

Analysis of the Coffee Market Structure, Conduct, and Performance in The Gimbo District of The Kaffa Zone in Southwest Ethiopia

Tariku Teka Mekuria*

Abstract

Coffee is a vital export commodity for Ethiopia, contributing significantly to the country's GDP and rural livelihoods. In the Kaffa Zone, particularly in Gimbo District, coffee production serves as the primary source of income for small-holder farmers. Despite its economic importance, the coffee market in the study area faces several constraints, including low production capacity and inadequate market infrastructure. This study aimed to identify key actors in the coffee market chain and to analyze the market structure, conduct, and performance using the Structure–Conduct–Performance (SCP) framework. Primary data were collected from 200 coffee producers, 22 traders, and 22 consumers through a multi-stage sampling technique using structured questionnaires. Both descriptive statistical methods and econometric analyses were employed to examine market dynamics. The results indicate that coffee market supply is positively influenced by quantity produced, access to market information, availability of credit, educational level, and gender of the household head, while distance to the nearest market has a negative and significant effect. Consumer outlet preference analysis revealed that 78.5% preferred retailers and 73.5% preferred private traders. Market concentration analysis ($CR_4 = 36\%$) indicated a weak oligopolistic market structure. The conduct analysis revealed that producers have limited bargaining power in price determination, indicating an imbalance in market influence. Performance analysis further showed that marketing margins vary across channels, with the highest margin observed in channel II (17.67%) and the lowest in channel III (10.69%). However, producers obtained the largest share of the consumer price in channel III (89.31%), indicating relatively better performance in this channel. Overall, the coffee market in Gimbo District is characterized by weak oligopolistic structure, limited producer influence, and varying efficiency across market channels. The findings highlight the need for improving market infrastructure, strengthening institutional support, and enhancing farmers' access to information and financial services to promote a more efficient and equitable coffee marketing system.

Keywords: Coffee, market structure, market conduct, market performance, Gimbo District, economic analysis, consumer behavior, industry trends, agricultural economics

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INTRODUCTION

Coffee is one of the most important global commodities, produced in more than 50 developing countries across South America, Africa, and Asia. It acts as an essential source of income for approximately 20 to 25 million households worldwide [1]. The coffee industry represents a multi-billion-dollar sector involving millions of smallholder farmers, most of whom cultivate less than five hectares of land [2]. Globally, daily coffee consumption exceeds two billion cups, generating an estimated annual revenue of about USD 200

billion [3]. More than 90% of global coffee production is concentrated in approximately 45 developing countries, underscoring its critical role as an economic driver in these regions [4]. In addition to its economic importance, coffee is deeply embedded in the social and cultural fabric of many societies, particularly in Africa.

Ethiopia, widely recognized as the birthplace of *Coffea arabica*, produces approximately 384,000 metric tons of coffee annually and is the largest coffee producer and exporter in Africa [5]. The sector contributes nearly one-third of the country's total export earnings and provides livelihoods for millions of smallholder farmers, particularly in the western, southern, and southeastern regions [6].

A comprehensive understanding of the coffee market requires an analysis of its structure, conduct, and performance (SCP), as these dimensions directly influence market efficiency, profitability, and sustainability. The SCP framework, originally developed by [7], posits that market structure influences firm conduct, which in turn determines market performance. This framework has been widely applied in agricultural market studies, including coffee, to evaluate competitiveness and market efficiency.

Market structure in the coffee sector refers to the number and size distribution of market participants, the degree of market concentration, and the level of competition. Despite Ethiopia's significant contribution to global coffee production, its domestic market often exhibits characteristics of a concentrated structure, particularly during peak harvest periods. In many developing countries, coffee markets display weak oligopolistic tendencies, where a limited number of traders control a substantial share of the market [8]. In Ethiopia, such concentration restricts producers' bargaining power and limits their ability to influence prices [9].

Market conduct encompasses the behavior and strategic decisions of market participants, including pricing mechanisms, product differentiation, and the selection of marketing channels. In Ethiopia, particularly in coffee-producing areas such as Gimbo District, farmers frequently face limited access to formal markets and rely on informal channels, which are often associated with lower and more volatile prices [10]. Producers must choose among alternative outlets, including cooperatives, private traders, and local collectors, each of which has different implications for profitability [11]. Moreover, trader behavior significantly influences price dynamics, especially during harvest seasons when increased supply exerts downward pressure on prices [6].

Market performance reflects the outcomes of market interactions, including price efficiency, profitability, and the distribution of value along the supply chain. Ethiopia's coffee market is often characterized by inefficiencies, with producers receiving a relatively small share of the final consumer price. Factors such as market efficiency, the level of concentration among traders, and the size and distribution of marketing margins play a crucial role in determining overall market performance. Evidence from Gimbo District indicates that poor market organization, high concentration of intermediaries, and unequal marketing margins reduce farmers' profitability and hinder their ability to obtain fair returns [12]. These challenges create structural constraints that limit improvements in rural livelihoods [9].

However, despite the recognized importance of market structure, conduct, and performance, several critical issues remain insufficiently understood in the context of Gimbo District. Specifically, there is limited empirical evidence on the degree of market concentration among coffee traders, the extent of market efficiency across different marketing channels, and the distribution of marketing margins among value chain actors. Existing studies in Ethiopia have largely emphasized production constraints and export performance, with inadequate focus on localized market dynamics and value distribution. As a result, it remains unclear how market concentration affects price formation, how efficiently markets transmit price signals to producers, and how marketing margins are shared among actors in the coffee value chain. This constitutes a significant research gap. Addressing this gap is essential because without

a clear understanding of these market dynamics, policy interventions may fail to enhance competitiveness, improve efficiency, or ensure equitable benefit distribution. Therefore, this study is needed to generate context-specific empirical evidence on market concentration, efficiency, and marketing margins, thereby informing policies and strategies aimed at improving market performance, strengthening farmers' bargaining power, and promoting inclusive growth in the coffee sector.

Gimbo District, located in the Kaffa Zone of Southwest Ethiopia, is a major coffee-producing area, contributing approximately 28.6% of the zone's total coffee output [13]. Despite its production potential, coffee farmers in the district face several challenges, including seasonal market surpluses, declining prices during harvest periods, and limited access to formal marketing channels. These issues highlight the need for a comprehensive analysis of the coffee market chain.

