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Research Article

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Production and adoption constraints of improved coffee varieties in Jimma zone, Southwest Ethiopia

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ABSTRACT

The study was aimed to identify major coffee production problems that affected coffee farmers' production and productivity. The study was conducted in four districts of Jimma zone namely Gera, Manna, Limu Kosa and Gomma. Multistage sampling technique was employed to select the population for the study which involved both purposive and random sampling techniques. Data was collected through structured questionnaire administered to sampled farmers from 285 coffee producing households. Both descriptive and inferential statistics were used to analyze the gathered and cleaned data. Kendall's coefficient of concordance was used to rank the most important coffee production constraints. The study has identified three top constraints on coffee production. Low and fluctuating coffee price, coffee market information problem and lack of coffee seed and seedling varieties preferred were the major problems explored. Strengthening cooperatives and unions, sustainable supply of improved coffee seeds and seedlings, and sustainable coffee seed system are suggested to tackle coffee production problems.

KEYWORDS: Constraint, Cooperative, Kendall, Market Information, Unions

BACKGROUND AND RATIONALE

World coffee production is increasing from year to year in spite of huge market volatility and environmental constraints [1, 2]. Arabica coffee has its center of origin in southwestern and southeastern Ethiopia [3,4]. Ethiopia produces 9% of world's Arabica coffee with a value of 7.2 million 60kg bags annually. Brazil and Colombia ranked first and second with 57% and 22% of the total production, respectively [5].

In Ethiopia, coffee is cultivated in four distinct production systems. Garden coffee refers to the bulk of Ethiopian coffee which represents more than 50% of total coffee coverage. It is grown by smallholder farmers intercropped among other crops in the southern and eastern regions. The last production system is plantation which is grown on large state owned or commercial farms (represents 5% of production). The plantation production system that mainly observed in the southwestern part of the country under heavy shade and intensive management is based on improved varieties and agronomic practices [6,7].

Pokorná and Smutka [8] reported that international coffee trade does not support the developing or least developed countries Bizualem *et al.* [9] pointed out lack of capital, poor extension service, poor market infrastructure, low and volatile coffee price, poor linkage to cooperatives as a major coffee production and marketing constraints. Apart from these, disease and lack of pest control programs also results in decline in coffee production [10].

Jimma agricultural research center has been developing new technologies, better resources utilization, and developed several coffee technology packages. A number of coffee cultivars that combine high yield, disease resistance and quality character were developed by the center. In addition to these technologies, several recommendations have been developed on pest and disease management, agronomic and soil fertility management [11]. Jimma zone is one of the major coffee producing areas of Ethiopia. Despite the dissemination of coffee improved technologies through different coffee extension approaches, utilization of the improved technologies is poor. Intensive study on the constraining factors for coffee production has not been studied using different methodologies. This study was designed to explore constraints of coffee production. The result of the study could be helpful for coffee related biological and physiological researchers, academicians and policy makers.

Objectives

The overall objective of the study is identifying major constraints of coffee production in Jimma zone. The specific objectives are:-

- To identify constraints that hinder coffee production activities on the study area.
- To suggest policy options the way coffee production bottlenecks could be eliminated.

MATERIALS AND METHODS

Study Area Description

The study was conducted in four districts of Jimma zone namely Gera, Manna, Limu Kosa and Gomma districts.

Gera district is found in the southwest of Jimma Zone. It shares border with Chekorsa to the south east, with Gomma to the east, with Setema to the north east, with Sigmo to the north west, with Shebe Sombo to the south and the south Ethiopian people's nations and nationalities to the west and south west. Its absolute location ranges between $7^0$27' to $7^0$55' north latitude and $38^0$01' to $36^0$24' east longitude. Tropical, Semi tropical and temperate agro climates respectively shares 15%, 35% and 50% of the district's total area. The mean annual temperature of the district ranges from 15-22^{0}c. The vast area of the district's annual rainfall varies between 1300mm and 1700mm. Coffee and *teff* are the major local cash crops in the district.

