Market Chain Analysis of Coffee in Sidama Zone, SNNPR, Ethiopia: The Case of Dale District

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Abstract

The study analyzed the market chain of coffee in Dale district, a major coffee producing district in southern Ethiopia. The main coffee marketing channels were investigated and the determinants of household coffee supply identified. Data were generated from 123 coffee producers and 36 coffee traders in the district using a formal survey. Nine coffee marketing channels were identified and channel I and channel II, representing 49.3% and 25.7% of the total produce, respectively, were the principal coffee marketing channels. The coffee marketing performance revealed that in channel I and channel II 36.9% and 34.13% of total gross marketing margin were added to coffee price, respectively. Out of the total gross marketing margin, 9.6% was captured by coffee assemblers, while 27.3% went to wholesalers in channel I, while out of the total gross marketing margin in channel II 34.13% goes to the wholesalers. The OLS model identified that sex of the household head, education level, coffee productivity, extension contact, price of coffee, and access to market information were the significant variables influencing coffee marketable supply positively. Whereas, the variables distance to the nearest market and non-farm income negatively affected the coffee marketable supply.

Key words: Marketable Supply, Marketing Channel, Marketing Margin, OLS model
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INTRODUCTION

Over one million farming households and about 25% of the total population of Ethiopia are dependent on the production and export of coffee. It also accounts for more than 25% of the GDP, about 40% of the total export earnings, absorbs around 25% of employment for both rural and urban dwellers and 10% of the total government revenue of the country (MoARD, 2008). Dale district is found in Sidama zone, Southern Nations, Nationalities and Peoples Regional State (SNNPR). In the district, most farmers (96%) grow coffee as the main source of income. In 2011 total of 59111.6 quintals of washed and 112499.56 quintals of unwashed coffee were produced and traded in Dale district (WoFED, 2013).

The Ethiopian current regulation requires all coffee to be inspected in central markets of Addis Ababa and Dire Dawa. Thus, coffee produced from different Zones of the country is required to be assembled and transported to the central markets in Addis Ababa and Dire Dawa. The Coffee Standard and Quality Inspection and Auction Centers (CSQIAC) of Ethiopia monitor the exportation of all coffee. In the supply chain, the National Coffee Board of Ethiopia (NCBE) is responsible for inspecting, organizing and coordinating the classification, grading and auction sale of the coffee supplied to central markets in Addis Ababa and Dire Dawa with its own operational rules, regulations, and modalities (ECX, 2009).

Coffee has been given greater attention by the country and it is the first cash crop with which the Ethiopia Commodity Exchange (ECX) started trading operations in April 2008. Agricultural markets in Ethiopia before 2008 had been characterized by high costs and high risks of transaction, with only one third of output reaching the market. Besides, small-scale farmers, who produce 95% of Ethiopia's output, came to market with little information and are at the mercy of merchants in the nearest market, and are unable to negotiate for better prices or reduce their market risks (ECX, 2009).

Ethiopian is the birth place of coffee with diversified landscape and suitable climate for growing large quantities of coffee. It is a country that produces high quality coffee with a distinct flavor including the highest valued coffee in the world called '*Mocha*' and the leading exporter of the famous *Arabica* coffee. However, the coffee sector is less developed and the export volume has not shown significant increase over the years. As a result, the country's export represents about three percent of the world exports and the coffee industry accounts for 2.5% of the country's gross domestic product (ECEA, 2012).

Transformation of the production system for domestic and export agricultural commodities requires the existence of efficient marketing system that can transfer the agricultural commodities from the point of production to the required market at the lowest possible cost.

The efforts to increases agricultural production and productivity should be accompanied by a well performing marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices. Higher prices for producer encourage farmers to adopt new technologies and increase production (Amha, 1994).

Limitations to export coffee to distant but rewarding market emanate from low marketable output and high transaction costs. Dependable marketing system of coffee market is yet to develop in Ethiopia. Market infrastructures and marketing facilities are less developed. This in turn, reduces incentives to transactions (Hassano, 2012). Therefore, building the capacity of smallholders to actively engage in the market is one of the important tasks.

The coffee commodity chain faces its own complex set of problems, including various constraints on production, processing and marketing. For example, in specialty/gourmet segments of the international coffee market, Ethiopia occupies a unique place with an impressive selection of distinct coffee profiles. Many analysts have also proposed increasing the quantity of washed coffee as it sells at significant premiums over unwashed coffee (FDRE, 2003).

