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Value Chain Analysis of Coffee: The Case of Amaro Woreda in Southern Ethiopia

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Abstract
Ethiopian coffee production and its productivity level are unsatisfactory to uphold the country's comparative advantage. The study intends to examine possible reasons for low productive performance of coffee using cross sectional data gathered from Amaro Woreda and gathered data from 366 households by simple random sampling techniques. The study attempted to analyze different factors that hinder coffee value chains in the study area. Accordingly to the finding various factors that have approximately similar influence on coffee value chains. The study used 13 continuous variables from which all are highly statistically significant at 99% confidence interval and 19 discrete variables those are highly statistically significant at 99% confidence interval under descriptive statistic. The econometric model used for this study is MLR model and its result raveled on coffee value chains factors was also identified. The study included 13 continuous variables in the model from these about 6 variables are highly statistically significant at 95% and 99% confidence interval such as Distance from home of farmers, Average Number of coffee trees, Price of coffee in total Ethiopian Birr, Number of livestock in Tropical livestock Unit, Extension contact and family size have statistically significant that affecting coffee value chains of households. Family size and extension contact are factors negatively affecting coffee value chains while the remaining 4 variables enhance coffee value chains positively. About 4.43% of the variation in coffee value chains is explained by continuous variables in OLS technique but many factors were in discrete variables. There are many post-estimation tests used to check the satisfaction of the basic assumptions of multiple linear regression models. Based on the finding of the study, government and other related stockholders should target at development of rural infrastructure, work diversification cultures, empowering extension contacts for rural farmers, and family plans to improve both production and marketing of Coffee through awareness creation by training, follow up and creating the market linkages for participant in coffee production and marketing in Amaro Woreda.
Keywords: Amaro, Coffee, production, Value Chain and MLR model.
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1. INTRODUCTION

1.1. Background of the Study

Ethiopia is one of the poorest countries in the world in spite of its productive land, labor and natural resource. Agriculture is dominate means Ethiopian economy, accounts for about half of Gross Domestic Product (GDP), 90% of exports, 81.7% of total employment. Peasant farming is the most important in Ethiopian agriculture (CSA, 2010). Based on MoA (2014) report, more than 95 percent of the total viable agricultural land is cultivated by small holder peasant farmers that produce 97.6% of the agricultural output (Mekuria *et al.,* 2004). To overturn poverty situations, the country set out a series of economic reform programs since 1991. The structural adjustment programme was introduced in 1991 with the aim of economic growth and poverty reduction. Following this the country has adopted agricultural development led industrialization (ADLI) strategy in 1993, Interim Poverty Reduction Strategy Paper (IPRSP) in 2000, Sustainable Development and Poverty Reduction Program (SDPRP) in 2002. All these strategies and programs were intended to bring about economic growth through Increase in agricultural productivity. The above strategies and programs were primary focused up on the poverty reduction (Alemayehu, 2010).

The word "coffee" comes from the name of a region of Ethiopia where coffee was first discovered 'Kaffa'. The name 'Kaffa' is inherited from the hieroglyphic nouns 'KA' and 'AfA'. 'KA' is the name of God; 'AFA' is the name of earth and all plants that grow on earth. So the meaning of Koffee (Coffee) from its birth-place bells on as the land or plant of God. Botanically, coffee is belonging to the family *Rubiaceae* in the genus *Coffea*. Although the genus *Coffea* includes four major subsections (Chevalier, 1947), 66% of the world production mostly comes from *Coffea arabica* L. and 34% from *Coffea canophora* Pierre ex Froehner (robusta type), respectively. Ethiopia is the home and cradle of biodiversity of Arabica coffee seeds. More genetically diverse strains of *C. arabica* exist in Ethiopia than anywhere else in the world, which has lead botanists and scientists to agree that Ethiopia is the centre for origin, diversification and dissemination of the coffee plant (Fernie, 1966; Bayetta, 2001).

Two main coffee varieties are traded internationally viz. Arabica (*Coffea Arabica*) and Robusta *(Coffea. canephora var. robusta)*. Coffee Arabica is more favored by consumers in general than Robusta. Coffee Arabica is native to Ethiopia and it represents around 70% of world coffee production. On the world market, coffee arabica brings the highest prices. Arabica is more climate sensitive than Robusta and needs mild temperatures for optimum

quality produce while Robusta is comparatively climate resistant and needs less agronomic attention. Robusta coffee contains about 50 to 60% more caffeine and has a unique taste compared to Arabica. Robusta coffee is mainly used for making instant coffee and for blending purposes (Tiwari and Bisht, 2010).

Coffee is the major agricultural export crop, providing currently 35% of Ethiopia's foreign exchange earnings, down from 65% a decade ago because of the slump in coffee prices since the mid-1990's. Coffee cultivation plays a vital role both in cultural and socio-economic life of the nation**.** About 25% (15 million) of the Ethiopian population depend, directly or indirectly, on coffee production, processing and marketing (Mekuria *et al.,* 2004).

