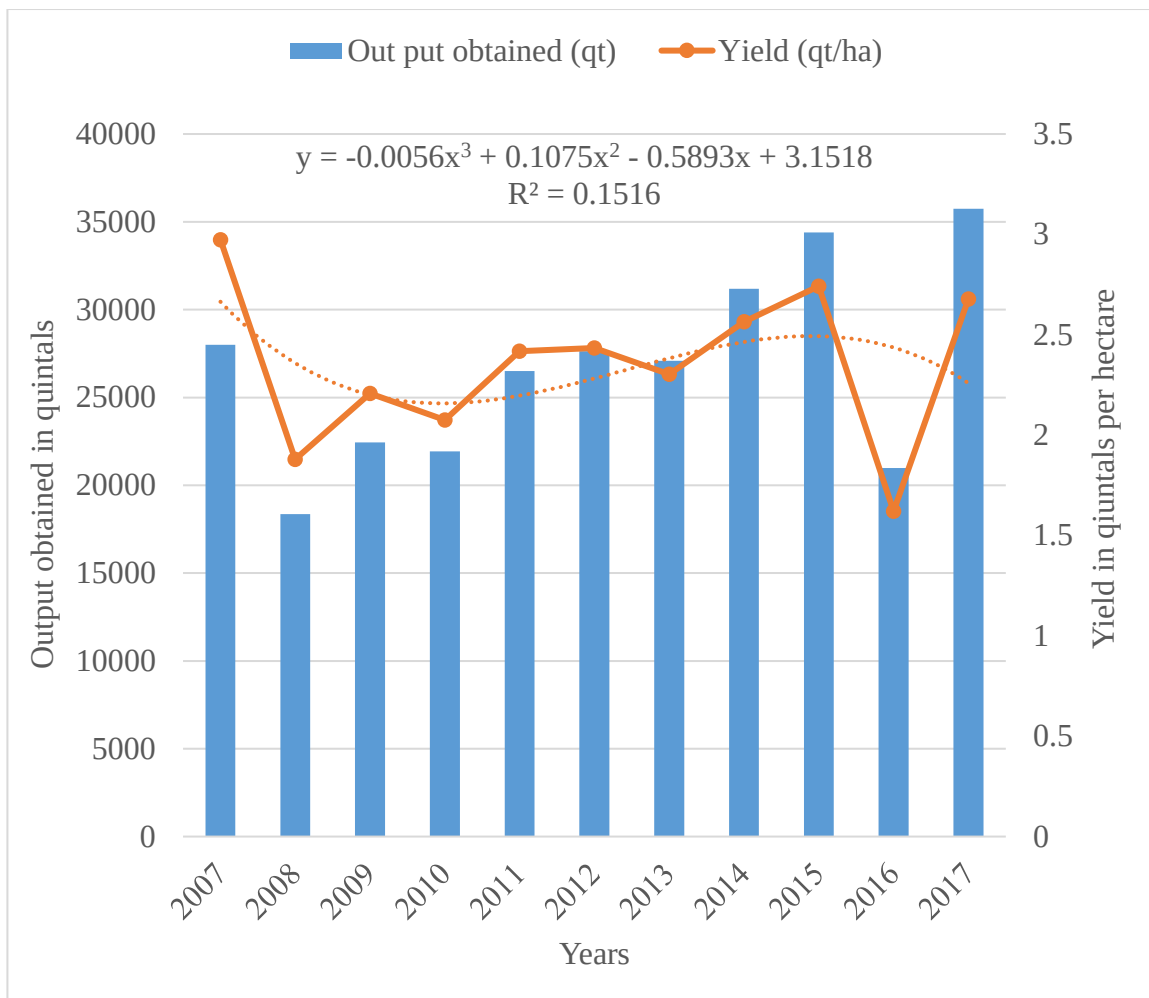


Figure 2: Level of output and yield obtained in Gololcha district for the last 11 years
 Source: Own computation from district data, 2019

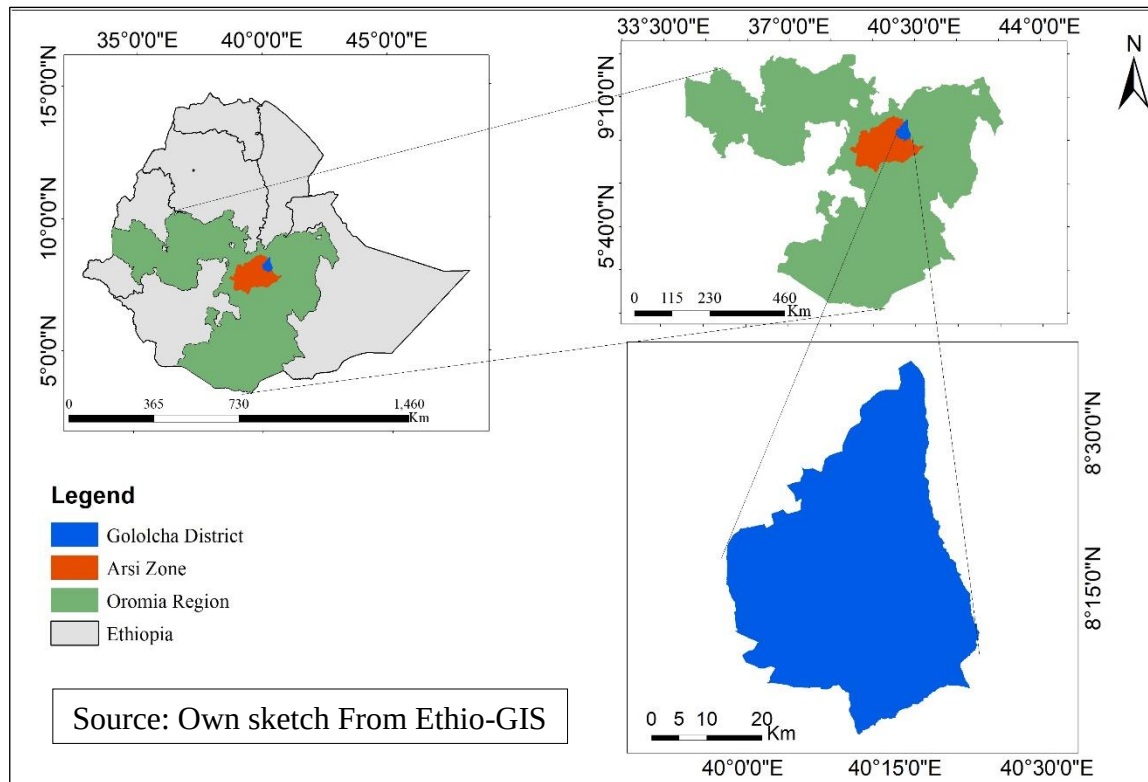


Figure 3: Geographical map of the study area

3.2. Sources and Methods of Data Collection

The study has utilized both primary and secondary data sources. Primary data was collected from sample respondents by using a structured interview schedule. Before data collection, the questionnaire was tested on some farmers to evaluate the appropriateness of the design, clarity and interpretation of the questions, relevance of the questions, to make sure important issues have not been left out and to estimate time required for an interview. Training was given for enumerators regarding the objectives of the study and particularly on the detailed contents of the questionnaire. Focus group discussion composed of key informant and developmental agent was formed and interviewed prior to household survey to generate qualitative data.

Secondary data on population size of the study areas, lists of coffee producers and traders, and agro-climatic condition of the study area were taken from unpublished documents of district agricultural and natural resource office, and coffee and tea development and marketing authority.

3.3. Sample Size and Sampling Procedures

Two stage random sampling technique was used to select coffee producing *Kebeles* and sample farm households. In the first stage, 4 coffee producing *Kebeles* were selected purposively from 20 coffee producing *kebeles*. In the second stage, from the total coffee producers, 154 household heads were selected randomly based on probability proportional to population size.

Knapp and Campell (1989) suggested a rule of thumb which states that for most multivariate analysis, the number of observations should be at least 10 times the number of variables and exceed the number of variables by at least 30.

This means, $n \geq 10v + 30$ (4)

where, n = is number of observations

v = is number of variables

The number of variables hypothesized in this study were 12 and therefore, the minimum size of total sample would be, $n \geq 10(12) + 30 \rightarrow n \geq 150$

Table 1: Sample size selection proportional to population size

No	Kebeles	Total number of coffee producers	Number of sample households
1	Mine Gora	782	47
2	Jinga Sokoru	305	18
3	Tibi Sebata	932	55
4	Ungule Hara	569	34
	Total	2588	154

Source, Gololcha District Office of Agricultural and Natural Resource, 2019.

Therefore, the sample size of the study was 154 households. So, 154 households were selected randomly from the lists of coffee producers in the *Kebeles* administration. Hence, based on proportional to the total household size of the selected *kebeles*, the sample size of each *kebele* was determined.

In addition to farm households, 17 wholesalers, 5 agent middle-men, 11 coffee boilers and 26 consumers were selected purposively. Wholesalers were selected based on their total amount purchase per year by depending on the data taken from the district and from total 22 licensed wholesalers in the district, the largest 17 traders were interviewed. Four focus group discussion at each district composed of model farmers and community leaders, and

two coffee purchasing cooperatives were also interviewed. Agent middlemen were selected depending on their availability to obtain information related to them.

3.4. Method of Data Analysis

Both descriptive statistics and econometric analysis were used

3.4.1. Descriptive Statistical Analysis

Descriptive statistics such as mean, maximum, minimum, standard deviation, frequencies, percentages and graphs were used.

a) Market structure, conduct and performance analysis

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

1) Market structure

In agricultural marketing studies, market structural characteristics are used as a basis for classification of three categories of market: competitive, oligopolistic and monopolistic. According to Scott (1995), four salient aspects of market structure could be identified: degree of seller concentration, degree of buyer concentration, degree of product differentiation, and the condition of entry to the market. The following tools were employed to study the market structure.

Concentration Ratio: Four-firm concentration ratio was used to measure the degree of market concentration. The formula for the 4-firm concentration ratio can be specified as;

$$CR_4 = \sum_{i=1}^4 S_i \quad (5)$$

Where, CR_4 = Concentration ratio for the first 4 largest firms

S_i = Percentage share of the of i^{th} firm

Kohl's and Uhl (1985) bring into play as a rule of thumb, four largest enterprises' concentration ratio of 50% or more (an indication of a strongly oligopolistic industry), 33-50% (a weak oligopoly) and less than that (competitive industry).

Barriers to Entry: Microeconomic theory views entry (and exit) as an important driver in the process by which markets adjust towards equilibrium. Other things being equal, entry is likely to reduce concentration, assuming the average size of entrants is smaller than that of incumbent firms (John *et al.*, 2017). Accordingly, barriers to entry in the coffee market was assessed in the study area.

2) Market conduct

Market conduct refers to the patterns of behavior that traders and other market participants adopt to affect or adjust to the markets in which they sell or buy. These include price setting behavior, and buying and selling practices (Kizito, 2008). Similarly, price setting, and buying and selling strategies were used to identify coffee market conduct of the study area.

3) Market Performance

In a commodity system approach, the institutional analysis is based on the identification of the major marketing channels. This approach includes the analysis of marketing cost and margins (Mendoza, 1995). The marketing margin can be broken down in many ways. Two of the most common classifications are on the basis of specific cost items and on the basis of jobs performed at the various levels in the marketing channel (Kohl, 1955).

Marketing Margin: A marketing margin really measures the share of the final selling price that is captured by a particular agent in the marketing chain. The marketing margin, or the farm to retail price spread, is the difference between the farm value and retail price. It represents payments for all assembling, processing, transporting, and retailing charges added to farm products (Gardner and Rausser, 2001).

Following Mendoza (1995), the total marketing margin is given by the formula shown below

$$TGMM = \frac{\text{consumers price} - \text{farmers price}}{\text{consumers price}} * 100 \quad (6)$$

Where, $TGMM$ = Total gross marketing margin

It is useful to introduce the idea of farmer's portion or producer's gross margin which is the portion of price paid by the end consumer that belongs to the farmer as producer.

$$GMMP = \frac{\text{consumers price} - \text{marketing gross margin}}{\text{consumers price}} * 100 \quad (7)$$

Where; $GMMP$ is farmers' portion.

Marketing Costs: Marketing costs are incurred when commodities move from the farm to the final market, whether they are moved by farmers, intermediaries, cooperatives, marketing boards, wholesalers, retailers or exporters. Margins are often used in the analysis of the efficiency of marketing systems. The presentation of a trader's share of the final selling price in percentage terms can give a totally misleading impression unless there is an understanding of the costs involved (Crawford, 1997). According to Elepu (2011), marketing costs vary from commodity to commodity and product to product. In this study, cost of hulling, loading and unloading cost, packing cost, transport cost, container costs, cost of utilities (water and energy), storage cost, processing cost, commission and other costs were considered.

b) Ranking of constraints

Production and marketing constraints of producers, and marketing constraints of traders in selling and buying were prioritized by using Garrett's ranking technique. Following Nirmala and Suhasini (2013), percent position can be specified as the follows;

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_{ij}} \quad (8)$$

Where; R_{ij} = is the rank given by i^{th} item by j^{th} individual.

N_{ij} = is the number of items ranked by j^{th} individual.

The percent position of each rank was converted into scores using Garrett's table. For each constraint, scores of individual respondents were added together and divided by total number of respondents.

3.4.2. Econometric Models

Econometric models were used to analyze factors affecting supply of coffee to the market and factors determining choices of market outlet.

