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Knowledge and Attitude of Small holder Coffee Producing Farmers to Coffee Quality: The Case of Oromiya and South Nations Nationalities and Peoples Regional States, Ethiopia

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ABSTRACT

In time bound when nobody was sure how Coffee arabica is originally discovered, farmers in Ethiopia have been growing quality coffee in the untamed forests of Kaffa and Buno areas. As a result, coffee is an important source of genetic resource for the world where Ethiopia stands as the Africa's leading producer and domestic consumer and the World's fifth largest producer of coffee. Despite its earliest establishment, a series of complaints are reported from this origin of coffee legend which even resulted in to rejection of export consignments. Correspondingly, there is no comprehensive study conducted to identify the contribution of smallholder farmers' knowledge on coffee quality. To this effect, eighteen variables were assessed by the survey and the result signified ten variables were found significant at ($P<0.10$) probability level. Form these variables, market distance, distance to washing stations, frequency of training and actors' efforts to improve quality were important to influence coffee quality. Similarly of the 12 items selected items for comparison in attitude scale, primary actors involved in quality improvement, awareness of quality trend, skill and knowledge of farmers were important items that affected coffee quality. The finding has also indicated farmers had virtually low information regarding quality beans they produced and their social, institutional, economical and psychological factors differ across the study areas and among respondents. These necessitated strengthening linkages among institutions so as to popularize the already available technologies.

Keywords: Attitude, Knowledge, Coffee, Oromiya, Quality

INTRODUCTION

Ethiopia is the World's fifth largest coffee producer, the Africa's leading domestic consumer and oldest exporter of coffee (*Coffee arabica* L.) in the world (Bäckman, 2009; Wintgens, 2004). Its afromontane rainforests are the origin of the crop which contributes 35 % of export earnings and 10% of revenue source for Ethiopia. It is also an important source of genetic resources for the coffee industry. As a matter of fact, Ethiopia is the only center of origin and diversity of the crop (Endale et al, 2007).

Coffee is also an important source of income and employment in developing countries of Latin America, Africa and Asia (Anthony *et al.,* 2001). Because of its tremendous importance in the Ethiopian economy, 400,000 tons of clean coffee is produced annually in Ethiopia. Similarly about 22 million people of Ethiopia (25%) directly or indirectly depend on coffee. The crop is thus considered as 'socio-political crop of the country' (Boot, 2007; Petit, 2007; Wrigley, 1988).

Though Ethiopian coffee is prominent in world market for its quality; its production is mainly concentrated in Oromiya (53.3%) and the Southern Nations, Nationalities and People's Region States (SNNPRS) 42.6%. But all the rest Regional States totally accounted for 4.1% of the total production (Endale *et al.*, 2007).

Coffee quality is a quantifiable characteristic which is related to tastes, smells, and personal preferences. Though Coffee quality is an aggregate outcome of genotype, environment, agronomic and postharvest attributes, human controlled factors largely contributes to the intrinsic quality which basically emanates due to difference in knowledge and attitudes of smallholder coffee farmers with the context of cultural managements which they were practicing in their farms (Petit, 2007). Thus series complaints rose on the moribund quality (Dessie, 2003) though there is no concerted public support and systematically documented knowledge which could benefit the sector.

Correspondingly, there is no comprehensive study conducted to identify the contribution of knowledge and attitude of smallholder farmers about factors affecting coffee quality series complaints were rose despite its importance (Wintgens, 2004; Dessie, 2008). Thus the sector is at its infancy to utilize its potential which is the rationale to restrained competitiveness in the market. To solve these problems farm-level quality improvement was given high priority to capitalize farmers' indigenous knowledge and thereby to improve coffee quality (Kawuma, 2003). In consideration of these facts, this study is conducted to show the pragmatic realties in major coffee growing regions of Ethiopia.