Coffee is the second-largest traded commodity in the world after oil and employs 25 million people in the developing world. Coffee landscapes are very important for the world's market. Though an increase in market demand for coffee produced under biodiversity-friendly, sustainable production practices. By increasing market demand for certified coffee from all origins, providing market incentives through certification (UNDP, 2011).

Coffee is producing almost all in non-arid countries in the tropics. Over 50 countries produces coffee in significant amounts; in many of these, foreign exchange earnings from coffee exports are of vital importance to the balance of payments of payments and trades. International Coffee Organization (ICO) is the main intergovernmental organization for coffee, bringing together producing and consuming countries to tackle the challenges facing the world coffee sector through international cooperation (ICO, 2009). Coffee growers in developing countries receive a notoriously small share of the export price of green coffee, which often is explained with excessive government regulation of the domestic markets and market inefficiency (Baffes, 2003). Producer price shares vary substantially across countries, even when comparing countries with seemingly similar exporting systems (ITF, 2002b).

Ethiopia is Africa's most important coffee producer until 1992 the Ethiopian Coffee Marketing Corporation (ECMC) fully controlled coffee marketing. Growers were committed to deliver annual quotas at a fixed price. After the switch in the country's economic policy towards a market-based economy, ECMC was divided into two structures: the Ethiopian Coffee Purchasing Enterprise (ECPME), which purchases coffee and the Ethiopian Coffee Export Enterprise (ECEE), which handles exports. Both compete with the private sector. The reforms facilitated entry of new traders and exporters. Around 75 exporters were active and 240 hold an export license. Private traders account for 75% of exports, compared to only 10% prior to 1992. However, the sector remains somewhat regulated with Coffee Price Differential Setting Committee setting daily minimum export differentials (Krivonos, 2004).

According to Dominic (2011) Ethiopia is the largest coffee producer in Africa: Around 400,000 tons per annum all of it Arabica. However, Ethiopian coffee production and its productivity level are till unsatisfactory to uphold the country's comparative advantage. Ethiopia and Brazil are the only coffee producing countries that consume a significant portion of their production; around 50% of the production for Ethiopia. Annual coffee export from Ethiopia is around 200,000 tons valued at around US$ 500 million. Coffee is Ethiopia's number one source of foreign exchange. Ethiopia is one of the few countries where coffee sale is not liberalized (i.e. buyers must purchase through the commodity exchange only cooperatives and large scale growers are exempt but their coffee qualities are still checked by ECX laboratories). Coffee production is mainly in West and South Ethiopia, around 90% based on smallholders. An estimated 1.2 million smallholder farmers are engaged in coffee production. The quality of Coffee arabica from Ethiopia is generally good. Some regions (e.g. Sidama, Yirgacheffee, Amaro and Harar) receive very high prices from coffee value chain activities.

Global coffee consumption continues to grow at a steady pace, particularly in emerging markets. Consumption in 2010 is estimated at 135 million bags, an increase of 2.4% compared to2009. During the last ten years world consumption increased at an average rate of 2.5% per annum. Growth is fastest in emerging markets, such as those in Eastern Europe and Asia, and in the coffee producing countries themselves. In Europe and the United States, consumers are increasingly attentive to quality and origin, and show a growing interest in the economic, social and environmental aspects of coffee production (Lucia, 2012).

1.2. Statements of the problem

There are multiple factors that contributed to the current low level of coffee production and productivity with also inefficient marketing systems that impeded future revitalization and promotion of coffee production and marketing. There were many factors that hindered Coffee Value Chain activities (Belachew, 1997). Such as Low Net Incomes from Coffee Production, limited availability and Access to Appropriate Technology, Inefficient Extension Service, low farmer capacity to access and Use of technology but these constraints were not yet analyzed in depth to show the gaps. However, Coffee is one of the most important traded commodities in the world. The sector's trade structure and performance have large development agenda and poverty implications, due to this reason given high concentration on the production and its marketing by small-holders in poor developing countries is needed. Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries farmers Jema (2008). This study has initiated to identifying different actors with their roles and determinant factors that hinders the, production, productivity, and

processing, marketing and consuming coffee in detail. This study can also drop special recommendation based on the findings of the study.

1.3. Objectives of the study

1. To identify actors and their roles in Coffee value chain activities.
2. To analyze determinants that affecting Coffee Value Chain in the study area.

