FACTORS AFFECTING INFORMATION UTILIZATION IN COFFEE PRODUCTION PACKAGES AMONG SMALLHOLDER FARMERS IN WEST ETHIOPIA

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Abstract: The main objectives of the study were intended to investigate factors affecting coffee production packages information utilization by smallholder coffee growers in Ethiopia. Cross sectional research design and two stage sampling techniques were used to select sample households. The data were collected from both primary and secondary sources. The data was analyzed using descriptive and inferential statistics to describe factors affecting information utilizations in coffee production packages. Ordered logistic regression model was used to analyze the factors affecting information utilization in coffee package. From 16 explanatory variables hypothesized: age, household size, on-farm income, coffee farm size, radio use, social participation, farmer's willingness to share information and farmers perception toward coffee package practice were found to be significant at less than 1% and 5% significance level. In a nutshell, there are different demographic, economic, institutional and psychological factors which result in the reduction of coffee yields. Therefore, rural development strategy should give priority attention to promote coffee production package technologies by providing sustainable technical services through training practically by introducing coffee demonstration site and managing the existing old coffee farm in the study area.

Keywords: *Coffee Producers, Information Utilization, Ordered Logit Model*

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INTRODUCTION

Ethiopia is the center of origin and diversity of Arabica coffee (Anthony *et al.*, 2001) and important source of coffee genetic resources for the world coffee industry. Coffee production is a vital to the Ethiopian economy with about 15 million people directly or indirectly deriving their livelihoods from it (Tefera and Tefera, 2013). Report of Ethiopian Market Overview (2018) coffee exports accounts 30% among the other agricultural products. However, the National average productivity of the coffee is not more than 6-7 quintal clean coffee from a hectare which is very small amount (Tesfu, 2012). Lack of

dissemination of agricultural information from appropriate sources across smallholder coffee growers were a major difficulty to access and utilize agricultural information and utilization of relevant accurate and up-to-date agricultural information would ensure increased agricultural productivity (Banmeke and Ajayi, 2008). Due to this smallholder farmer who produces coffee in Ethiopia still follows traditional farming systems of production and management practices due to the limited utilization of agricultural information (Tefera and Tefera 2013). In the study area the implementation of coffee package practices was utilized in different level. This variation resulted in

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low production; low marketable products due to low quality product. This might be due to limited sources of information and personal, social, economical, institutional and psychological factors existed in the area.

The use of information in agriculture sector is enhances farming productivity in a number of ways (Bachhav, 2012). Lack of information dissemination, utilization and limited coverage of extension across the agricultural supply chain is a major concern in the developing world including Ethiopia (CSA, 2015). In the study area even though there is potential coffee production, the smallholder farmers frequently harvest low production in which the yield obtained from hectare was not more than 5 quintal of clean coffee which is below the national average as the report of (CTMDA, 2017). The reason behind for the reduction of production low utilization modern practice which is theoretically, shown by Meyer's (2000) model that small-scale farmers are not aware of modern practices and are dependent on their local knowledge. In the study area no any research was conducted so far which identify the sources of information in coffee packages and utilization, and locally specific factors affect modern coffee technology packages and its practices. So, this is the remaining parts of the problem to conduct the study for appropriate policy intervention to overcome the problems. Therefore, these gaps call for the study and motivated the researcher to conduct in the area. Therefore, investigating factors affecting information utilization in coffee production packages by smallholder coffee growers in the study area are important so as to endeavor future direction and policy recommendation.

RESEARCH METHODS

A cross-sectional survey design was used in this study. Both quantitative and qualitative data types were collected for this study from Primary and secondary data. Quantitative data were gathered using pre-tested, structured interview schedules from the respondents. Primary qualitative data, collected from Focus Group Discussion (FGD) and key informant interviews. Secondary data was collected from published and unpublished sources; documents. Two stage sampling techniques were used to select sample households. By using systematic random sampling, sample was taken from the total list of respondents proportionally in

each Kebeles. The sample size was determined by using (Yemane, 1967).