Research objectives

Major objective:

To assess farmers' knowledge and attitude towards coffee quality in the study areas

Specific objectives

- To assess production methods and decision making matrix of coffee smallholder farmers
- To identify indigenous knowledge and attitudes that determine coffee quality
- To identify socio-economic and institutional factors which are related to coffee quality

RESEARCH METHODOLOGY

Description of the Study Area

Oromiya is one the largest States of Ethiopia both in terms of population and area. The state is well known as origin of *Coffee arabica* and it stretches from Western to South-Western boarder of Ethiopia, between 3^0 and 15^0 North Latitude; and 33^0 and 40^0 of East Longitude (FDRE, 2003).

There are about 965,303 coffee producing household heads that produce a total of 165,121 ha of coffee with total productivity of 651 kg ha^{-1}. Similarly these farmers possess an average total farm size of less than 5 acres per household. The average family size in Oromiya is 4.8 persons per household, which is exactly similar to SNNPRS (CSA, 2007).

SNNPRS is the second largest coffee producing areas of Ethiopia and it is found in Southern part of Ethiopia, stretching from the Boarder of Kenya in South and South Sudan to the South-West, Gambella and Oromiya Regional States in North West and North East directions, respectively (FDRE, 2003; CSA, 2007).

Coffee in SNNPRS contributes more than 73% of regional GDP and 90% of employment. The total number of coffee producing household head in this regional state is 1,116,601 and these farmers totally hold an area of 68,978 ha of coffee farmers. Out of 134 Districts in SNNPRS 64 are coffee growers. The annual average exports of clean coffee from the region is about 85,500 tones and it contributes 67% and 29% of the National washed and unwashed coffee export, respectively.

With a total contribution of 96 percent of coffee production of Ethiopia, Oromiya and SNNPRS, produces a total of 400,000 ha of coffee area. And from this total area, 53.3% (213,000 ha) is produced by Oromiya; and the rest 170,000 ha is produced in SNNPRS.

Study site

The study was conducted in five coffee producing Zones of Oromiya and SNNP Regional States of Ethiopia namely: Sidama and Gedeo Zones of SNNPRs; and Jimma, Illuababora and Western Wellega Zones of Oromiya Regional State. All these Zones are well characterized by humid tropical climate with temperature range of 25^0c-30^0c where coffee is produced in very fragmented manners (FDRE, 2003).

The main towns of Sidama and Gedeo Zones in SNNPRS are located to the Southern Ethiopia with 275 and 360 Km distance from the capital City, Addis Ababa, respectively. Similarly the two administrative Zones in Oromiya Regional State, Jimma and Illuababora are found in South-western Ethiopia and their main towns: Jima and Metu are located at a distance of 356 and 623 Km away from the capital city, respectively. But the last study zone, Western Wellega, is found in the western part of Ethiopia with a distance of 445 Km away from the capital city.

Research Design and Sampling Technique

By using multistage sampling technique, Oromiya and SNNPRS were purposively selected at first stage. This is because the States are prominent coffee producing areas where almost all coffee in Ethiopia is produced from (96%). Then a total of five Zones namely: Gedeo and Sidama from SNNPRS and Jimma, Illuababora and Western Wellega Zones from Oromiya were selected by using Simple Random Sampling technique at the

second stage. Subsequently, Probability Proportional to Size; was employed to select eight Districts from Oromiya and six from SNNPRS that made a total of 14 coffee producing Districts for the study. Then at fifth stage, twenty five sample Kebele[1] Administrations selected based on PPS and Slovin's sampling formula was used to select a total of 253 respondent households.

Methods of Data Collection

Interview schedules were administered by trained researchers from Jimma Agricultural Research Center and data was collected on demographic characteristics, institutional and social services, access to information, attitudes of farmers, agronomic practices, effluent discharges and adulteration. Similarly market price particulars such as: pricing for different coffee quality and awareness of farmers to quality trend, were collected through semi-structured interview schedules.