Market chain analysis is a modern approach to study problems of production and marketing. Analysis of the market of coffee based on market structure, conduct and performance considering the product and location specificity will, therefore, be useful to identify the bottlenecks and come up with possible solutions. Dale is one of the districts known for production of high quality coffee in Ethiopia; however, its coffee market is less studied. This study investigated the coffee marketing chains and factors affecting coffee supply in Dale district.

METHODOLOGY

Study Area

Dale district is one of the 19 districts in the Sidama Zone of SNNPR region and covers a total area of over 30,212 ha. The district capital, Yirgalem town is located at about 320 km south of Addis Ababa along the main highway to Moyale, located at $6^0$44" N and $38^0$28'' E longitude (WoFED, 2013).

The mean annual rainfall of the district ranges from 1041 mm to 1448 mm. Mean temperature ranges between 11^0c to 22^0c. The district is subdivided into 36 *Kebeles* (Smallest administrative unit)and all of them produce coffee (WoFED, 2013).

Average land holding of individual farm household is about 0.5 ha. Coffee, barley, wheat, *teff*, *enset* and vegetable crops are the common crops grown in the area. Coffee production is the main economic activity of the district with total area coverage of 15,367 hectare (WoFED, 2013).

Sampling and Data Collection

Dale district was purposely selected for its high production of coffee. Sample farm households were drawn from five purposively selected rural administrative *kebeles* of the district for their higher volume of coffee production (Table 1). The data were collected by using pre-tested semi-structured questionnaire. The survey questionnaires were administered through a simple random sampling based on proportional probability sampling technique. Yamane's sampling formula (1970) was used to determine the sample size.

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

Where: n= Sample size; N= Total number of coffee producer households; e = level of precision with 95% confidence interval.
Accordingly, 123 coffee producer households were selected.

Table 1. List of sampling Kebeles and sample size used for the study.

Name of Kebele	Coffee producer households	Sample households
Awada	3618	15
Gane	6633	27
Mesincho	6331	26
Moto	8441	34
Wenenata	5126	21
Total	30149	123

Yirgalem and Hawassa, areas with high volume flow of coffee produce, were the sites selected for the coffee trader's survey. There were a total of 36 coffee traders and all of them were covered in the traders' survey.

Data Analysis

Descriptive statistics

Descriptive statistics including means, percentages, ranges, ratios, standard deviations and variances were used to examine the socioeconomic and institutional characteristics of coffee producers and traders in the marketing channels, and the structure, conduct and performance of coffee markets in the study area.

Market concentration

The concentration ratio is expressed in terms of percentage of the market controlled by the biggest four firms. Four firms (CR4) concentration ratio is the most typical concentration ratio for judging the market structure (Kohls and Uhl, 1985). A CR4 over 50% is considered as a tight oligopoly, between 25% and 50% as a lose oligopoly and less than 25% no oligopoly. We used this method for coffee market concentration analysis. The problem associated with this index is the arbitrary selection of "r" (the number of firms that are taken to compare the ratios).

$$MS_i = \frac{V_i}{\sum V_i}$$

Where, MS_i = market share of buyers i.

V_i = amount of product handled by buyer i.

$\sum V_i$ = Total amount of product

$$C = \sum_{i=1}^{r} S_i$$

Where, C = concentration ratio handle

S_i = percentage share of i^{th} firm

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

The degree of coffee market concentration analysis was carried out for Yirgalem and Hawassa towns taking the annual volume of coffee purchased in 2013/14.

Marketing margin

According to Mendoza (1995) computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage. In addition, the producers gross marketing margin (GMM) and net marketing margin (NMM) were calculated.

$$\text{TGMM} = \frac{\text{Consumer price} - \text{producer price}}{\text{Consumer price}} \times 100$$

$$\text{GMM}_p = \frac{\text{Price paid by consumer} - \text{Gross marketing maregin}}{\text{Price paid by consumers}} \times 100$$

$$\text{NMM} = \frac{\text{Gross marketing margin} - \text{Marketinn cost}}{\text{Price paid by consumer}} \times 100$$

Another parameter related to marketing margin is the producer's share. It is calculated as:

$$\text{PS} = \frac{\text{Producer price}}{\text{Consumer price}} \text{ or } 1 - \frac{\text{Marketing margin}}{\text{Consumer price}}$$

