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Determinants of Market Outlet Choice of Coffee Producing Farmers in Lalo Assabi District, West Wollege Zone, Ethiopia: An Econometric Approach

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Abstract

This study examines the major determinants of market outlet choice of coffee producing farmers in Lalo Assabi district of West Wollega zone, Ethiopia with the specific objectives of exploring the general characteristics and livelihood activities; and identifying major factors affecting coffee market outlet choice. A Random sample of 141 coffee producers was selected for interview based on the appropriate sample size determination. Both descriptive and inferential statistical methods were employed for data analysis. For the marketing of coffee, 11.3%, 51.8% and 36.9% of the respondents mainly chose end consumer, private trader and cooperative outlets, respectively. The result of a multinomial logistic model showed that the choice of end consumer outlet is positively and significantly affected by access to transportation facilities, access to price information and access to credit compared to private trader outlet, whereas the quantity of coffee sold and access to extension services negatively affected the main choice of end consumer outlet. Similarly, the choice of cooperative outlet is positively and significantly affected by distance to the market, access to transportation facilities, access to price information and access to training compared to private trader outlet. Therefore, these variables require special attention if farmers' margins from coffee marketing are to be increased.

Keywords: Coffee; households; market outlet; multinomial logistic model.

1. Introduction

Coffee is one of the most important commodities in the world economy and the production of this commodity varies across regions. Coffee in particular is the backbone of the Ethiopian economy and is the leading commodity in generating foreign exchange for the country. Ethiopia is the origin of Arabica coffee and the world's fifth and Africa's leading producer. By its very nature, coffee is a highly labor-intensive production activity and a very significant part of the population derives its livelihood from coffee (ECEA, 2013). Coffee is produced in more than 60 countries providing income for smallholder producers. Ethiopia and Brazil are the only coffee producing countries that consume a significant portion of their own production. Ethiopia is one of the few countries where the sale of coffee is not liberalized. That means buyers must purchase through a commodity exchange. Only cooperatives and large-scale growers are exempt, but their coffee quality is still checked by ECX laboratories. Coffee production is mainly common in West and South Ethiopia, around 90% being based on smallholder farmers (ITC, 2011).

Ethiopia is famous as the origin of coffee and about 15 million people directly or indirectly depend on coffee for their living. The largest volume of coffee is grown in the two large regions, Oromiya and the Southern Nations, Nationalities, and Peoples' (SNNP) region. About five percent of coffee production is grown on modern plantations, which are owned by private investors or by the government. The rest is grown by smallholder farmers, and about half of that production is in backyards or gardens. In both cases (modern plantations and smallholder production), coffee is generally grown under shade (Abu, 2012). The quality standards of Ethiopian coffee are classified according to their origin of production. Among the best-known coffee varieties in Ethiopia are Harar, Wollega, Limu, Sidama and Yirga Cheffe all taking priority. The first, Harar coffee, is the highest premium coffee in Ethiopia and also in the world and it has a medium size bean, with a greenish to yellowish color with a medium level of acidity and a distinctive mocha flavor. The second well-known variety of Ethiopian coffee is Wollega coffee, which is produced in western Ethiopia. The beans of Wollega coffee are a medium to bold bean with fruity taste. The third type, Limu coffee is known for its spicy, wine flavor, and good acidity. It is most preferred and popular in Europe and the United States of America. The fourth type of Ethiopian coffee is Sidama coffee, which has a greenish to grayish color and medium sized beans (ECXA, 2008).

Modern coffee marketing is based on a coffee standard classification. Grading and licensing was started in the 1950s, following the establishment of the National Coffee Board of Ethiopia in 1957. The National Coffee Board of Ethiopia (NCBE) was established to regulate coffee marketing in the country and improve the quality of Ethiopian coffee for export. The NCBE has centers for coffee inspection, grading and auction with its own operational rules, regulations, and modalities. Ethiopian coffee marketing is constrained by major problems. The major constraints are an unfavorable international coffee price, relatively high transaction costs, lack of adequate local standard processing and handling facilities, a centralized coffee inspection and grading system, and a

lack of export marketing skill and inconsistency in coffee quality (ECXA, 2008).

In an effort to identify interventions that could initiate the participation of farmers in the markets, the important thing is to identify and understand the choice of marketing channels made by the farmers (Jari and Fraser, 2009). Improving market infrastructure by providing more and better markets and making it easier for farmers to access them is also deemed necessary for increasing the level of commercialization, especially in developing countries (Shilpi and Umali, 2008). Though coffee is the basis of livelihood in Ethiopia, little is empirically known about the determinants in choosing between different outlets. Past studies conducted on coffee marketing in Ethiopia are mostly focused on coffee cooperatives. For instance, Tinsae (2008) investigated the performance of primary coffee cooperatives in Wonago and Yirga Cheffe *woreda*. This study includes only single market outlets (cooperatives). Demeke (2007) investigated the performance of coffee marketing cooperatives and members' satisfaction in Dale district, Southern Ethiopia. This study has basically focused only on the members of cooperatives and cooperative non-members were not included.

In the study area that is the focus of this current research (Lalo Assabi district), the main crops are coffee, maize, sorghum, finger millet and sweet potatoes. The main cash crop is coffee and the livelihoods of smallholder farmers are highly reliant on this cash crop. This present study aims to explore the general characteristics and livelihood activities and to identify major factors affecting the coffee market outlet choice of coffee producing farmers (three outlets in focus) using an econometric approach. To the best of the author's knowledge, the determinants of the market outlet choices of coffee producing farmers have never been explored specifically in the study area. Therefore, it is necessary to undertake an empirical study to fill this information gap by exploring the major determinants of the market outlet choices of these farmers. The main contribution of the study to the methodology as well as to the theory is that it can be used as a good stepping-stone for other studies on agricultural marketing and for policy formulation by concerned bodies. This paper is structured as follows. Section 2 is a literature review; Section 3 presents the data and methodology; Section 4 discusses results and discussion and Section 5 presents concluding remarks and recommendations.