Factors affecting market supply

One of the assumptions of classical liner regression model is the exogeneity of the independent variables, i.e., $E[\mathcal{E}^i / X_{j1}, X_{j2}, \dots, X_{jk}] = 0$. This states that the expected value of the disturbance at observation i in the sample is not a function of the independent variables observed at any observation. This means that the independent variables will not carry useful information for prediction of $\mathcal{E}^i$ (Greene, 2008). In this situation, the classical OLS method may not be applied because the estimators thus obtained are not consistent, that is, they do not converge to their true population values no matter how large the sample size (Gujarati, 2003). The method of instrumental variables (IV) provides a general solution to the problem of an endogenous explanatory variable (Wooldridge, 2002). To use IVLS, we must find an instrumental variable, namely, a random variable Z_i ; that is statistically independent of the error term (Dunning, 2008). Number of coffee mother trees owned and level of fertilizer applied were used as instrumental variables. Appendix Table 3 indicated that level of output is endogenous variable and hence two stage least squares was used. Following Wooldridge (2010), as the name indicates, the method involves two successive applications of OLS and specified as the following;

Stage 1: Obtain the fitted values $\hat{X}_k$ from the regression

$$X_k = \alpha_o + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \dots + \alpha_{k-1} X_{k-1i} + \gamma_1 Z_{1i} + \gamma_2 Z_{2i} + u_i \quad (9)$$

Where; X_k = is level of output produced (endogenous variable)

α_o = is constant

X = is a vector of explanatory variables (SEXHH, EDHH, AREACOF, FARMEX, DMRKT, FEXCONT, TROWR, NONFRM and INFO)

Z = is a vector of instrumental variables (level of fertilizers and number of mother coffee trees owned).

U = is known as a random, or stochastic, error term and

The subscript i denotes i^{th} observation.

Stage 2: Run the OLS regression

$$Y_i = \alpha_o + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \dots + \alpha_{k-1} X_{k-1i} + \hat{X}k + u_i \quad (10)$$

Where; Y_i = is amount of coffee sold (ln)

α_o = is constant

X = is a vector of explanatory variables (SEXHH, EDHH, AREACOF, QUANP, FARMEX, DMRKT, FEXCONT, TROWR, NONFRM and INFO).

$\hat{X}k$ = is level of output that,

U = is known as a random, or stochastic, error term and

the subscript i denotes i^{th} observation.

Determinants of market outlet choice

Multinomial logit model is the most frequently used nominal regression model (Long and Freese, 2014). In multinomial logit model, there is a single decision among two or more alternatives. Odds ratios in the multinomial logit are independent of the other alternatives. This property is convenient as regards estimation, but it is not a particularly appealing restriction to place on consumer behavior. The independence assumption follows from the initial assumption that the disturbances are independent and homoscedastic (Greene, 2003).

In the study area, cooperative, wholesalers and agent middle-men were coffee producers' outlets and the decision to sell to existed outlet was interdepend (Table 21). According to Belderbos *et al.* (2004), it is multivariate probit model which takes these correlations into account. If correlation exists, the estimates of separate (probit) equations of the cooperation decisions are inefficient. Therefore, multivariate probit model was used to for the determinants of marker outlet choice.

Following Greene (2012), multivariate probit model can be specified as;

$$Y_m^* = X_m' \beta_m + \varepsilon_m, Y_m = 1 \text{ if } Y_m^* > 0, 0 \text{ otherwise, } m = 1, \dots, m \quad (11)$$

In multivariate model, where the choice of several market outlets is possible, the error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance normalized to unity;

$$E[\varepsilon_m | X_1, \dots, X_m] = 0 \quad (12)$$

$$Var[\varepsilon_m | X_1, \dots, X_m] = 1 \quad (13)$$

$$Cov[\varepsilon_j, \varepsilon_m | X_1, \dots, X_m] = \rho_{jm} \quad (14)$$

The joint probabilities of the observed events;

$[Y_{i1}, Y_{i2}, \dots, Y_{im} | X_{i1}, X_{i2}, \dots, X_{im}] i = 1, \dots, n$, that form the basis for the log-likelihood function are the m-variate normal probabilities,

$$L_i = \phi_m(q_{i1} X_{i1}' \beta_1, \dots, q_{im} X_{im}' \beta_{im}, R^*) \quad (15)$$

Where, $q_{im} = 2^{y_{im}} - 1$,

$$R_{jm}^* = q_{ij} q_{im} \rho_{jm}$$

3.5. Hypothesis and Definitions of Variables

3.5.1. Dependent Variables

Quantity of Coffee Marketed (QCM): It is a continuous variable which represents the actual amount of coffee supplied to the market by the farm household in 2017/18 production years and is measured in quintals.

Market Outlets (MRKTUOT): It is a binary dependent variable measured by the probability of producers sell coffee to either of the alternatives market outlets. It was represented in the model as Y1 for those households who choose to sell coffee to cooperatives, Y2 for producers who choose wholesalers, Y3 for producers who choose commission men to sell their coffee.

3.5.2. Independent Variables

The explanatory variables hypothesized to influence quantity of supply and market outlet choice of coffee producers were the following.

Sex of the household head (SEXHH): It is a dummy variable taking a value of 1 if the household head is male and 0 otherwise. Male headed households have relatively better advantage to attend agricultural training, to produce more output and to supply more amount of coffee to the market than female headed households. Sex of the household head (being male) had influenced market supply of coffee positively and significantly (Wendmamegn, 2014). Male farmers have more resource for transportation and time to sell their coffee product to markets even when the markets are far away from their residence. (Samuel *et al.*, 2017). Therefore, sex of the household head (being male) was expected to affect quantity of coffee sold positively, and likelihood of choosing cooperatives and wholesalers positively, and choice of commission men negatively.

Education status of the Household Head (EDHH): It is a continuous variable that refers to the number of years of formal schooling the household head attended. Educated household heads are expected to have better skill, better access to information and make better use of their available resources. Educational level of the household head was found to have positive and significant relation with the quantity of coffee supplied to the market (Engida, 2017). The more educated the farmers are the more likely to participate in retail channels, perhaps on account of higher education levels helping farmers to adjust to new market requirements and making the farmers more likely to adopt innovative production practices (Efa and Tura, 2018). Mengistu (2014) also reported education level provides positive predictive power whether or not the household choose cooperative as market outlet. Therefore, it was expected to affect quantity of coffee sold positively, and likelihood of choosing cooperatives and wholesalers positively, and of commission men negatively.

Family size in adult equivalent (FAMSZ): It is a continuous variable measured in adult equivalent. Availability of active labor force in a household is assumed to affect households decision in choosing a given market outlets in coffee market chain. Nasir (2016) found family size had positively and significantly affects amount of sundry coffee supply. On the other hand, Sultan (2016) justified high family member results in high

proportion of wheat consumption and low market supply, respectively. Takele *et al.* (2017) reported family size is positively correlated with the choice of wholesaler outlet and justified that households with the larger family size have plenty of labor force to deliver mango to final market. Hence, it was hypothesized that family size influence the quantity of coffee sold either positively or negatively, and likelihood of choosing cooperatives and wholesalers positively and of commission men negatively.

Size of land allocated to coffee production (AREACOFE): It is a continuous variable measured in terms hectare of land allocated for coffee production by the household. As the land of the household allocated to coffee increases, the yield proportionally may increase, so that the amount of coffee sold increases. The likelihood of choosing private traders and cooperative market outlet was positively and significantly affected by size of land allocated under coffee (Engida, 2017). According to Samuel *et al.* (2017) size of land allocated for coffee production has positive and significant impact on choice of farmers for consumers. The implication was that those farmers who have large total and coffee land harvests more yield and supply the products to fair and efficient markets. Mengistu (2014) also reported that size of land allocated for coffee production has positive and significant impact on choice of farmers for cooperatives. Similarly, Solomon *et al.* (2016) identified that total coffee land of the household has positive and significant effect on the preference of farmers for formal markets and brokers and has negative and significant effect on the preference farmers for cooperatives as compared to informal market. The larger area allocated to haricot bean production increases the quantity of produce available for sale (Wogayehu and Tewdros, 2015). Hence, land allocated to coffee production was hypothesized to influence the quantity coffee sold positively, and likelihood of choosing cooperatives and wholesalers positively and of commission men negatively.

Quantity Produced (QUANP): An increase in quantity of production has a significant effect on market supply and motivates farmers to increase the supply of commodity to the market. Samuel (2016) indicated the amount of coffee produced had positively and significantly affected market supply. According to Mekonin (2017), if the quantity of coffee to be sold is low, farmers are not forced to search for price and market information. However, if the quantity to be sold is high, they search for a market outlet, which buys with the most effective price. Hence, it was hypothesized to influence the quantity coffee

sold positively, and likelihood of choosing cooperatives and wholesalers positively and of commission men negatively.

Farming Experience (FARMEX): It is a continuous variable measured by number of years of experience the households have in coffee farming at the time of interview. Farmers with longer production experience are expected to be more knowledgeable and have good weather forecasting ability, this improves the productivity and quantity of output sold. Efa and Tura (2018) reported that the farming experience has a positively and negatively affected tomato farmer's market outlet choice of wholesaler and consumer outlet, respectively. The study by Solomon *et al.* (2016) indicated that farming experience of the household had positive and significant effect on the preference of the farmer for formal market and brokers as compared to informal markets. Farming experience has increased mango supply positively and significantly (Ayelech, 2011). Wendmagegn (2014) also reported quantity of coffee produced had positively and significantly influenced amount of coffee supplied. Hence, it was hypothesized to influence the quantity coffee sold positively, and likelihood of choosing cooperatives and wholesalers positively and of commission men negatively.

Distance to the nearest market (DMRKT): It is a continuous variable and measured in km from nearest market the household used to sell their coffee produce. The farther away a household is from the market, the more difficult and costly it would be to get involved. Engida (2017) found that distance from the nearest market had negative and significant influence on the market supply of coffee. Sultan (2016) reported that distance from the closest market place positively and significantly affected accessing millers/processors market outlet as compared with accessing assembler market outlet of wheat. It also affected wholesaler market outlet negatively and significantly. Hence, distance from nearest market was hypothesized to affect amount of coffee sold negatively, and likelihood of choosing cooperatives and wholesalers negatively and of commission men positively.

Frequency of Extension contact (FEXCONT): It is continues variable and measured by number of visits per year made by the extension to the sampled households. Extension service helps in availing the information regarding the technology, which improves the production. Mohammed (2011) found that access to extension service was positively and significantly related to the amount of *teff* supplied to the market. Mekonin (2017) reported that access to extension services negatively and significantly affected the choice of end

consumer outlet of coffee producers. According to Solomon *et al.* (2016), frequency of extension contact has negative and significant effect on formal markets and brokers and positive and significant effect on cooperatives as compared to informal. Hence, it was hypothesized to affect amount of coffee sold positively, and likelihood of choosing cooperatives positively and wholesalers either positively or negatively and of commission men negatively.

Ownership of market transport facilities (TROWR): It is a dummy variable and take the value of one if household owned transportation facilities and zero otherwise. Ownership of transport facilities play vital role in lowering transportation costs as well as enable to go distant market and choose more than one market to sell their produce and able to achieve higher price. Shewaye (2017) found that number of equine owned was found to have a positive and significant influence on the probability of haricot bean producer farmers decision to choose direct consumers and urban traders outlets and negative and significant influence on rural assemblers' outlet. Ownership of means of transportation increases the quantity of coffee supplied to the market (Engida, 2017). Hence, it was hypothesized to affect amount of coffee sold positively, and likelihood of choosing wholesalers positively and of commission men negatively.

Cooperative Membership (COMSHIP): It is a dummy variable that taking a value of 1 if a household head is a member of agricultural cooperatives and 0 otherwise. Membership in cooperative can also contribute towards reduced transaction costs and strengthen farmers bargaining power through networking and provision of up to date information to members. Being a member in cooperatives increases the likelihood of choosing urban traders outlet (Shewaye, 2017). Therefore, cooperative membership was hypothesized to affect market likelihood of choosing cooperatives positively, and of wholesaler and commission men negatively.

Non/off-farm income (NONFRM): It is a continuous variable measured in monetary value (ETB) and shows the amount of income obtained from non/off-farm activities undertaken by the household heads. According to Hasen (2016), the coefficient of off-farm income for volume of wheat marketed is negative and statistically significant, and justified that households who had off-farm generate their income from off-farm rather than selling wheat product. The availability of off/non-farm income has negative and significant relation with the likelihood of choosing private trader outlet and positive and

significant relation with the likelihood of choosing consumer market outlet of coffee producers (Engida 2017). Hence, it was hypothesized that non/off-farm income influence the quantity coffee sold negatively, and was expected to influence likelihood of choosing cooperatives and wholesalers positively and of commission men negatively.

Access to market information (INFO): It is a dummy variable that takes a value of 1 if a household head had access to market information and 0 otherwise. Wendmagegn (2014) found that access to market information had significantly and positively influenced coffee market supply. According to Nasir (2016) access to coffee market information affected the choice of collector outlet negatively and significantly. Hence, it was hypothesized that access to information influences the quantity coffee sold positively, and likelihood of choosing cooperatives and wholesalers positively, and of commission men negatively.

Table 2: Summary of variables definition, measurement and hypothesis for coffee market supply

Variables	Category	Measurement	Expected effect on supply and outlet choice			
			Supply	Cop	Whole	Agent
Sex	Dummy	1 if male, 0 otherwise	+	+	+	-
Education	Continues	Years of schooling	+	+	+	-
Family size	Continues	Men equivalent	±	+	+	-
Area allocated	Continues	hectare	+	+	+	-
Quantity	Continues	Quintal	+	+	+	-
Experience	Continues	Number of years	+	+	+	-
Distance	Continues	Kilometers	-	-	-	+
Extension	Continues	Number of visit/year	+	+	±	-
Transport	Dummy	1 if owned, 0 otherwise	+	+	+	-
Cooperatives	Dummy	1 if member, 0 otherwise		+	-	-
Non-farm	Continues	ETB	-	±	±	-
Information	Dummy	1 if access, 0 otherwise	+	+	+	-

Note: “Cop”, “Whole” and Agent” refers to Cooperatives, Wholesalers and commission men, respectively.

4. RESULTS AND DISCUSSIONS

In this section, the result of the study along with previous research findings is discussed as the following.

4.1. Demographic and Socio-economic Characteristics of Sample Respondents

4.1.1. Demographic and Socio-economic Characteristics of Sample Coffee Producers

In this sub-section, demographic and socio-economic characteristics such as sex, age, marital status, family size, educational level, farming experience and access to institutional services were discussed.