Econometric model

Since all the sampled coffee farmers of the study area supply coffee to the market, OLS model was fitted to the survey data to identify the determinants of coffee supply to the market. Following Green (2003) formula, the OLS model is specified as:

$$Y_i = \beta X_i + U_i$$

Where,

Y_i=a vector coffee supplied to the market by the sample farmers

β = a vector of estimated coefficient of the explanatory variables

X_i= a vector of explanatory variables (Access to credit, Access to market information, Sex of household head, Age of household head, Area allocated for coffee, Coffee productivity, Extension contact, Household education level, Household family size, Size land holding, Coffee price in 2013, Nearest market distance, Non–farm income).

Ui = disturbance term

RESULTS AND DISCUSSION

Sample Characteristics

Average age of sampled household was 39.5 ± 12.7 years and average family size was 5.5 ± 2.7 persons per household (Table 2). With respect to education level, average number of years of schooling was 8.3 ± 2.2 years. In the study area, demand for credit is influenced by availability of cash on hand. The sampled household accessed credit both from formal and informal sources. The average amount of credit taken by the farmers was 6 335.6 birr.

The government deployed at least two development agents (DA's) in each *kebeles* and built Farmers'

Training Centers (FTC) in attempt to fill the required knowledge gap and achieve food self-sufficiency in the country. In the study area the average number of extension contact by the respondent was 18.65 times per year.

Sampled households also reported that they have to walk on average for an hour to reach to the nearest market center (Table 2). In all the selected *kebeles* market is available for six days per week, except on Sundays. Farmers obtained information on price before they sold their coffee was obtained from various sources and 20.3% of coffee producing sampled households reported that they get the information from the nearby market, 14.6% from the central market and 17% from both.

Table 2. Distribution of sampled households.

Variables	Mean	Standard deviation	Minimum	Maximum
Distance from nearby market (walking hour)	1	0.48	0.5	2
Years of farm experience	26.7	11.32	7	35
Age	39.54	12.66	20	65
Family size	5.54	2.73	5	15
Education (schooling years)	8.29	2.20	0	12
Number of extension contact per year	18.65	18.5	52	2
Amount of credit taken (birr)	6,335.6	2,234.62	10,000	1,500

Coffee Marketing Channels

Coffee marketing channels is the sequence of intermediaries through which coffee passes from farmers to ultimate consumers (Mendoza, 1995). Generally, in the study area nine channels were identified.

I. Producers → Assemblers → Wholesalers → ECX → Exporters → Export
II. Producers → Wholesalers → ECX → Exporters → Export
II. Producers → Primary cooperatives → Union → ECX → Exporters → Export
IV. Producers → Assemblers → Retailers → Domestic consumers
V. Producers → Domestic consumers
VI. Producers → Wholesalers → ECX →Retailers (Rejected coffee) → Domestic consumer
VII. Producers → Assemblers → Wholesalers → ECX → Retailers (Rejected coffee) → Domestic consumer
VII. Producers → Primary cooperatives → Union → ECX → Retailers (Rejected coffee) → Domestic consumer
IX. Producers → Informal traders → Domestic consumers

Among these, channel I and channel II, which represented 49.3% and 25.7% of the total produce, respectively, were the principal coffee marketing channels (Fig. 1).