2. Literature review

2.1. Marketing and marketing channels

According to the definition of the American Marketing Association (AMA), marketing is described as "the performance of business activities that directs the flow of goods and services from producers to consumers". This definition reveals the traditional perspectives of marketing where marketing was purely distribution and trade driven. Another definition given by the American Marketing Association is that "marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods and services to create exchanges that satisfy individual and organizational objectives" (AMA, 2007).

Marketing channels are sets of interdependent organizations involved in the process of making a product or services available for use or consumption. Marketing channel decisions are

among the most critical decisions facing management (Kotler, 2003). A marketing channel is the chain of interrelated enterprises that take part in the process of the movement of goods from the producer to the consumer. It provides the proper amount of goods and services in the proper place, of right quality and optimal price, not only to meet the needs of consumers, but also to stimulate the demand, by using different methods of promotion among all the organizations in the marketing channel. Different authors have described the possible options of marketing channels in different ways (Guibert, 2006).

2.2. Farmers' choice of marketing channels and individual decision making

All farmers must utilize marketing channels, regardless of whether they are production oriented or market oriented, if they produce goods that are in excess of their domestic consumption. So, farmers are required to choose between various marketing channels in order to dispose of their produce. Possibilities certainly exist for the market oriented farmer to improve his/her profit potential, if he/she is prepared to spend time deliberating over which marketing channel to use, and then makes his/her decision on the basis of sound economic motives (Barker, 1989).

Individual decision-making forms the basis for nearly all microeconomic analysis. In the standard view, rational choice is defined to mean the process of determining what options are available and then choosing the most preferred one according to some consistent criterion. The utility maximization approach to choice has several characteristics that help account for its long and continuing dominance in economic analysis. First, from its earliest development, it has been deeply attached to principles of government policy making. Second, many of the comparative statistical predictions of choice theory that are the qualitative predictions concerning the ways in which choices change as people's environments change, tend to be confirmed in empirical studies. Third, the optimization approach including utility maximization and profit maximization has a spectacularly wide scope (Levin and Milgrom, 2004).

2.3. Analytical framework

Multinomial logistic formulation is widely used to capture the potential interdependencies among alternatives. It is used where the assumption of the independence of irrelevant alternatives, which states that the odds in each outcome are mutually exclusive, is fitted. This implies that the omission of an outcome does not affect the odds in the remaining outcomes. In other ways, the Multinomial probit model provides the most general framework for inter-dependent alternatives in discrete choice analysis. The interdependencies are accounted for through the correlation structure of normally distributed error terms. The primary impediment to the application of the Multinomial probit model is related to the dimensionality of the multifold normal choice probability integrals about the size of the choice set. This model is an extension of the probit model and is used to estimate several binary outcomes jointly. It simultaneously models the influence of the set of explanatory variables on each of the different outcomes, while allowing the unobserved and/or unmeasured factors (error terms) to be freely correlated (Greene, 2000). Since the choice of the outlets that maximizes the utility of house-

holds should be independent, a multinomial logistic model is more appropriate for modeling the outlet choices.

2.4. Review of related empirical studies

Different authors have tried to explore major factors affecting the agricultural market outlet choices of smallholder farmers using different approaches. For instance, Jari and Fraser (2009) provided an insight into the institutional and technical factors that influence agricultural marketing channel choices. The institutional factors that influence agricultural marketing channel choices include transaction costs, market information flow and the institutional environment which encompasses formal and/or informal rules, the use of grades and standards, organization in the markets and the legal environment. An appropriate institutional environment reduces transaction costs for traders. Jane (2009) identified variables that influenced farmers' participation in the banana marketing association in Murang'a south district. This study confirmed that the age of household head, years of experience in marketing, an irrigation facility on the farm, availability of family labor for farming activities, access to credit for agricultural development, contact with agricultural extension service providers, membership of the household head in agri-commodity marketing association, good condition of roads and access to market information significantly affect the participation of farmers in the banana market through different outlets.

Rao et al. (2010) empirically showed that the educational level of the operator, off-farm employment, access to transportation facility and age of operator had a positive effect on the supermarket channel choices. According to Nyaupane and Gillespie (2010), in the Louisiana crawfish industry, farmers choose a market outlet considering its convenience and economic profitability. Farmers choose the channel that is most convenient and that offers the highest returns. The survey result showed that most farmers choose wholesale markets compared to selling directly to consumers, retailers and processors. Farmers have a choice of whether to sell through direct or indirect marketing channels and demographic farm characteristics (farm size and diversification) and premarket characteristics had significant influences on market choice. The choice of channel therefore also depends on the farmer's demographics such as age, gender, marital status and education level as well as on the farm characteristics. Anteneh et al. (2011) identified factors affecting the market outlet choice of coffee farmers in Sidama zone. The finding of their study revealed that younger coffee farmers with better education, higher proportions of off-farm income to total income, and higher proportions of land allocated to coffee tend to diversify their market choices by selling to traders. Farmers delivering exclusively to the cooperatives seem to be the older ones, with a relative lower individual performance.