Therefore, this study aims to analyze the coffee market chain in Gimbo District using the SCP framework. Specifically, it examines market structure, the conduct of coffee producers in selecting marketing outlets, and overall market performance. By identifying key constraints and opportunities, the study seeks to provide policy-relevant insights to improve market efficiency, strengthen producers' bargaining power, and enhance the profitability of coffee farmers in the study area.

RESEARCH METHODOLOGY

Description of the Study Area

Gimbo District is situated in the Southwest of Ethiopia, within the Kaffa Zone, located between 07°00'-07°25' N latitude and 35°55'-36°37'E longitude. The district is approximately 18 km from Bonga town and 442 km from Addis Ababa, accessible via the Jimma-Bonga road. Geographically, the district spans from 07°24' N to 07°70' N latitude and from 35°69' E to 36°78' E longitude.

Gimbo District shares its borders with Shebe District (Oromia Region) to the southwest, Decha District to the north, Adiyo District to the northwest, and Gewata District to the southeast. According to the Gimbo District Agricultural and Natural Resource Development Office (GADO), the district's agroecology consists of 10.3% highland, 74.4% midland, and 15.3% lowland. The temperature in the district ranges from a minimum of 15°C to a maximum of 35°C, with an elevation between 1,750 and 2,750 meters above sea level.

The total population of Gimbo District is 117,588, which includes 58,559 men and 50,059 women. The population distribution consists of 25% youth, 60% economically active adults, and 15% elderly individuals, with an average household size of 4 persons. Most of the population lives in rural areas, with only 13,438 people residing in urban centers. The district comprises 12,311 households, of which 10,942 are male-headed and 1,369 are female-headed, with 10,311 households engaged in agriculture.

Gimbo District consists of 33 rural and 3 urban kebeles, covering a total area of 88,129 hectares. The land distribution includes 1,064 hectares of arable land, 28,240 hectares of forest cover, 30,531 hectares of permanent crops, 855 hectares of annual crops, 10,177 hectares of grazing land, and 7,257 hectares of wetland, along with an additional 1,259 hectares of private forest plantations.

The district experiences its primary rainy season from April to October. The local economy is primarily based on traditional cash crop farming, with coffee, sesame, haricot beans, and maize being the major crops cultivated in the area [14]. Figure 1 shows the location of the study area.

Data Types, Sources, and Collection Methods

Both primary and secondary data sources were employed in this study. Primary data were gathered from smallholder coffee producers, traders, and consumers who were randomly selected from four rural kebeles in the study area. The data collection focused on factors influencing coffee market supply and market outlet choice, including output size, distance to the nearest market, cooperative membership, access to credit, transportation, land allocated for coffee, extension services, and household demographic characteristics.

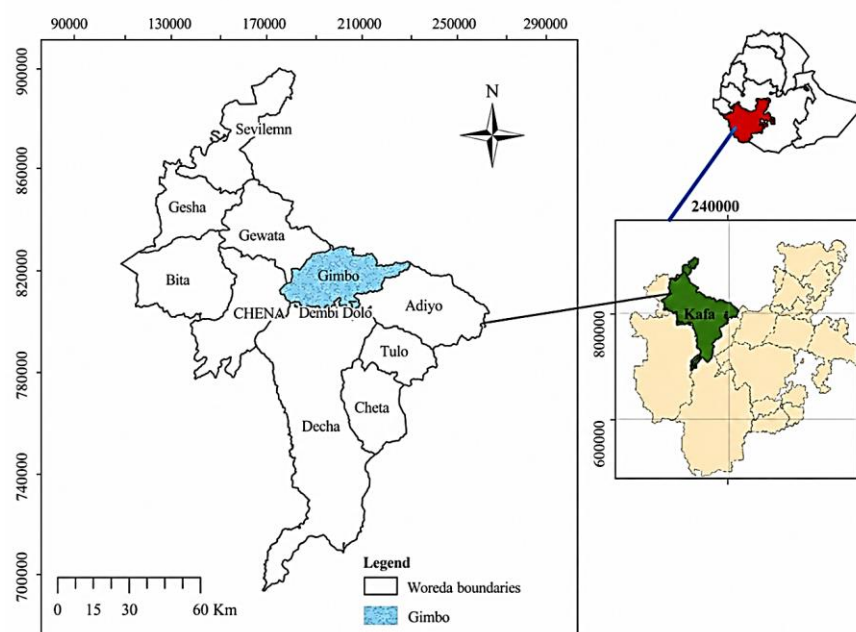


Figure 1. Location of the study area.

Data from traders were collected regarding buying and selling strategies, capital requirements and sources, market information, and demographic details. Consumer data were obtained through structured questionnaires designed to evaluate their role in the coffee market.

The questionnaires were semi-structured, permitting both quantitative and qualitative responses. Before the data collection, a pre-test was conducted with five farmers to assess the clarity and relevance of the questionnaire, as well as the estimated time required for interviews. Adjustments were made based on the pre-test to enhance reliability and validity.

Secondary data were sourced from various entities, including official documents from the Gimbo District Agricultural and Natural Resource Office, the Office of Trade and Industry, the District Cooperative and Marketing Office, the District Environmental Protection Office, and the Ethiopian Commodity Exchange (ECX) Bonga Branch. Reports were also obtained from the Kaffa Zone Agriculture, Natural Resource, and Cooperative Office, as well as online sources providing coffee price trends, production statistics, the number of licensed coffee traders, and other relevant socioeconomic indicators.

Sampling Procedure and Sample Size

The study aimed to include all participants in the coffee market chain, such as producers, local collectors, wholesalers, retailers, and cooperatives. Sample household heads were selected using a multistage sampling technique, as presented in Table 1.

Stage One: Four kebeles were randomly chosen from the coffee-producing kebeles in the Gimbo District.

Stage Two: Households were randomly selected from a complete list of households within these kebeles.

The sample size was determined using [15] formula at a 93% confidence level with a 7% precision level ($e = 0.07$):

$$n = \frac{N}{1+N(e)^2}, n = \frac{10311}{1+10311(0.07)^2} = 200 \quad (1)$$

Where:

n = Sample size

N = Population size (sampling frame)

e = Level of precision (7%)

A total of 200 coffee producers were selected using probability proportional to sample size (PPS) sampling.