From total household interviewed, 20.1% were female headed households and 79.9% were male headed households. Almost all (93.5%) of the respondents were married, followed by single, divorced and widowed which accounted for 3.9%, 1.9% and 0.6%, respectively (Table 3). Education is instrumental to attain developmental goals through application of science, technology and innovations (Tirussew *et al.*, 2018). In line with these facts, educational status of coffee producers in the study area was assessed and it was found that the maximum years of education attended were 12 grades with the mean of 5.15 and standard deviation 3.72. According to CSA (2017), nearly half of women (48%) and 28% of men age 15 up to 49 in Ethiopia have no education. Illiteracy rate for male and female households in the study area was 15.45% and 58.06%, respectively. This implies that illiteracy rate of coffee producers was below national average for male households in one hand and it was above national average for female household heads on the other hand. Table 3 also revealed that majority of the farmers in the study area were educated which can be an opportunity to increase coffee production. The test statistics indicated that there is statistically significant mean difference in supply of coffee between males and female headed households and between literate and illiterate household heads.

Table 3: Summary statistics of characteristics of sample coffee producers (categorical variables)

		Coffee supply				
Variables		N	%	Mean	Std. Dev.	t/ χ^2 -test
Sex	Female	31	20.1	3.9	2.58	3.54***
	Male	123	79.9	8.37	6.69	
Marital status	Married	144	93.5			71.68
	Single	6	3.9			
	Divorced	3	1.9			
	Widowed	1	0.6			
Educational status	Illiterate	37	24	3.73	2.66	4.23***
	Literate	117	76	8.66	6.92	

Source: Own survey, 2019

The other variables used to describe demographic characteristics of sampled farmers were age, family size and farming experience. Accordingly, the age of the respondents ranges from 16 to 75 with the mean of 38.96 and standard deviation of 11.49. The mean family size was 3.7 persons with standard deviation of 2.17 and ranges from 1 to 12 persons. According to CSA (2017), the average household size in Ethiopia was 4.6 members. This implies that the average family size of coffee producers in the study area was below national average.

Availability of land is one of the most important factors that influence crop production. The mean of land holding in the study area was 0.98 hectare. According to CSA (2014), the average land holding in Ethiopia was 1.14 hectare. Hence, average land holding of coffee producers was below national average. From total land owned, around 59.18% was allocated to coffee production.

Table 4: Summary statistics of characteristics of sample coffee producers (continuous variables)

Variables	Observations	Mean	Std. Dev.	Min	Max
Age of the respondent	154	38.96	11.49	16	75
Family size	154	3.7	2.17	1	12
Farming experience of the respondent	154	16.58	9.71	2	45
Total land owned in hectare	154	0.98	0.49	0.125	2
Total land allocated to coffee (<i>Coffea arabica</i>) in hectare	154	0.58	0.27	0.125	1

Source: Own survey, 2019

Access to Institutional Services and Resource Endowment

Table 5 indicated that 81.85% of the respondents had no access to off/non-farm income and only 18.2% had access to non/off-farm income. Their major sources of non/off-farm income were shopping, fattening, selling of food and others which accounted for 31.1%, 21.1%, 21.1% and 26.7%, respectively. The mean value of non/off-farm income received per year was 2802.60 birr with the high standard deviation of 8568.01 and ranges to 60000 Birr. The highest value of non/off-farm was obtained from fattening.

Means of transport ownership is also critical in transporting coffee cherries and searching for better place and price. Accordingly, 52.6% of the farmers were transporting coffee to the near market by their own donkey. Means of transporting coffee for those who had no donkey were hired donkey 67.12%, human labor (own and hired) 24.66% and hired vehicles 8.22%.

Another crucial factor from institutional services is market information. It is important especially for market oriented crops such as coffee. Table 5 indicated that around 44.8% of the respondents had access to market information while the rest had no access to information. Their major sources of market information were friends (19.7%), traders (18.2%), own assessment (16.7%), radio (13.6%), own assessment and traders (12.1%), own assessment and friends (9.1%).

Access to extension service is also important to boost coffee production and productivity. Half of the respondents had contact with the extension agent. Their contact organizations (body) were developmental agents (62.7%), developmental agents, and district agricultural

and natural resource office (201.9%), and district agricultural and natural resource office (16.7%). Their time of contact was harvesting time, during land preparation, during seed and fertilizers application and during planting. The mean of contacting extension agent per year of coffee producers was 1.52 times with the maximum of 12 times and standard deviation 2.11.

Primary cooperatives enable farmers to pool coffee product together and sell at a better price. But, Table 5 revealed that only 26% of coffee producers were members of multipurpose cooperatives. The reasons for being a member were to obtain oil and sugar, cooperative provided better price than traders, weighting of coffee was fair in cooperative than traders and, to save and use for the future. The reasons of not joining primary cooperative in the study area were corruption by committee members on benefit share, cooperatives were far from their home and no perceived benefit. Distance to the nearest market was also estimated by the respondent in Km and the result indicated that on average, one household sold coffee by traveling 5.57 km with minimum and maximum of 0.5 km to 16 km.

Table 5: Access to institutional services and resource endowment

Variables		Coffee supply				
		Frequency	Percent	Mean	Std. Dev.	t-value
Obtain non/off farm income	No	126	81.8	7.13	6.43	1.41
	Yes	28	18.2	9.04	6.78	
Own means of transport	No	73	47.4	6.19	5.1	2.36**
	Yes	81	52.6	8.63	7.4	
Had access to information	No	85	55.2	6.24	5.38	2.65***
	Yes	69	44.8	8.99	7.44	
Had extension contact	No	77	50	6.09	4.94	2.68***
	Yes	77	50	8.85	7.56	
Cooperative membership	No	114	74	6.68	5.44	2.59**
	Yes	40	26	9.73	8.58	
Distance to the nearest market (KM)	Observations	Mean	Std. Dev.	Min	Max	
	154	3.93	5.57	0.5	16	

Source: Own survey, 2019

4.1.2. Demographic and Socio-economic Characteristics of Sampled Traders

Variables included under demographic characteristics are sex, age, educational level, trading experience and marital status. Socio-economic factors such as resource endowment, amount of working capital and sources of working capital have also been included here. The survey result indicates that 95.5% of the sampled traders were male while 4.5% were female. This indicated that coffee trading was mainly held by male traders. The average age of traders was 39.73 years and ranges from 25 years to 55 years. Table 6 further indicated that all of the sample traders were literate with the mean of 8.23 grades and ranges from 4 grades to 12 grades complete. Traders had 7.36 years of trading experience on average with minimum and maximum years of 2 and 17, respectively.

Table 6: Demographic characteristics and resource ownership of sampled traders

Variables		Frequency	Percent
Sex	Female	1	4.5
	Male	21	95.5
Marital status	Married	20	90.9
	Single	1	4.5
	Divorced	1	4.5
	N	Mean	Std. Dev.
Age of the traders	22	39.73	8.51
Educational status	22	8.23	2.25
Experience in trading	22	7.36	3.92

Source: own survey, 2019

Table 7 summarizes resources owned and source of current working capital (cash) of traders. Traders' warehouse can hold 1447.22 quintals of coffee dry cherries on average and minimum of 150 quintals and maximum of 10000 quintals. The minimum and maximum of working capital was 100000 and 500000 birr, respectively with mean of 262500 birr when starting the business and currently increased to minimum and maximum of 300000 and 2000000 birr, respectively with mean of 744444.4. These showed that the amount of working capital has increased by 183.60% on average over the traded years. Regarding sources of capital, 81.8% started the business from own, 9.1% by borrowing, and 9.1% from own and borrowing. But, at the time of survey, own source of working capital has risen to 95.5% and loan has declined to 4.5%.

Table 7: Resource endowment and sources of working capital

Resource endowment	N	Mean	Std. Dev.
Storage capacity (quintals)	22	1447.22	2270.17
Amount of working capital at the beginning (ETB)	22	262500	159799
Amount of working capital at the time of interview (ETB)	22	744444.4	538774.3
Sources of capital	Variables	Frequency	Percent
Sources of initial working capital (cash)	Own	18	81.8
	Loan	2	9.1
	Own and loan	2	9.1
Sources of current working capital (cash)	Own	21	95.5
	Loan	1	4.5
Sources of loan	Relative	1	25
	Banks	3	75

Source: Own survey, 2019

4.2. Coffee Production by Sample Households in the Study Area

Composting of coffee pulp and husk with legume plant materials and farmyard manure significantly accelerated composting process and better nutrient balance (Jafer, 2018). Similarly, coffee producers in the study area have been applying farmyard manure to their coffee mother trees. In addition, cultivation of coffee mother trees was practiced to increase production. Cultivation was mostly undertaken during wet season in April, July and September.

Table 8: Number of coffee mother trees owned and some agronomic management

Variables		Frequency	Percent
Application of organic fertilizers	Did not apply	47	30.5
	Applied	107	69.5
Cultivation of coffee	Did not cultivate	5	3.2
	cultivated	149	96.8
	N	Mean	Std. Dev.
Number of coffee mother trees owned	154	895.58	773.25
Frequency of cultivating coffee	154	4.4156	4.45559

Source: Own survey, 2019

4.3. Coffee Market Chain Actors and their Functions in the Study Area

The major coffee market chain actors in the study area were producers, primary agricultural cooperatives, agent middle-men (commission-men), rural assemblers, wholesalers and processors. There were also supportive institutions such as District Agricultural and Natural Resource Office and, Coffee and Tea Development and Marketing Authority.

Producers: Producers are smallholder farmers who produce and supply coffee to the market. Their functions start from seedbed preparation, growing seed on seedbed, field preparation (hole preparation, cultivation), transplanting, cultivation (digging), weeding, pruning, fertilizer applications, harvesting, post-harvest handling and marketing their produce. Coffee red cherries were harvested starting from October to January, and dried on clean land and plastic sheet. The form of coffee sold were dry cherries without removing its husk. Table 9 indicated that around 97.67% of total output was marketed in 2017/18. The rest was consumed and postponed (stored) and sold at time of emergence. The study conducted by Samuel *et al.* (2017) showed commercialization level of coffee in West Wollega and Kellem Wollega was 77.8% and 80%, respectively. Samuel *et al.* (2016) also reported commercialization level of coffee was 68% in Jimma zone. This implied commercialization level of coffee in the study area is greater than that of both areas. Majority of farmers in the study area have stored dry coffee bean for 1 up to 8 months and it was only 5% who have stored for more than one years. The result of the study also indicated 88.3% of coffee producers sold coffee at village market (Mine Gora, Tibi Sebata and Jinga Sokoru), around their home (7.1%), at district market or Chanco town (1.3%) and both at village market and around their home village (3.2%). The major market outlet identified were wholesalers, cooperatives and agent middle-men (commissionmen).

Table 9: Amount of coffee bean produced and sold in 2017/18

	N	Mean	Std. Dev.
Dry coffee cherries produced in 2017/18 in kilogram (with husk)	154	541.8	411
Total amount of coffee sold in 2017/18 in kilogram (with husk)	154	529.2	500.4
	Variables	Frequency	Percent
Duration of storing coffee (months)	Sale immediately	4	2.6
	1-3 months	49	31.8
	4-8 months	79	51.3
	Up to one year	17	11
	More than one year	5	3.2
Selling to wholesalers	Yes	94	61
Selling to cooperatives	Yes	38	24.7
Selling to commissionmen	Yes	62	40.3

Source: Own survey, 2019

Cooperatives: Cooperatives purchase coffee from members and non-members. They hull sundry coffee, sort, pack and supply to auction market at Dire Dawa. According to the result from discussion with cooperatives committee members, the great challenges in purchasing coffee were lack of budget and human resource. More burdens were left on committee only and members had low participation.

Agent/Commissionmen: They are traders who have no license and used the license of wholesalers to purchase coffee from farmers. They purchase dry coffee cherries by their own money, collect together, transport to district market and resale to wholesalers by a fee of two birr per kilogram on average.

Rural assemblers: These are illegal traders and are females who purchase coffee from farmers by local unit called “*bikire*” which is equal to 0.167 kg by 5 ETB and resale to wholesalers and agent middle-men by 6.5 ETB on average. They purchase both red cherries and dry cherries and further dry at their own residence. Wholesalers added extra 50 cents over market price for rural collectors. Because, collectors bring large amount of sundry coffee cherries for wholesalers.

Wholesalers: Are licensed traders who purchase dry coffee cherries from farmers, agent middle-men and unlicensed rural collectors at both village and district market in large

amount, and transport to Dire Dawa market. They remove coffee husk (hull), further dry, sort, pack and transport to Dire Dawa for a bid at ECX market.

Boilers: They boil and sell coffee to final consumers.

Consumers: It is possible to look consumers of coffee in the district in two types. The first are those who buy either clean bean or dry cherries from market and prepare at their home and drink. The second are those who buy prepared coffee from clay spot (boilers) and drink. The former purchases coffee clean bean from farmers at 91.25 birr per kg on average and from shop at 120 birr per kg on average and drink at their home. The later buy a cup of coffee by 5 birr and drink. Consumers can also be foreigners and who import and drink coffee from the district.

Supportive institutions: District Agricultural and Natural Resource, and Coffee and Tea Development and Marketing Authority are supportive institutions of coffee in the study area. They are responsible for distribution of seed, training provision on pre and post-harvest management, controlling for illegal traders and market price.