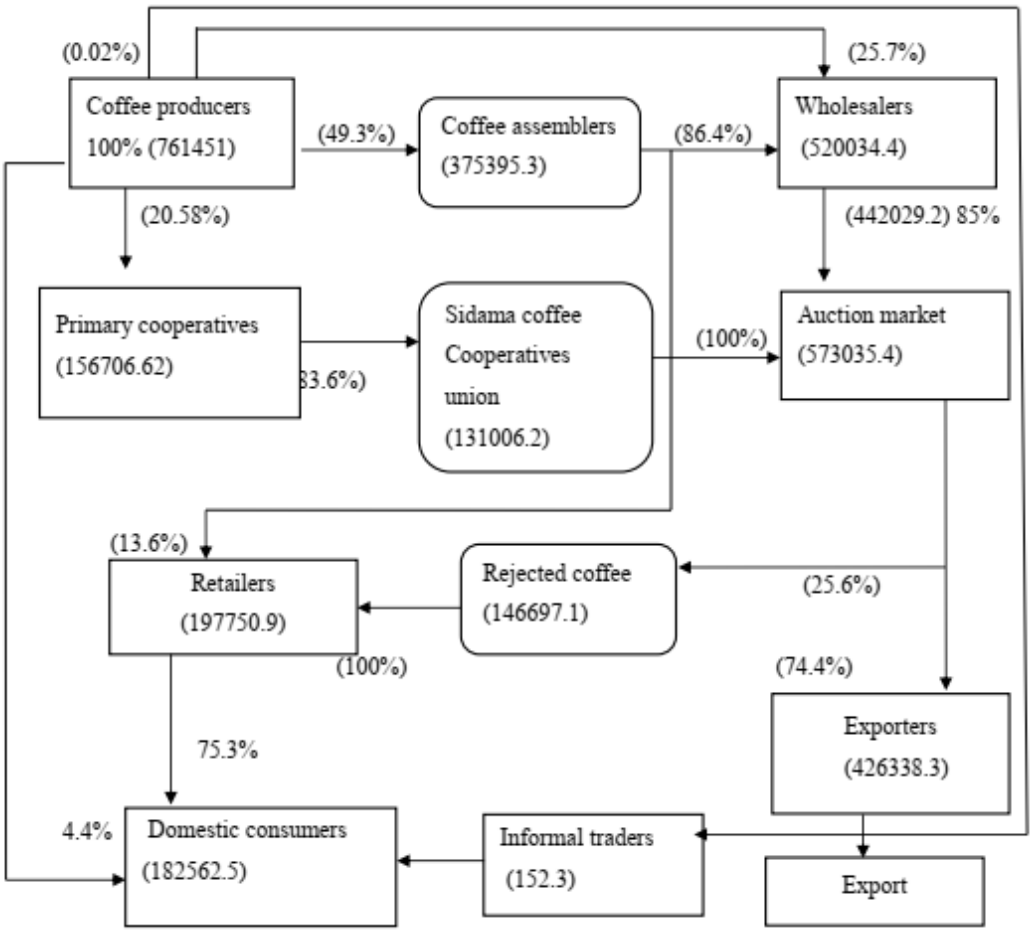

Figure 1.Coffee marketing channels of the Dale district, southern Ethiopia.
(Values in the parenthesis represent the volume of coffee product in kg.).

Degree of Market Concentration

Coffee markets at Yirgalem and Hawassa were strongly oligopolistic in the hands of few coffee traders (Table 3). CR4 measures concentration ratio showed that the top four or 19.05% of the traders controlled 65.3% of the coffee market in Yirgalem and 26.67% of the coffee traders controlled 69% of the coffee market in Hawassa.

The strongly oligopolistic market in both towns indicated that there is market imperfection because few traders seem to have monopolized the coffee market.

Table 3.Traders concentration.

Market centers	Concentration ratiofor the largest four firms (CR4) (%)	Traders (%)	Market structure
Hawassa	65.3	19.05	Tight oligopoly
Yirgalem	69.0	26.67	Tight oligopoly

Labor cost which includes (weeding, pruning, harvesting, cost of food item during group work, loading and unloading, etc.) was the principal cost of coffee growers and consisted about 57.5% of the total cost (Table 4). Cost of transport (farm to home, home to market or sometimes market to home when the price is very low) was 15.4% and the second major cost of producers followed by cost of land, materials and tax which amounted to 12.4%, 12.2% and 2.5%, respectively.

Table 4. Cost of actors in Channel I and Channel II (birr / feresulla*).

Cost items	**Producers**	**%**	**Assemblers**	**%**	**Wholesalers**	**%**	**Producers**	**Wholesalers**	**%**
Labor	58.4	57.5	6.46	23.4	5.26	11	58.4	5.26	9.7
Transportation	15.6	15.4	6.20	22.5	20.00	41.6	15.6	20.00	37.1
Land rent	12.6	12.4					12.6		
Packaging materials	12.4	12.2	6.20	22.5	3.72	7.8	12.4	3.72	6.9
Tax	2.5	2.5	2.5	9.1	2.41	5	2.5	2.41	4.5
Commission	-	-	-	-	1.43	3	-	1.43	2.6
Wage	-	-	-	-	2.64	5.5	-	2.64	4.9
Pulping and hulling charge	-	-	-	-	4.16	8.7	-	4.16	7.7
Depreciation	-	-	-	-	2.09	4.4	-	6.50	12
Other miscellaneous expenses	-	-	6.2	22.5	6.25	13	-	7.86	14.6
Coffee purchasing price	-		202.7		233.4		-	211.57	
Cost	101.5		27.56		47.96		101.5	53.98	
Selling price	202.7		233.4		321.2		211.57	321.2	
Profit	101.2		30.7		87.8		110.07	109.63	