In addition to coffee producers, 22 coffee traders and 22 consumers were sampled. Purposive sampling was utilized to select traders from specific markets, while consumers were also intentionally chosen for interviews [8].

Methods of Data Analysis

Descriptive statistics and econometric analysis were both employed to analyze the data gathered from farmers and traders.

Descriptive statistical analysis included ratios, percentages, means, and standard deviations to examine farm household characteristics, resource ownership, and the roles of intermediaries.

Econometric analysis was conducted to test hypotheses related to the study's objectives using multiple linear regression to identify the factors influencing the market supply of coffee. Since coffee is a cash crop, all farmers in the study area primarily produced it for sale, leading to the participation of all sampled coffee farmers in the market. The dependent variable in this study was the quantity of coffee supplied to the market, which is a continuous variable. Consequently, a multiple linear regression model was applied to the survey data to identify the key determinants affecting coffee supply.

Due to potential endogeneity issues, the two-stage least squares (2SLS) method was employed to ensure the exogeneity assumptions of the Classical Linear Regression Model (CLRM). This was necessary as the quantity of coffee produced was used as an explanatory variable, which might have been endogenous. Following [16], the econometric model specification for multiple linear regression is given as:

Table 1. Sample distribution of coffee producers in selected kebeles.

No.	Kebele name	Total coffee producers	Sample size
1	Beyemo	512	38
2	Kuti	637	47
3	Michit	825	61
4	Tula	723	54
Total		2,697	200

Source: Gimbo District Agriculture Office (2023).

The econometric model specification of the supply function in matrix notation is as follows:

Structural equation:

$$Y = \beta_0 + X_k' \beta_1 + \delta Y_1 + U$$

Where Y is a vector of the quantity of coffee supplied to the market, X is the exogenous variable from which it is assumed to affect coffee marketed supply, Y_1 is a vector of exogenous variables which are productivity of coffee, β_0, β_1, δ are a vector of parameters to be estimated, and U is a vector of disturbance terms. As the name suggests 2SLS involves using OLS regression in two stages:

In the first stage, a reduced form of the structural equations is estimated where the endogenous variable productivity of coffee is regressed on all the exogenous variables in the system separately. Reduced form:

$$Y_{1i} = \pi_0 + \pi_1 X_i + \pi_2 Z_i + v$$

Table 1. Summarized variable specification and hypothesized in the form of a table.

Variables	Description	Types	Relation
Dependent variables			
<i>ACSM</i>	<i>Amount of coffee supplied to the market</i>	<i>Market supply</i>	<i>Continuous</i>
Independent Variables Affecting Market Supply			
QUANPROD	Quantity produced (quintal)	Continuous	Positive
MarktInfo	Access to Market Information	Dummy	Positive
CreditAcc	Credit use	Dummy	Positive
PriceCoffe	Current price of coffee	Continuous	Positive
Landcoffe	Land allocated to coffee	Continuous	Positive
HHSIZ	Household size of respondents	Continuous	Positive/Negative
Edulevl	Education level of household head	Continuous	Positive
SEXHH	Sex of the household head	Dummy	Positive
NONOFFAF	Non-farm/off-farm Income	Continuous	Positive
EXTAGECON	Frequency of Extension contact	Continuous	Positive
DNMkt	Distance to the nearest market	Continuous	Negative
Farmexpr	Farming Experience	Continuous	Positive
Independent Variables Expected to Affect Coffee Market Channel Choices			
QCOFFSOLD	Quantity of coffee sold	Continuous	Positive/Negative
EXTAGECON	Frequency of Extension contact	Continuous	Positive
DNMkt	Distance from the nearest market	Continuous	Negative
TRANS	Transportation access	Dummy	Positive
MarktInfo	Access to market information	Dummy	Positive
CreditAcc	Access to credit	Dummy	Positive
MEMBCOOP	Cooperative membership	Dummy	Positive
NONOFFAF	Non-farm/off-farm Income	Continuous	Positive
AGERES	Age of the respondents	Continuous	Positive
SEXHH	Sex of the household head	Dummy	Positive
Edulevl	Education level of household head	Continuous	Positive
HHSIZ	Household size of respondents	Continuous	Positive/Negative

Where, Y_{1i} is the endogenous variable (productivity of coffee, X_i is the vector of exogenous variables

(MarktInfo, CreditAcc, famrsz, PriceCoffe, HHSIZ, Edulevl, SEXHH, NONOFFAF, EXTAGECON, and DNMkt), Z_i is a vector of excluded instruments (land used for coffee production and farmer experiences); π is the coefficients to be estimated; and v is the errors terms, symmetrically distributed around zero. To obtain consistent estimators in this case, we need some additional information. These instruments (in this case Z) must satisfy two conditions; uncorrelated with U , also called orthogonal to the error process (homogeneity condition i.e. $\text{Cov}(Z, U) = 0$) and correlated with Y_1 the endogenous variable (relevance condition i.e. $\text{Cov}(Y_1, Z) \neq 0$).

This means Z is a variable directly affecting the endogenous variable and may not directly be related to the dependent variable Y . By subtracting the residual of the regression of equation (2) from the actual value of the productivity variable (QUANPROD), a fitted value $\hat{Y}$ of the productivity variable is obtained that is uncorrelated with the error term. In the second stage, by substituting the yield variable in structural equations (1) with the fitted value of yield, the right-hand side of the equations no longer contains any endogenous variables. It is vital to make different tests before 2SLS estimations.

Descriptive statistics were utilized to examine and describe key marketing functions, farm household characteristics, resource ownership, and the roles of intermediaries in the market. This method involved the use of ratios, percentages, means, variances, and standard deviations to analyze various aspects of the data.