4.4. Coffee Market Channels

Identifying coffee market channel is important to know the alternative routes it follows from the point of origin to final destination. From the survey result, the amount of dry coffee cherries supplied to the market by the sampled households was 1262.5 quintals and eight channels were identified. The major receivers of coffee from farmers were wholesalers (57.93%), Agent middle-men (23.92%) and Cooperatives (15.19%)

Channel I: Producers-Local consumers

Channel II: Producers-Commission men-Wholesalers- (Auction market) ECX - Exporters

Channel III: Producers-Cooperatives- (Auction market) ECX- Exporters

Channel IV: Producers-Retailers- Local Consumers

Channel V: Producers-Wholesalers- (Auction market) ECX-Exporters

Channel VI: Producers-Rural collector-wholesalers- (Auction market) ECX-Exporters

Channel VII: Producers-Coffee boilers-Local consumers

Channel VIII: Producers-Retailers-Coffee boilers-Local consumers

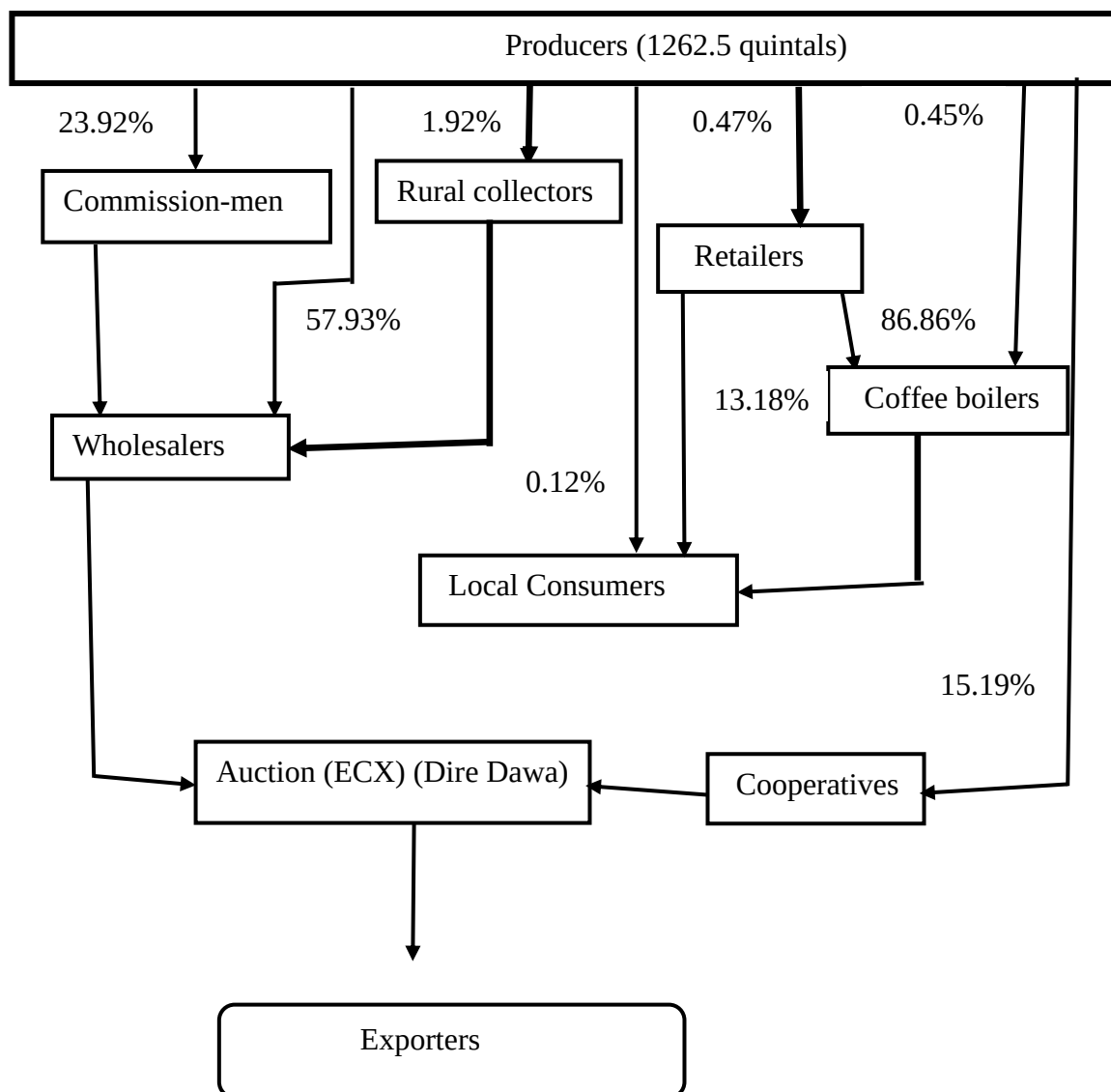


Figure 4: Coffee bean marketing channel
Source: Own sketch from survey result, 2019

4.5. Analysis of Coffee Market Structure-Conduct-Performance

4.5.1. Structure of Coffee Market in the Study Area

To evaluate market structure of coffee in the study area, concentration ratios, barriers to entry and market transparency were used and discussed as below.

a) Concentration ratios: The concentration ratio was calculated based on the amount of coffee bean purchased by traders in 2017/18 production year. Khols and Uhl (1985)

suggest that, as a rule-of-thumb, a four enterprise concentration ratio of 50% or more is indicative of a strongly oligopolistic industry; of 33-50% a weak oligopoly, and less than that, an unconcentrated industry. Accordingly, the concentration ratio of the first largest four firms which is 31.88% implied that the market is an unconcentrated.

Table 10: Concentration ratio of the largest four firms

No	Quantity purchased per year (qt)	% Share of quantity purchased	Cumulative %share
1	1500	8.39	8.39
2	1500	8.39	16.78
3	1500	8.39	25.17
4	1200	6.71	31.88
5	1020	5.70	37.58
6	960	5.37	42.95
7	900	5.03	47.99
8	900	5.03	53.02
9	840	4.70	57.72
10	720	4.03	61.74
11	720	4.03	65.77
12	600	3.36	69.13
13	600	3.36	72.48
14	600	3.36	75.84
15	600	3.36	79.19
16	600	3.36	82.55
17	600	3.36	85.91
18	540	3.02	88.93
19	540	3.02	91.95
20	480	2.68	94.63
21	480	2.68	97.32
22	480	2.68	100.00
17880		C ₄ = 31.88%	

Source: Own survey, 2019

b) Barriers to entry

License: Traders of the study area reported that license is a barrier to enter the coffee market. All wholesalers have a license while agent middle-men used the license of wholesalers to purchase coffee. They also added that 100,000 ETB is required to get the license.

Capital requirement: The result of the study indicated that capital requirement is another constraint to enter the coffee market. To be a wholesaler, weight, store, sisal sack (“*jonia*”), drying place and other minimum 300,000 ETB is required to operate the business.

c) Market transparency

It is believed that buyers and sellers will make more rational decisions if they have more information at their disposal pertaining to prices in different markets and the qualities of the various products (Olukosi, 2017). But, it was only 44.8% of the farmers who had access to market information. Their major sources of market information were friends (19.7%), traders (18.2%), own assessment (16.7%), radio (13.6%), own assessment and traders (12.1%), own assessment and friends (9.1%). This implied that traders were sources of market information for 30.3%. Even, for those who received market information by assessing local market, the initial source was traders. But, traders receive information from their client traders lives in Chanco town and Dire Dawa city. The farmers had no means to check the accuracy of information. Therefore, it can be generalized that there was information bias between traders and farmers.

4.5.2. Market Conduct

To evaluate market conduct, price setting, and buying and selling strategies were used and described as the follows.

Price setting strategy: Majority of the farmers reported that price was set by traders (Table 11). About 18.2% of the traders have also confirmed that price setter were traders. But, 50% and 22.7% of the traders stated that price was determined by market and negotiation, respectively. Moreover, the result from focus group discussion showed that market price was determined by traders and farmers were simply price takers. Discussion from focus group further indicated that traders agreed on price and purchase by the same price. They also have relation and agreement with district agricultural office and hence low control on market price. This indicated that there was no good market conduct.

Table 11: Price setting strategy

By whom selling price is determined	Variables	Frequency	Percent
Farmers	Traders	123	79.9
	Negotiation of traders with producers	30	19.5
	World price	1	0.6
Traders	Negotiation	5	22.7
	By the market	11	50.0
	Traders	4	18.2
	Negation and market	1	4.5
	Traders and market	1	4.5

Source: Own survey, 2019

Buying and selling strategies: As it is depicted from Table 12, 86.4% of traders purchased coffee on cash and 94.2% of farmers sold coffee on cash. This implied that payment of coffee sold in the study area was mostly undertaken on cash. Sampled traders also reported that they attracted farmers through giving credit, better price and fair weight, and attracted their buyers by supplying quality coffee. On the other hand, result from sampled survey and focus group discussion indicated that traders were cheating on weight. Farmers may not know about the weight they used. By using this as an opportunity, traders hack on weight.

Table 12: Buying and selling strategies

Terms of cell	Variables	Frequency	Percent
Traders	Cash	19	86.4
	Credit and cash	3	13.6
	In cash	145	94.2
Farmers	In credit	3	1.9
	Credit and cash	6	3.9

Source: Own survey, 2019

4.5.3. Performance of Coffee Market in the Study Area

To determine market performance, marketing margin and associated marketing costs has been used and discussed as below.

Production cost of coffee in ETB/ha in the study area: Production cost and output obtained has been estimated by averaging production cost and output harvested by sampled households. As it is depicted from Table 13, total annual production cost of

households was 20012.03 ETB per hectare. Opportunity cost of land was estimated by annual market price (rental value) of one hectare in the area and it accounted for 59.96% of total production cost followed by harvesting cost (14.99%), cultivation cost (12.45%) and fertilizer cost (9.99%). Fertilizer cost was estimated by market price for inorganic, and cost of preparation and application for organic fertilizers. As it is indicated in Table 9, the average amount of output supplied to the market by the sampled households was 529.2 kilograms of dry cherries and Table 4 showed that total land allocated to coffee in 2017/18 was 0.58 hectares on average. Therefore, the profit obtained per 0.58 hectare by sampled households from sale of coffee was 9067.80 ETB in 2017/18 by selling at 39.06 ETB per kilogram of dry cherries on average.

Table 13: Estimated dry coffee cherries production cost (ETB per hectare) and output obtained (Kg per hectare) in 2017/18 production year in the district

No	Activities	Cost (ETB)	%Share of total cost
1	Cultivation cost (ha)	2492.32	12.45
3	Fertilizers cost (ha)	2000.00	9.99
4	Harvesting cost (ha)	3000.00	14.99
6	Tax (ha) (annual tax)	219.71	1.10
7	Opportunity cost of land (ha)/year	12000.00	59.96
Total estimated annual production cost in ETB/ha		20012.03	100.00
8	Average output in kg/ha (with husk)	912.6	
9	Total revenue (output * average price)/ha	35646.16	
10	Profit/ha in ETB	15634.13	

Source: Own survey, 2019

Marketing cost: Marketing costs per kilogram in moving coffee bean from farm to the final market for different coffee marketing actors was estimated in the Table 14. Highest marketing cost was incurred by wholesalers. This was because, wholesalers were supplying coffee to the auction (ECX) market. The highest cost incurred by wholesalers was payment at ECX which was 43.55% of total cost. Wholesalers paid 16500 ETB per trip or per 51 quintals on average which includes tax payment to ECX (2%) from total sale, payment to commission men (1.75%) from total sale and 0.4 ETB per quintal per day for storage. All these costs accounted for 16500 ETB per 51 quintals on average. Transportation cost accounted for 26.34% of total marketing cost next to total payment at ECX market. It costs 10000 ETB per 51 quintals from Gololcha to Dire Dawa market. The other costs were cost of hulling (0.4 ETB per kg of dry cherries), sisal sack cost (0.5 ETB

per kg of dry cherries) and load unload, filling cost, storage rent (opportunity cost if owned), broker cost and other costs accounted for 0.06, 0.03, 0.01, 0.01 and 0.08 ETB per kg of dry cherries, respectively. Municipality tax is tax paid at district and was 350 ETB birr per 51 quintals of green bean. Other costs include the estimate of personal payments made at different points in shifting the product from farmers to EXC market.

High marketing cost for producers was transportation cost which was 35.71%, followed by sack cost (24.29%), load/unload cost (24.29%), and cost of drying and filling (10%). Similar to farmers, high proportion of marketing cost for agent middle-men was transportation cost which was 40.85% (Table 14).

Table 14: Marketing cost in birr per kg of dry coffee cherries for coffee market actors in the study area

No	List of costs per kg	Farmers	Wholesalers	Agent middlemen	Cooperatives	Boilers	Retailers	Rural assemblers
1	Production cost	21.93	-	-				
2	Sack	0.17	0.5	-	0.5			0.17
3	Load/unload	0.17	0.06	0.16	0.06			0.17
4	Filling cost	0.07	0.03	0.06	0.03			0.07
5	Transportation cost	0.25	0.98	0.29	0.98			0.5
6	Storage rent		0.01		0.01	30	1	
7	Broker		0.01		0.01			
8	Municipality tax		0.03					
9	Hulling cost		0.4		0.4		0.5	
10	ECX		1.62					
11	Sugar					61.25		
12	Wood and charcoal					13		
13	Spice					4.75		
14	Other costs	0.05	0.08	0.2	0.16			1.75
15	Marketing cost	0.7	3.72	0.71	2.15	109	1.5	2.65
16	Average buying price per kg	-	39	37	40	52	44	30
17	Average selling price per kg	39.06	47	39	48	350	60	39.5
18	Total cost per kg	22.63	42.72	37.71	42.15	161	45.5	32.65
19	Market profit per kg	16.43	4.28	1.29	5.85	189	14.5	6.85

Source:

own

survey,

2019

Marketing margin: Marketing margin was estimated by deducting purchase price from selling price and dividing the difference by the end price along the channels. Table 15 showed marketing margin of different coffee marketing actors in the study area. Farmers received highest gross profit if they directly supplied to retailers and processors in channels IV, VII and VIII. But, only small amount of coffee can be supplied through these channels. Next to retailers, farmers earned profit of 17.53 birr per kg if coffee is sold directly to cooperatives. Agent middlemen earned gross profit of 1.29 birr per kg. According to survey result, one agent middlemen had purchased 95 quintals of sundry coffee on average. This implied that, agent middlemen had earned 12255 ETB per year on average. Wholesalers earned highest profit in channel V (buying directly from farmers). The result from sampled wholesalers indicated that, one trader had purchased 374.57 quintals. Accordingly, wholesaler had earned 161814.24 ETB on average in the last year. Retailers and rural collector obtained gross profit of 14.5 and 6.85 ETB per kg of sundry coffee, respectively. But, since they purchase small quantity, their total profit is low. The others are processors who prepared coffee and sell at 5 ETB per cup. A 1 kg of dry coffee bean is 70 cups if prepared. The price of one piece of cup was 5 ETB and accordingly, they sell for 350 ETB from one kg of dry coffee bean.