Limu Kosa district extends between $7^0$50' to $8^0$36' north latitudes and $36^0$44' to $37^0$29'east longitudes. It is bordered with Limmu Seka district in north and West Shoa Zone in north east, with Tiro Afeta in southeast, with Manna and Kersa districts in south, with Buno Bedele zone and Gomma district in west. It is situated in the north central part of the zone. Sub-tropical and temperate agro climates do respectively constitute 70% and 15% of the district's areas. The remaining 15% of the district's agro climate does have tropical climate. The mean annual temperature of the district ranges from 18-23^{0}c. The mean annual rainfall of the district ranges from 1300-2300mm. Maize and coffee are the main crops grown in the district.

Gomma district extends between $7^0$40' to $8^0$04' north latitudes and $36^0$17' to 36^0 46'east longitudes. It is bordered with Didesa district in north, with Limmu Kosa district in east, with Manna district in southeast, with Seka Chekorsa in south and with Gera district in west. It is situated in the central part of the zone. Most part of the district belongs to subtropical and temperate agro climates. Sub-tropical and temperate agro climates do respectively constitute 88% and 12% of the district's area. The mean annual temperature of the district ranges between 15^{0}c and 22^{0}c. The vast area of the district's annual rainfall varies between 1700mm and 2100 mm. Maize and coffee are also the main crops grown in the district.

Manna district extends between $7^0$38' to $7^0$54' north latitudes and $36^0$38' to $36^0$53'east longitudes. It is bordered with Gomma and Limmu Kosa districts in north, with Kersa district in east, with Seka Chekorsa district in south and with Gomma district in west. It is also situated in the central part of the zone. Sub-tropical and temperate agro climates do respectively constitute 80% and 20% of the district's total areas. The vast part of the district does have with mean annual temperature ranges between 18^{0}c and 20^{0}c. The district has mean annual rainfall which lies between 1300 and 1700mm. Maize and coffee are the main crops grown in the district [12].

Sampling Procedure

Multistage sampling technique was employed to select the population for the study which involved both purposive and random sampling techniques. First, districts were purposively picked, and secondly *kebeles* were selected using random sampling method. Finally, households were randomly chosen from the sampling frame exist at *kebele* level. A total of 205 households were selected for the study.

Data Collection and Analysis

Data was collected through structured questionnaire administered to sampled farmers from March 2017 to April 2017. All demographic, socio-economic, coffee production and utilization, technology use, adoption pathway, constraints of production and technology adoption were collected.

Information related to coffee production and utilization was gathered from the respondents. Households' socio demographic, institution and economic features were also collected. Data were cleaned, organized and analyzed using STATA version 14.2 software. Both descriptive and inferential statistics were used to analyze the gathered and cleaned data. The Kendall coefficient of concordance was used to assess the constraints against the production of coffee [13]. In our case, constraints were ranked from 1-10; 1 being the most constraining factor and 10 being the least constraining factor.

RESULT AND DISCUSSION

Farmers' Demographic Structure

The study was conducted on four coffee potential districts of Jimma zone in Oromia regional state. Total number of respondents interviewed was 205. Out of the total respondents, 95.1% were male headed households and the rest were female headed.

The marital status of the farmers showed that the majority of them were married and insignificant amount were widowed household heads. Regarding occupation, most of respondents were engaged on full time agricultural work on own farm. Out of the total respondents, the education level of more than halve of respondents were primary education and few were non-educated. Gomma and Manna districts have the least non educated respondents, and Limu Kosa have the highest non educated respondents (Table 1).

Table 1: Socio-demographic characteristics by districts

Variables	Gomma (N=46)	Gera (N=50)	Limu Kosa (N=71)	Manna (N=38)	Overall (N=205)
Gender in %					
Male	95.7	98.0	94.4	92.1	95.1
Female	4.30	2.0	5.6	7.9	4.9
Marital status in %					
Married living with spouse	95.6	98.0	91.6	92.2	94.2
Married living without spouse	0.0	0.0	1.4	2.6	1.0
Single/Never married	0.0	0.0	1.4	0.0	0.4
Divorced	2.2	0.0	1.4	2.6	1.5
Widowed	2.2	2.0	4.2	2.6	2.9
Occupation of the household head in %					
Agriculture self employed	93.5	96.0	93.0	97.4	94.5
Agriculture wage labor	4.3	0.0	1.4	0.0	1.5
Non agriculture self employed	0.0	0.0	2.8	0.0	1.0
Non-agricultural wage labor	2.2	2.0	1.4	2.6	2.0
Domestic work	0.0	2.0	1.4	0.0	1.0
Education level of the household head in %					
Non educated	8.7	20.0	22.6	10.5	16.6
Adult/religious education	2.2	18.0	2.8	5.3	6.8
Primary education (1-8)	65.2	56.0	56.3	68.4	60.5
Secondary education (9-12)	23.9	6.0	18.3	15.8	16.1
College education	0.0	0.0	0.0	0.0	0.0