Structure, Conduct, and Performance Model (S-C-P)

The Structure, Conduct, and Performance Model (S-C-P) was utilized to evaluate market efficiency and performance. This model examines the causal relationships among market structure, conduct, and performance [17]. Key elements of the analysis included:

- *Market structure*: The study considered structural characteristics such as market concentration, product differentiation, barriers to entry, and diversification.
- *Market concentration*: Market concentration describes the structure of a market in terms of the number and distribution of buyers and sellers. A higher concentration may suggest the potential for non-competitive behavior, such as collusion [18]. The two most commonly used concentration indices in market analysis are the Concentration Ratio (CR4) and the Herfindahl-Hirschman Index (HHI). The CR4 measures the total market share of the largest four firms in a market, calculated as follows:

$$C = \sum_{i=1}^r S_i \quad i = 1, 2, 3, 4, r \quad (2)$$

C = is the concentration ratio, S_i is market share of the i^{th} firm and
 r = is the number of largest firms for which the ratio is going to be calculated

$$C = \sum_{i=1}^r S_i \quad (3)$$

Where

C = is the concentration ratio,
 S_i = is the market share of the i^{th} firm, and
 r = is the number of largest firms considered.

The HHI, which considers the market shares of all firms, was also used in this study as a measure of market concentration. It is calculated as:

$$HHI = \sum S_i^2 \quad (4)$$

The HHI is also directly related to the Lerner Index. Therefore, the Herfindahl-Hirschman Index was employed in this study as a measure of market concentration.

Barriers to Entry: Barriers to entry refer to the advantages that existing firms hold over new entrants,

which can influence competition and market performance.

Market Conduct: Market conduct pertains to the strategies employed by firms concerning pricing, product differentiation, and promotional activities [18]. This study evaluated conduct in terms of producer and trader strategies, including market information, storage practices, and product processing.

Market Performance: Market performance is assessed based on efficiency, with key components being the effectiveness of marketing services and their impact on production and consumption costs [19]. Two approaches for measuring marketing performance include marketing margin and analysis of market channel efficiency.

Marketing Margin: This measure calculates the price difference between producers and consumers, often expressed as a percentage of the consumer price. The Total Gross Marketing Margin (TGMM) is calculated as follows:

$$TGMM = \frac{\text{end buyer price} - \text{first sell price}}{\text{first sell price}} \quad (5)$$

Where TGMM is the total gross marketing margin.

It is also important to introduce the concept of the producer's Gross Marketing Margin (GMMp), which is the portion of the price paid by the consumer that goes to the producer. For producers, the Gross Marketing Margin (GMMp) is given by:

$$GMM_p = \frac{\text{end buyer price} - \text{marketing gross margin}}{\text{end buyer price}} \times 100 \quad (6)$$

The Net Marketing Margin (NMM) represents the percentage of the final price earned by intermediaries after deducting marketing costs:

$$NMM = \frac{\text{gross margin} - \text{marketing margin}}{\text{end buyers price}} \times 100 \quad (7)$$

This analysis aids in assessing the distribution of welfare among producers, intermediaries, and consumers in the coffee market.

Empirical Review

The Major Coffee Market Chain Actors and Their Role

They identified the key participants in the coffee market chain. Producers are responsible for growing and supplying coffee to the market. Once the coffee matures, producers harvest the red coffee cherries and transport them to cooperatives or local collectors. This aligns with the findings of [21], which emphasizes the role of producers in the coffee market chain. Local coffee collectors buy coffee directly from producers, often with the pulp still attached, and sell it to wholesalers for further processing and marketing. This is supported by earlier studies [22].

Furthermore, cooperatives buy coffee cherries from producers, process them, and mainly supply coffee-to-coffee unions, occasionally selling to the Ethiopian Commodity Exchange (ECX) in Jimma. Local wholesalers in the coffee supply chain acquire coffee from local collectors and sell it to wholesalers in Jimma or Addis Ababa.

The Market Structure, Conduct, and Performance of the Coffee Market

A study examined the concentration ratio of four major coffee collectors in Sheko and South Bench Woredas, which were found to be 68.8% and 60.33%, respectively. These results indicate that a small number of collectors manage most of the total coffee volume, suggesting a strong oligopolistic market at the collector level, while the producer-level market remains unconcentrated, with no individual producer significantly influencing others. Similarly, the survey investigated the coffee market chain in the Gewata District, Kaffa Zone, Southwest Ethiopia, and found the concentration ratio (CR4) of coffee

market traders to be 40.86%, indicating a weak oligopoly structure. [8] analyzed the structure, conduct, and performance of the coffee market in the Jimma Zone and discovered that the four major suppliers in Limmu Kossa, Gomma, Manna, and Limmu-Seka controlled 60.6%, 52.4%, 51.2%, and 58.9% of the total volume of red cherry coffee purchased, respectively. For dry cherry coffee, the concentration ratios were 55.7%, 38.6%, 36%, and 45.4%, respectively. These findings suggest that the red cherry coffee market is highly oligopolistic, while the dry cherry coffee market exhibits a weak oligopoly, except in Limmu Kossa, which demonstrates a strong oligopolistic market structure.

Factors Affecting the Market Supply of Coffee

Identified key factors influencing the market supply of coffee in the Dale district of SNNPRS through multiple linear regression analysis. The results of the OLS regression model indicated that eight significant variables impacted market supply: the sex of the household head, education level, quantity of coffee produced, access to extension services, coffee price in 2022/23, distance to the nearest market, household non-farm income, and access to market information. Among these, distance to the nearest market and household non-farm income negatively affected coffee supply.

Similarly, a studied utilized multiple regression models to analyze the determinants of forest coffee supply in southwestern Ethiopia. The market structure analysis revealed that producers, assemblers, and wholesalers were the primary actors in the coffee market chain. The concentration index for local wholesalers (40% in Gera and 29.64% in Shebe) indicated the potential for oligopolistic behavior, particularly in Gera. The market conduct analysis showed that price-setting mechanisms were largely influenced by buyers and prevailing market forces in both producer and exporter markets. Factors such as output, access to market information, family size, and distance to the market positively influenced coffee supply, while family size and market distance had a negative impact.

The investigation also employed multiple linear regression to analyze the marketed surplus of coffee by smallholder farmers in the Jimma zone, Ethiopia. Their OLS regression results indicated that factors such as the sex of the household head, coffee farming experience, access to credit, adequacy of extension services, attractiveness of coffee prices, cooperative membership, and non-farm income significantly and positively influenced the marketed supply of coffee.