*One *feresula* approximately equals to17 kg

There was a difference in gross marketing margin between coffee assemblers ((C – P)*17) (birr 521.9)) and coffee wholesalers ((W – C)*17) (birr 1492.6) in channel I (Table 5)). However, the gross margin of wholesalers was higher ((W – P)*17) (birr 1863.71)) in channel II due to the direct transaction with farmers. The Woreda Agriculture Office reported that a law was recently developed to encourage the direct transaction between coffee growers and wholesalers in order to improve quality of coffee and farmers benefit.

The total wholesalers gross margin in channel I (birr 1492.6 was lower than in channel II (birr 1863.71). The producers share from the auction market was 63.1% in channel I and 65.87% in channel II (Table 5). This result supports the theory that the share of producers decreases as the number of market agents increases.

Table 5: Summary of market share for channel I and channel II.

Marketing agent	Selling price (birr/feresulla)		Gross share from wholesale price (%)	
	Channel I	Channel II	Channel I	Channel II
Producers (P)	202.7	211.57	63.1	65.87
Assemblers (C)	233.4	-	9.6	-
Wholesalers (W)	321.2	321.2	27.3	34.13

The gross marketing margins of 36.9% and 34.13% were added to coffee price in channel I and channel II, respectively (Table 6). Out of these, 9.6% was gross margin of coffee assemblers, while 27.3% was that of wholesalers in channel I and in channel II. The gross margin of wholesalers was about 34.13%.

Table 6: Distribution of marketing margin.

Channel I	Value (%)
TGMM (Complete distribution channel)	36.9
GMM (Collector)	9.6
GMM (Wholesaler)	27.3
GMM_p (Producers share)	63.1
Channel II	
TGMM (Complete distribution channel)	34.13
GMM (Wholesaler)	34.13
GMM_p (Producers share)	65.87

Determinants of Household Coffee Market Supply

Among the thirteen hypothesized variables only eight variables namely sex of the household head, education level of household head, quantity of coffee produced, access to extension service, price of coffee in 2013, distance to the nearest market, non-farm income and access to market information were found to be the significant (Table 7).

Sex: Both men and women took part in the production and marketing of coffee. Sex of the household head had significantly positive influence on market supply of coffee ($P \leq 0.05$) (Table 7). The positive sign implies that if the household is male headed it leads to increase in coffee supply to the market by 0.049 kilogram. Tshiunza et al. (2000) who studied about determinants of cooking banana in Nigeria found that male headed household tends to produce more cooking banana for market than female headed and explained that males have relatively better labor advantage to produce and supply more volume.

Education level: This variable is positive in the model and statistically significant at ($P \leq 0.05$) (Table 7). One additional year of formal education level leads to an increase in marketable supply of coffee by 0.013 kilogram. The positive and significant relationship may indicate that formal education determines the readiness to accept new ideas and innovations, and easy to get supply, demand and price information which enhances farmers' willingness to produce more and increase volume of sales. Zekarias et al. (2012) studied market chain analysis of forest coffee in south western Ethiopia and found that education level has significant positive effect.

Coffee productivity: Households with high level of productivity supplied more to the market. Coffee productivity affects the volume of coffee supplied to the market positively and highly significantly ($p \leq 0.01$) (Table 7). The model shows that a one kilogram increase in coffee productivity per hectare resulted in 0.334 kilogram increase in the volume of market supply of coffee. A study by Zekarias et al. (2012) on market chain analysis of forest coffee in south western Ethiopia found that quantity of production has significant effect on volume of market supply.

Extension contact: The extension service positively and significantly ($p \leq 0.01$) affected the volume of coffee product supplied to the market (Table 7). Increase in frequency of extension agent contact by one increased the amount of coffee supplied to the market by 0.005 kilogram. This suggests that extension service avails information regarding technologies which improves production of coffee that positively affects the volume coffee supplied by the household to the market. Gecho (2005) and Musema (2006) found that access to extension service on improved maize, red pepper and improved haricot bean seed positively and significantly affected marketed supply of each of the commodities.