Mamo and Degnet (2012) found that gender and educational status of the household head together with household access to free aid, agricultural extension services, market information, non-farm income, volume of sales and market distance had a statistically significant influence on the livestock market outlet choice in Ethiopia. The study by Kadigi (2013) revealed that access to credit decreases the choice of neighbor milk market outlets. The

probability of choosing to sell to milk vendors is positively influenced by the price paid per liter and the possibility of the dairy farmer being a female rather than male. Female headed dairy households increase the probability of marketing milk to milk vendors. Geoffrey (2015) identified factors affecting the choice of marketing outlets among smallholder pineapple farmers in Kericho country and further confirmed that price information had a positive influence on the choice of local market outlets while vehicle ownership positively and significantly influenced the choice of both local and urban market outlets for the marketing of pineapples. The variables such as gender, group marketing, pineapple production, price information and vehicle ownership significantly influenced the choice of pineapple marketing outlets. Riziki et al. (2015) found that the quantity of African indigenous vegetables sold, distance to the agricultural market, sex of the household head, education level, family size, levels of value addition, farming experience in agro-pastoralism, off-farm income and marketing costs influenced the choice of the marketing outlet for African indigenous vegetables in Tanzania and Kenya.

Thus, this present study tries to explore the determinants of the market outlet choice of coffee producers in Lalo Assabi district, which is one of the coffee producing districts in western Ethiopia. This study attempts to address the following questions. What do the general characteristics and livelihood activities of the coffee producers look like? What are the major determinants of market outlet choice of the coffee producers in the study area?

3. Data and methodology

3.1. Description of the study area

The study area, Lalo Assabi district, is one of the 19 districts of West Wollega zone of Oromiya national regional state, Ethiopia. West Wollega zone is located in the western part of the country at a distance of 441 kilometers from Addis Ababa, the capital city of the country. The capital city of the district is Inango and it is 23 kilometers away from the zonal city, Gimbie. The district is situated at latitudinal and longitudinal ranges of 19^0 to 20^0 N and 35^0 to 45^0 E, respectively. The estimated total area coverage of the district is 43355 hectares. The geographical division of the district is rural area 42,337 hectares, urban 1018 hectares, individual 38,325.7 hectares; the communal area 3496.624 hectares and the residential area is 514.626 hectares. The climate condition of the district is appropriate for both livestock and honey production in addition to crop production. One of the Ethiopian coffee varieties known as Wollega coffee is mainly grown in the West Wollega zone including Lalo Assabi district (LAWARDO, 2015).

3.2. Sampling procedure

Lalo Assabi district is selected for the study due to the fact that no study has been conducted yet on coffee, which is the basis of livelihood for the district. In order to select a representative sample, a three-stage random sampling technique was implemented to select coffee producing households for interview. In the first stage, the district is divided into *Kebeles*. All *kebeles* in the district produce coffee under a similar agro-ecological zone; but the amount of production is different among the *kebeles* in the district so the *kebeles* can be used as strata. In the second stage, since the number of

stratum is large all strata could not be included in the study. Therefore, following Chocran (1963), four *kebeles* (Dongoro Gebo, Dongoro Dissi, Warra Jirru Bacho and Nabbo Dalatti), which have a large proportion of coffee producing households, are selected. In the third stage, households were selected from the four above-mentioned rural *kebeles* by systematic sampling based on proportional allocation after the representativeness of the sample is confirmed.

3.3. Sample size determination

In calculating the required sample size, P is taken as proxy for the proportion of households who prefer private traders outlet to sell their coffee. The value of P is fixed at 0.5 since there is no previous study on the same title in the study district. Using the formula of sample size determination for stratified random sampling, the required sample size for this study is calculated as follows.

$$n = \frac{\sum\left(\frac{N_h^2 A_h}{W_h}\right)}{N^2 D^2 + \sum N_h A_h}, \text{ Where } D = \frac{C}{Z_{\frac{\alpha}{2}}} \text{ and}$$

$$A_h = P_h\left(1 - P_h\right), \; h = 1, 2, 3, 4 \qquad (3.1)$$

Where C is a margin of error which the researcher tolerates in the estimation, $Z_{\alpha/2}$ - is the value of standard normal distribution for a given level of significance, N is population size and *n* is total sample size required for the study, W_h is proportion of population of *kebele* h to the population of the selected *kebeles.* Setting *C = 0.08, α = 0.05, N = 1386 and P = 0.5* in equation (3.1), the required sample size obtained is 141.

3.4. Type of data

The primary data source was used to collect the necessary information for the study using a structured questionnaire to generate primary data from the selected households. The statistical software packages used for data analysis are SPSS version 20 for the descriptive part and STATA version 11 for the inferential part.

3.5. Method of data analysis

Based on the research objectives, both descriptive statistics and inferential statistics are used. For the inferential part, an econometric model, the Multinomial logistic model, is applied. The multinomial logistic model is selected to identify the major socioeconomic and demographic determinants of coffee market outlet choice. The multinomial logistic model is a multi-equation model in which a response variable with K categories will generate K-1 equations. Each of these K-1 equations is a binary logistic regression equation comparing each category with the base or reference category. The multinomial logistic model is analogous to a logistic regression model, except that the probability distribution of the response is multinomial (categorical) instead of binomial (binary) and thus we have K-1 equations instead of one equation.