COFFEE MARKET CHAIN ACTORS AND THEIR ROLES

The main participants in the conventional coffee market chain consist of smallholder farmers, rural coffee collectors, private traders, coffee cooperatives, cooperative unions, the Ethiopian Commodity Exchange (ECX), exporters, and consumers.

Smallholder farmers: At the start of the coffee marketing chain, smallholder farmers grow coffee trees and sell coffee cherries either at the farm gate or in nearby markets. They control the quantity and quality of the coffee produced.

Rural coffee collectors: These independent operators gather and transport coffee from smallholder farmers using pack animals, animal carts, or by carrying it manually. They help move coffee from remote areas to the market, often aiming for a profit margin between producer and trader shares [21]. Some collectors do not have enough capital and rely on advances from private traders.

Private traders: Licensed operators who meet certain criteria, including a working capital of 100,000 birr, a cemented drying field, and storage facilities. They buy and process coffee before sending it to the ECX warehouse in Bonga for quality inspection and grading.

Coffee Cooperatives: Organizations formed by farmers that purchase coffee from both members and non-members to supply it to the Kaffa Forest Coffee Farmers Union. They manage processing, collection, transportation, and sales. Their presence can impact the pricing strategies of private traders.

Union: The Kaffa Forest Coffee Farmers Union, created by primary cooperatives, buys coffee at

prices matching the ECX market rate and provides transportation, credit, input supplies, and export services.

ECX: The ECX maintains market integrity by introducing viable products with certified grades, standardized trading rules, and enforcement mechanisms.

Exporters: The last link in the domestic trade chain, exporters primarily operate in Addis Ababa, buying coffee through the ECX auction before processing it to meet export standards.

Consumers: Households that purchase coffee for direct consumption, either from farmers or retailers.

Coffee Market Channels

The analysis of marketing channels aimed to identify the alternative routes that coffee follows from its origin to its final destination. Based on the direction of flow and volume of coffee transactions, six marketing channels were identified in the study area. Figure 2 illustrates that the channel originates from producers and concludes with consumers, passing through various marketing actors along the way.

STRUCTURE OF THE COFFEE MARKET

The structure of the coffee market in the study area was analyzed using the degree of market concentration ratio and barriers to entry like licensing procedure, capital requirement, and coffee marketing experience.

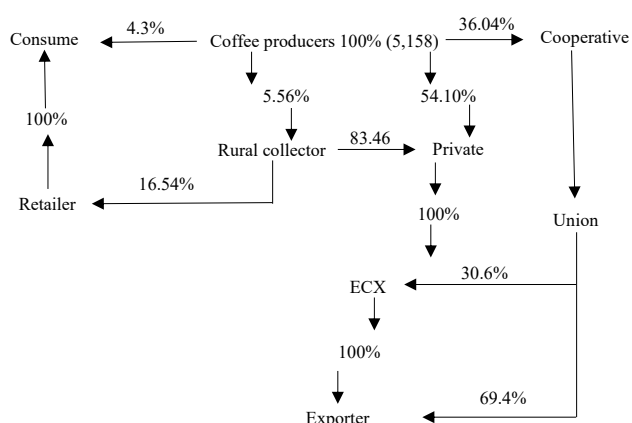
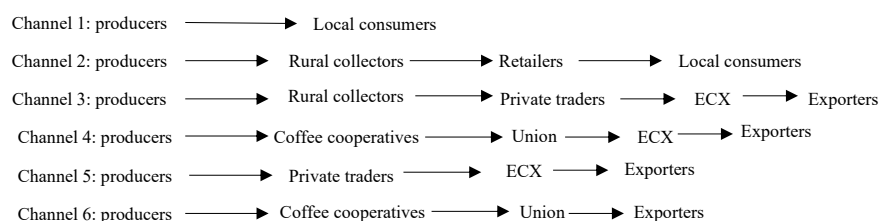


Figure 2. Market channels of coffee.

Source: Own survey Sketch

Table 3. The concentration ratio of sampled traders (CR4).

District total

No. of traders (A)	Cumulative traders (B)	Quantity purchased (C)	Total purchased in quintals (D= A*C)	% share of purchased $Si=D/52848$	%Cumulative purchase
1	1	5800	5800	9.36	9.36
2	3	5672	11344	18.31	27.67
1	4	5160	5160	8.33	36.00
1	5	4564	4564	7.36	43.36
2	7	4200	8400	13.55	56.91
1	8	3560	3560	5.74	62.65
3	11	2080	6240	10.07	72.72
4	15	1500	6000	9.68	82.4
4	19	1150	4600	7.42	89.82
3	22	720	2160	3.48	93.3
4	26	550	2200	3.55	96.85
4	30	480	1920	3.09	100
Total			61948	100.00	

Source: survey result, 2023/22

Degree of Market Concentration

The analysis of the degree of market concentration ratio was carried out for all sampled coffee traders of the study area. It measured the percentage of coffee handled by the largest four traders. On the other hand, the concentration ratio was estimated by taking an annual volume of coffee purchased during 2022/23 by sample traders in the study area. Here concentration ratio for four traders was meant for all coffee traders across the study area with the largest volume handled.

Four firms' concentration ratio is the most typical concentration ratio for judging the market structure [18]. According to this, a CR4 of over 50% is generally considered a strong oligopoly; a CR4 between 33% and 50% is generally considered a weak oligopoly, and a CR4 of less than 33% is considered a competitive market. As indicated in Table 3, the result of CR4 shows that the top four coffee traders handled 36% of the coffee purchased by all sampled traders in the study area. This implies that the coffee market structure in Gimbo District was a weak oligopoly.

Barriers To Entry into the Coffee Market

Licensing

According to the survey result, all traders having coffee-trade licenses and residing in the town reported that it is very difficult to get a coffee-trade license, because of the large requirement for initial capital which is a minimum of 100,000 birr and above. Besides the requirement of large initial capital, the necessities of appropriate equipment such as a weighing scale, store, sisal sack, drying fields, storehouse at each coffee collection center, and the like were additional binding factors for coffee traders.