Source: Survey result, 2017

Table 2: Other socio demographic variables

Variable	Gomma (N=46)		Gera (N=50)		Limu Kosa (N=71)		Manna (N=38)		Overall (N=205)		P-value
	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	
Head age	45.46	1.59	41.56	1.35	47.77	1.48	44.24	1.17	47.08	0.79	0.143
Family size	7.02	0.33	6.76	0.27	6.38	0.28	6.50	0.33	6.64	0.15	0.049**

*Indicate significance level at 5% Source: Survey result, 2017

The age of the respondents was examined as it is an important demographic factor to affect agricultural activities. The result showed non-significant difference among the districts in age of respondents. The mean age of the respondents was 47.08 years. Family size affects agricultural productivity and production as it is the proxy for labour. The survey result revealed that large mean family size was seen at Gomma district and the lowest mean family size existed at Limu Kosa district. The overall mean family size was 6.64. Table 2 showed statistically significant difference between districts in number of family size of the household at 5% significance level.

The age of respondents across gender revealed that female headed households have larger age than male headed households. However, male headed households have high mean family size than female headed households which is significant at 10% significance level (Table 3).

Table 3: Socio demographic characteristics by gender

Variables	Male headed household (N=195)		Female headed households (N=10)		P-value
	Mean	S.E	Mean	S.E	
Age	44.96	0.80	47.50	3.89	0.488
Family size	6.70	0.16	5.40	0.72	0.066*

*Indicate significance level at 10% Source: Survey result, 2017

Land Ownership and Tenure Arrangement

Land is the main irreplaceable factor of production in agricultural sector. The study result showed that the mean land size of the respondents is 2.14 hectares. However, large land size was seen at Gera and Limu Kosa. The study showed statistically significant difference between the districts in land size at 10% significance level. Coffee land holding of the study area revealed that Gera and Limu Kosa district's farmers holds as large coffee land. The small land size was observed at Gomma district. However, there was no statistically significant difference between districts in terms of coffee land size (Table 4). The mean share of coffee land from total land is 69.6% which is high at Manna district. The land covered by coffee at Manna district is 77.4% which is by far higher than the rest of districts.

Land holding among gender also revealed that male headed households have large mean land holding as compared to the female counterparts though no statistically significant difference. On other hands, coffee land holding by gender has also been seen. The result pointed out that male headed households have large coffee land relative to female headed counterparts. Despite the result, there is no significant difference between coffee lands among gender. The share of coffee land among male and female headed households showed

coffee has covered 69.4% of male headed household's land and 81.6% of the female headed counterparts (Table 5).

Number of plots affects the resource allocation and utilization of the farmers which in turn affect the gross margin of a farm. The study was tried to assess the number of coffee plots that farmers own. The result of the study showed that the mean number of coffee plot is 2.33 across the study districts. However, coffee land fragmentation is high at Gomma district and lower at Manna district.

Farmers' Coffee Farm Characteristics

Totally 539 coffee plots of 205 farmers were investigated on the survey. Farmers' perception on coffee plots' soil fertility showed that 37.85% of plots are good and 13.73% are poor in fertility. Gera district has relatively higher proportion of coffee plots and Gomma district has lower fertile plots according to farmers' traditional evaluation and perception. The slope of the coffee plots was also seen on the survey. The descriptive result of the study showed that 32.84%, 48.98 and 18.18% of coffee plots have gentle, medium and steeply slope respectively. Farmers' evaluation of depth of the soil of the coffee plots showed that 50.1% has medium and 23% has deep soil. Gomma district has relatively high proportion of deep soil and Manna has the least. Regarding soil color, the majority of the plots' soil is red (42.49%). Black and brown soil covers 38.03% and 19.48% of the total coffee plots (Table 7).