The analytical model is constructed as follows. Suppose that the utility to a household of alternative j is U_{ij} where *j = 0,1,…,J*. From the decision maker's perspective, the best alternative is simply the one that maximizes net private benefit at the margin. In other words, a household i will choose marketing outlet j if and only if $U_{ij} > V_{ik}$, $\forall j \neq k$. Based on McFadden (1978), a household utility function from using alternative j can then be expressed as follows:

U(Choice of alternative j for i household) = $U_{ij} = V_{ij} + \varepsilon_{ij}$ (3.2)

Where, U_{ij} is overall utility, V_{ij} is an indirect utility function and ε_{ij} is a random error term. The probability that household i select alternative j can be specified as:

$$P_{ij} = Pr(V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik}) \quad (3.3)$$

$$P_{ij} = Pr(\varepsilon_{ik} < \varepsilon_{ij} + V_{ij} - V_{ik}) \text{ for } \forall j \neq k \quad (3.4)$$

Assuming that the error terms are identically and independently distributed, the probability that household i chooses alternative j was explained by the multinomial logistic model (Green, 2000).

$$P(Y_i = j / X_i) = P_{ij} = \frac{e^{X_i \cdot \beta_j}}{\sum_{j=0}^{J} e^{X_i \cdot \beta_j}}, \; i = 1, 2, ..., n \quad (3.5)$$

Where, P_{ij} is the probability representing the i^{th} household choice of category j; X_i are predictors of probabilities; *e* = natural base of logarithms; n is sample size and β_j are parameters to be estimated by maximum likelihood estimate.

Following the generalized equation (3.5), the multinomial logistic regression fitting to the present study is adapted as:

$$P(Y_i = j / X_i) = P_{ij} = \frac{e^{X_i \cdot \beta_j}}{\sum_{j=0}^{J} e^{X_i \cdot \beta_j}}, \; i = 1, 2, ..., 141 \; j = 0, 1, 2 \quad (3.6)$$

Where, P_{ij} is the probability representing the i^{th} household choice of outlet j. That is, j = 0 for choice of end consumer outlet, j = 1 for choice of private trader outlet and j = 2 for choice of cooperative outlet. Following these, P_{i0} is the probability representing the i^{th} household selection of end consumer outlet, P_{i1} is the probability representing the i^{th} household selection of private trader outlet and P_{i2} is the probability representing the i^{th} household selection of cooperative outlet. X_i are predictors (independent variables) and these include X_1 = Age of household head (AGE), X_2 = Education level of household head (EDUC), X_3 = Household size (HHSIZE), X_4 = Cooperative membership (MCOOP), X_5 = Land size allotted to coffee production (COFLANDSIZE), X_6 = Distance from the nearest market (MKTDIS), X_7 = Quantity of coffee sold (QCOFFSOLD), X_8 = Transportation access (TANSP), X_9 = Total livestock holding (TLU), X_{10} = Access to price information (PINF), X_{11} = Access to credit (ACRDT), X_{12} = Access to extension service (EXTSER), X_{13} = Access to training (TRAIN). *e* = natural base of logarithms; and β_j are parameters to be estimated by maximum likelihood estimate with the second category (Private trader) as a base (reference) category. An appropriate normalization that removes an indeterminacy in the model is to assume that $\beta_1[\beta_0, \beta_1, \ldots, \beta_{13}] = 0$ (coefficients of explanatory variables on the reference category) so that $e^{\beta_1 \cdot X_i} = 1$. Here, the probability that a base (reference) category was chosen can be expressed as:

$$Pr(Y_i = 1 / X_i) = P_{i1} = \frac{1}{1 + e^{\beta_0 \cdot X_i} + e^{\beta_2 \cdot X_i}} \quad (3.7)$$

Where, $\beta_0[\beta_0, \beta_1, \ldots, \beta_{13}]$ are coefficients of explanatory variables on the end consumer outlet and $\beta_2[\beta_0, \beta_1, \ldots, \beta_{13}]$ are coefficients of explanatory variables on the cooperative outlet. Using the fact that all P_{ij} must sum to one $\left(\sum_{i=0}^{2} P_{ij} = 1\right)$, the separate probabilities that end consumer and cooperative outlets were chosen can be expressed by equations (3.8) and (3.9), respectively.

$$Pr(Y_i = 0 / X_i) = P_{i0} = \frac{e^{\beta_0 \cdot X_i}}{1 + e^{\beta_0 \cdot X_i} + e^{\beta_2 \cdot X_i}} \quad (3.8)$$

$$Pr(Y_i = 2 / X_i) = P_{i2} = \frac{e^{\beta_2 \cdot X_i}}{1 + e^{\beta_0 \cdot X_i} + e^{\beta_2 \cdot X_i}} \quad (3.9)$$

The parameter estimates of the multinomial logistic model only provide the direction of the effect of the independent variables on the dependent variables. Thus, the estimates represent neither the actual magnitude of change nor the probabilities. Instead, the marginal effects are used to measure the expected change in the probability of a particular technique being chosen with respect to a unit change in an independent variable from the mean. The marginal effects of the characteristics on the probabilities are specified as:

$$\delta_{ij} = \frac{\partial P_{ij}}{\partial X_i} = \ddot{u}_{ij}\left[\beta_j - \sum_{j=0}^{J} {}_{ij}\beta_j\right] = {}_{ij}\left[\beta_j - \overline{\beta}\right] \qquad (3.10)$$

Where $\overline{\beta} = \sum_{j=0}^{J} P_{ij}\beta_j$ is a probability weighted average of the β_j.

Test of significance of coefficients: Individual regression coefficients are tested with the reported z-statistics and the corresponding p-values as usual. The Likelihood ratio test, to test the significance of the overall model, involves three steps: (1) Estimate the full model including all of the variables and obtain the likelihood-ratio statistic LR_f^2; (2) Estimate the restricted model that excludes some explanatory variables, X_K and obtain LR_r^2 and (3) Compute the difference, $LR^2 = LR_f^2 - LR_r^2$ which is distributed as chi-square with j-1 degrees of freedom.