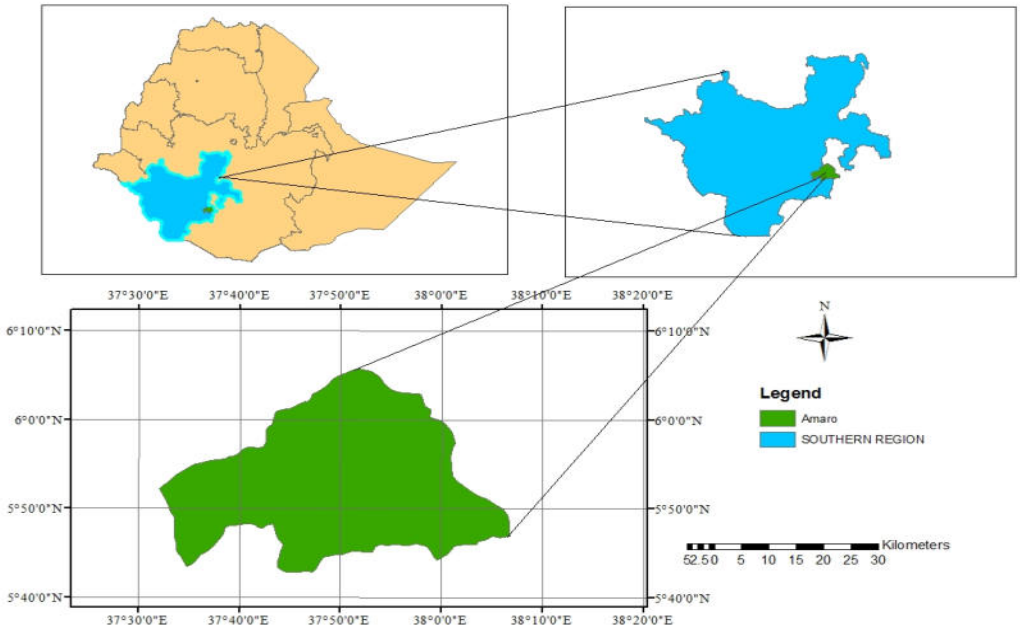
2. RESEARCH METHODOLOGY

2.1 Descriptions of the Study Area

This study was conducted in Amaro *Woreda* of Segen Area Peoples Zone, SNNPRS. Amaro is located in the southern part of the country at a distance of 468 kms from Addis Ababa and 207 kms south from regional city of Hawassa. It is bounded by NechSar National Park, Chamo Lake from the North, Guji Zones of Oromiya regional State from the east, Burji Woreda from the South and Konso *Woreda* from the west. Amaro *Woreda* comprises three agro-ecological zones namely, Highland (*Dega*) with altitude ranges from 2301-3601 m.a.s.l, middle altitude area (*Weyena dega*) its altitude ranges from 1501-2300 m.a.s.l and Lowland (*Kola*) which ranges from 1000-1500 m.a.s.l with 32%, 38%, and 30% of the area coverage, respectively. Which are very favorable for coffee and other crops production. The altitude of the Amaro *Woreda* ranges from 1000–3600 meters above sea level (m.a.s.l.) from Dulbe depression to Dello Mountain (AWADO, 2015). The study area is known by its bimodal rainfall distribution. The first small rainfall season is autumn (*Belg*), occurs from the beginning of March to the end of April and the second main rainfall season is summer (*kiremt)*, occurs from the beginning of July to the end of November in normal years. The average annual rainfall of the study area ranges from 735–1200mms. The rainfall intensity and distribution of the study area in the cropping season was reported as decreasing over time, this causes crop failures and drought finally totally led to low productivity of crop productions. The Woreda is known by its chained mountains from north to south direction and with small stream flow on the sides of the mountains chain. Also the *Woreda* is known with use of long-time local irrigation from those streams.

The Amaro *Woreda* has total human population of 167,379 of which 84,411 (50.4%) are males and 82,968 (49.6%) females. Most of the population or about 70% were engaged in mixed farming systems. The *Woreda* has total area of 1,422.16sq. Km (CSA, 2010).

Figure 1. The map of the study area



***Source**:* Own draw

2.2 Data Sources and Sampling Technique

The Sampling technique for this study was applied three stage sampling techniques. In the first stage, Amaro Woreda was selected purposely because the area was representative for Coffee production based on agro-ecological feature, soil type, farming system etc.; secondly 5 *kebeles* were selected by stratified sampling technique from 34 *kebeles* in the Woreda that are listed in the table 1 below based on similarity of their weather conditions

and soil types. Finally, 366 respondents were selected by using simple random sampling technique according to Yemane (1967) formula as shown below in equation 1, Primary data were collected from sample households using semi-structured questioners, well prepared and pretested interview schedule that would be administered to the respondents by the trained enumerators and questionnaires and Seconder data were collected from Annual reports, different magazines, books articles, internets etc.

$$n = \frac{N}{1+N(e^2)} = \frac{4280}{1+4280(0.0025)} = 366 \qquad \text{Equation 1}$$

Where; n is the sample size from the population

N is the total household heads in study area

e is degree of precision at 95% confidence interval (Yemane, 1967). In this study i.e. e= 5%. The distributions of the total sample in sample *kebeles* were based on the probability of proportional to the number of population of Coffee producers in each *kebele*.