The study was also tried to examine soil and water conservation methods and structures applied on farmers' coffee land. Accordingly, soil bunds and terrace were structures used by farmers relatively. About 77.5% of respondents do not used any conservation structures on their coffee land.

Farmers' Awareness for Improved Coffee Varieties

Awareness is the most crucial step for the adoption of agricultural technologies. Farmers were asked whether they have information about coffee cultivars with high productivity, disease resistant and high sensory quality. Accordingly, most of the farmers of each district knew the existence of improved coffee cultivars.

The information for the cultivars also differs among gender. The result pointed out that 80% of male headed households have awareness about the cultivars. Out of female headed households, 50% have information and 50% do not. The reason could be male headed households have more access to and socially delegated to meetings, training and farmers' field days.

Coffee Productivity

The overall objective of coffee production is yield. Coffee yield differ from location to location. Aside the coffee's morphological and physiological characteristics, different socio economic and geographical features affect the productivity of coffee. Despite the factors, high coffee yield was seen at Manna district and lowest clean coffee productivity per hectares was seen at Limu Kosa. The mean overall coffee yield per hectare was 769 kg/ha which is higher than national average (710 kg/ha) by 8.3%. However, there was no significant productivity difference between study areas (P=0.768).

Due different socio economic factors, productivity may differ among gender groups. Despite non-significant difference between the groups (P=0.520), male headed households' productivity (842 kg/hectare) is higher than the female headed households' productivity (766 kg/hectare).

Table 4: Land holding and share of coffee by location

Description	Gomma (N=46)		Gera (N=50)		Limu Kosa (N=71)		Manna (N=38)		Overall (N=205)		P value
	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	
Total land in hectares	1.94	0.32	2.39	0.25	2.40	0.24	1.55	0.18	2.14	0.13	0.087*
Coffee land in hectares	1.35	0.19	1.64	0.20	1.63	0.23	1.20	0.16	1.49	0.11	0.465
Share of coffee in %	69.6		68.6		67.9		77.4		69.6		0.002***

***,*Indicate significance level at 1% and 10% respectively Source: Survey result, 2017

Table 5: Land holding and share of coffee by gender

Description	Male headed households (N=195)		Female headed households (N=10)		P-value
	Mean	S.E	Mean	S.E	
Mean land in hectares	2.16	0.13	1.74	0.49	0.438
Mean coffee land in hectares	1.50	0.11	1.42	0.52	0.886
Share of coffee in %	69.4		81.6		0.995

Source: Survey result, 2017

Table 6: Coffee plot holding by location

Gomma (N=46)		Gera (N=50)		Limu Kosa (N=71)		Manna (N=38)		Overall (N=205)		P-value
Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	
2.46	0.18	2.18	0.16	2.46	0.15	2.09	0.17	2.33	0.08	0.310

Source: Survey result, 2017

Table 7: Coffee plots characteristics by location

Coffee plots' features	Gomma (N=137)	Gera (N=111)	Limu Kosa (N=195)	Manna (N=96)	Overall (N=539)
Soil fertility in % from total plots					
Good	34.30	48.65	34.87	36.46	37.85
Medium	51.11	45.05	50.26	44.79	48.42
Poor	14.59	6.30	14.87	18.75	13.73
Slope in % from total plots					
Gentle slope	33.58	31.53	29.23	40.63	32.84
Medium slope	42.33	56.76	53.85	39.58	48.98
Steeply slope	24.09	11.71	16.92	19.79	18.18
Soil depth in % from total plots					
Shallow	18.25	35.14	30.26	22.92	26.90
Medium	51.82	43.24	48.72	58.33	50.10
Deep	29.93	21.62	21.02	18.75	23.00
Soil color in % from total plots					
Black soil	41.61	40.54	35.38	35.41	38.03
Brown soil	19.71	20.72	20.51	15.63	19.48
Red soil	38.68	38.74	44.11	48.96	42.49