Test of the Independence of Irrelevant Alternatives (IIA): Independence of Irrelevant Alternatives refers to the situation where the odds in one outcome do not depend on other outcomes that are available or odds are mutually exclusive. In this sense, these alternative outcomes are "irrelevant." What this means is that adding or deleting outcomes does not affect the odds among the remaining outcomes. This can be tested by hausman specification test and the test statistic has the following form.

$$\chi^2 = \left(\hat{\beta}_r - \hat{\beta}_f\right)'\left[\hat{V}_r - \hat{V}_f\right]^{-1}\left(\hat{\beta}_r - \hat{\beta}_f\right) \qquad (3.11)$$

Where, r indicates estimators based on the restricted (constrained) subsets; f indicates estimators based on the full set of choices (unconstrained); β_r and β_f are the respective coefficients; V_r and V_f are the respective estimated covariance matrices.

3.6. Variable selection and definition

3.6.1. Dependent variable

Market outlet choice (MKTOUTCH): Is a categorical dependent variable used in multinomial logistic model and coded as 0 for the household who mainly chose end consumer outlet, 1 for the household who mainly chose private trader outlet and 2 for the household who mainly chose cooperative outlet.

3.6.2. Independent variables

Age of household head (AGE): A continuous variable measured in years showing how old the household was. Aged households are believed to be wise in their resource use and in searching out markets that provide high prices. Anteneh et al. (2011) used age as the major farmers' characteristic that significantly affected the coffee market outlet choice.

Education level of household head (EDUC): A continuous variable referring to the number of years of formal education the household head attended. Educated persons make better use of their time and available resources. Anteneh et al. (2011) confirmed that the level of education of the household head significantly influenced coffee market outlet choice.

Household size (HHSIZE): A quantitative

variable referring to the total number of members of the household. According to the study by Kadigi (2013), household size positively affected the probability of the choice of neighbor households as one of the milk marketing outlets.

Cooperative membership (MCOOP): A dummy variable coded as 1 if the household is a member of any agricultural cooperatives, and 0 otherwise. Cooperatives can improve the understanding of members about marketing and strengthen the relationship among the members. According to Berhanu et al. (2013), membership of cooperatives positively and significantly affected accessing cooperative milk market outlet as compared to accessing individual consumer milk market outlets.

Land size allotted to coffee production (COFLANDSIZE): A continuous variable representing the total area of land in hectares allocated for coffee. As the land of the household allotted to coffee increases, the yield proportionally may increase, so that the amount of coffee sold increases or decreases based on the market efficiencies. Tinsae (2008) found that land size allotted to coffee production had a positive influence on marketing through a cooperative outlet.

Distance from the nearest market (MKTDIS): A continuous variable measured in hours of travel and refers to the distance of the nearest market from the farmer's house. If the distance to the nearest market increases, the transportation cost will also increase. Riziki et al. (2015) confirmed that distance to the market is a significant determinant of choice of marketing outlet.

Quantity of coffee sold (QCOFFSOLD): A continuous independent variable measured in quintals and shows the quantity of coffee sold in the year prior to the survey year. A marginal increase in coffee production has an obvious and significant influence on the marketable supply of coffee. If the marketable supply of coffee increases, the ability of farmers to choose their market increases. Daniel (2006) confirmed that the yield of *teff* had a positive influence on sales to cooperatives as the marketing agents.

Transportation access (TRANSP): A dummy variable coded as 1 if the household owned the transportation facility and 0 otherwise. The availability of transportation facilities helps to reduce long market distance constraints, offering greater depth in marketing choices. Abraham (2013) found a positive influence of owning transportation on the choice of a collector outlet compared to a wholesale outlet in the marketing of vegetables.

Total livestock holding (TLU): A continuous variable and refers to the total number of livestock the household own in terms of TLU. A household with a larger TLU can have a better economic strength and financial position to purchase coffee and hire labor during the peak season. According to Rehima (2006) as cited in Abraham (2013), TLU had a negative influence on the quantity of pepper sales through different market outlets.

Access to price information (PINF): A dummy variable coded as 1 if the household obtained market price information and 0 otherwise. Access to information helps the farmers to choose the market outlets that offer a high price for their product. According to Geoffrey (2015), access to price information had a positive influence on the choice of the local market

outlet in the marketing of pineapples.

Access to credit (ACRDT): A dummy variable coded as 1 if the household obtained credit from a rural financial institution(s) operating in the area and 0 otherwise. According to Kadigi (2013), access to credit had a negative influence on the choice of the neighbor milk market outlet.

Access to extension services (EXTSER): A dummy independent variable coded as 1 if the household had access to agricultural extension services and 0 otherwise. Agricultural extension services widen household knowledge regarding the use of improved agricultural technologies. Agricultural extension services can enhance households' skills and knowledge, and link households with technology and choice of markets.

Access to training (TRAIN): A dummy variable coded as 1 if the household attended formal agricultural training and 0 otherwise. Creation of awareness and skill development through training increases the understanding of farmers toward modern systems of coffee production. Ayelech (2011) found that access to training had a positive influence on the supply of avocados and mangos.

4. Results and discussion

4.1. Descriptive results

4.1.1. General characteristics of sampled households

The total sample size of respondents handled during the survey was 141 coffee producing households and out of these, 122 (86.5%) were male-headed and 19 (13.5%) were female-headed households. The distribution of marital status shows that 3 (2.1%), 115 (81.6%), 21 (14.9%) and 2 (1.4%) were single, married, widowed and divorced household heads, respectively. Regarding cooperative membership, 98 (69.5%) of the sampled households were members of different agricultural cooperatives and the rest 43 (30.5%) were not organized under any agricultural cooperatives. The cooperative membership distribution of sampled households shows 50 (35.5%), 22 (15.6%), 6 (4.3%) and 20 (14.2%) were members of Burka Dongoro, Gudetu Bacho, Leta Harrojji and Lalisa Lalo agricultural cooperatives respectively. Coffee production is the main occupation and source of livelihood for all sampled farmers - 141 (100%). That means all sampled households generate income from coffee marketing and/or production to earn their livelihood (Table 1).