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

Where: n= Number of samples, e = maximum variability or margin of error 8%, N =total number of households; 1= probability of the event occurring.

$$n = \frac{4088}{1 + 4088(0.08)^{(2)}} = 151$$

In this study, quantitative data were analyzed using descriptive statistics and inferential statistic. Qualitative data were analyzed in the form of statements or narration. Besides, it was analyzed on the spot to minimize the risk of overlooking important information used for triangulation to reinforce the information obtained from, quantitative primary data. Ordered logistic regression was used in this study since the response variables have a natural ordering and assess the influence of the explanatory variables on the dependent variable. According to Green (2008), the functional form of ordered logit model was specified as:

$$\tilde{y} = \sum_{k=1}^k \beta_k * x_k + \varepsilon \dots \dots \dots 1$$

$\tilde{y}$ = latent variable and can be thought of as the underlying tendency of an observed phenomena
 ε = is disturbance term assumed to follow a certain symmetric distribution with zero mean such as nominal or logistic distribution. What do observe is

$$y= 1 \text{ if } \tilde{y} \leq \mu_1,$$

$$y= 2 \text{ if } \mu_1 < \tilde{y} \leq \mu_2,$$

$$y= 3 \text{ if } \mu_2 < \tilde{y} \leq \mu_3,$$

$$y=j \text{ if } \mu_{j-1} < \tilde{y}$$

Where y is observed in j number of ordered categories, μ are unknown threshold parameters separating the adjacent categories to estimate with β s. The general form of the probability that the observed y fall to category j and the μ s and the β s was estimated with ordinal logit model is

$$Prob(y = j) = 1 - L(nj - \sum_{k=1}^k \beta_k x_k) \dots \dots 2$$

RESULTS AND DISCUSSION

Factors Affecting Information Utilization in Coffee Production Packages

Demographic Factors

Age is one of the important explanatory variables that affect information utilization. As indicated in (Table 1) below, the mean age for low, medium and high coffee package information utilization was 48.54, 45.11 and 50.88 with the standard deviations of 6.90, 6.99 and 8.20 respectively. The result of mean test, using one-way ANOVA for information utilization in coffee package categories were ($F = 6.549$ and $P = 0.002$) and statistically

significant difference among the respondents in low, medium and high information utilization in coffee packages and practices.

In (Table 1) below, the total mean average family size of low, medium and high information utilization categories was 3.77 with the standard deviation of 1.40. The mean household size of low, medium and high coffee package information categories was 3.25, 3.88 and 4.88 with the standard deviation of 1.45, 1.28 and 1.09 respectively. One-way ANOVA test result shows that, information utilization ($F = 9.943$ and $P = 0.000$) significant mean difference between low, medium and high categories at 1% significant level based on their household size.

Table 1: Relationship of demographic variables with information utilization

Categories		N	Mean	S. Dev	Minimum	Maximum	F	P
Age of household head	Low	52	48.54	6.90	34.00	64.00	6.549**	0.002
	Medium	83	45.11	6.99	33.00	66.00		
	High	16	50.88	8.20	40.00	69.00		
	Total	151	46.90	7.35	33.00	69.00		
Household size	Low	52	3.25	1.45	0.75	7.90	9.943***	0.000
	Medium	83	3.88	1.28	1.00	7.15		
	High	16	4.88	1.09	3.10	7.20		
	Total	151	3.77	1.40	0.75	7.90		
Education Level	Low	52	4.37	2.85	0.00	12.00	7.658**	0.001
	Medium	83	6.19	2.89	0.00	12.00		
	High	16	6.56	2.48	2.00	10.00		
	Total	151	5.60	2.96	0.00	12.00		

Source: Own study (2017); Note that *** and ** significant at 1% and 5% probability level, respectively, *N*: sample size

In (Table 1) above the total mean average education level of low, medium and high information utilization categories was 5.60 with the standard deviation of 2.96 grades respectively. The mean education level of household in low, medium and high level categories were 4.37, 6.19 and 6.56 with the standard deviation of 2.85, 2.89 and 2.48 grades respectively. The one-way ANOVA test result shows that, information utilization ($F = 7.657$ and $P = 0.001$) is a significant mean difference among low, medium and high categories at 1% significant level.