Total gross marketing margin (TGMM) is highest in channels VII and VIII where producers directly sell to retailers and processors. The reason was that processors added value over coffee bean by roasting, thinning and cooking. Retailers also added value by storing. They purchase a kg of dry cherries by 44 ETB from farmers and resale at 60 ETB for urban consumers. Producers' gross marketing margin is highest in channel III where coffee sold directly to cooperatives followed by channel V where they directly sell to wholesalers.

Table 15: Market margin of dry coffee cherries for different coffee marketing actors along marketing channels in the study area

		Coffee market channels							
Actors		I	II	III	IV	V	VI	VII	VIII
Far	Production cost	21.90	21.90	21.90	21.90	21.90	21.90	21.90	21.90
	Marketing cost	1.20	0.57	0.57	1.15	0.98	0.00	1.15	1.15
	Selling price	45.63	37.50	40.00	44.00	39.00	30.00	44.00	44.00
	Gross profit	22.53	15.03	17.53	20.95	16.12	8.10	20.95	20.95
	GMMp%	100	79.78	83.33	73.33	82.98	63.83	12.57	12.57
Am	Purchase price		37.50						
	Marketing cost		0.71						
	Selling price		39.50						
	Market profit		1.29						
	GMMam%		4.26						
Wh	Purchase price		39.50			39.00	39.50		
	Marketing cost		3.68			3.68	3.79		
	Selling price		47.00			47.00	47.00		
	Gross profit		3.82			4.32	3.71		
	GMMwh%		15.96			17.02	15.96		
Cop	Purchase price			40.00					
	Marketing cost			2.15					
	Selling price			48.00					
	Gross profit			5.85					
	GMMco%			16.67					
Ret	Purchase price				44.00				44.00
	Marketing cost				1.50				1.50
	Selling price				60.00				60.00
	Gross profit				14.50				14.50
	GMMret%				26.67				4.57
Ras	Purchase price						30.00		
	Marketing cost						2.65		
	Selling price						39.50		
	Gross profit						6.85		
	GMMra%						20.21		
Boil	Purchase price							44.00	60.00
	Marketing cost							111.92	106.08
	Selling price							350.00	350.00
	Gross profit							194.08	183.92
	GMMboi%							87.43	82.86
TGMM%		0.00	20.22	16.67	26.67	17.02	36.17	87.43	87.43

Note: GMMp, GMMam, GMMwh, GMMco, GMMret, GMMra and GMMboi are gross marketing margin for producers, agent middle-men, wholesalers, cooperatives, retailers, rural assemblers and coffee boilers, respectively.

Far, Am, Wh, Cop, Ret, Ras, and Boil stands for Farmers, Agent middle-men, Wholesalers, Cooperatives, Retailers, Rural collectors and Coffee boilers, respectively.

Source: Own survey, 2019

4.6. Production and Marketing Constraints of Coffee in the Study Area

4.6.1. Production Constraints of Coffee in the Study Area

Data taken from District Coffee and Tea Development and Marketing Authority indicated that yield per hectare of clean bean was 2.68 quintals which is below national average. The yield per hectare of green bean reported by CSA (2018) was 6.19 quintals per hectare. The result from Table 16 depicted the problem of coffee production listed and prioritized by focus group discussion at four *kebeles*. According to the result, drought, diseases, lack of improved coffee varieties, lack of extension and technical support, lack of scientific research on appropriate shade, insect infestation and lack of post-harvest materials were major problems of coffee production in the study area.

Drought: Drought was a great challenge of coffee production in the study area. According to the result from focus group discussion, the new transplanted coffee seedlings are not surviving because of drought and the existing coffee mother trees on farm field are old. Additionally, coffee yield declines because of changing of climate. In the same manner, Moat *et al.* (2017) reported that challenge of coffee production in Ethiopia is the variability of weather pattern such as rainfall variability on the onset of the wet season, extension of dry season and more extreme (drier and hotter).

Diseases: Coffee berry diseases (*Colletotrichum kahawae*), branch die back (physiological disorder), coffee wilt diseases (*Fusarium xylarioides*) and coffee leaf rust (*Hemileia vastatrix*) were also other constraints of coffee production listed by focus group discussion. Coffee berry diseases can cause considerable yield losses of up to 75% when not adequately controlled and coffee leaf rust can cause yield losses in excess of 75% where outbreaks are severe (Mike and Phiri, 2006). Dieback is caused by poor management, excessive crops as a result of light exposure without sufficient fertilization, heavy temperature fluctuations, nutrient deficiencies, or severe moisture stress. All these issues can be handled with proper management in the field (Michiel *et al.*, 2004). This implied that there is a poor management of coffee in the study area.

Lack of improved coffee varieties: The respondent also raised that there were no improved coffee varieties recommended by research for the study area. They were cultivating indigenous coffee landraces which are susceptible to diseases and pest. Their

yielding conditions were also not consistent and highly vary from year to year. Similarly, Jose (2012) reported that coffee production in Ethiopia is constrained by lack of adequate technology transfer and research.

Lack of extension and technical support: Low government support on coffee production in the area was also another problem of coffee production. There was low support in terms of seedling dissemination and training provision on coffee production and management. Moreover, the respondents also added, the skill of experts and developmental agents were low in answering the problems coffee producers faced such as diseases. When the farmers ask how to manage diseases and other problems, developmental agents could not properly address the problems.

No appropriate permanent shade: Shade available in the area was simply locally available tree and their suitability has not been checked. The permanent shades available in the area were *Cordia africana*, *Acacia albida*, *Acacia seiberiana*, *Milletia ferruginia*, *Erthrina abyssinica*, *Ficus sycomorus*, *Ficus vasta* and *Croton macrostachyus* which were affecting coffee production. According to Jean (2004), one of the three major principles of sustainable coffee production is shade-grown coffee. The other two are organic coffee growing and fair-trade. Coffee shades have manifold ecological benefits by serving as windbreaks and shelterbelts, for aesthetic value in residential areas, and more importantly to protect the coffee plants from excessive sun and high temperatures (Molla 2015).

Insect-pest: The other problems reported by focus group discussion were insect-pest such as termite and stem borer. Termite and stem borer pose serious problems on coffee production by feeding on the bark or skin of the tree and also by making tunnel or passageway of another fungal and bacterial diseases and causes yield loss.

Lack of post-harvest handling materials: Post-harvest handling materials such as lack of drying bed, high price of sisal sack (85 ETB per unit) and storage were also found to be other constraints of coffee production in the study area.

Table 16: Production constraints of coffee in the study area

No	Factors	Mean core	Rank
1	Drought	67.75	1
2	Lack of improved coffee varieties	57.75	3
3	Lack of extension and technical support	52	4
4	No appropriate shade	40.5	5
5	Insect (termite and stem borer)	41	6
6	Diseases (CBD, BDB and CWD)	64	2
7	Lack of post-harvest handling materials	27	7

Note: TS, UH, MG and JS stand for Tibi Sebata, Ungule Hara, Mine Gora and Jinga Sokoru kebeles, respectively.

Source: Focus Group Discussion, 2019

4.6.2. Marketing Constraints of Coffee Producers in the Study Area

Table 17 revealed the problems of coffee marketing listed and prioritized by interviewed focus group discussion and discussed one by one as the follows.

Low and volatile price: The result from focus group discussion showed low and volatile price was ranked first from other coffee marketing constraints. Coffee producers in the study area are exposed to low price which could not even cover their cost of production. In the same way, Jose (2012) and Tesfu (2012) reported low price and low benefit shares of farmers are problems of coffee marketing in Ethiopia. Coffee producers are exposed to large fluctuation in market price (Berhanu, 2017; Alemayehu, 2014). Many farmers in sub-Saharan Africa face significant difficulty when trying to bring their products to market. They also complain about the low level of profit that they are able to earn from their products (Anne and Delmas, 2009).

Agreement of traders on market price: It is not allowed to farmers to sell coffee out of the district. But, within the district, they can sell their coffee to wholesalers, cooperatives and agent middle-men. The great problem of cooperatives was lack of capital (money cash) to purchase coffee all time and hence they did not purchase constantly but, temporarily. Traders were mostly the residents of the district and knew each other very well, and had agreement on market price and purchase by the same price. The participants on group discussion also added that traders had an agreement with agricultural office so

that they kept silent when farmers appeal about the price. Traders kept their advantage only and are the owners of car within short period while farmers are poor.

High transportation cost: The area had low infrastructural (road) facility and there were transportation problem. Farmers supplied their coffee to market by donkey and human labor

Lack of information on coffee price: Survey result showed that around 44.8% of the respondent had access to market information while the rest had no access to information. Even for those who had access, the initial sources were traders. The result from focus group discussion also indicated lack of market information as the fourth in constraining coffee marketing.

Lack of fairness on the price paid for qualified and not qualified sundry coffee: The payment made for coffee was not as per quality. Traders have mixed qualified and not qualified coffee and the difference in price did not cover the cost of qualifying.

Presence of illegal traders, mixing of coffee with other coffee and unfair weight: Illegal traders purchase coffee cherries that did not dry very well and mix with others. They disseminate false information about price and thereby affect coffee producers. The result from group discussion also indicated government control on illegal traders is very low. Mixing of Gololcha's coffee with Bale and Chole which could drop market price was also another problem of coffee marketing. Traders were also cheating on weight by putting their legs or stones on weight.

Table 17: Marketing constraints of coffee producers

No	Marketing constraints	Mean score	Rank
1	High transportation cost	56.75	3
2	Low price	68.5	1
3	Lack of information on coffee price	53	4
4	Traders agreement on price	64.75	2
5	No significant price difference between qualified and not qualified coffee	48.25	5
6	Presence of illegal traders	43.25	6
7	Mixing of coffee with other coffee	32.75	7
8	Unfair weight	29.75	8

Note: TS, UH, MG and JS stand for *Tibi sebata*, *Ungule Hara*, *Mine Gora* and *Jinga Sokoru kebeles*, respectively.

Source: Focus Group Discussion, 2019

4.6.3. Marketing Constraints for Traders

Constraints in buying: Table 18 portrayed, quality issue was the first factor in buying coffee. Poor quality of coffee such as being wet had affected traders in purchasing of coffee from farmers. Similar to farmers, traders also added that presence of unlicensed traders had declined quality of coffee in the area. Mixing of coffee (qualified and not qualified, Golocha's coffee with other coffee such as Bale and Chole) aggravated with low control of government especially starting from the last five years, had declined quality of coffee in the study area. In line with the expansion of drought and alternative bearing of coffee, the supply of coffee was inconsistent and characterized by high fluctuation. Table 18 further indicated that capital and price fluctuation were also constraints of traders in purchasing coffee. Because of price fluctuation, traders faced difficulty in determining purchase price.

Table 18: Marketing constraints in buying

No	Factors	Mean score	Rank
1	Inconsistency in supply of coffee (low supply)	12.95	3
2	Coffee quality	50.45	1
3	Presence of unlicensed traders	15	2
4	Price fluctuation	3.41	5
5	Capital	6.14	4

Source: Own survey, 2019

Constraints in selling of coffee: Price fluctuation was found to be the first challenge in selling of coffee for traders. Grading system given by ECX and price attached was unfair. For example, if a kg of 2nd grade is sold at 97 ETB, a kg of 4th grade is sold at 94 ETB. But, the cost of supplying 2nd grade coffee is greater than the difference. They paid 2% tax of total sell at ECX and perceived it unfair. In addition to tax, traders paid for commission men from 0.5% to 2% of total sell and 40 cents per quintal per day for storage. In general, they paid 16500 ETB per trip or per 51 quintals on average. Sampled traders also added that Sisal sack or “*jonina*” was not returned after they sell coffee. The price of one sisal sack was 85 ETB and at one trip, they supplied 60 sisal sack (net contents of 85 kg) to Dire Dawa market. Therefore, they lost 60 “*joinia*” or sisal sack or 5100 ETB at one trip only. Transportation cost was also another problem in selling coffee which was 10000 ETB per trip from wholesalers' store to Dire Dawa. The end ranked problems of coffee

selling was shortening of selling days at ECX market. Traders should sell their coffee within 20 days after they enter ECX market. If not, traders were penalized and re-enter to market as new and sell within 7 days only.

Table 19: Major constraints in selling of coffee

No	Factors	Mean score	Rank
1	Price fluctuation	40.32	1
2	High tax by ECX	6.36	5
3	Unfair grade at ECX	20.91	2
4	Sisal sack or “ <i>jonia</i> ” will not be returned	16.23	3
5	Shortening of selling day	3.50	6
6	High transportation cost	8.82	4

Source: Own survey, 2019

4.7. Opportunities of Coffee Production in the Study Area

Even though coffee has production constraints discussed above, it has the following opportunities. Mechara Agricultural Research Center has sown 60000 improved coffee seedlings in the district which will be disseminated in the coming summer season. In addition, the center is conducting a research on Arsi coffee landraces to release recommended coffee varieties for the area. The establishment of Coffee and Tea Development and Marketing Authority at country and district level can also be other opportunities for coffee production in the study area.

4.8. Econometric Model Results

In this section, factors affecting coffee producers market supply and channel choice has been discussed.

4.8.1. Factors Affecting Amount of Coffee Supplied to the Market in the Study Area

Before interpreting output from OLS model, Tests for heteroscedasticity, omitted variables and multicollinearity were conducted.

Tests for heteroscedasticity: Presence of heteroscedasticity was tested using Brush pagan test and the result indicated that there was heteroscedasticity problem. According to Gujarati (2011), sometimes, instead of estimating regression we can regress the logarithm of the dependent variable on the regressors which may be linear or in log form. The reason

for this is that the log transformation compresses the scales in which the variables are measured, thereby reducing a tenfold difference between two values to a twofold difference. To overcome the problem of heteroscedasticity, functional transformation (ln amount of coffee sold) was used and then after, no heteroscedasticity problem existed (Appendix Table 2).