The Existence of Unlicensed Traders

The existing unlicensed trader in the district is one of the major constraints to entering and expanding trading activities. Weak mechanisms of controlling unlicensed traders and the quality of *Jenfel* (sun-dried coffee) have led to the supply of coffee beans that are adulterated with broken coffee beans. This resulted in losses to some wholesalers as a result of the reduction in the amount of coffee exported as it was indicated by the majority of traders. The respective district office of agriculture does have a coffee marketing and quality inspection center. However, the center is not performing at full capacity in that the licensed traders were not well protected. This is related to the problems in executing rules and

regulations. Besides to concentrated market, unfair competition with unlicensed traders, large capital requirements, and licensing procedures are identified to be the major entry barrier to coffee marketing. So, the coffee market structure in Gimbo district has deviated from the norms of competitive market structure.

CONDUCT OF COFFEE MARKET

In this subsection, the conduct of coffee traders is analyzed in terms of the producers' and traders' price setting, purchasing, and selling strategies.

Buying and selling strategies: In Table 4, The strategies of traders in maximizing profit and developing bargaining power include the use of regular partners, long-term relation with clients or suppliers, the use of collectors, availability of market information and its impact on price, the feasibility of alternative market channel and price setting practices, etc. Based on the data from the sample trader's survey, about 54.5% and 31.8% of respondents reported that buying price was set by the market and discussion with other traders respectively. The rest 13.6% of sample traders reported that the market price was set by negotiation with farmers and by traders themselves.

Almost all private traders had their marketing sites in the local coffee collection center and have their commission agents at Bonga ECX and Addis Ababa who facilitate the exchange process, money transfer, and market information through telephone. These agents are paid according to the volume of coffee sold.

Performance of the Coffee Market

The performance of the coffee market was evaluated by considering different marketing costs, production costs, and marketing margins. Hence, on the consideration of the 2022/2023 production season, costs and purchase prices of the channel actors, margin at producers, private traders, rural collectors, and the cooperative level were analyzed.

To know the performance of coffee in the study area, the profitability of producers was undertaken based on the average coffee produced listing out all the associated costs for coffee production and marketing in the study area during the survey year. Coffee is a perennial crop, its lifetime extends over many years, and computing the actual amount money of spent on the establishment of a coffee farm was difficult due to poor record keeping and shortage of data availability on cost structure starting from seed preparation at the smallholder farm level. Therefore, operation and maintenance costs incurred during the bearing stage in the survey year were taken as production costs. Expenditure on labor, cultivation practices in terms of human labor, compost preparation, plant protection, weeding, land tax, and drying bed preparation were taken as a production cost, from the cost of operation and maintenance of the coffee farm (Table 5).

Table 4. Buying and selling strategies of traders.

Variable	Frequency	Percent
Price setter		
By Market	12	54.5
With Others	7	31.18
Negotiation	3	13.6
Total	22	100

Source: survey result, 2023/22.

Table 5. Cost of production incurred in the year 2022/23 coffee production season.

Production cost	Cost birr/quintal
Cost of cultivation	64.5

Harvesting cost	76.5
Weeding	12.96
Cost of compost preparation	35.7
Land tax	8.19
Cost of drying bed preparation	9.54
Total production cost	207.39

Source: survey result, 2022/23

Table 6. Marketing cost for different channels (Birr/quintal).

	Actors			
	Producers	Rural collector	Cooperative	Private traders
Marketing costs				
Labor/unloading	46.65	9.38	8.3	9.84
Material cost	14.01	8.5	6.9	7.2
Transport cost	40.29	6.52	35.12	35.12
Wastage loss	3.90	2.24	3.28	3.6
Municipality tax	8.58	-	-	0.58
Telephone cost	-	0.62	-	1.2
Personal expense	-	0.44	-	1.44
Hulling cost	-	-	11.28	11.28
Miscellaneous exp	-	-	0.72	0.58
Brokering fee	-	-	-	3.8
Total marketing cost	113.43	27.7	65.6	74.64

Source: survey result, 2022/23

Analysis of the level of marketing margins and their cost components could help to evaluate the impact of the structure and conduct characteristics on market performance. Marketing margin is defined as the percentage of the final weighted average selling price taken by each of the market chain actors. The margin must cover the cost involved in transporting the produce from one place to the other and provide a reasonable return to those doing the marketing.

Table 7: depicted differences between the total income from coffee trading and the costs incurred in the process of coffee trading which gives the gross profit of each actor namely producers, rural collectors, cooperatives, and private traders. The results showed that coffee producers' gross profit was highest when they directly sell to cooperatives in channels III and IV which is 362.01 birr/quintal and to private traders in channel IV which is 426.04 birr/quintal while taking the lowest gross profit when they directly sell to rural collectors, which is 330.23 birr/quintal. This implies that producers are more profitable if they sell to private traders and consumers. From traders, cooperatives shared the highest profit of 36.6 birr/quintal when they made direct purchases from producers in channel III. Rural coffee collectors made a profit of 17.8 birr/quintal on channel II. This implies that private traders received the highest remuneration from the coffee market in the study area while rural collectors took the smallest profits shares (Table 7). As indicated in Table 7, the total gross marketing margin (TGMM) was highest in channel II which was 17.6%, and lowest in channel III which was 10.69%. Producers' share (GMMp) was highest in channel I from the total consumer price and lowest in channel II which was 82.4%. This difference might support the theory that as the number of marketing agents increases the producers' share decreases. The district agricultural office and ECX reported that currently, they developed a law to encourage direct transactions between coffee growers and private traders to improve farmers' benefits and coffee quality.

Table 7. Coffee marketing margins for different channels (Birr/quintal).

Actors	I.	II.	III.	IV.
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Producers	Production cost	207.39	207.39	207.39	207.39
	Marketing cost	113.43	117.36	98.4	42.87
	Selling price	672.76	655.05	667.8	690.3
	Gross profit	351.94	330.23	362.01	426.04
	GMMP (%)	100	82.4	89.31	86.84
Rural collector	Purchase price		655.05		
	Marketing cost		27.7		
	Selling price		700.55		
	Gross profit		17.8		
	GMMRc (%)		5.72		
Cooperatives	Purchase price			667.8	
	Marketing cost			65.6	
	Selling price			770	
	Gross profit			36.6	
	GMM Coop (%)			10.69	
Private traders	Purchase price		700.55		690.3
	Marketing cost		74.64		74.64
	Selling price		795		795
	Gross profit		19.81		30.06
	GMMPt (%)		11.88		13.16
	TGMM (%)	0	17.6	10.69	13.16

Source, Survey result, 2022/23

ECONOMETRIC RESULTS

This section presents the econometric model outputs of the study. Thus, the determinants of the volume of Coffee marketed and Coffee producer's market outlet's choice decisions are discussed.