Price of coffee in 2013: The model revealed that the price of coffee had positive and significant ($P \leq 0.05$) effect on the volume of coffee supplied to the market (Table 7). The positive and significant relationship indicates that the rise by one birr in the preceding year price of coffee supplied to the market increases the supply by 0.169 kilogram in the following year.

Distance to the nearest market: It was argued that distant markets increase producers marketing cost which in turn reduces the volume of supply to the market. The model output from the current study indicates that the variable affected supply volume of marketed coffee negatively (Table 7). An increase in one hour walking time to the nearest coffee market led to a decrease in the quantity coffee supplied by 0.123 kilogram. The variable was also statistically significant ($P \leq 0.05$). Earlier study by Hassano (2012) also revealed that market distance affect marketed supply of coffee negatively in Nensebo district of Oromia, Ethiopia.

Table 7. OLS results of determinants of coffee market supply.

Variables	Coefficient	Standard error	t-ratio	p-value
Constant	2.767***	0.246	11.24	0.000
Sex	0.049**	0.024	2.07	0.041
Age	0.001	0.002	0.59	0.554
Education	0.013**	0.006	2.01	0.047
Coffee productivity	0.334***	0.036	9.13	0.000
Extension	0.005***	0.002	3.32	0.001
Lagged price	0.169***	0.035	4.78	0.000
Credit	0.018	0.034	0.51	0.609
Market distance	-0.123**	0.058	-2.29	0.024
Family size	-0.007	0.005	-1.40	0.164
Farm size	0.012	0.044	0.30	0.768
Coffee land	0.056	0.057	0.97	0.333
Non-farm income	-0.001***	0.000	-2.63	0.010
Market information	0.084**	0.033	2.52	0.013

Dependent variable=quantity supplied, N=123, R^2=0.9733, Adjusted R^2= 0.9701***, ** and * shows the values statistically significant at 1%, 5% and 10% respectively.

Non–farm income: Increase in non-farm income as compared with farm income sources will tend to minimize agricultural activities and shift the focuses on those non-farm activities which benefit the farmers more. This leads to decrease in their volume of farm output or coffee produced and supplied to the market. The model indicated that this variable affected supply of coffee negatively and significantly ($p \leq 0.01$) (Table 7). One birr increase in non-farm income resulted in decrease of coffee product volume supplied to the market by 0.001 kilogram.

Market information: The variable's coefficient is positive and statistically significant ($p \leq 0.05$) (Table 7). The coefficient also indicated that access to market information increased the marketable supply of coffee by 0.084 kilogram. Earlier study by Hassano (2012) also indicated that access to market information affected market supply of coffee positively in Nensebo district of Oromia, Ethiopia.

CONCLUSION AND IMPLICATIONS

The study identified nine major marketing channels. The marketing costs and margin analyses showed that coffee producers incurred the highest cost followed by wholesalers. The coffee assemblers bear the lowest cost (birr 468.52). About 36.9 % of the total gross marketing margin was added to coffee price in channel I. Out of the total gross marketing margin about 9.6% was accounted for gross margin of coffee assemblers and 27.3% for the wholesalers. Hence, the study pointed out that all marketing participants of the commodity operated at a margin and all the marketing agents profited through the channel.

The coffee wholesalers obtained significant annual total net benefit than producers and coffee assemblers. The estimated annual net benefits of a typical coffee producer, coffee assemblers and coffee wholesalers in Dale district were birr 4887.96, birr 2016.54 and birr 255354.21, respectively. This implies that coffee marketing is relatively highly determined by wholesalers.

Eight variables namely sex of the household head, education level of household head, quantity of coffee production, price of coffee in previous year, distance to the nearest market, non-farm income, access to extension service, and access to market information significantly affected the market supply of coffee at household level.

Since the coffee market in the study area is oligopolized, government should attract other traders to enter into coffee trade by improving the existing credit system and giving different incentives in order to make the market more competitive.

Existence of informal traders in the coffee market discourages the legal traders to expand their business or enter into the market (for new traders). Hence the government should take action to protect the legal traders from unfair competition with informal traders by putting mechanisms which prevent informal traders not to participate in the market and eventually convince them to join the formal and legal market. Besides, due attention should be given to improve communication networks in different coffee production sites and marketing centers of the study area.

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