Test for multicollinearity: The presence of multicollinearity problem was tested using variance inflation factor (VIF). The results of all VIF values range between 1.1 and 2.21 with a mean of 1.38 which indicates that there is no serious multicollinearity problem among independent variables (Appendix Table 2).

Test for omitted variables: Ramsey RESET test was used and the result showed there were no omitted variables (Appendix Table 2).

Test of endogeneity: Durbin score and Wu-Hausman test were used to test endogeneity problem by using estat endog STATA command after ivregress 2sls and the result indicated that we are 95% confident that the model had endogeneity problem. Appendix Table 3 also indicated the value of minimum eigenvalue statistic which is 49.34, is greater than any value of 2SLS size of nominal 5% Wald test and LIML size of nominal 5% Wald test. This implied that the null hypothesis which states that the instrumental variables are weak is rejected.

Therefore, two stage least squares was used to identify determinants of amount of coffee market supply. The P-value of F for the overall significance of the model which is (Prob> F=0.0000) indicates that the model (included explanatory variables) are jointly significant at 1% or in other words, the null hypothesis which states that all regressors have zero impact on amount of coffee sold is rejected. It indicated that there is at least one regressor that is significantly different from zero. The value of coefficient of variation indicates that 49.1% of variation in ln of amount of coffee sold in 2017/18 is explained by included explanatory variables (Table 22). From eleven hypothesized explanatory variables, six were found to be significant and discussed as below

Amount of coffee produced (QUANP): It was hypothesized that amount of coffee produced has positive and significant effect on quantity supplied to the market. Similarly, the result from the model indicated that the quantity of coffee produced affects amount of

coffee bean supply to the market positively and significantly at 1% probability level. The result from Table 20 indicated the amount of coffee supplied to the market increases by 3.01% for every one additional quintal of coffee produced, other explanatory variables kept constant. The rationale behind this was that coffee is market-oriented crops and the more produced, the more supplied to the market. Similarly, the study conducted by Samuel (2016), Tadele *et al.* (2016) and Mohammed (2011) indicated the amount of coffee, *teff* and wheat produced had positively and significantly affected market supply, respectively.

Sex of the household heads (SEXHH): It was hypothesized that male headed households are more likely to supply more than females headed households. The result of the study also confirms this and showed that it has positive and significant influence on amount of coffee supplied at 1% level of significance. It also showed being male household head increases the amount of coffee supplied to the market by 47.2% as compared to female household head, controlling for other independent variables. From the survey result, male headed households have sold around 598.8 kilograms of dry coffee cherries while female headed households sold around 253.2 kilograms on average in 2017/18. The reason could be of that female headed households are busy in home and stay at home for child care. The result of the study is not consistent with Nasir (2016) who reported that sex of household heads (being male), had negatively and significantly affected amount of sundry coffee supplied to the market. But, it is consistent with Tadele *et al.* (2016) who identified that sex of the household heads had influenced quantity of *teff* marketable surplus positively.

Educational level (EDHH): Level of education influenced market supply at 5% level of significance. For each additional year of education, coffee market supply increases by 3.42%, keeping other variables constant. Educated farmers might be better in adoption of technology, coffee production management and application of fertilizers such as farmyard manure. This might help them to increase production and thereby quantity supply. The result is in line with Jemberu (2017), and Wogayehu and Tewodros (2015) who identified that educational level affects significantly and positively the amount of chickpea and haricot bean supplied, respectively.

Family size (FAMSZ): It was hypothesized that family size affects coffee market supply either positively or negatively. But, the result of the study indicated that family size affects the amount of coffee supplied to the market positively at 1% level of significance. It

implies that, for every additional family member (in men equivalent), the amount of coffee sold increases by 6.27%, other variables kept constant. The rationale behind is that those households who have more family members had more total labor available which in turn could help to increase amount of coffee bean available for sale. Moreover, households with large family size might need to expend more for children schooling and other expenses. The study is consistent with Nasir (2016) who found family size had positively and significantly affects amount of sundry coffee supply. But, it is inconsistent with Agegnehu (2016) and Sultan (2016). According to them, high family member results in high proportion of rice and wheat consumption and low market supply respectively.

Land allocated to coffee production (AREACOFE): Land allocated had influenced positively and significantly the amount of sundry coffee bean sold at 5% level of significance. The positive coefficient under land allocated to coffee production showed that for each additional hectare of land, amount of coffee supplied to the market increases by 12.1%, controlling for other variables. Similarly, Bekele *et al.* (2017), Adisu (2016) and Jemberu (2017) reported that land allocated had positively and significantly affected the amount of sales of potato, onion and chickpea, respectively.

Access to market information (INFO): The result of the model indicated that access to market information had positively and significantly affected the amount of coffee supply. The positive and significant value of coefficient under access to market information implied that access to market information increases the quantity of supply by 22.2%, keeping other variables constant. The rationale behind this could be access to market information might enable farmers to receive accurate price level and encourage to sell more. The result of the study is in line with Wendmagegn (2014) who found that access to market information had significantly and positively influenced coffee market supply.

Table 20: Determinants of amount of coffee bean (with dry husk) supplied to the market

Variables	Coefficient	Robust Std. Err.	t-value
Level of output	0.0301***	0.00966	3.11
sex	0.472***	0.124	3.81
Educational level	0.0342**	0.0164	2.09
Family size	0.0627***	0.0218	2.87
Farming experience	-0.00389	0.00544	-0.72
Land allocated to coffee production	0.121**	0.0491	2.45
Access to non-farm income	-0.0410	0.139	-0.30
Means of transport ownership	-0.00803	0.0892	-0.90
Frequency of extension contact	0.0154	0.0277	0.56
Access to market information	0.222**	0.0924	2.40
Distance to the nearest market	-0.00623	0.0116	-0.54
Constant	0.256	0.182	1.41
Observations		154	
F(11, 142)		21.340	
Prob > F		.0000***	
R-squared		.491	

Note: *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$, and dependent variable is amount of coffee supplied (ln) in 2010 E.C. or 2017/18 G.C.

Source; Own survey, 2019

4.8.2. Determinants of Market Outlet Choice

Coffee producers in the study had three major market outlets to sell their coffee bean. Multivariate probit model was used to analyze producers channel choice. The p-value of Wald χ^2 (36) = 114.21, Prob> χ^2 = 0.0000*** is significant at 1% significance level and indicated that the coefficients of regressors are jointly significant. The value of χ^2 (3) = 72.11, Prob> χ^2 = 0.0000*** implies that the null hypothesis which states the choice of available market channels are independent is rejected and therefore, coffee producers market outlet decisions are interdependent. Correlation matrix showed that the likelihood of choosing agent middle-men and cooperatives is negative and significant at 5% significance level. Similarly, it revealed the decision of choosing wholesalers and agent middle is negatively correlated at 1% significance level. Table 21 further revealed that the probability of choosing cooperatives, wholesalers and agent middlemen of coffee producers were 24.6%, 60.6% and 41.5%, respectively. The joint probability of choosing all market outlets was 0.5% and failed to jointly choose was 2.7%.

As it is portrayed in Table 21, out of twelve explanatory variables, one was commonly affected entire outlet. It also depicted that three and five variables, had significantly affected cooperatives, and wholesalers and agent middle-men, respectively.

Sex of the household heads (SEXHH): Sex of the household head had positively influenced likelihood of choosing wholesaler and negatively influenced choice of agent middle-men at 1% and 5% level of significance, respectively. Because, male have more time to sale and also hold large amount of coffee bean to sale, and hence search for wholesalers even if the market place is far from their home. But, female households were more likely in choosing of agent middle-men. Similarly, Samuel *et al.* (2017) justified that male farmers have more resource for transportation and time to sell their coffee product to far markets.

Educational level (EDHH): Educational level of household head was significantly and positively related to the choice of cooperatives and wholesalers market channel, and significantly and negatively related with agent middle-men at 5%, 10% and 5% level of significance, respectively. This is due to the fact that most of educated farmers in the study area were member of cooperative and hence more likely to sell through cooperative than other outlets. Moreover, education enhances the capability of farmers in making decisions with regard to the choice of market outlet based on the marketing margin and marketing cost. This finding is consistent with Mengistu (2014) who reported that educational level provides positive predictive power whether or not the household choose cooperative as market outlet of coffee.

Means of transport ownership (TROWR): The result indicated ownership of donkey had positively and significantly affected choice of wholesalers channel and negatively influenced choice of agent middle-men market channel at 5% level of significance. This is due to the fact that in the study area means of transporting coffee to the market was through donkey and those who owned it were more likely to sell it at village and district market to wholesalers at better price. The finding is in line with Addisu (2018) who reported that having equines positively correlate to the likelihood of choosing wholesalers outlet.

Access to market information (INFO): A positive relationship was found between access to price information and choice of wholesalers' market outlet at 1% significance

level, and negative relationship was found between access to price information and agent middle-men market outlet at 5% significance level. The rationale behind this could be access to market information might encourage farmers to sell to better market and increase their profit. The result of the study is in line with Nasir (2016) who justified that access to coffee market information affected the choice of collector outlet negatively and significantly. Samuel *et al.* (2017) also added farmers who have no information preferred brokers relative to urban traders.

Cooperatives membership (COMSHIP): It was significantly and positively affected cooperatives channel choice at 1% significant level. The reason is that members have responsibilities to supply their coffee as the norm of cooperatives. Additionally, cooperatives provide input and training to its members and give a share dividend at the end of each year. The finding is consistent with Engida (2017) who showed that cooperative membership has a significant and positive relationship with the likelihood of choosing cooperative.

Frequency of extension contact (FEXCONT): It had affected choice of cooperatives positively and of middlemen negatively at 10% level of significance. This might imply that extension agents advice farmers to sell their coffee to cooperatives rather than brokers. The finding of the study is in line with Solomon *et al.* (2016) who found that frequency of extension contact had negative and significant effect on choice of brokers and positive and significant effect on cooperatives.

Distance to the nearest market (DMRKT): The result indicated that distance to the nearest market had negatively and significantly affected choice of wholesalers channel at 5% level of significance. The reason of this was that wholesalers were purchasing coffee at village and district market and hence those farmers who are far from market were less likely in selling to them. The finding is consistent with Sultan (2016) who reported that distance from the closest market had negatively and significantly affected wholesaler market outlet.

Table 21: Multivariate probit estimation for determinants of coffee producers market outlet choice

	Cooperatives		Wholesalers		Agent middle-men	
Variables	Coeff.	Std. Er.	Coeff.	Std. Er.	Coeff.	Std. Er.
Sex of household heads	-0.566	0.514	1.487***	0.378	-0.706**	0.323
Educational level	0.140**	0.0632	0.0744*	0.0409	-0.101**	0.0397
Farming experience	-0.0259	0.0187	-0.00942	0.0145	0.00491	0.0132
Land allocated	-0.0168	0.182	0.0488	0.139	0.0297	0.128
Access to non-farm	0.121	0.434	0.00948	0.327	-0.288	0.304
Means of transport	-0.255	0.364	0.628**	0.266	-0.484**	0.241
Frequency of extension	0.105*	0.0623	0.104	0.0649	-0.0966*	0.0573
Access to information	-0.371	0.333	0.674***	0.247	-0.506**	0.231
Cooperative membership	2.685***	0.401	-0.418	0.300	-0.107	0.287
Distance to market	0.0541	0.0403	-0.0685**	0.0335	0.0110	0.0318
Output level	-0.0142	0.0237	0.0192	0.0252	0.00443	0.0212
Family size	0.0919	0.0787	0.0154	0.0624	-0.00305	0.0592
Constant	-2.026***	0.772	-1.753***	0.582	1.303**	0.520
Multivariate probit (MSL, # draws)			100			
Number of observations			154			
Log likelihood			-155.32			
Wald χ^2 (36)			114.21			
Prob> χ^2			0.0000***			
Predicted probability	0.246		0.606		0.415	
Joint probability of success			0.005			
Joint probability of failure			0.027			
Correlation matrix	$\rho_1(Y_1)$	$\rho_2(Y_2)$	$\rho_3(Y_3)$			
$\rho_1(Y_1)$	1					
$\rho_2(Y_2)$	0.0249	1				
$\rho_3(Y_3)$	-0.224**	-0.756***	1			
Likelihood ratio test of $\rho_2\rho_1=\rho_3\rho_1=\rho_3\rho_2=0$						
$\chi^2(3)=72.11$						
Prob> $\chi^2=0.0000***$						

Note: ***, ** and * indicated significance level at 1%, 5% and 10%, respectively. Y1, Y2 and Y3 are Cooperatives, Wholesalers and Commission-men, respectively.

Source: Own survey, 2019

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary and Conclusions

Coffee is the major cash crop produced and sources of income in Gololcha district. As data from Coffee and Tea Development and Marketing Authority indicated, total of 35750 quintals of green bean was produced. But, yield per hectare was only 2.68 quintals which is by 56.7% below than national average. To improve coffee production and productivity in the area, development of well-performing marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices is important.

The study aimed to identify structure-conduct-performance of coffee market, analyze factors affecting market supply of coffee by smallholder farmers and identify determinants of coffee producers market outlet choice in the study area. To address the objectives of the study, both quantitative and qualitative data were used. The data were generated from both primary and secondary sources. The primary data were collected through personal interviews from a total of 213 respondents (154 producers, 22 traders, 11 processors and 26 consumers) using structured and semi-structured questionnaires. Focus group discussion composed of key informant and developmental agent was formed and interviewed prior to household survey to generate qualitative data. Secondary data on number of coffee producing *kebeles*, lists of coffee producers and traders, agro-climatic condition and level of production of the study area were taken from unpublished documents of District Agricultural and Natural Resource Office, and Coffee and Tea Development and Marketing Authority.

Descriptive statistics, gross margin and econometric model were used to analyze the data collected. Two stage least square regression (2SLS) model was used to analyze the determinants of coffee supply to market and multivariate probit model (MVP) was used to analyze factors affecting market outlet choice of farmers. Garrett's ranking technique was used to rank producers' production and marketing constraints, and marketing constraints of traders in buying and selling of coffee.