Economic factors

The total mean annual on-farm income of total sample respondents was 23911 with the standard deviation of 15117. The mean annual income and standard deviation of low, medium and high information utilization was 14080, 25294, 48686

and 8429, 12504, 13733 Ethiopian Birr respectively. Further analysis using one-way ANOVA result indicates that, there is statistically significant mean difference between low, medium and high utilization ($F = 57.616$ and $P = 0.000$) categories at less than 1% significance level based on their on-farm income they earns. From (Table 2) below the total mean annual off-farm income of sample respondents were 2863 with the standard deviation of 1987. The mean average off farm income of low, medium and high was 2256, 3077 and 3726 ET Birr with the standard deviations of 1251, 2223 and 2197 respectively. The results of the mean test using one-way ANOVA indicated that, there is a significant difference between the respondent categories at ($F = 4.63$ and $P = 0.011$) significant level depends on their off-farm income.

Coffee farm size is also unique important factor decided information utilization in coffee

packages and practices. The assessment result shown in (Table 2) above, the mean total of coffee farm size was 1.66 ha with the standard deviation of 0.47 ha, respectively. The mean average of coffee farm size between low, medium and high category was 1.36, 1.71 and 2.38 with the standard

deviation of 0.35, 0.36 and 0.41 ha respectively. The results of one-way ANOVA show that there is a significant mean difference between utilization ($F = 49.99$ and $P = 0.000$) categories at less than 1% significance level.

Table 2: The relationship between economic factors and information utilization

Variable	Categories	N	Mean	Std. Dev	Minimum	Maximum	F	P
On farm income	Low	52	14080	8429	3305	38545	57.616***	0.000
	Medium	83	25294	12504	2410	51800		
	High	16	48686	13733	17145	70300		
	Total	151	23911	15117	2410	70300		
Off farm income	Low	52	2256	1251	200	6500	4.63**	0.011
	Medium	83	3077	2223	225	9945		
	High	16	3726	2197	1050	8000		
	Total	151	2863	1987	200	9945		
Total coffee farm size	Low	52	1.36	0.35	0.13	2.00	49.99***	0.000
	Medium	83	1.71	0.36	1.00	3.00		
	High	16	2.38	0.41	1.50	3.00		
	Total	151	1.66	0.47	0.13	3.00		

Sources: Own study (2017); Note that; ***, ** significant at 1% and 5% probability level, respectively, N= Sample size

Institutional factors

Proximity to a market place is important to purchase and sell different agricultural products and exchanging different information between producers, consumers, traders and utilized other social services. As indicated in table 3 mean total distance of household from nearest town were 4.60 km and standard deviation 1.80 km. The mean distance of households between low, medium and high categories were 5.2, 4.10, 5.23 km with the standard deviation of 2.20, 1.33, 1.94 km respectively. The results of the mean test using one-way ANOVA indicated that, there is significant ($F = 8.016$ and $P = 0.000$) between the respondents among the three information utilization categories.

Extension contact is the most important information dissemination means. In (Table 3) the total mean number of extensions contact of the respondents' in low, medium and high coffee production package information utilization category was 17.62 with the standard deviation of 7.4 days respectively. While the mean number of extensions contact for low, medium and high information utilization category was 17.7, 17.4, and 18.63 with the standard deviation of 7.5, 6.95, and 8.5 days respectively. The one-way ANOVA analysis test shows that there is statistically significant difference among respondents' in coffee package information utilization ($F = 0.192$ and $P = 0.825$) based on their extension participation at less than 5% probability level, respectively.