Where N=total number of plots examined Source: Survey result, 2017

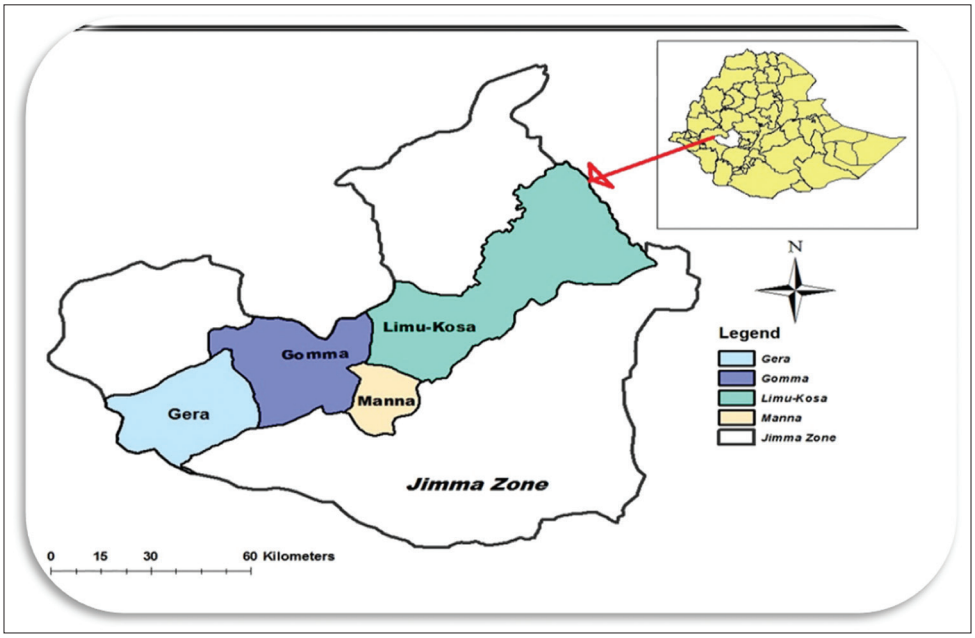

Figure 1: Map of the study districts

Source of Planting Material

Seed and seedlings are two planting materials for coffee that has been diffused to users. The main source of seed and seedlings is government extension services. There is no certified coffee seed supplier in Ethiopia. However, Jimma agricultural research center produces seed and disseminate to districts according to their request and agro ecology. The districts disseminate the seed to model farmers and farmers' groups. The extension also prepares seedlings at government nurseries which could be sold to farmers at low price. Accordingly, the result of the survey revealed that 46% and 61% of farmers got seed and seedlings respectively from government extension. Own prepared, gifts and NGOs are also the sources of the planting materials. Research center also supplies seedlings in some cases like for the establishment of demonstration and scaling out of improved coffee technologies (Figure 5).

Sources of Information

Information is the basic tool for the transfer of agricultural technologies. Different information dissemination and awareness creation method has been modeled and used by researchers. Training is one of the main methods among the models. The result revealed that 62% of respondents have got training on coffee production, post-harvest handling and marketing.

Different bodies provided information for the farmers in the study area. The major one was government extension service which accounts for 61.1% of farmers. Research center specifically Jimma agricultural research center also contributes its share in providing information and knowledge for 19.1% of respondents.