The study revealed that the main coffee market chain actors were producers, cooperatives, wholesalers, agent middlemen, rural collectors, processors, retailers and consumers. Cooperatives purchase coffee from members and non-members. They hull sundry coffee,

sort, pack and supply to auction market at Dire Dawa. Agent/commission-men purchase dry coffee cherries by their own money, collect together, transport to district market and resale to wholesalers by fee of one birr per kilogram on average. Rural collectors purchase coffee from farmers by local unit called “*bikire*” and resale to wholesalers and agent middle-men. Wholesalers buy dry coffee cherries from farmers, agent middle-men and unlicensed rural collectors at both village and district market in large amount, and transport to Dire Dawa market.

SCP approach was used to analyze the structure, conduct and performance of coffee market. The concentration ratio of four top coffee traders indicated unconcentrated market structure. But, license and capital requirement were found to be barriers to entry coffee marketing. Majority of the farmers reported that price was set by traders. Moreover, the result from focus group discussion showed that market price was determined by traders and farmers were simply price taker. Discussion from focus group further indicated that traders agreed on price and purchase by the same price. They also have relation and agreement with district agricultural office and hence low control on market price. Traders were cheating on weight. Farmers may not know about the weight they used. By using this as a chance, traders hack on weight.

Eight main alternative channels were identified for coffee marketing in the study area. From total coffee supplied, the largest amount has passed through channel V (57.93%) while the smallest number is through channel VII (0.45%). Total gross marketing margin (TGMM) is the highest in channels VII and VIII where producers directly sell to retailers and processors. Producers’ gross marketing margin is highest in channel III where coffee sold directly to cooperatives followed by channel V where they directly sell to wholesalers.

Production constraints of coffee producers were drought, diseases, lack of improved coffee varieties, lack of extension and technical support, no scientific research was done on appropriate shade, insect and lack of post-harvest materials. Low and volatile price, agreement of traders on market price, lack of information on coffee price, lack of fairness on price paid for qualified and not qualified sundry coffee, presence of illegal traders, high transportation cost, mixing of coffee with other coffee and unfair weight were also found to be major marketing constraints of producers in the study area. However, the establishment of coffee nursery site by Mechara Agricultural Research Center and, Coffee

and Tea Development and Marketing Authority at country and district level can be opportunities of coffee production in the study area.

The study further revealed that poor quality of coffee, mixing of Golocha's coffee with other coffee such as Bale and Chole, presence of illegal traders, inconsistent supply of coffee, capital and price fluctuation were constraints of traders in purchasing coffee. Price fluctuation, unfair grading system given by ECX and price attached, high tax payment at ECX, no return of sisal sack or "*jonja*", transportation cost and shortening of selling days at ECX market were found to be constraints of coffee selling for wholesalers.

The result of two stage least squares showed that amount of coffee produced, sex of the household heads, educational level, family size, land allocated to coffee production and access to market information had positively influenced amount of coffee supplied to the market. Coffee producers in the study had three major market outlet to sell their coffee bean. Multivariate probit model was used to analyze producers channel choice because, coffee producers' market outlet decision were found to be interdependent. The probability of choosing cooperatives, wholesalers and agent middlemen of coffee producers were 24.6%, 60.6% and 41.5%, respectively. The joint probability of choosing all market outlet were 0.5% and failed to jointly choose were 2.7%.

The result from MVP showed that sex of the household head, level of education, means of transport ownership and access to information had positively influenced choice of wholesaler and negatively influenced choice of agent middle-men. Level of education was significantly and negatively related with agent middle-men, and significantly and positively influenced cooperatives and wholesalers channel choice. Frequency of extension contact had affected choice of cooperatives positively and of middlemen negatively and distance to the nearest market had negatively and significantly affected choice of wholesalers channel.

Generally, barriers to entry (capital and license), price agreement by traders, cheat on weight and higher margins for traders implied that coffee market in Gololcha district was inefficient. The study also concluded that demographic, socio-economic and institutional factors play a vital role in determining amount of coffee supplied and producers market outlet choice. The study further indicated that availability of many production constraints

aggravated with marketing constraints had demoralized coffee producers unless appropriate measures will be taken by the government and other responsible bodies.

5.2. Recommendations

Based on the finding of the study, the following recommendations are forwarded to improve performance of coffee marketing and market supply.

The result indicated that drought, diseases, lack of improved coffee varieties, lack of extension and technical support, no scientific research was done on appropriate shade, insect and lack of post-harvest materials were among the major constraints of coffee production. Therefore, strengthening coffee research to improve farm productivity, reducing risk, improving shade tree practices by using improved recommended shade tree species, Practice stumping old coffee tree for recycling its life or re-plant and using of improved coffee variety are found to be important for the study area.

Low and volatile price, agreement of traders on market price, lack of fairness on price paid for qualified and not qualified sundry coffee, presence of illegal traders, high transportation cost, mixing of coffee with other coffee and unfair weight were also found to be major marketing constraints of producers in the study area. Therefore, controlling of illegal traders and enhancing of market infrastructure is found to be important.

Sampled traders reported that coffee supplied by the farmers had no quality. Therefore, improving harvesting techniques by only harvesting red cherry at the farm level, improving drying techniques through drying coffee on plastic sheet, improving packaging materials (use only sisal sack) and store coffee after it well dried in appropriate warehouse only for a short period are also important.

Grading system, price attached to each grade and tax paid at ECX market were reported to be unfair by sampled traders. Therefore, further research should be conducted on coffee market condition at ECX level.

Producers' gross marketing margin was found to be highest if they directly sell to cooperatives. Therefore, establishing and supporting the existed coffee farmers' cooperatives is very important.

The result of two stage least squares showed that amount of coffee produced, sex of the household heads, educational level, family size, land allocated to coffee production and access to market information had positively influenced amount of coffee supplied to the market. Therefore, enhancing information access, increasing level of coffee production (through extension of improved varieties, fertilizer application, irrigation, pruning and other agronomic management) expansion of education facilities were other crucial issues to increase coffee market supply.

The result from multivariate probit model showed that level of education, means of transport ownership, access to information, frequency of extension contact, distance to the nearest market and cooperatives membership had affected choice of coffee producers channel choice. Therefore, enhancing institutional and infrastructural (transportation and extension) facilities is necessary in enabling coffee producers to select efficient channels. In addition, the study recommended that establishing and supporting multi-purpose coffee farmers' cooperatives and thereby increasing cooperative members which would increase farmers' income through marketing activities and supply of inputs is important.

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7. APPENDIX

Appendix I: Tables

Appendix Table 1: Result of regressing output level over other explanatory variables and instrumental variables

Variables	Coefficient	Std. Err.	t-value
sex	1.150	1.026	1.12
Level of education	0.211*	0.121	1.74
Family size	0.363*	0.194	1.87
Farming experience	-0.0545	0.0432	-1.26
Land allocated to coffee	1.135***	0.380	2.99
Access to non-farm income	0.319	0.978	0.33
Means of transport ownership	0.676	0.770	0.88
Frequency of extension contact	0.204	0.176	1.16
Access to information	1.409*	0.756	1.86
Distance to the nearest market	0.103	0.0977	1.05
Number of coffee mother tree owned	0.00432***	0.000567	7.61
Level of fertilizer	0.244***	0.0667	3.66
Constant	-2.783*	1.551	-1.79
Observations	154		
R-squared	0.608		
Adj R-squared	0.5744		
F(12, 141)	18.21		
Prob > F	0.0000***		

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

Appendix Table 2: Tests for multi-collinearity, heteroscedasticity and omitted variables

estat hettest		
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity		
Ho: Constant variance		
Variables: fitted values of log of amount of coffee sold		
chi2(1) = 1.04		
Prob > chi2 = 0.3080		
estat ovtest		
Ramsey RESET test using powers of the fitted values of log of amount of coffee sold		
Ho: model has no omitted variables		
F(3, 139) = 0.30		
Prob > F = 0.8263		
estat vif		
Variable	VIF	1/VIF
Level of output	2.21	0.45
Level of education	1.74	0.58
Land allocated to coffee	1.55	0.65
Family size	1.44	0.69
Sex	1.32	0.76
Farming experience	1.3	0.77
Means of transport ownership	1.14	0.88
Distance to the nearest market	1.14	0.88
Access to information	1.11	0.9
Frequency of extension contact	1.1	0.91
Access to non-farm income	1.1	0.91
Mean VIF	1.38	

Source: own survey, 2019

Appendix Table 3: Endogeneity and instrumental variable test

Tests of endogeneity					
Ho: variables are exogenous					
Durbin (score) chi2(1) =5.8249		(p= 0.0158)			
Wu-Hausman F(1,141)= 5.54284		(p=0.0199)			
estat firststage					
First-stage regression summary statistics					
		Adjusted	Partial		
Variable	R-sq.	R-sq.	R-sq.	F(2,141)	Prob > F
level of output	0.6078	0.5744	0.4117	49.3433	0
minimum eigenvalue statistic = 49.3433					
Critical Values		# of endogenous regressors: 1			
Ho: Instruments are weak		# of excluded instruments: 2			
		5%	10%	20%	30%
		10%	15%	20%	25%
2SLS Size of nominal 5% Wald test		19.93	11.59	8.75	7.25
LIML Size of nominal 5% Wald test		8.68	5.33	4.42	3.92
Overidentifying restrictions test					
Sargan (score) chi2(1) = .185781 (p = 0.6665)					
Basmann chi2(1) = .171512 (p = 0.6788)					

Source: own survey, 2019

Appendix Table 4: Conversion factor used to compute man equivalent (Labor Force)

Age group/years	Male	Female
Less than 10	0	0
10-13	0.2	0.2
14-16	0.5	0.4
17-50	1	0.8
Greater than 50	0.7	0.5

Source: Stork, et al., 1991. As cited in Negash, 2007.

Appendix II: Survey questionnaires

Title: Market Chain Analysis of Coffee (*Coffea arabica* L.): The case of Gololcha District, Arsi Zone, Oromia National Regional State, Ethiopia

Objectives:

- ✓ To identify structure-conduct-performance of coffee market in the study area
- ✓ To identify factors affecting market supply of coffee by smallholder farmers
- ✓ To identify determinants coffee producers market outlet choice

Instruction for Enumerators

- ✓ Start with warmly greeting farmers according to the culture of the area
- ✓ Introduce yourself, your organization (from where you come) and objective of your meeting with him.
- ✓ Tell the farmer that information collected for this study will be kept strictly confidential.
- ✓ Tell him also he has the right to ask questions at any point before the interview, during the interview, or after the interview is completed.
- ✓ Write important information below the page margin
- ✓ Before going to ask questions please identify ambiguous questions and be it clear for you from the survey supervisor.

General Information

1. Date of interview: _____

2. Enumerators Name: _____ Signature: _____

3. Name of Kebele: _____

A. Questionnaire for Producers (Farmers)

1. Socio-economic characteristics

1.1. Name of the respondent: _____

1.2. Sex of the household head 1. Male 2. Female

1.3. Age of the respondent: _____

1.4. Educational status of the household head

1. Illiterate 2. Read and write 3. Formal (_____) grades

1.5. Marital status 1. Married 2. Single 3. Divorced 4. Widowed

1.6. Family Size

Sex \ Age (years)	< 10	10-13	14-16	17-50	>50
Male					
Female					

1.7. When did you started farming of coffee (farming experience) _____(years)

2. Resource Endowment

2.1. What is the area of your total land _____ ha

2.2. Crops grown and area allocated by coffee producers

No	Crops	Area (ha)		Total out put
A. Annual crops				
1	Maize			
2	Sorghum			
3	Teff			
4	Barley			
5	Haricot bean			
6	Others			
B. Perennial crops		Area	Number of tress	
1	Coffee			
2	Chat			
3	Mango			
4	Banana			
5	Others			

2.3. Estimate of annual farm income per year

No	Income from crops sold			Income from livestock		Livestock products	
	Types	Total/ku	Total/birr	Types	Total amount (birr)	Types	Total (birr)
1	Coffee			Goat		Butter	
2	Haricot bean			Sheep		Eggs	
3	Teff			Cattle		Milk	
4	Maize			Hens		Others	
5	Others			Others			

2.4. Do you have access to non/off farm income? 1. Yes 2. No

2.5. If yes to Q 2.4. List types of sources and amount of income received

No	Sources	Income received per year (birr)
1	Chat trading	
2	Hand craft	
3	Daily laborer	
4	Permanent employment	
5	Remittance	
6	Coffee trading	
7	Fattening	
8	Others (if any)	

2.6. What is your means of transporting coffee to market?

1. Human (labor) 2. Donkey 3. Car 4. Others, _____

2.7. What is the source of means of transport mentioned in Q 2.6?

1. Owned 2. Hired

3. Institutional Factors

3.1. Did you have an extension contact? 1. Yes 2. No

3.2. If yes Q3.1. Who provide extension service? 1. BoARD 2. DA 3. Model farmer 4. NGOs

5. Research center 6. Other, specify

3.3. If yes to Q3.1 how do you frequently meet extension agent per year?

1. Once per year 2. Twice per year 3. Three times per year

4. Others (specify), _____

3.4. At what time you meet extension agents 1. During land preparation 2. During sowing 3. During input (seed and fertilizer) provision 4. At harvesting time
5. Others specify, _____

3.5. Do you have access to credit? 1. Yes 2. No

3.6. If yes to Q3.5, list your credit source, amount and for what purpose credit has been received

No	Source (thick)	Amount (birr)	Purpose of borrowing; code “1” for farm input parches, “2” for family consumption, “3” for livestock purchase, “4” for land rent, and if others specify
1	Cooperative		
2	Micro finance		
3	Saving and credit association		
4	Local lender		
5	Others (specify)		