The average age of the sampled respondents was 46.36 years with a standard deviation of 14.608. The education status of the sampled households shows that the average years of education of the household head was found to be 5.38 years with a standard deviation of 3.822. The average household size per household was found to be 6.26 persons with a standard deviation of 2.554. The distance to the nearest market is also taken into account and the average distance (expressed in hours) of the nearest market from the household residence is found to be 0.7310 hours with a standard deviation of 0.396 (Table 2).

4.1.2. Resource ownership

Land: The total land owned by the sampled households was divided into cultivated land and coffee farm land measured in hectares. From the survey result, the average size of the total land owned by households was found to

Table 1: General characteristics of sample households (categorical variables)

Variables	Item	Number of household	Percent
Sex	Male	122	86.5
	Female	19	13.5
Marital status	Single	3	2.1
	Married	115	81.6
	Widowed	21	14.9
	Divorced	2	1.4
Cooperative Membership	Yes	98	69.5
Cooperative Name	Burka Dongoro	50	35.5
	Gudetu Bacho	22	15.6
	Leta Harrojji	6	4.3
	Lalisa Lalo	20	14.2

Source: Computed from survey, 2015

be 0.951 hectares with a standard deviation of 0.589 and that of cultivated land was found to be 0.540 with a standard deviation of 0.446; whereas the average land size allotted to coffee production was 0.420 hectares with a standard deviation of 0.251 (Table 3). During the interview, some of the respondents reported that they have a scarcity of coffee farm land as these figure show and this has a great impact on their economic development.

Livestock: Livestock is the farmer's most important source of income, food and draught or traction power for the cultivation of land. Hence, households with larger livestock holdings have better access to draft power than those with smaller livestock holdings. A Livestock holding is also one of the main cash sources to purchase agricultural inputs. To assess the livestock holding of each household, the Tropical Livestock unit (TLU) per household was calculated. Table 3 depicts that the tropical livestock holding of sample households ranged from 0 to 16.93. The average livestock holding of coffee producing farmers in the study area was 3.505 TLU with a standard deviation of 2.699.

4.1.3. Coffee production and marketing (livelihood activities)

As discussed above, coffee production is the main occupation and source of livelihood for all sampled households. Table 4 demonstrates the type of seed used for the production of coffee by the sampled households. The result

Table 2: General characteristics of sampled households (continuous variables)

Variables	Mean	Std. dev.
Age (years)	46.36	14.608
Year of education (years)	5.38	3.822
Household size (number)	6.26	2.554
Distance to the market (hours)	0.731	0.396

Source: Computed from survey, 2015

Table 3: Distribution of households by resource ownership

Variables	Min	Max	Mean	Std. dev.
Total land (hectares)	0.1	3.00	0.951	0.589
Cultivated land (hectares)	0.00	2.5	0.540	0.446
Land allotted to coffee (hectares)	0.06	1.50	0.420	0.251
Tropical livestock holding (TLU)	0.00	16.93	3.505	2.699

Source: Computed from survey, 2015

confirmed that 94 (66.7%) used both local and improved coffee seed for the production of coffee. Forty-four households (31.2%) used local seed, whereas only 3 (2.1%) used improved seed. These figures show that the majority of the households used both types of coffee seed (local and improved) seed. The proportion of households who used improved coffee seed is very small. The majority of the households reported that they prepared the coffee seed by themselves.

Experience of production is important in increasing production and productivity of coffee because experienced farmers can more easily access opportunities for their production. The respondents said that having experience of coffee production made them more profitable in coffee production and/or marketing. But still the quantity obtained is not enough when compared with the experience of production. Table 5, depicts that the mean of coffee production experience of sampled households was found to be 20 years. In a given coffee year, on average, one household produced 6.39 quintal of coffee and sold 5.525 quintal, on average. This result shows that the quantity obtained is not enough with the production experience being so high. The probable reason is that the farmers are not well adapted with modern agricultural technology and with the use of improved coffee seed.

4.1.4. Coffee market outlet choices and market related access

The market outlets used for the marketing of coffee in the study area are private traders, cooperatives and direct selling to end consumers. The majority of the respondents reported that they mainly choose private traders because they can sell their coffee at any time they need to sell. Cooperatives have their own time schedule to buy coffee. This means farmers cannot access cooperatives outlet as per their interest. End consumers are not a popular coffee market outlet. The survey result revealed that 73

Table 4: Distribution of sampled households by the type of coffee seed used for production

Variables	Item	Number of households	Percent
Type of coffee seed used by household	Local	44	31.2
	Improved	3	2.1
	Both	94	66.7

Source: Computed from survey, 2015

Table 5: Coffee production experience and quantity of output

Variables	Mean	Std. dev.
Coffee production experience (years)	20.20	11.874
Quantity obtained in a given coffee year (quintal)	6.39	4.091
Quantity sold in a given coffee year (quintal)	5.525	3.909

Source: Computed from survey, 2015

(51.8%), 52 (36.9%) and only 16 (11.3%) of the respondents mainly choose private traders, cooperatives and end consumers outlets, respectively to sell their coffee products (Table 6).

Market related accesses such as transportation facilities and market price information are the most important accesses for more profitable production and marketing of coffee. The majority of the respondents do not have any form of transportation facility. They carry their coffee crops by themselves to the market. The result revealed 91 (64.5%) of the respondents do not have any form of transportation facility. The rest 50 (35.5%) of the respondents reported that they have the transportation facility. Market price information is another important market related access. From the survey result, it is revealed that 139 (98.6%) households had access to price information and the rest 2 (1.4%) did not have access to price information (Table 6). The sampled households get their market price information from Development agents, district experts, *kebele* administrators, the radio and directly from the market. Development agents and the radio are the most common source of market price information in the study area. The result shows almost all sampled households have market price information except those who do not have much coffee to sell and for which they do not need further information about price.