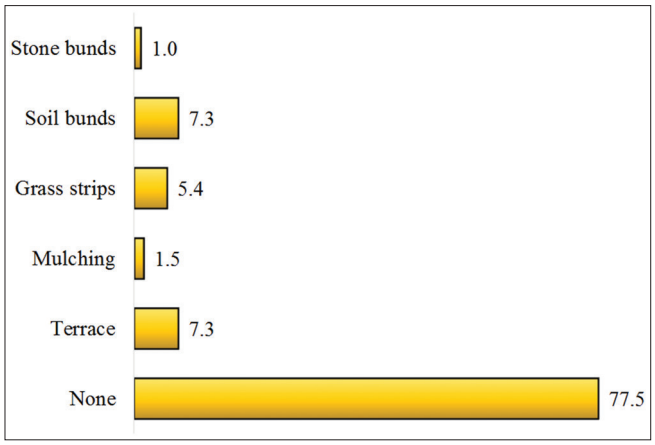

Figure 2: Soil and water conservation structures on coffee farms in %

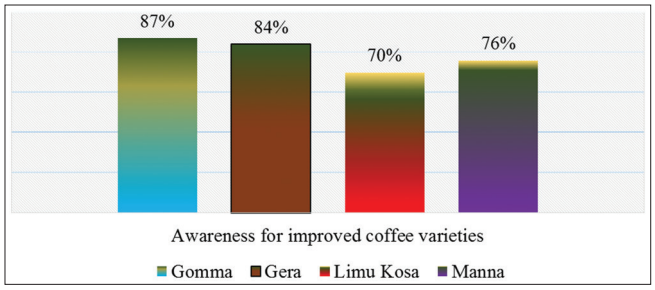

Figure 3: Awareness for improved coffee cultivars by location

This study identified the interrelationship between training and adoption of improved coffee technologies. The result showed that 61% of respondents who have participated on coffee related training have adopted the improved varieties. However, 39% of respondents who got training didn't adopted improved coffee varieties (Figure 7).

Different studies revealed that participation on farmers' field days positively and significantly affects adoption of improved agricultural technologies. This study was also identified the descriptive impact of participation coffee field days on adoption. The result revealed 68% of respondents who have participated on farmers' field days adopted the improved coffee varieties and 32% did not.

Coffee Produce Utilization

The utilization of coffee produce was also examined on the study area. The result of the study showed that the highest commercialization level was seen at Gera district (90.8%) and relatively the lowest was recorded at Manna district (86.5%). The mean commercialization level of coffee on the study area was 88.6%. When we see the consumption of coffee, the mean consumption of coffee was 6.8% and the highest coffee consumers were farmers of Limu Kosa district (7.8%). Generally, there is no wider difference in coffee consumption among the districts.

Perception on Improved Coffee Technologies

Perception about the specific technology strongly affects farmers' adoption decision [14]. The respondents were asked to give

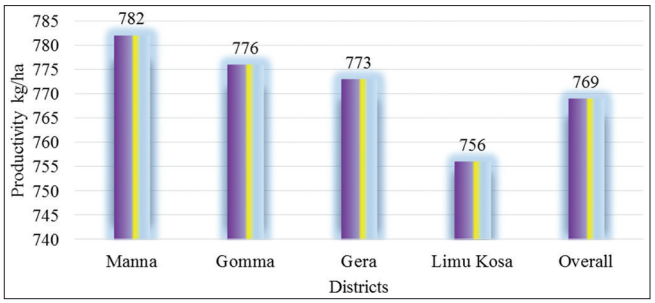

Figure 4: Productivity by districts

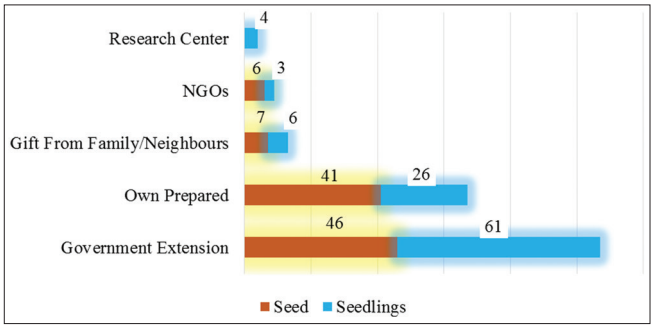

Figure 5: Source of coffee planting materials in %

their level of agreement on perception statements comparing the improved varieties with the local varieties. The agreement levels were arranged on hedonic scale of 1 to 10 (1 indicating strong agreement and 10 indicating strong disagreement to the statement). Accordingly, farmers strongly agree in high yield, vigorously and large canopy size and disease tolerance of improved coffee varieties relative to the local counterparts (Table 10).

Constraints to Improved Coffee Adoption

Agriculture is risky and uncertain sector of developing world economy. Production, marketing, financial, human and institutional factors are the most commonly known risks in agriculture. Coffee farmers were told ten major problems related to coffee production on their area to rank them based on their importance. The result of Kendall's coefficient of concordance summarized below showed that fluctuating coffee price is the most important problem ranked first. This was the problem raised by almost all farmers interviewed. The problem of coffee price is related to coffee global price which is set by giant coffee processing and marketing companies. The constraint ranked second was lack of reliable coffee market information. Own observation in this regard also showed farmers sell their product to local traders without having any know how about update coffee price. The third important problem identified by the coffee farmers was lack of coffee seed and seedling varieties preferred (Table 9).