3.7. Do you have information on coffee price during selling? 1. Yes 2. No

3.8. If yes what is your source? 1. Own assessment 2. Friends 3. Others (specify)_____

3.9. Are you a member of farmers cooperative? 1. Yes 2. No

3.10. If yes to Q3.9, what is the name of cooperative? _____

3.11. If yes to Q3.9, why you joined the cooperative? 1. The cooperative provide better price 2. Give field service or technical assistance 3. The scaling is fair
4. To save and use for feature 5. Others (specify) _____

3.12. If no to Q3.9 why? 1. No perceived benefit 2. Fails to meet member criteria
 3. It is far from my home 4. No cooperative in the area 5. Others
 (specify), _____

3.13. Distance of the nearest market place that you sale your coffee _____ km or
 _____ hours

4. Coffee production and marketing

4.1. How much coffee you produced in 2017/18 production

Red coffee berries _____ kg or _____ quintal

Dried coffee berries _____ kg or _____ quintal

Coffee grain _____ kg or _____ quintal

4.2. Fertilizer application and cultivations

Thick if apply	Age of coffee owned (years)		Level of fertilizer (Kg)/year		Frequency (per year) (thick)			
	No		Urea	Dap	Once	Twice	Three times	Others
1. Chemical fertilizers	1							
	2							
	3							
2. Cultivation	1							
	2							
	3							
3. organic fertilizers								
4. pruning								

4.3. When do you harvest coffee (critical time for harvesting coffee) (thick) multiple choices are possible

October	November	December	January
---------	----------	----------	---------

4.4. Materials used to harvest, _____

4.5. For how long do you store your coffee after harvest? 1. Sale immediately 2. 1-3 months 3. 4-8 months 4. Up to one year 5. Other specify,

4.6. About coffee sold in 2017/18

To whom did you sell coffee? Thick (✓) multiple choice is possible	Amount sold qt/year	Price per kg	In what form did you sell? 1. dry cherries 2. red cherries 3. clean bean	What was the reason of choosing the buyer? 1. Offers high price 2. socially close 3. payment on cash 4. suitable locations 5. others (specify)_____	Where did you sell? 1. village 2. village market 3. district market	Frequency of selling per year 1. once 2. twice 3. others (specify)
1. local consumers						
2. retailers						
3. wholesalers						
4. cooperatives						
5. others (specify)_____ _____						

4.7. If you sell your coffee to traders do you know the legality of buyers? 1. Yes 2. No

4.8. If yes to Q 4.8. to whom you sell coffee 1. Legal traders 2. Illegal traders 3. Both

4.9. Who decides on price during selling? 1. Traders 2. Producers 3. Brokers 4. Negotiation of farmers with traders 5. Others (specify) _____

4.10. What is your term of sell? 1. In Cash 2. In Credit 3. Both

4.11. If your terms of sell is both, list for whom you sell in cash and credit

1. Cash, _____

2. Credit, _____

4.12. Is there a difference in price due to differences in place of sale? 1. Yes 2. No

4.13. If yes to Q 4.12. Indicate level of price per Kg when the product is sold to different actors and in different places.

Place of sale	Actors				
	cooperatives	wholesalers	retailers	consumers	others
On the farm/farm gate					
Village market					
District market					
Others					

4.14. Did you face difficulty in finding buyers when you want to sell? 1. Yes 2. No

4.15. If yes, in Q 4.14. what was the reason 1. Inaccessibility of market 2. Low price
3. Lack of information 4. Other (specify)_____

4.16. Production constraints of coffee

No	Factors	Rank
1		
2		
3		
4		
5		

4.17. Marketing constraints of coffee

No	Factors	Rank
1		
2		
3		
4		

5		
---	--	--

4.18. Production and marketing cost of coffee in 2017/18 production year

List of Cost incurred	Unit	Total cost in Birr				
		Per unit	Total cost			
A. Production cost						
Cultivation	Ha					
Fertilizer	Kg					
Weeding	Ha					
Herbicides	Ltr					
Harvesting/collection	HA					
Pulping/dehusking	Qt					
Land rent	Ha					
tax	Ha					
Others (specify)						
B. Marketing cost		Marketing cost/Qt/Trip if coffee is sold to different actors				
		Cooperatives	Wholesalers	Retailers	Consumers	Others
Packing materials/Sack	Qt					
Packing cost/filling to sack	Qt					
Grading cost	Qt					
Loading/unloading	Qt					
Storage rent	Qt					
Weight loss/Storage loss	Qt					
Broker cost (commission for agent)	Qt					
Transportation cost	Qt					
Municipality Tax	Qt					
Telephone cost	Per trip					
Processing cost (hulling or pulping cost)	Qt					
Personal travel and other expense	Per trip					

Other costs (specify)						
-----------------------	--	--	--	--	--	--

B. Interview Schedule for Traders

1. Demographic and socio-economic characteristics

1. Name of trader _____

2. Age _____

3. Sex _____ 1. Male 2. Female

4. Marital status 1. Married 2. Single 3. Divorced 4. Widowed

5. Type of business: 1) Wholesaler 2) Retailer 3) Processor 4. Others
(specify), _____

6. Level of education of respondent _____

7. How long have you been operating the business? _____ years

8. Did you trade alone or in partnership? 1. Alone 2. Partnership 3. Other
(specify)

9. If partnership, how many are you in the joint venture? _____

10. Total number of peoples employed in your business: _____

2. Buying (in 2017/18)

1. Who are suppliers of coffee to you?

Actors (suppliers)	Legal 1. Licensed 2. unlicensed	quantity supply to traders/year	Place 1. Farm gate 2. Village market 3. District market 4. Others (specify)	Price/Kg		
				Dried cherry	Red cherry	Clean bean
1. Farmers						
2. Retailers						
3. Brokers						
4. Investors						
5. Cooperatives						
6. State farm						
7. Others						

2. How do you attract your suppliers? 1. by giving credit to purchase inputs
2. By giving better price relative to others 3. By fair weighing
4. By visiting them 5. Others (specify) _____

3. Who purchases coffee products for you? 1. Yourself 2. Brokers/commission agent
3. Local coffee collectors/sebisabi 4. Others specify them: _____

4. What is the term of payment? 1. Cash 2. Credit

5. Who set the purchase price? 1. Negotiation 2. By the market 3. Your Self
4. Other (specify _____)

6. Do you pack your purchase? 1. Yes 2. No

7. If your answer for Q.6. is yes, what were your packing materials?
1. sisal sack „teka“ 8. Plastic Sack (Madaberya) 3. Sisal sack „jonja“
4. Basket 5. Others _____

8. Major problems in buying coffee,

No	Factors	Rank
1		
2		
3		
4		
5		

3. Selling (in 2017/18)

1. To whom coffee sold

	Quantity sold to each channel per/year	Place	Frequency of (trip) selling/year	Price/Kg
1.				
2.				
3.				
4.				
5.				

2. How do you attract your buyers? _____, _

3. Do you have your own means of transporting coffee? 1. Yes 2. No

4. If yes to Q3, list , _____

5. If no to Q3, how did you transport from buying center to coffee store house? Means of transportation mostly used?

a. For dried cherry from collection point to store _____

b. For dried cherry from store to hulling station _____

6. Did you have your own store house? 1. Yes 2. No

7. If yes to Q6, how much is the storage capacity? _____

8. Did you have your hulling machines? 1. Yes 2. No

9. Did you grade your coffee? 1. Yes 2. No

10. If yes to Q9, what were your criteria to grade? 1. Size 2. Others specify,

11. Did you get enough quantity of coffee that you expect in the year 2017/18? 1. Yes
2. No

12. If no to Q11, what was the reason?, _____

13. Major problems in selling your products

No	Factors	Rank
1		
2		
3		
4		
5		

4. Marketing cost

Marketing cost	Unit	Cost to different actors per/quintal and per/trip in birr
Sack cost		
Packing cost/filling to sack		
Grading cost		
Loading/unloading		
Storage rent		
Weight loss/Storage loss		
Broker cost (commission for agent)		
Transportation cost		
Municipality Tax		
Telephone cost		
Processing cost (hulling or pulping cost)		
Personal travel and other expense		
Other costs (specify)		

5. Capital

1. What was the major problem to enter *coffee* trade?

1. License 2. Lack of starting capital 3. Trading experience

4. Other (specify)_____
2. What are the main criteria's to be licensed *coffee* traders? 1. Initial capital 2. Interest
3. *coffee* Trading experience 4. Others (specify)_____
3. How do you see the procedure to get the license? 1. Complicated 2. Easy 3. others
4. How much amount Birr is required to get the license? _____Birr.
5. How much was your initial working capital when you started the business? _____Birr
6. How much is the amount of your working capital in 2018?_____ Birr
7. What was the source of the initial working capital? 1. Own 2. Loan 3. Gift
4. Share 5. Others (specify)_____
8. If it was loan, from whom did you borrow? 1. Relative/family 2. Friends
3. NGOs 5. Banks 6. Private money lender
7. Others (specify)_____
9. What was the source of the current working capital? 1. Own 2. Loan 3. Gift
4. Share 5. Others (specify)_____

C. Checklist for Focus Group Discussion

1. List production constraints of coffee by rank

No	Factors	Rank
1		
3		
4		
5		
6		
7		

2. List marketing constraints of coffee by rank

No	Factors	Rank
1		
3		
4		
5		
6		
7		

3. List coffee marketing actors in your area

No	Marketing actors	Legal status 1. Legal 2. illegal	Their activities along coffee market chain
1			
3			
4			
5			
6			

D. Checklist for Cooperatives

1. Name of cooperative _____

2. Year of establishment _____

3. Number of members

a) during establishment male: _____ female: _____

b) currently male: _____ female: _____

c) coffee producers from total members male: _____ female: _____

4. Capital of cooperative

a) during establishment in cash (birr) _____ in kind _____

b) currently in cash (birr) _____ in kind _____

5. About coffee bought in 2017/18

No	From whom you buy? 1. Member Farmers 2. Non member farmers 3. Wholesaler 5. Retailer 5. Other (specify)	Types of coffee 1. Clean 2. Dry cherry	Amount/year	Price/kg
1				
2				
3				

6. How do you attract your suppliers? 1. by giving credit to purchase inputs

2. By giving better price relative to others 3. By fair weighing

4. By visiting them 5. Others (specify) _____

7. What is the term of payment? 1. Cash 2. Credit

8. Who set the purchase price? 1. Negotiation 2. By the market 3. Your Self

4. Other (specify) _____

9. Major problems in buying coffee, _____,

10. About coffee sold in 2017/18

No	To whom you sold? 1. Union 2. Other (specify)	Types of coffee 1. Clean 2. Dry cherry	Amount/year in quintal	Price/kg
1				
2				

11. Marketing cost

Marketing cost	unit	Cost in birr	
		Unit cost	Total cost
Packing cost	Quintal		
Grading cost	Quintal		
Loading/unloading	Quintal		
Storage cost	Quintal		
Weight loss	Kg/Quintal		
Broker cost (commission for agent)	Quintal		
Transportation cost	Quintal		
Tax	Quintal		
Telephone cost	Per trip		
Processing cost (hulking and pulping cost)	Quintal		
Personal travel and other expense	Per trip		
Other costs (specify)			

12. Major problems in selling coffee, _____,

13. What type of services you provided for coffee producers`?

A. For members _____,

B. Nonmembers _____,

E. Checklist for District Agricultural Office and Bureau of Trade and Industry

1. Total Number of Kebeles in the District, _____

2. Total Number of Coffee Producing: kebeles _____, and Farmers _____

3. Total number of coffee producers in selected kebeles

No	Kebeles	Number of holders
----	---------	-------------------

1		
2		
3		
4		

4. Number of Licensed Coffee Traders and Their Quantity Purchase

No	Name	Number of members	Types of traders 1. Wholesalers 2. Retailers 3. Other specify	Quantity purchase/year
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

5. Number of illegal Coffee Traders and Their Quantity Purchase

No	Total numbers	Total Quantity purchase/year
1		

6. Land allocated for coffee production and output obtained for the last 10 years

years	Number of holders	Land allocated	Output obtained
2000			
2001			
2002			
2003			
2004			

2005			
2006			
2007			
2008			
2009			
2010			
2011			

F. Check list for Processors

General Information

1. Date of interview: _____

2. Enumerators Name: _____ Signature: _____

3. District: Gololcha Name of Kebele: _____

1. Name of processor _____

2. Age _____

3. Sex of the respondent 1. Male 2. Female

3. Marital status of the respondent 1. Married 2. Single 3. Divorced 4. Widowed

7. Educational Level of the respondent 1. Illiterate 2. Read and write 3. Formal (____)

9. How long have you been selling coffee? _____ Years

10. From whom you buy?

No	From whom you buy? 1. Wholesaler 2. Retailer 3. Farmers 4. Cooperative 5. Other (specify)	Types of coffee 1. Clean 2. Dry cherry	Amount/ week	Frequency of buying/week	Price/kg
1					
2					
3					
4					
5					

11. Activities performed and cost

Activities performed	Cost in birr
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G. Consumers interview schedule

General Information

1. Date of interview: _____

2. Enumerators Name: _____ Signature: _____

3. District: Gololcha Name of Kebele: _____

1. Name of consumer _____

2. Age _____

3. Sex of the respondent 1. Male 2. Female

3. Marital status of the respondent 1. Married 2. Single 3. Divorced 4. Widowed

6. Types of job: 1) government worker 2) trader 3) farmers 4. Others (specify), _____

7. Educational Level of the respondent 1. Illiterate 2. Read and write 3. Formal (____)

9. How long have you been drinking coffee? _____ years

10. How many piece of cup you drink per day?, _____

11. From whom you buy?

No	From whom you buy? 1. Wholesaler 2. Retailer 3. Farmers 4. Cooperative 5. Other (specify)	Types of coffee 1. Clean 2. Dry cherry	Amount/week	Frequency of buying/week	Price/kg
1					
2					
3					
4					
5					

11. Do you drink coffee daily? 1. Yes 2. No
12. If no Q11, what is the number of days per week you drink coffee, _____
13. What is price per cup? _____
14. Do you consider any quality requirements to drink coffee? 1. Yes 2. No
15. If yes for Q.14, what quality requirement do you consider? _____,

16. What is the level of your income per month? _____ birr?