Similarly purposive sampling was employed to collect data from 22 key informants and five Focus Group Discussions (FGD) participants who were knowledgeable to the subject matter.

Method of Data Analysis

Statistical Package for Social Sciences (SPSS) version 16 was run to generate tabulated reports, charts; plots of distributions and descriptive statistics. T-test; and Chi square tests were analyzed to identify mean differences among continuous and discrete variables, respectively. Likert scale was also used to test attitude of respondents.

RESULT AND DISCUSSION

Demographic characteristics

Age

With Standard Deviation of 12.94, the mean age of household heads was 44.45 years which is equal to the National Average (45 years). But farmers in Oromiya are older (48.88 years) than that of SNNPRS (40.21 years). This result indicated older age in Oromiya influenced the households to have a short planning horizon than young farmers as a result they are not willing to accept and to utilize new information due to their reluctance. But in contrast younger age in SNNPRS assisted the farmers to innovativeness

The finding is similar to Million and Belay (2004) and Sharon (2004) who reported young age increased willingness to change and thereby offer incentives for lasting quality where older farmers were less willing to get information than younger ones. Similarly Gockowski and Ndoumbe (2004) on adoption of intensive mono-crop, horticulture in southern Cameroon indicated that younger farmers were more likely to adopt new technologies and thereby the effect of age on probability of adoption was elastic.

[1] Kebele is the lowest socio-political administrative strata in Ethiopia

Table 1. Demographic characteristics in the study areas

Characteristics	Oromiya (N=144)		SNNPR (N=109)		Total (N=253)		t-test	P value
	Mean	SD	Mean	SD	Mean	SD		
Age of household heads'	48.88	13.84	40.21	11.02	44.45	12.94	28.56	0.003***
Family size (no.)	6.70	12.51	7.98	2.11	7.34	15.42	5.63	0.076*
Experience in coffee farming (year)	24.12	4.11	29.37	13.47	26.74	5.45	-25.60	0.002 ***
Household Characteristics								
Education level (%)	Oromiya (N=144)		SNNPR (N=109)		Total		$\chi 2$	P value
Illiterate	14.7		16.70		15.70		25.45	0.00***
Read and write	20.0		6.70		13.65			
Primary school	50.0		16.60		33.35			
Post primary	14.70		60.00		37.30			
Marital status (%)								
Single	0.00		0.00		0.00		13.56	0.422
Married	94.10		100.00		97.05			
Divorced	5.90		0.00		2.95			

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Experience

Experience on coffee farming was larger in Oromiya (29.37 years) than SNNPRS (24.12 years) (Table 2). The result assisted the farmers to access and use information better than non-experienced farmers in SNNPRS. Thus long experience in Oromiya is expected to bring positive contribution for innovativeness and thereby technology adoption. Despite the higher experience, farmers in Oromiya were less responsive to evaluate the advantage of the technology than others. Consequently these farmers were bounded in their cultural and tradition which eroded their confidences (t=25.60; p=0.002).

The finding is similar to Chilot et al (1996) who found a negative relationship of farming experience that influenced improved coffee technology adoption. Similarly, Million (2001) showed that increase in age as proxy to farming experience brought negative impact on adoption of long term investment without tangible return in short period of time. Thus experienced farmers were found to be negative due to reluctance to adopt improved technologies.

Family Size

With significant mean difference of p<0.1 (t=0.149), the mean family size per household was 7.34 with a. And this result was by far greater than the National Average 4.8 persons per household (CSA, 2007). The higher family size contributed to overcome the higher demand of labor force on routine field activities like: picking and pruning and thereby positively contributed to improve coffee quality (Table 3). As a proxy for labor availability, family size of households was negatively correlated to maintain coffee quality particular.

The result is similar to Legesse et al (2004) who stated large family size of productive labor in adult man equivalent provided adequate labor to improve quality particulars. But the result was not

significant to households' participation in commercial cattle production. Techane (2002) has reported family labor has assisted to acquire better information and to take the risk associated in new practices.