Table 1: Sampling techniques

S. No	kebeles	Total populations	Mean Household Heads according SSA	proportional Sample size
1.	Kore	4546	4546/5 = 909	78
2.	Kobo	3670	3670/5 = 704	63
3.	Zokessa	2167	2167/5 = 433	37
4.	Sharo	3455	3455/5 = 691	59
5.	Darba	7562	7562/5 = 1512	129
Total		**21,400**	**4280**	**366**

2.3 Methods of Data Analysis

2.3.1 Descriptive and inferential statistics:

Descriptive and inferential statistics along with econometric models were used to analyze the collected data. Descriptive statistics such as mean, minimum, maximum, standard deviation and percentage were employed to analyze the data on socio-economic and institutional characteristics of the sample households while inferential statistics such as t-test and chi-square or $\chi 2$ tests were used to undertake statistical tests on different continuous and categorical or discrete variables respectively.

2.3.2 Econometric model specifications

a. Analysis of Coffee Value Chain

To analyze Coffee value chain total amount of coffee production or efficiency of its marketing were see through a multiple linear regression model by regressing production against with different explanatory variables. Multiple liner regression was used to analyze factors that affected Coffee value chain activities in the study areas (Gujarati, 2003).

$$\mathbf{Y_i = B_0 + \Sigma B_i X_i + ei} \qquad \text{Equation 2}$$

Where:

- ✓ Y is total amount of coffee production in Kilo gram per year
- ✓ B_O is intercept constant of Yi
- ✓ B_i is slope coefficient of X_i's
- ✓ Ei is error term

2.3.3 Definition of Variables and Working Hypothesis

1. **Dependent variables**
   - **a. Coffee production:** This is measured as a continuous variable taking a value from 0 to different amounts which produced in the production seasons. The status was determined on the basis of the kilo gram. This variable was included as a dependent variable in Multiple Linear Regression model to estimate coefficients of parameters to evaluate its influence on the production.
   - **b. Participation in Coffee Value Chain Activities:** The participation in Coffee Value Chain is measured as dummy variable taking a value of 1 if the household is coffee value chain actor and 0 otherwise.
   - **c. Coffee Value chain Actors:**
     Measured as taking values 1 for Growers or producers, 2 for Processors, 3 for Wholesaler(s), 4 for Retailers, 5 for Consumers, 6 for Brokers and 7 for others Actors in Coffee value chain activities in the study area.
2. **Explanatory or independent variables:** These variables were highly likelihood with the study or these are determining variables in this study and there were identified and analysed in results and discussion part.

3. Results and Decision

3.1. Analysis of Descriptive statistics

Analysis of continuous descriptive statistics

Table 2: Socio-economic characteristics of sample respondents

Variables N= 366	Minimum	Maximum	Range	Sum	Mean	Std. Err.	Std.Dev	Variance	t test
Age of Household	19	90	71	14820	40.5	0.76	14.5	209.8	53.3***
Fertilizer or composts Use in kg	0	210	210	11460	31.3	2.9	55.4	3071.4	10.7***
Land Holding in Hectare	0	6	6	695.7	1.9	0.07	1.4	1.9	27.1***
Land for coffee production in Ha	0	2	2	77.1	0.21	0.02	0.39	0.16	10.5***
Distance of Farm from Market	1	20	19	2403	6.6	0.22	4.3	18.267	30***
Age of coffee tree	0	40	40	2484	6.8	0.59	11.3	128.5	11.5***
Number of coffee tree	0	374	374	15012	41	4.4	84	7056.3	9.3***
Coffee production in kg	0	2450	2450	31530	86.2	18.01	344.7	118796.5	4.8***
Family Size engaged in CVC	1	10	9	1740	4.8	0.13	2.5	6	37***
Numbers of Livestock in TLU	0	241	241	9534	26.1	2.16	41.3	1701.7	12.1***
Total Income of the Actors	768	265765	264997	6314368.7	17252.4	1974	37764.5	1426153372.6	8.7***
Extension contact in number	1	52	51	5280	14.4	0.59	11.2	126.1	24.4***
Price of Coffee in Birr per Kg	45	90	45	23196	63.4	0.62	11.9	141.3	102.3***

Source: computed by SPSS 20, 2018 and *** shows all variables has statistically significant mean difference between Coffee Value Chain activities and its production.