Determinants of Quantity of Coffee Supplied to Market

Since coffee is a cash crop all farmers decided to produce it for selling purposes to earn cash. Therefore, all the sampled coffee farmers of the study area supply coffee to the market, and the dependent variable which is the amount of coffee supplied to the market is a continuous variable. Even if the multiple linear regression models were the fitted model for the data, it doesn't address the endogeneity problem of the data. Therefore, the two stages least square (2SLS) was applied to full fill the exogeneity assumption of the Classical Linear Model (CLRM) since the quantity produced was taken as an explanatory variable. Test of multicollinearity: All VIF values are less than 10. This indicates the absence of a serious multicollinearity problem among independent variables (Appendix Table 1).

Test of endogeneity: Testing for the endogeneity of the quantity of *coffee* produced was carried out in using both the Hausman test and Durbin-Wu-Hausman (DWH) test which shows Durbin (score) $\chi^2(1)$ ($p=0.0064$), and Wu-Hausman ($F(1,188)$ ($p=0.0077$)). Both the Hausman test and Durbin-Wu-Hausman test results indicate that the null hypothesis of exogeneity of the quantity of *coffee* produced was rejected at a 1% significant level. This confirms that when a quantity of *coffee* produced is included as an additional explanatory variable cause an endogenous problem due to its correlation with the error term which results in violation of OLS assumptions and makes the OLS estimators of relevant model parameters biased and inconsistent. As a result, two stages least squares (2SLS) method was used to control the endogeneity problem and obtain consistent and unbiased parameter estimates (Appendix Table 3).

Test of heteroscedasticity: The heteroskedasticity test was performed using Breusch Pagan/Cook-Weisberg $\chi^2(1) = 223.04$; $\text{prob} > \chi^2 = 0.0000$; it suggests the null that the errors have constant variance is rejected at 1% significant level. It indicates there is a problem of heteroskedasticity in the

data set, the parameter estimate of the coefficient of independent variables cannot be BLUE. Therefore, to address such a problem, a Robust 2SLS analysis with a heteroskedasticity consistent covariance matrix was estimated (Appendix Table 3).

These two stages' least square (2SLS) method we used has two completely separate stages during the analysis. The first stage is made by regressing the suspecting endogenous variable (quantity of coffee produced) over pre-determined or pure exogenous variables to obtain their predicted values (Appendix Table 3). Then the predicted endogenous variable (quantity of coffee produced) in the first stage is used to estimate the supply function (Table 8). In this two-stage method, instrumental variables such as Land under coffee and years of farming experiences were used for the production of coffee which was uncorrelated with the error term and correlated with the endogenous variable (quantity of coffee produced). These instrumental variables were employed by checking their correlation with endogenous and exogenous variables. The excluded variables were made the test with F statistics in the first stage regression to check whether instrumental variables are weak or strong using the first stage STATA command. The F test result for *coffee* quantity produced was 49.26 which is statistics greatly exceed the critical value that we should reject the null hypothesis of the presence of weak instrumental.

Over identifying restrictions test was also tested using the Hansen-Sargan test and the Baumann test using the estate over command. The results of the Basmann test show a P value of 0.1147, which indicated is correctly specified and the instruments are valid (Appendix Tables 3). The result show that was statistically significant at a 1% level indicating the goodness of fit of to explain the relationships of the hypothesized variables. The coefficient of multiple determinations (R-squared) was used to check the goodness of fit for the regression model. The fitness of (R2) was 0.8862 which passed the test and indicated about 88.62% of the variation for coffee supplied to the market by sampled respondents was explained by the variables included in this model. In the first stage of the 2SLS method, regressions were run and analyzed using eleven explanatory variables including instrumental variables and the result showed that the price of coffee sold, education level of household head, land under coffee, and years of farming experience affect the quantity of coffee produced significantly (Appendix Table 2). In the second stage of 2SLS regression, from the hypothesized explanatory variables four variables such as the quantity of coffee produced, access to market information, access to credit, education level of the sampled household, and distance to the nearest market used significantly affect the market supply of coffee.

Table 2. Estimate of determinants of coffee market supply.

Variable	Coefficients	Robust standard err	Z-value
QUANPROD	0.635***	0.112	5.64
MarktInfo	3.241*	1.783	1.82
CreditAcc	3.590**	1.280	2.80
PriceCoffe	0.075	0.071	1.05
HHSIZ	-0.362	0.473	-0.77
Edulev1	1.123*	0.648	1.73
SEXHH	2.730*	1.464	1.86
NONOFFAF	3.80e-06	0.0000646	0.06
EXTAGECON	-1.620	1.002	-1.62
DNMkt	-0.651***	0.164	-3.96
Constant	-7.525	6.621	-1.14
Numbers of observation			200
Prob > chi2			0.0000
R-squared			0.8862

Note: Dependent variable is the amount of coffee supplied in quintals. Land under coffee and years of farming experiences variables used as Instrumental variables. ***, ** and * are statistically significant at 1%, 5% and 10% respectively.

Source: Survey result, 2022/23.

CONCLUSION AND RECOMMENDATIONS

This study, titled Structure, Conduct, and Performance Analysis of the Coffee Market in Gimbo District, Kaffa Zone, Southwest Ethiopia, was motivated by a critical gap in the empirical understanding

of how coffee markets function at the local level. Despite the central role of coffee in rural livelihoods and the national economy, previous studies have largely remained fragmented, focusing either on production constraints or descriptive value chain analysis, while failing to provide an integrated assessment of market structure, producer conduct, and market performance. This limitation has constrained the development of effective, evidence-based policies aimed at improving market efficiency and farmer welfare.

In response to this gap, the study applied the Structure–Conduct–Performance (SCP) framework to generate a comprehensive and systematic analysis of the coffee market chain in Gimbo District. Primary data were collected from 200 coffee producers, 22 traders, and 22 consumers, complemented by secondary data from relevant institutions. The analysis employed descriptive statistics, concentration ratios, marketing margin analysis, and advanced econometric models, including Two-Stage Least Squares (2SLS) and Multivariate Probit (MVP), ensuring both methodological rigor and empirical robustness.