4.2. Inferential statistical models output results

Factors affecting coffee market outlet choices

Multinomial logistic regression was used to access coffee market outlet choices in three categories, end consumers, private traders, and cooperatives. Prior to running parameter esti-

Table 6: Coffee market outlet choice and market related access

Variables	Item	Number of household	Percent
To which market outlet do you mainly choose to sell your coffee?	End consumers	16	11.3
	Private traders	73	51.8
	Cooperatives	52	36.9
Have you transportation facility?	Yes	50	35.5
	No	91	64.5
Do you have access to market price information?	Yes	139	98.6
	No	2	1.4

Source: Computed from survey, 2015

mation of the multinomial logistic model, the independence of irrelevant alternatives (IIA) assumption was tested by the Hausman specification test. The hypothesis of the difference in coefficients not being systematic was tested. Under IIA assumption, we would expect no systematic change in the coefficients if we exclude one of the outcomes from the model. In this study, there is no systematic change in the coefficients when we exclude one of the outcomes. This shows that the assumption is well fitted. In order to overcome the estimation problems such as hetroscedasticity, the robust standard error is printed using the STATA command. For the diagnostic checking, no indogeneity problem is detected.

Table 7 presents the coefficients from multinomial logistic regression on the existing alternative marketing outlets in the sample and the marginal effects. According to Greene (2012), the sign of the coefficient shows the direction of influence of the variable on the logit. It follows that a positive value indicates an increase in the likelihood that a household will change to the alternative option from the reference (base) group.

The resulst showed two variables, transportation facility and access to market price information, were significant in both end consumer and cooperative market outlets compared to private traders. The quantity of coffee sold, access to credit and access to extension services significantly affected the main choice of the end consumer coffee market outlet while the variables distance to the nearest market and access to training significantly affected the choice of the cooperative outlet compared to the private trader outlet.

The results of the estimated marginal effects are discussed in terms of the significance and signs on the parameters. The positive estimated coefficients of a variable indicate that the probability of the coffee producers either mainly choosing end consumers or cooperatives relative to choosing private trader outlets increases as the explanatory variables increase. The implication is that the probability of the producers being in these outcomes (end consumer or cooperatives) is greater than the probability of being in a private trader market outlet (base category).

The negative and significant parameter indicates that the probability of using a private trader is higher than the probability of being in the two alternative outcomes. The estimates not significantly different from zero indicate that the explanatory variable concerned does not affect the probability of the coffee producers' decision using a private trader outlet outcome more than using the other two outcomes (end consumers or cooperatives). The results of the MNL and marginal effect as well as their possible discussions are presented below.

Quantity of coffee sold (QCOFFSOLD): The quantity of coffee sold negatively and significantly affected the main choice of an end consumer coffee market outlet. The marginal effect depicts that the quantity of coffee sold decreases the likelihood of choosing an end consumer coffee outlet by 1.5% other things being constant compared to choosing a private trader coffee outlet. The implication is that farmers' usage of an end consumer market outlet is negatively related to quantity of coffee sold. If the quantity of coffee to be sold is low, farmers are not forced to search for price and

market information. However, if the quantity to be sold is high, they search for a market outlet, which buys with the most effective price. This result is contradictory to the result obtained by Daniel (2006) who found that farmers' usage of the cooperatives as a marketing agent is positively related to the yield of *teff*.

Transportation access (TRANS): Transportation access positively and significantly affected the choice of both end consumer and cooperative outlets. The marginal effects depict that having any form of transportation facility increases the likelihood of mainly choosing end consumer and cooperative outlet by 5.4% and 20.3%, respectively, compared to private trader outlet, given that other things are constant. This can be attributed to the fact that those who have their own transportation facility were able to travel further distances in order to sell their coffee to markets that offer higher prices than the private trader outlets. The availability of a transportation facility offers greater depth in choosing a market. This result is in line with Abraham (2013) who found that owning a transportation facility had a positive influence on the choice of a collector outlet compared to a wholesale outlet in the marketing of vegetables.

Access to market price information (PINF): Access to market price information positively and significantly influenced the choice of both end consumer and cooperative outlets. The implication is that getting coffee market price information most likely increases the likelihood of choosing both end consumer and cooperative outlets. The probable reason is that those farmers having price information would appropriately choose a coffee market outlet with a high price which fulfills their needs and which reduces transportation expenses. Other things being constant, having market price information increases the likelihood of choosing end consumer and cooperative outlets by 4.45% and 38.7%, respectively. The result obtained is contradictory to the result obtained by Berhanu et al. (2013) who found that access to a milk market outlet negatively affected accessing a cooperative milk market outlet.

Access to credit (ACRED): Access to credit positively and significantly influenced the choice of end consumer outlet. One of the reasons for accessing credit is to recruit a transportation facility to supply coffee to the market. Farmers who have access to formal credit have more possibility to choose their coffee market outlet than those who have no access to formal credit. In the study area, access to credit is determined by the availability of cash on hand. The finding of marginal effect depicts that, other things being constant, getting access to formal credit increases the likelihood of the main choice being an end consumer outlet by 8.8% compared to a private trader outlet. The implication is that if a farmer has access to credit he or she can easily access a transportation facility that assists in having a greater depth of market choice. The result obtained is contradictory to the result obtained by Kadigi (2013) who found a negative influence of access to credit on the neighbor milk market outlet.