Farm Size

The average farm size per household in all study sites was 1.52 ha but coffee farmers in SNNPRS have allocated 0.6 ha which is less than the Oromiya's (0.96 ha) and the National average farm size, 0.8ha (CSA, 2007). The result indicated 63.97 percent of farmers possess less than a quarter of a hectare of land (Table 3). The F-test result also revealed that the mean difference between the groups is statistically significant at less than 1% probability level which implied land access was an acute problem. However, the result further showed farmers in Oromiya have better opportunity to introduce new improved technologies.

A similar result is reported by Million and Belay (2004) who indicated farm size exerted positive influence on adoption of improved technologies.

Table 2. Average farm size by farmer

Characteristics	Oromiya (N=144)		SNNPR (N=109)		Mean (N=253)	
	Local	**Improved**	**Local**	**Improved**	**Local**	**Improved**
< 0.25 ha	34.24	51.62	47.3	76.32	40.77	63.97
0.25 - 0.5 ha	22.72	21.28	17.6	6.00	20.16	13.64
0.51 - 1ha	19.52	15.25	20.5	11.7	20.01	13.48
1.1 - 2ha	15.32	9.21	11.7	2.95	13.51	6.08
> 2ha	8.2	2.64	2.9	3.03	5.55	2.84
F						22.38
P value						0.002***

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Dependency ratio

The dependency ratio of the study areas was 1.35 persons which signified an occurrence of 135 dependent persons for every 100 working force, which is greater than the National Average (0.97). However Oromiya showed high dependency ratio (1.58) than SNNPR (1.12) which indicated the labor scarcity for quality particulars.

The result is line to Million and Belay (2004) that depicted customary presence of dependents where the constraints have resulted in lesser purchasing ability and thereby higher dependency ratio.

Institutional and social services

Farm Distance

The statistical analysis results of farm distance found negative significant association to quality particulars at 5% probability (t= -7.07) and farmers in SNNPRS were closer than those farmers in Oromiya (1.25 km and 3.66 km) respectively. This assisted farmers to participate in intensive farming practices to apply for different cultural practices and improving coffee quality. The result further signified a mean farm distance of 2.46km. Thus improvement in coffee quality declined as farm distance increased in non-selective picking and costs for transport. The result is similar to Legesse et al (2004) who showed farm distance is negatively associated with significant effects.

Market Distance

Physical access to market which was measured by frequency of household heads was affected the infrastructure availability where markets were important social services which determine returns to investment. Thus a negative but significant association observed in the study sites (t=-6.95, p=0.091) where inadequate infrastructure brought physical inaccessibility and thereby reduced coffee quality. The mean market distance of 5.54 km farmers in SNNPRS were closer (4.36 km) than Oromiya's. This has minimized the required labor cost and time spent to access markets Thus as distance increased by one hour, the probability of farmers' in SNNPRS has decreased by 2.3. Thus the longer the time taken to reach to local market, the lesser intensity of the HHHs adopt fattening package in the study area.

The result agreed with Daviron and Ponte (2005) who found negative and significant relationship between adoption and distance to market entailed high marketing and transaction cost.

Table 3. Demographic characteristics of coffee farmers in the study areas

Access to infrastructures	Oromiya (N=144)		SNNPR (N=109)		Total (N=253)		t value	P value
	Mean	SD	Mean	SD	Mean	SD		
Farm distance (km)	3.66	15.23	1.25	6.72	2.46	6.02	-7.07	0.039**
Market distance (km)	6.92	14.41	4.36	12.21	5.54	1.56	-6.95	0.091*
Distance to DA office (km)	5.38	22.32	2.66	5.86	3.52	11.85	9.21	0.525
Distance to washing station	8.55	7.17	5.11	4.23	6.83	2.08	-10.54	0.001***
Frequency to								
Demonstration	19.17	11.13	25.3	12.38	22.2	0.88	20.74	0.525
By extension worker	18.20	5.42	31.2	6.78	24.7	0.96	6.28	0.041**
Training	2.33	6.65	3.40	5.71	2.87	0.66	5.67	0.005***

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Distance to Development Agents office

Frequency of farmers' contact to DAs was better in SNNPRS (2.66 km) than farmers in Oromiya (5.38 km). This closeness assisted increase the frequency of contact to update their knowledge and skills for improvement of coffee quality.