The findings revealed that the coffee market in Gimbo District is characterized by the participation of multiple actors, including smallholder farmers, rural collectors, private traders, cooperatives, unions, and exporters. The market structure is identified as weakly oligopolistic, with a concentration ratio (CR4) of 36%, indicating moderate concentration and the potential for market power among a few dominant traders. Entry barriers such as high capital requirements, the presence of unregistered traders, and limited access to reliable market information contribute to observable market distortions.

From a performance perspective, marketing margin analysis indicated that producers bear the highest production costs, while relatively better returns are obtained through cooperative and private trader channels. Channel II was found to generate the highest total gross marketing margin (TGMM) of 17.6%, highlighting variations in efficiency across marketing channels.

The econometric results further reinforce the structural findings. The 2SLS model indicated that coffee supply is significantly influenced by production volume, education level, access to market information, and credit availability. Specifically, a one-quintal increase in production increases market supply by 0.635 quintals, while each additional kilometer of distance to the nearest market reduces supply by 0.651 quintals. Education enhances market participation, with more educated farmers supplying an additional 1.12 quintals. Similarly, access to credit and market information positively affects supply decisions by improving investment capacity and price awareness.

The MVP model demonstrated that farmers' market outlet choices are not random but are systematically influenced by supply levels, market access, and information availability. When interpreted within the SCP framework, these findings confirm that market structure directly shapes producer conduct, which in turn determines market performance. Compared to other coffee-producing regions such as Jimma, West Guji, and Yirgacheffe, the Gimbo District market exhibits relatively lower concentration but faces distinct institutional and infrastructural challenges.

These results strongly justify the necessity of this study. By integrating SCP analysis with advanced econometric techniques, the research fills a significant methodological and empirical gap, providing a deeper understanding of the interrelationships between market organization, farmer behavior, and economic outcomes. Without such an approach, it would remain difficult to identify whether inefficiencies arise from structural concentration, behavioral constraints, or institutional failures.

Based on these findings, several policy and development recommendations are proposed. First, enhancing farmers' education and training is essential to improve their capacity to respond to market signals and adopt improved production and marketing practices. Second, strengthening cooperatives is critical to improving market access, increasing bargaining power, and reducing the influence of intermediaries. Third, investment in rural infrastructure, particularly transportation networks, is necessary to reduce transaction costs and mitigate the negative effects of market distance. Fourth,

expanding access to affordable credit will enable farmers to invest in productivity-enhancing inputs and technologies. Finally, establishing efficient and accessible market information systems will improve price transparency and support informed decision-making among farmers.

In conclusion, this study provides strong empirical evidence that improving market efficiency in Gimbo District requires a comprehensive approach that simultaneously addresses structural, behavioral, and institutional constraints. By doing so, it contributes not only to academic literature but also offers practical, policy-relevant insights aimed at strengthening producers' bargaining power, enhancing market performance, and ultimately improving the livelihoods of smallholder coffee farmers.

In conclusion, several policy and development interventions are recommended to enhance coffee market efficiency and farmer participation. First, investing in education and training is essential to improve farmers' understanding of market dynamics and production practices. Strengthening cooperatives can enhance market access and bargaining power, encouraging non-members to participate. Improving rural infrastructure, particularly transportation networks, will mitigate the negative impacts of market distance and lower transaction costs. Enhancing access to credit through low-interest loans and financial services will empower farmers to invest in necessary inputs and technologies. Lastly, establishing robust market information systems will provide timely data on prices and demand, enabling farmers to make informed marketing decisions. A comprehensive approach that combines these strategies is crucial for increasing coffee supply, enhancing market participation, and fostering a more efficient and profitable coffee market in Gimbo District.

Disclosure

None of the authors have any conflicts of interest.

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APPENDIX

Appendix

Table 1. Test for Multicollinearity of the explanatory variable.

Variable	VIF	1/VIF
QUANPROD	3.75	0.266
Edulev1	2.29	0.436
Farmexpr	1.77	0.566
Landcoffe	1.74	0.574
MarktInfo	1.52	0.657
EXTAGECON	1.48	0.673
PriceCoffe	1.23	0.813
CreditAcc	1.16	0.861
HHSIZ	1.14	0.877
DNMkt	1.14	0.880
NONOFFAF	1.07	0.935
SEXHH	1.05	0.956
Mean VIF	1.61	

Appendix

Table 2. Factors affecting the quantity of coffee produced.

QUANPROD	Coef.	Robust Std. Err.	t-value
MarktInfo	2.867	3.127	0.92

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CreditAcc	3.707	2.389	1.55
PriceCoffe	0.377	0.165**	2.28
HHSIZ	1.162	0.716	1.62
Edulevl	4.544	0.460***	9.88
SEXHH	3.936	4.240	0.93
NONOFFAF	0.000	0.000	0.45
EXTAGECON	-0.134	1.697	-0.08
DNMkt	-0.067	0.467	-0.14
Landcoffe	0.956	0.168***	5.67
Farmexpr	2.652	0.385***	6.88
_cons	-50.525	12.451	-4.06

Note: The quantity of coffee produced is the dependent variable. ***, ** and * are statistically significant at 1%, 5% and 10% respectively. Farmer experience and land used for coffee applied are instrumental variables for the quantity of coffee produced.

Source: survey result of 2022/23.

Appendix

Table 3. Heteroskedasticity and endogeneity test result.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of QUANPROD
chi2(1) = 223.04
Prob > chi2 = 0.0000
Tests of endogeneity
Ho: variables are exogenous
Durbin (score) chi2(1) = 7.43668 (p = 0.0064)
Wu-Hausman F(1,188) = 7.26045 (p = 0.0077)

Source: survey result of 2022/23

Appendix

Table 4. First stage regression summary statistics.

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F(2,188)	Prob > F
QUANPROD	0.7331	0.7175	0.3439	49.26	0.0000

Minimum eigenvalue statistic = 49.26

Critical Values # of endogenous regressors: 1

Ho: Instruments are weak # of excluded instruments: 2

2SLS relative bias	5%	10%	20%	30%
	(not available)			
	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

Source: Survey result, 2022/23

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