Table 3: Relationship of institutional variables with information utilization

Variable	Categories	N	Mean	Std. Dev	Minimum	Maximum	F	P
Distance from nearest town	Low	52	5.20	2.20	1.00	9.00	8.016***	0.000
	Medium	83	4.10	1.33	1.50	8.00		
	High	16	5.23	1.94	2.00	9.00		
	Total	151	4.60	1.80	1.00	9.00		
Number of extension contact	Low	52	17.70	7.74	6.00	36.00	0.192NS	0.825
	Medium	83	17.40	6.95	6.00	32.00		
	High	16	18.63	8.50	6.00	30.00		
	Total	151	17.62	7.35	6.00	36.00		

Sources: Own study (2017); Note that; *** is significant at 1% profanity level and NS: non-significant; N= Sample size

Table 4: Relationship of social participation (Idir) and radio use frequency with information utilization

Categories	Frequencies of radio use				χ^2	P
	Never	Sometimes	Always	Total		
Low	4	42	6	52	19.142***	0.001
Medium	0	53	30	83		
High	0	8	8	16		
Total	4	103	44	151		

Source: Own study (2017); Note that: *** is significant at 1% probability level

The frequency of radio use in this study shows pertaining to the usage and radio listening habits of the sample respondents. The results in the above (Table 4) shows 4 (2.6%) sample respondents not accessed and use radio, 103 (68%) respondents use radio sometimes and 44 (29.4%) used radio always. The Chi-square test result ($\chi^2 = 19.142$ and $P = 0.001$) for information utilization categories indicates that, there is a significant relationship between radio uses and respondents in low, medium and high categories at 1% significant level.

Psychological variables

Information seeking behavior is the extent to which an individual is ready to obtain information from different sources on various tasks she/he performs. The results in (Table 5) reveals that 44 (29.1%), 59 (39%), and 48 (31.9%) respondents were seeking information rarely, sometimes and always respectively. The statistical test of chi-square indicates that there is positive and significant ($\chi^2 = 12.331$ and $p = 0.015$) association between information seeking behavior of the respondents.

Table 5: Relationship of information seeking behavior with information utilization

Categories	Information seeking behavior			N	χ^2	P
	Rarely	Sometimes	Always			
Low	13	27	12	52	12.331**	0.015
Medium	30	26	27	83		
High	1	6	9	16		
Total	44	59	48	151		

Source: Own study (2017); Note: ** is significant at 5% probability level; NS =non-significant respectively

Influence of independent variables on the dependent variable

From the ordinal logistic regression model a positive estimated coefficient implies that the higher information utilization in coffee packages and practices the higher the values of explanatory variables. The estimated sign implies a unit change in the individual independent variables have in information utilization in coffee package and practices when all other variables are remaining constant. For dummy independent variables, the odd ratio was expressed in comparison to the base category ($x=0$). For continuous independent variables, the odd ratio was expressed for a one-unit change of the independent variable.

Age of the Household Head: Age of the respondents was hypothesized that it has a negative relationship with the dependent variable. The result of the ordered logit regression model has shown

that, age has negatively affected the dependent variable at 5% significant level. Odds ratio suggested as other variables remain constant one-year increase in age of household would cause information utilization of coffee packages decreases by a factor of 0.893 in versus to medium and low perception. The possible explanation for this condition is that, young farmers are strong and eager to utilize recommended coffee packages practice as compared to old farmers. Also, elder farmers tend to be risk averse and may avoid innovations in an attempt to avoid risk associated with the initiative, because some of the technologies to be used, sunk costs have to be incurred. This study is similar with the study conducted by Rukuniet *al.*, (2006) who reported, that being older creates a conservative feeling among farmers and hence resistance to change. The study also confirms the findings of Sanusiet *al.*,

(2004) and Ayoolaet *al.*, (2012) imply that farmers might not be energetic and excited enough to

embark on long term investment in coffee plantation as the age increase.