The result is in line with findings of Chilot et al (1996) who reported availability of information communication process and brought improved technologies.

Access to information

Source of information

Extension personnel advice, training and demonstration were popular sources of information in the study areas. It was found that a total of 74.15%, 19.13%, 2.14% and 4.58% of farmers were obtained information from radio, television, leaflet and posters, respectively (Table 4). However, their accessed to radio didn't support to improve the quality of coffee due to lack of paying attention to listen radio

programs ($\chi 2$= -2.618, p=0.005). Consequently, radio and TV price notice is the only market price information where actors' got day-to-day market information and market price fluctuations. The finding is in line with Dempsey (2006) who reported lack of agricultural programs through Medias has deterred to improve and gain better reward from agricultural production.

Table 4. Sources of information for Farmers in percent

Sources of information	Oromiya (N=144)	SNNPR (N=109)	$\chi 2$	P
Radio	88.33	81.24	0.00	0.005***
Television	16.26	22.04	4.020	0.785
Leaflet	2.82	1.46	7.45	0.08*
Posters	6.71	2.45	21.22	0.056*

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Extension Advise

The result showed 49 and 56.08 % in Ormiya and SNNPR sample households have access to extension contact: agricultural education, training, demonstration, farm visit, seed distribution, and extension service records. Similarly, the total average frequency was 6.36 and 9.12 days per year in SNNPRS and Oromiya (Table 5); and thereby improved quality particulars. But the chi-square result is statistically insignificant (p=0.56).

The result agrees with findings of Million and Belay (2004) farmers' participation in extension service brought positive and significant relationship on the adoption of improved maize technology.

Table 5. Sources of information for farmers

Sources of information	Extension advise			Visit To Demonstration			Training frequency		
	Mean	$\chi 2$	P	Mean	$\chi 2$	P	Mean	$\chi 2$	P
SNNPRS	56.08	21.2	0.56**	11	7.7	0.02**	28.92	4	0.456
Oromiya	41.92			4			14.08		
Total	49			7.5			21.5		

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Visit to demonstration

Demonstration sites were done2.375 days per year, to update knowledge and skills of farmers and to provide them with timely information. Consequently, the opportunity brought change on farmers' behavior and positively influenced coffee quality. Therefore, better access to information is gained to change farmers' intent into action.

The result agreed with the findings of Legesse et al (2004) who reported

frequent visit to demonstration favored the adoption of new varieties.

Training Frequency

17.79% of respondents received training from agricultural offices with frequency of (0.8 days per year).The training enables the experts to transfer specific knowledge to farmers. However, insignificant relationship was observed between groups to create better attitudinal change towards improving coffee quality. Hence failure of conducting frequent training resulted in poor technology.
This result agrees with findings of Yishak (2005) who reported that recurrent training has assisted for quality improvement and adoption of improved technology.

Attitudes of farmers

Market price

Coffee production in Ethiopia is marketed via two main channels: domestic consumption and for exports. Most of smallholder farmers both in SNNPR (68.81) and Oromiya (56.25%) sold their coffee to local collectors in the nearby markets. The lower market price is regularly fixed based on International market price announced each morning through radio. Thus spatial market price is vibrant along chain actors and it varied across days (Table 6). However the price is higher at start of picking and decreases across time mainly due to due to oversupply of coffee production.