Access to extension services (AEXTSERV): Access to extension services negatively and significantly affected the choice of end consumer outlet. Other things being constant, the likelihood of choosing end consumers outlet drops by 14.4% as a household receives ex-

Table 7: Coefficients and marginal effects of multinomial logistic model

Variables	B	Robust S.E	Z	P-value	Marginal effect
End consumer					
AGE	-0.026	0.277	-0.95	0.341	-0.001
EDUC	-0.220	0.144	-1.52	0.127	-0.009
HHSIZE	0.079	0.150	0.53	0.598	0.001
MCOOP (1=Yes)	-1.178	0.790	-1.49	0.136	-0.066
COFFARSIZE	0.6391	0.662	0.96	0.335	0.269
MKTDIST	-1.459	1.086	-1.34	0.179	-0.076
QCOFFSOLD	-0.404	0.239	-1.69	0.092***	-0.015
TRANS (1=Yes)	1.606	0.903	1.78	0.075***	0.054
TLU	-0.228	0.152	-1.50	0.133	-0.007
PINF (1=Yes)	15.484	1.681	9.21	0.000*	0.044
ACRED (1=Yes)	2.106	0.799	2.63	0.008*	0.088
AEXTSERV (1=Yes)	-2.101	0.860	-2.44	0.015**	-0.144
ACCTRAIN (1=Yes)	-0.198	0.834	-0.24	0.812	-0.24
_Cons	-11.127	2.764	-4.03	0.000	
Private traders (base outcome)					
Cooperative					
AGE	0.009	0.020	0.45	0.654	0.02
EDUC	0.065	0.062	1.06	0.288	0.018
HHSIZE	0.143	0.090	1.59	0.112	0.031
MCOOP (1=Yes)	0.483	0.542	0.89	0.372	0.126
COFFARSIZE	-0.234	0.345	-0.68	0.497	-0.061
MKTDIST	1.665	0.559	2.98	0.003*	0.392
QCOFFSOLD	-0.021	0.055	-0.39	0.697	0.000
TRANS (1=Yes)	1.017	0.483	2.11	0.035**	0.203
TLU	-0.089	0.087	-1.02	0.310	-0.017
PINF (1=Yes)	15.667	1.006	15.57	0.000*	0.387
ACRED (1=Yes)	0.240	0.449	0.53	0.593	0.020
AEXTSERV (1=Yes)	-0.422	0.619	-0.68	0.495	-0.034
ACCTRAIN (1=Yes)	1.298	0.694	1.87	0.062***	0.242
_Cons	-19.941	1.723	-11.57	0.000	
N=141 Prob>Chi2 = 0.0012 LR Chi2 (26) = 471.90*** Log likelihood = -108.04061					
Significance levels: * (1%), ** (5%) and *** (10%) Pseudo R^2 = 0.1981					

Source: Computed from survey, 2015

tension services relative to choosing private traders outlet. Farmers' access to extension services increased the ability of farmers to acquire important market information as well as other related agricultural information which in turn increases farmers' ability to choose the best market outlets for their products. This result is in line with the result obtained by Abraham (2013) who found a negative impact of agricultural extension services on the probability of choosing collector and retailer outlets compared to wholesale outlets in vegetable market outlet choice.

Access to training (TRAIN): The result indicated that access to agricultural training positively and significantly influenced the choice for cooperative outlet. The implication is that the participation of households in agricultural training most likely increases the likelihood of choosing cooperative outlet over private trader

outlets. The probable reason is that coffee production training given by cooperative leaders to coffee farmers enhances agricultural production skills, knowledge and experience of farmers. This situation helps farmers to get better production and this leads to them obtaining more income to fulfill their family requirements. The finding of the result depicts that, other things being constant, access to training increases the likelihood of mainly choosing cooperative outlet by 24.2% relative to choosing private traders. This result is in line with Ayelech (2011) who found a positive influence of access to training on the supply of avocado and mango marketing.

Distance to the nearest market (MKTDIST): Distance to the nearest market center positively and significantly affected the choice of cooperative outlets. The marginal effect indicates that, other things being constant, the likelihood of mainly choosing cooperative outlet increases by 39.2% for each hour distance away from the nearest market center relative to private trader outlet. This result is contradictory with the result obtained by Berhanu et al. (2013) who confirmed that distance to the nearest urban center negatively affected accessing hotel or restaurant milk market outlets as compared to accessing individual consumer milk market outlets.

5. Conclusion and recommendations

5.1. Conclusion

The majority of the annual total income of the farmers in the study area is generated from coffee production and/or marketing and the farmers there have high coffee production experience. The output obtained from coffee production is not enough compared to their experience due to the fact that improved coffee seed is used by only a small proportion of the farmers. In the marketing of coffee, the likelihood of choosing an end consumer outlet increases with the increase in transportation access, access to market price information and access to credit, whereas the quantity of coffee sold and access to agricultural extension service decrease the likelihood of choosing an end consumer outlet compared to a private trader outlet. The likelihood of choosing a cooperative outlet increases with an increase in transportation access, access to market price information, distance to the nearest market and access to extension services compared to choosing a private trader outlet. Access to transportation and access to market price information are vital for the marketing of coffee through both end consumer and cooperative outlets. A private trader outlet is the best option for farmers since it has marketing freedom in the sense that farmers can choose to sell their coffee at the time they need.

5.2. Recommendations

Policy recommendations have been drawn from the study findings as follows: (1) Expanding equal accessibility of infrastructures such as road and transportation facilities needs government intervention to promote the effective marketing of coffee through all outlets. (2) It is good if the government provides long term loans for the farmers to enable them to access agricultural inputs which promote the quantity of output and manage their coffee marketing and/or production more effectively. (3) The concerned bodies and information centers should be able to disseminate market price information at the appropriate time for the farmers so they can equally get accessibility.

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