Table 6 Parameters estimates of the ordinal logistic regression model

Independent variables	Estimate	Std. Error	Wald	Sig.	Odd ratio
Age	-0.113	0.039	8.282	0.004***	0.893
Household size	0.538	0.224	5.752	0.016**	1.710
Education level	0.143	0.084	2.920	0.087NS	1.154
Total coffee farm	2.348	0.833	7.943	0.005***	10.381
On-farm income	6.606E-005	2.726E-005	5.871	0.015**	1.000
Livestock owner ship	0.289	0.164	3.110	0.078NS	1.335
Off-farm income	1.761E-005	0.000	0.020	0.886NS	1.000
Social participation	1.463	0.624	5.497	0.019**	4.319
Distance from market place	-0.135	0.138	0.967	0.325NS	0.874
Access to credit service	0.230	0.489	0.220	0.639NS	1.259
Number of extensions contact	0.052	0.034	2.294	0.130NS	1.053
Frequency of radio uses	1.029	0.545	3.564	0.059**	2.798
Innovation proneness	0.226	0.298	0.574	0.449NS	1.254
Information seeking behavior	0.343	0.315	1.188	0.276NS	1.409
Willingness to share information	1.390	0.514	7.309	0.007***	4.015
Atti. toward coffee package technology	1.791	0.693	6.685	0.010***	5.995
Cut = 1	12.083	3.186	14.382	.000	
Cut = 2	18.334	3.569	26.393	.000	

Source: Model output (2017); -2 Log Likelihood = 282.039, chi-square test = 146.696, High base category Significant =0.000, pseudo R² (Nagelkerke) = 0.735 *** and ** is significant at 1% and 5% probability level and NS= non- significant.

Household size: From the econometric ordered logit model result, it is observed that number of family size has a positive and significant influence on utilization categories at 5% probability level. The result shown in table 6 indicated that, holding the other variables constant, one unit increase in adult equivalent, would cause utilization of coffee package information increases by a factor of 1.710 in versus to medium and low perception. The probable reason behind is that a farmer with larger household size relatively supplies more labor force who participates in coffee production activities. The This result agreed with Hassenet *al.*, (2012) who reported that farmer's decision on utilization of improved practices and technologies becomes dependent on the availability of labor force in the household. The conducted by Assefa and Yared (2016) is similar with this study who reported that households that have a larger number of working group members were more likely to be included in utilization of agricultural information.

On-farm income: The model result revealed that on farm income has positive and significant influence on information utilizations in coffee productions package at less than 5% level of

significance. Holding the other variables constant, a one Birr increase on farm income would cause information utilization in coffee packages increases by a factor of 1 versus to the medium and low perception. This might be respondents have more income privately will purchase different farm inputs and implements as well and get more profit by selling the product obtained from the farm. This is in line with Lalisa (2016) who reported that households who earn more on-farm income are more likely to adopt new production packages. In the same line, Kidane (2001), Degnetet *al.*, (2001) and Getahun (2004) reported that farm income has a positive influence of households in adoption of improved agricultural technologies.

Coffee farm size: coffee farm size was significantly and positively influencing information utilization at less than 5% significance level. The model output indicates that by a 1 hectare increase in coffee farm size, would cause information utilization in coffee production package by a factor of 10.381 times more versus the medium and low perception when the other variables remain constant. This might be a farmer with large farm size would plant more coffee seedling, and

relatively harvest more yield and more flow of money into the family, hence, relatively strong purchasing power to buy coffee package inputs. This study is in line with the study conducted by Okwu and Lorkaa (2011) who reported that farmers with large farms are likely to be better informed, richer and keener in searching for information on improved technologies. It is also similar to the study conducted by Gebregziabher (2012) who reported that the farm size has a positive and significant influence on utilizations of new agricultural practices.

Social participation: The ordinal logit model result indicates that social participation has a significant and positive influence on coffee packages information utilization by 5% significant level. Odds ratio suggested as other variable remain constant, increases in frequency score of social participation would cause coffee package information utilization to increase by the factor of 3.281 versus in the medium and lower category. This implies that as the participation of farmers in social organization increase, the probability of information utilization in coffee packages and practices also increases. This study is in line with the study conducted by Getahun (2008) who reported that social participation increases utilization of wheat production packages.