The finding is similar to Daviron and Ponte (2005) and Oxfam (2002) who reported the global coffee market are currently plagued by two paradoxes: coffee boom in consuming countries, and coffee crisis due to oversupply of low quality and shortage of high quality coffee which are driving the coffee market. Thu authors further explained after termination of the International Coffee Agreement between producing and consuming countries in 1989, the oversupply of coffee by producing countries is the main factor that affect coffee market price.

Table 6. Coffee local market for fresh cherry

Variable	Oromiya (N=144)		SNNPR (N=109)		Total (N=253)		χ^2	P Value
	N	%	N	%	N	%		
Actors in market	32.00	56.25	15.00	68.81	47.00	62.53		
Local collector	81.00	22.22	75.00	13.76	156.00	17.99	6.21	0.000***
Cooperatives	7.00	4.86	4.00	3.67	11.00	4.27		
Local market	24.00	16.67	15.00	13.76	39.00	15.21		
Directly for private pulping factories	19	13.19	52.00	48.1	71.00	30.65	25.62	0.005***
Nearest selling point distance								
< 1 km	19	13.19	52	48.1	71.00	30.65	25.62	0.005***
1-2 km	29	20.14	20	18.4	49.00	19.27		
2.1-3.5 km	51	35.42	10	9.5	61.00	22.46		
3.5 - 7.0 km	20	13.89	18	15.4	38.00	14.64		
> 7 km	25	17.36	9	8.6	34.00	12.98		

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Different prices for different coffee quality

Quality factors are not totally considered for price variations in "buni coffee marketing" i.e. dried but un-hulled coffee. Thus all respondents from the two regions mentioned that absence of differential pricing is evident especially for buni coffee. Consequently farmers gave little attention for quality starting from picking until post-harvest this contributed to deterioration of coffee quality in the study areas.

Thus small-scale farmers, who produce bulk of coffee, are price takers who can't negotiate for better prices and therefore they are at the mercy of merchants who have better market information. Thus lower retail price directly affected the value placed for intrinsic quality of Ethiopian coffee and its reputation.

Attitude of quality and its consequence

72.91 % of respondents in Oromiya and 38 % in SNNPR didn't perceive coffee quality is declining. However 27.09 % of farmers in Oromiya and 62% of farmers in SNNPR have perceived coffee quality is declining and 56.70% farmers from SNNPR acknowledged quality is declining improve quality.

The result indicated the readiness of the farmers to further improve coffee quality in SNPRS, the second largest coffee producer in Ethiopia. The finding is similar to the results of Dessie (2008) and Dempsey (2006) who reported, the export return to Ethiopian coffee is disproportionately low due lack of pricing based on quality particulars. But the report further signified some Ethiopian fine coffees through wet coffee processing achieved far higher export prices when traded in specialty coffee.

Table 7. **Attitudes of farmers to coffee quality issues**

Farmers' Attitude	Oromiya (N=144)		SNNPR (N=109)		Total (N=253)		χ^2	P Value
	N	%	N	%	N	%		
Quality is declining								
Strongly disagree	59	40.97	18	16.70	77	28.95	4.251	0.04**
Disagree	46	31.94	14	13.30	60	22.55		
Not decided	13	9.03	15	13.30	28	11.05		
Agree	17	11.81	0	0.00	17	5.85		
Strongly agree	9	6.25	62	56.70	71	31.60		
Effort exerted to improve quality								
Strongly disagree	0	0.00	45	41.28	45	20.64	15.25	0.009***
Disagree	4	2.78	27	26.32	31	14.61		
Not decided	26	18.06	0	0.00	26	8.80		
Agree	39	27.08	7	5.62	46	16.41		
Strongly agree	75	52.08	30	26.78	105	39.54		
Government made efforts to improve quality								
Strongly disagree	34	23.61	33	30.00	67	26.90	5.71	0.512**
Disagree	30	20.83	15	13.30	45	16.90		
Not decided	22	15.28	0	0.00	22	7.60		
Agree	53	36.81	40	36.70	93	36.96		
Strongly agree	5	3.47	21	20.00	26	11.65		
Farmers are primary actors to improve quality								
Strongly disagree	52	36.11	31	28.36	83	31.86	10.56	0.000***
Disagree	36	25.00	30	27.18	66	26.37		
Not decided	0	0.00	0	0.00	0	0.00		
Agree	37	25.69	25	23.34	62	24.68		
Strongly agree	19	13.19	23	21.12	42	17.10		
Improving quality brought extra cost								
Strongly disagree	84	58.33	36	33.30	120	46.05	28.36	0.356*
Disagree	25	17.36	0	0.00	25	8.80		
Not decided	17	11.81	0	0.00	17	5.90		
Agree	18	12.50	11	10.00	29	10.90		
Strongly agree	0	0.00	62	56.70	62	28.35		