Analysis of Discrete Descriptive Statistics:

Table 3: Area of Participation of Households in Coffee Value Chain with the following Discrete Variables

Variables	Area of Participation of Household in Coffee Value Chain									Chi-squared test
	Descriptions of Variable	Grower	Processor	Wholesaler	Retailer	Consumer	Broker	Others	Total	
Disease and Pest	Yes (Obs)	108	72	54	30	54	30	18	366	**No tested**
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack of water	Yes (Obs)	54	30	36	24	30	18	6	198	**8.26*** **
	Percentage (%)	14.75	8.2	9.8	6.6	8.2	4.9	1.6	54.1	
	NO (Obs)	54	42	18	6	24	12	12	168	
	Percentage (%)	14.75	11.5	5	1.6	6.6	3.3	3.3	45.9	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack of Improved Seed	Yes (Obs)	18	48	0	18	42	30	18	174	**8.56*** **
	Percentage (%)	4.9	13.1	0	4.9	11.5	8.2	4.9	47.5	
	NO (Obs)	90	24	54	12	12	0	0	192	
	Percentage (%)	24.6	6.6	14.8	3.3	3.3	0	0	52.5	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Input Shortage and Expensiveness	Yes (Obs)	18	42	36	6	24	18	6	150	**7.38*** **
	Percentage (%)	4.9	11.5	9.8	1.6	6.6	4.9	1.6	41	
	NO (Obs)	90	30	18	24	30	12	12	216	
	Percentage (%)	24.7	8.2	4.9	6.6	8.2	3.3	3.3	59	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack of Development agents advises	Yes (Obs)	54	36	6	24	24	0	6	150	**738*** **
	Percentage (%)	14.8	9.8	1.6	6.6	6.6	0	1.67	41	
	NO (Obs)	54	36	48	6	30	30	12	216	
	Percentage (%)	14.8	9.8	13.1	1.6	8.2	8.2	3.3	59	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Drought	Yes (Obs)	60	12	6	6	42	6	0	132	**6.49*** **
	Percentage (%)	16.4	3.3	1.6	1.6	11.5	1.6	0	36.1	
	NO (Obs)	48	60	48	24	12	24	18	234	
	Percentage (%)	13.1	16.4	13.1	6.6	3.3	6.6	4.9	63.9	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Geographical location of farm land	Yes (Obs)	96	66	18	24	54	24	12	294	**3.54*** **
	Percentage (%)	26.2	18.1	4.9	6.6	14.8	6.6	3.3	80.3	
	NO (Obs)	12	6	36	6	0	6	6	72	
	Percentage (%)	3.3	1.6	9.8	1.6	0	1.6	1.6	19.7	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	

Farm Distance from Household residence	Yes (Obs)	72	36	18	18	24	12	6	186	**8.85*** **
	Percentage (%)	19.7	9.8	4.9	4.9	6.6	3.3	1.6	50.8	
	NO (Obs)	36	36	36	12	30	18	12	180	
	Percentage (%)	9.8	9.8	9.8	3.3	8.2	4.9	3.3	49.2	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack or shortage of infrastructures	Yes (Obs)	60	12	18	6	24	6	6	132	**7.37*** **
	Percentage (%)	16.4	3.3	4.9	1.6	6.6	1.6	1.6	36.1	
	NO (Obs)	48	60	36	24	30	24	12	234	
	Percentage (%)	13.1	16.4	9.8	6.6	8.2	6.6	3.3	63.9	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack of storage	Yes (Obs)	48	12	36	12	12	12	0	132	**6.46*** **
	Percentage (%)	13.1	3.3	9.8	3.3	3.3	3.3	0	36.1	
	NO (Obs)	60	60	18	18	42	18	18	234	
	Percentage (%)	16.4	16.4	4.9	4.9	11.5	4.9	4.9	63.9	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Lack of Processing Machine and its Expensiveness	Yes (Obs)	48	12	18	18	36	18	6	156	**5.67*** **
	Percentage (%)	13.1	3.3	4.9	4.9	9.8	4.9	1.6	42.6	
	NO (Obs)	60	60	36	12	18	12	12	210	
	Percentage (%)	16.4	16.4	9.8	3.3	4.9	3.3	3.3	57.4	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Price Fluctuations	Yes (Obs)	38	25	21	11	13	15	3	126	**5.67*** **
	Percentage (%)	10.4	6.8	5.7	3.0	3.6	4.1	0.8	34.4	
	NO (Obs)	70	47	33	19	41	15	15	240	
	Percentage (%)	19.1	12.8	9.0	5.2	11.2	4.1	4.1	65.6	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Production Fluctuations	Yes (Obs)	57	36	29	15	26	17	9	189	**6.20*** **
	Percentage (%)	15.6	9.8	7.9	4.1	7.1	4.7	2.45	51.6	
	NO (Obs)	51	36	25	15	28	13	9	177	
	Percentage (%)	13.9	9.8	6.8	4.1	7.7	3.6	2.45	48.4	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Use Irrigation Water	Yes (Obs)	58	35	29	15	28	15	9	189	**2.97*** **
	Percentage (%)	15.8	9.6	7.9	4.1	7.7	4.1	2.45	51.6	
	NO (Obs)	50	37	25	15	26	15	9	177	
	Percentage (%)	13.7	10.1	6.8	4.1	7.1	4.1	2.45	48.4	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	
Land Holding uses	Yes (Obs)	43	25	22	12	16	15	5	138	**4.33*** **
	Percentage (%)	11.8	6.8	6.0	3.3	4.4	4.1	1.4	37.7	
	NO (Obs)	65	47	32	18	38	15	13	228	
	Percentage (%)	17.7	12.8	8.8	4.9	10.4	4.1	3.5	62.3	
	Total (Obs)	108	72	54	30	54	30	18	366	
	Percentage (%)	29.5	19.7	14.8	8.2	14.8	8.2	4.9	100	