Frequencies of radio use: The result of the model indicates that the frequency of radio listening shows a significant and positive influence information utilization at 5% level of significance. The odds ratio suggested that increase in frequency of radio listening would cause utilization of coffee package information by the factors 2.798 versus in the medium and lower category when the other factor kept constant. This might be due to the fact that farmers who have high (more frequently listening) have more utilized information than those farmers who have no/less radio exposure. The study is similar with study was conducted by Tilahun (2008) who reported those who have high exposure (more frequently listen) have more access and use information than those who have no/less radio listing. This study is in line with (Lwoga, 2010; Mtega, 2008); Olaleye *et al.*, 2009) which indicated rural radio, is one of the services offered by Telecentres, has gained a great role in Tanzania.

Willingness to share information: The model output reveals that willingness to share information positively influences information utilization in

coffee production package at 1% significance level. Odds ratio suggested as other variable remain constant, increase, willingness to share information would cause coffee package information utilization by the factor of 4.015 versus to unwillingness category when the other category remain constant. This might be because of farm households who are willing to share information, can easily communicate, access and utilize agricultural information. This result is in line with the study conducted by Tsadikan (2016). The study conducted by Getahun (2008) has similar results.

Attitude towards coffee package technology: The model output reveals that the attitude of farmers towards coffee package technology is positively influences, information utilization at 5% significance level. Odds ratio suggested as other variable remain constant, the increase in positive attitude towards higher level coffee package technology would affect more coffee package information utilization by the factor of 5.995 versus to the negative attitude. Positive attitude towards improved farming is one of the factors which could speed up the farm change process (Tadese, 2008).

CONCLUSION AND SUGGESTIONS

Coffee is one of the major cash and exported commodity in Ethiopia in general and Homa district in particular. Even though it is precious product to the areas farmers harvests low amount of yield which arises from less and infrequently information utilization in modern coffee production packages and its practice technologies by farmers in the area. The result of one-way ANOVA and Chi-square test more of the hypothesized variables were significantly related with dependent variable and some of them were insignificant relation with dependent variable. Further analysis was done by using ordered logit econometric model to know the detail influence of different explanatory variables on dependent variable. Age of the household size, on-farm income, coffee farm size, a frequency of radio use, social participation, and willingness to share information and attitude toward coffee packages technology were found to be significantly affect at less than 1% and 5% significance level. On the basis of this study the following recommendations are suggested for practical action and future studies. Age of the respondents had significantly and negatively influencing the information utilization. Therefore, current

extensions systems will need to strengthen coffee packages information dissemination as well as need to put a concerted effort to address the elder group of farmers through facilitating multi extension dissemination.

Household size had a significant and positive relationship with information utilization in coffee production packages. For more valuable it is recommended that Woreda coffee, tea and market development authority should be addressing labor supply gaps through organized small family size work to gather in order to manage all activities in a given work plan and seasons. The study revealed that farm income had a significant and positively related with information utilization. Therefore, the rural development strategy should give priority attention to promote on-farm diversification technologies by providing sustainable technical training for small household farmers.

Coffee farm size was significantly and positively related with the dependent variable. Therefore, wise utilization of coffee farm in the study area should be strengthening, since the coffee plant in the study area is very old, it is recommended that stumping or uprooting the old coffee trees which is not improved by stumping and replacing with the new variety coffee seedling. Participation of farmers in social organization is significantly influencing information utilization. The presence relevant organizations in the study area increase the probability of farmers to utilize more coffee production package. Therefore, it is recommended that all local planners and others concerned bodies should be given priority attentions to strengthen public institutions and incorporating it in to agricultural development planning in order to facilitate farmers participation in organization. This enables them to have more information about the existence of the available packages.

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