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Cultural practices

Coffee Picking

Coffee picking was the most important field operations that affect coffee quality and the result indicated that strip picking (65%) was dominant in the study areas indicating large amount of coffee is perpetually supplied as buni coffee. These farmers reported, non-selective picking was preferable because it eased stripping of entire crop at once and reduced harvesting costs where opportunities are attained at cost of quality decline.

Sun drying

Several types of coffee drying materials and sun drying were exclusively used in all the study areas. The result showed that, floor and raised bed sun drying method were the most widely used

drying materials used in the study areas (34.78 and 26.09%) respectively (Table 8). Tables with wire mesh, sisal or bamboo mats were also used for drying coffee (20.55%). However, mechanized drying installations: such as solar and other artificial dryers were entirely absent in the study areas

Table 8. Coffee drying materials in the study areas

Coffee drying	Oromiya (N=144)		SNNPR (N=109)		Total (N=253)		χ^2	P Value
	N	%	N	%	N	%		
Floor drying	65	45.14	23	21.10	88.00	34.78	21.87	0.000***
Raised bed drying	25	17.36	41	37.61	66.00	26.09		
Cemented floor drying	12	8.33	18	16.51	30.00	11.86		
Drying on asphalt road	14	9.72	3	2.75	17.00	6.72		
Drying on sisal or bamboo mats	28	19.44	24	22.02	52.00	20.55		

*** Significant at 1 percent (P≤0.01) ** Significant at 5 percent (P ≤0.05) * Significant at 10 percent (P ≤0.1)

Effluent discharge and adulteration

74.32% coffee pulping factories in the study areas were accustomed to let out coffee effluents without any treatment this resulted environmental pollution problem in the area. Besides 62% of the farmers don't have awareness about the cause and effect of recalcitrant and biodegradable environmental pollutants.

This finding is similar to Tsigereda (2011) who reported effluents generated from coffee processing plants brought change in physical, biological and chemical behavior of streams and the environment by depleting dissolved oxygen from the streams and by letting out toxic substances and chemicals like tannins, alkaloids (caffeine) and polyphenolics which could eventually bring environmental pollution

CONCLUSION AND RECOMMENDATION

Conclusion

The Ethiopian coffee sector is characterized by a number of distinctive features of which the most important include the following

Recommendation

- The extension service should mainly focus on assisting small-scale farmers to improve quality of coffee by disseminating research generated information and technologies.
- Attempts should be done to ensure farmers participation and strengthening interactions among different actors.
- Successive and regular short-term training should be offered for front line extension workers, subject matter specialists and extension managers.
- Information dissemination in media should focus on appropriate channels, contents and time of broadcast

- Coffee effluent from processing industries should be treated effectively
- Coffee grading should accompany the dry processed coffee, buni, as integral part of marketing system,
- Efforts should be exerted to avert constraints of small-scale women farmers who deserves of special attention
- Well organized and market oriented farmers organizations should be promoted to assist market share and niche markets

Improving production/ productivity and consistent quality through use of appropriate technologies and improved post-harvest technologies

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