Sources, SPSS 20 Output, 2018 *** show the variables are highly statistically significant at 99% Confidence interval and at 1% probability level.

The computed data result revealed on table 2 shows that all variables has highly statistical significant comparison differences between Coffee Value Chain actors in the study area except identifying the intensity level of the factors, Adaptations of technologies and marital status of the respondents. These variables are insignificant variable in the above table 2. Other exceptional variable in the above table 2 is Diseases and Pests which was No tested since all respondents agreed that diseases and pests is a common problem in Coffee Value Chain activities in the study area.

3.2. Econometric Analysis

Analysis of continuous data

Cross-section data consists of a sample of individuals, households, firms, cities, states, countries, or a variety of other units, taken at a given point in time. In a pure cross section analysis we would ignore any minor timing differences in collecting the data. An important feature of cross-sectional data is that we can often assume that they have been obtained by random sampling from the underlying population, which simplifies most of the analysis. There are various methods of analyzing cross-sectional data built in Stata. These basic methods with wider applications in economics and agribusiness are analyzed and reported here.

Table 4: Regress **CP** UFERT LHIHA LFCPM DFH AACT ANCT FAMS TLU TINCOME EXC PCIETEB

Source	SS	df	MS	Number of Obs =366
Model	3168016.67	11	288001.515	F (11, 354) = 2.54
Residual	40192721.4	354	113538.761	Prob > F = 0.0043
Total	43360738	365	118796.543	R-Squared = 0.073
				Adjusted R-Squared = 0.00443
				Root MSE = 336.96

D V (CP)	***Coefficient***	***Standard Error***	***t test***	***P> |t| or p-Value***
IV				
UFERT	-0.6823801	0.5733239	-1.19	0.235
LHIHA	23.64072	14.61153	0.107	0.107
LFCPM	-63.32392	99.16577	0.524	0.524
DFH	16.68327	5.837656	2.86	0.005**
AACT	7.583812	3.08715	2.46	0.003**
ANCT	-0.1665816	0.4697618	-0.35	0.723
PCIETEB	25.11853	8.124093	3.09	0.002**
TLU	-4.3537049	0.503013	-8.66	0.000***
TINCOME	-0.0006784	126.7011	-1.28	0.201
EXC	6.917364	2.073902	-3.34	0.001***
FAMS	-3.4441154	1.731355	-1.99	0.003**
cons	-33.31	0.0005292	-0.26	0.793

Source: MLR model output, 2018; ** and *** shows statistical significant variables at 5% and 1% probability level respectively.

According to the OLS technique outputs, six variables (DFH, ANCT, PCIETEB, TLU, EXC and FAMS) are statistically significant variables affecting Coffee Value Chain activities of households. Family size and extension contact are factors adversely affecting Coffee Value Chain (CVC) while the remaining 4 variables enhance CVC activities of households. About 4.43% of the variation in Coffee Value Chain activities were explained by continuous variables in this OLS technique but many factors are in discrete variables used which would be discussed in the next part. However, interpretation of MLR model outputs is possible if and only if the basic assumptions of classical OLS technique are satisfied. There are many post-estimation tests used to check the satisfaction of the basic assumptions of multiple linear regression models. Tests for heteroscedasticity, omitted variables and multicollinearity are the most important post-estimation tests that must be reported with the OLS technique outputs are satisfied.

Table 5: Mfx = Marginal effects after regress, y = Fitted values (predict) = 86.147541

Variable	**dy/dx**	**Std. Err.**	**z**	**P>|z|**
UFERT	-0.6823801	0.5733239	-1.19	0.235
LHIHA	23.64072	14.61153	0.107	0.107
LFCPM	-63.32392	99.16577	0.524	0.524
DFH	16.68327	5.837656	2.86	0.005**
ACT	7.583812	3.08715	2.46	0.003**
NCT	-0.1665816	0.4697618	-0.35	0.723
PCIETEB	25.11853	8.124093	3.09	0.002**
TLU	-4.3537049	0.503013	8.66	0.000***
TINCOME	-0.0006784	126.7011	-1.28	0.201
EXC	6.917364	2.073902	-3.34	0.001***
FAMS	3.4441154	1.731355	1.99	0.003**
cons	-33.31	0.0005292	-0.26	0.793

Sources Model output, 2018

Based on the above findings; a multiple linear regression model analysis was carried out to determine the relationship between each variable associated with coffee value chain activities. The analysis result reveals that the variables had the most statistically significant relationship with the coffee value chain activities in the household level (endogenous factors). It does not necessarily mean that they did not have influence to community at national level, but it mean that probably of the majority features were lied on farmers in study area mainly take into account endogenous factors' characteristics to make coffee production and marketing decisions. This result may be related to one of two theories for determining the factors affecting individual's coffee production and marketing decisions. "Subsistence theory", which states that farmers grow crops to satisfy principally their own consumption requirements, and therefore land allocation, is mainly associated with endogenous factors' characteristics.

Distance of Farm from Market of the sample household heads (DFH): The distance of farm to the market of the sample household heads was statistically significant at less than 5% probability level and had positive relationship with either coffee value chain activities. A Km increases in the distance to the market increases the coffee production by 16.7 quintals. Thus, due to the long distance of coffee value chain activities encourages the participants to earn the highest price and profit margin due to high of coffee in cities and towns in the study area.
Age of coffee trees (ACT): The average age of coffee tree was statistically significant at less than 5% probability level and had positive relationship with either coffee value chain activities. A year increases in the growth age of coffee tree it increases the coffee production by 7.6 quintals. Thus, due to the age coffee tree, the coffee value chain activities encourages the participants to earn the highest yield but its marginal production or productivity would be decreased in the study area. Biologically and practically after certain age the productivity will be decreases and the production will be stopped.
Price of Coffee in total Ethiopian Birr per Kg (PCIETEB): The average price of coffee in the study area was statistically significant at less than 5% probability level and had positive relationship with Coffee Value Chain activities. One ETB increases in the coffee market prices, increases the coffee production by 25.12 quintals. Thus, since the prices increased, the producers of coffee and coffee marketing participants are interested to engage in coffee marketing and production by applying different newly introducing technologies to enhance the productivity of coffee in the study area.
Numbers of Livestock in Tropical Livestock unit (TLU): The number of Livestock in the study area was highly statistically significant at less than 1% probability level and had negative relationship with Coffee Value Chain activities. Increases the number of Livestock by one TLU results the decreases in coffee production by 4.4 quintals and affect Coffee Value Chain activities. Because, the attention of the actors would be divided in to Livestock management and the care off Livestock is not a simple task for farmers and other actors. Therefore, participating in Livestock production is limited to engage fulltime in coffee Value chain in the study area.
Extension Contact (EXC): The Development agents advise in Coffee Value Chain activities were highly statistically significant at 1% probability level and had positive relationship with the coffee production and marketing activities or Coffee Value chain activities. As a development agents decrease the contacting with farmers for agricultural activities consultancy, it decreases the coffee production by 7 quintals. This has a direct relationship with coffee Value chain activities.
Family size of the sample households (FAMSIZE): The family sizes which attend in Coffee Value Chain activities were statistically significant at less than 5% probability level and had negative relationship with in either the coffee production or marketing. As a 1 person increase in the family size it increases the coffee production by 3.44 quintals. This has a direct relationship with in Coffee Value Chain in the study area.

3.2.1. Analysis of discrete or dummy variables

Table 6: Summery of Dummy or discrete data

Observed		Prediction of Coffee production		**Chi-squared test**
Do you participate in Coffee Value chain Activities	Yes	Frequency (Obs) 366	Percentage (%) 100	--------
Total		366	100	

Source, Survey Result from SPSS Version 20, 2018, the Chi squared test in the above table is not tested since all respondents were participant in coffee value chain activity and has no mean different among the actors.
Analyzing the dummy or discrete variables as follows in the table 8 below.

Table 7: Variables in the binary Logistics regression Equation (N=366)

Variables	Score	Standard coef. (B)	Exp (B)	Std. Erro.	Sig
MS	13.130	11.119	67474.134	35458.165	.000***
LACW	1.036	-6.033	.002	2876.867	.023**
LACIS	58.559	-5.511	.004	3417.849	.309
ISAE	37.456	-26.923	.000	7857.253	.000***
LACA	5.150	-1.101	.332	5778.927	.000***
DROUT	25.239	4.966	143.477	4450.899	.023**
GEOL	7.106	-2.498	.082	11320.966	.000***
FARMD	15.394	-20.594	.000	6535.757	.008*
LACINF	25.239	1.335	3.801	6607.064	.000***
LACS	4.665	-5.362	.005	3727.016	.000***
LACPM	.208	20.597	88095	4460.897	.031**
MACE	.290	6.892	984.104	18585.112	.648
PRICEF	.039	-7.047	.001	18646.022	.590
PROF	.080	-.006	.994	1901.242	.843
ARP	177.204	25.349	102123.295	1404.768	.778
Constant	251.202	3.888	48.819	40058.765	.000***

*Source Own Survey Result, 2018.**, ** and *** show that the significance levels at different probability level i.e. at 10%, 5% and 1% respectively. Variable(s) entered in the model were Martial Status of Households (MS), Lack of Water for coffee production (LACW), Lack of Improved Coffee Seed (LACIS), Input Shortage and Expensiveness (ISAE), Lack of Developments Agents Advise (LACA), Current Drought (DROUT), Geographical Location (GEOL), Farm Distance from farmers Residences (FARMD), Lack of Infrastructure Developments (LACINF), Lack of Storage (LACS), Lack of Coffee Processing Machines (LACPM), Machine Expensiveness for Coffee Processing (MACE), Price Fluctuations (PRICEF), Production Fluctuations (PROF), and Area of Stockholders participation in Coffee Value Chain (ARP).

4. CONCLUSIONS AND POLICY IMPLICATIONS

4.1 Conclusions

The study was conducted in Amaro woreda of SNNPRS, Coffee is very important cash crop and it needs particular attention. Coffee is an export crops among African countries. However, Ethiopian has not yet exploited its comparative advantage in coffee production and marketing. Evidence from various literatures show that many determinant factors were hinders Coffee Value Chain activities in Ethiopia. This study also attempts to analyze Coffee Value Chain in Amaro Woreda, by identifying its determinants and compare their influence in various areas of coffee value chain actors. To this end, a cross sectional household surveys have been conducted from representative sample of 366 participants in different coffee value chain activities selected randomly from five kebeles of Amaro Woreda. The MLR model was used to estimate the parameters in Coffee Value Chain activities to identify the determinant factors. In order to see the determinants in Coffee Value Chain, the MLR model Result shows that almost all mean difference is statistically significant at 95% and 99% Confidence Interval. Moreover, the study intends to examine possible reasons for low productive performance of coffee using cross sectional data gathered from 366 households of Amaro Woreda by simple random techniques. The study attempted to analyze different factors that hinder the production, productivity and marketing of coffee in the study area. Analysis of its determinants estimates coefficients of parameters. Accordingly to the finding, the result revealed that various identified determining factors have approximately similar influence on Coffee Value Chain activities. The study was implying that almost all considered variables have statistical significant influence on Coffee Value Chain activities. The study considered 13 continuous variables from which all are highly statistically significant at 99% of confidence interval and 19 discrete variables and also all these variables highly statistically significant at 99% of confidence interval under descriptive statistic. The econometric model used for this study to analyze the gathered data was MLR model and its result raveled on Coffee Value Chain factors were also identified. The study included 13 continuous variables in the model. According to the OLS technique outputs, from 13 variables; about 6 variables were highly statistically significant at 95% and 99% of confidence interval such as Distance from Home of farmers (DFH), Average Number of coffee trees (ANCT), Price of coffee in total Ethiopian Birr (PCIETEB), Number of livestock in Tropical livestock Unit (TLU), Extension contact (EXC) and family size (FAMS) have statistically significant affecting factors on Coffee Value Chain (CVC) of households. Family size and extension contact are factors adversely affecting Coffee Value Chain (CVC) while the remaining 4 variables enhance CVC of households. About 4.43% of the variation in Coffee Value Chain is explained by continuous variables in this OLS technique. However, interpretation of MLR model outputs is possible if and only if the basic assumptions of classical OLS Technique are satisfied. There are many post-estimation tests used to check the satisfaction of the basic assumptions of multiple linear regression models. Tests for heteroscedasticity, omitted variables and

multicollinearity are the most important post-estimation tests that must be reported with the OLS technique outputs are satisfied.

4.2 Policy Implications

Based on the analysis results of determinants in Coffee Value Chain activities of Socio-economic characteristics of sample respondents of all continuous variables had statistically significant mean difference between Coffee Value Chain actors. According to the OLS technique outputs, extension contact variable was factors adversely affecting Coffee Value Chain (CVC) while the remaining 4 variables enhance CVC activities of households. About 4.43% of the variation in Coffee Value Chain is explained by continuous variables in this OLS technique. The following policy implications can be highlighted. Based on the facts find from the study, government and other related stockholders should target at controlling diseases and pests, development of rural infrastructure, work diversification cultures, extension contacts practices, to adopt different technologies, to improve production and marketing through awareness creation by giving trainings and by follow up and creating the market linkages for participant in coffee value chain activities in Amaro Woreda.

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