CONCLUSIONS AND RECOMMENDATIONS

The study was aimed to identify major coffee production problems that affected coffee farmers' production and productivity. The result of the study identified three main coffee related problems raised and ranked by farmers namely coffee

Table 8: Utilization of coffee produce

Description	Gomma	Gera	Limu Kosa	Manna	Total
Mean Production (kg/household)	1828	1807	1453	1851	1697
Mean coffee sold (kg)	1587	1641	1302	1601	1504
Mean coffee for other uses (kg)	124	62	99.6	96.5	77
Mean coffee consumed (kg)	117	110	114	125	116
Sale % (Commercialization)	86.8	90.8	89.6	86.5	88.6
Consumption %	6.4	6.1	7.8	6.8	6.8

Source: Survey result

Table 9: Ranking of coffee production constraint

Constraints	Mean rank	Global rank
Coffee prices	2.90	1
Markets information	4.90	2
Getting preferred coffee variety (seed/seedling)	4.93	3
Prices of coffee seed/seedlings	5.10	4
Getting required quality coffee seed/seedlings	5.26	5
Timely availability of coffee seed/seedlings	5.31	6
Getting required quantity of coffee seed/seedlings	5.40	7
Availability of credit to buy improved coffee seed/seedlings	6.14	8
Availability of herbicides	6.95	9
Timely availability of coffee seed/seedlings	8.10	10
Chi-square=53.40; Kendall's coefficient of concordance=0.272***		

Source: Survey result

Table 10: Farmers' perception of important varietal attributes

Coffee characteristics	Mean rank	Global rank
Coffee improved varieties have high yield	3.52	1
Coffee improved varieties are vigorous and have large canopy	5.54	2
Coffee improved varieties are disease tolerant	5.71	3
Coffee improved varieties matures early	5.86	4
Coffee improved varieties have good berry size	6.06	5
Coffee improved varieties are insect tolerant	6.23	6
Coffee improved varieties have good berry color	6.76	7
Coffee improved varieties are drought tolerant	6.92	8
Coffee improved varieties are frost tolerant	7.16	9
Coffee improved varieties have good sensory quality (taste)	7.25	10
Coffee improved varieties are labor demanding	7.58	11
Coffee improved varieties are input demanding	9.40	12
Chi-square: 283.355'; Kendall's coefficient of concordance=0.187***		

Source: Survey resul

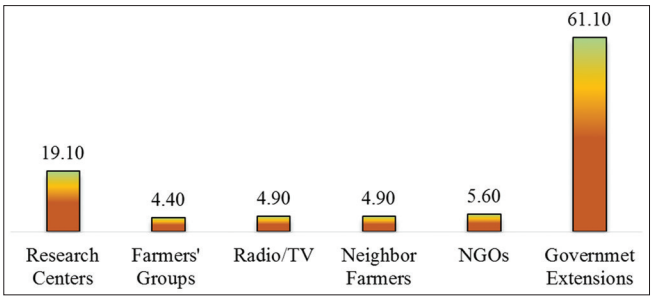

Figure 6: Source of information about improved coffee technologies in %

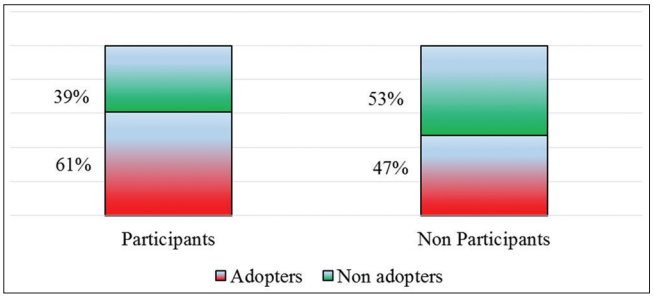

Figure 7: Descriptive relation of participation on coffee related training and adoption

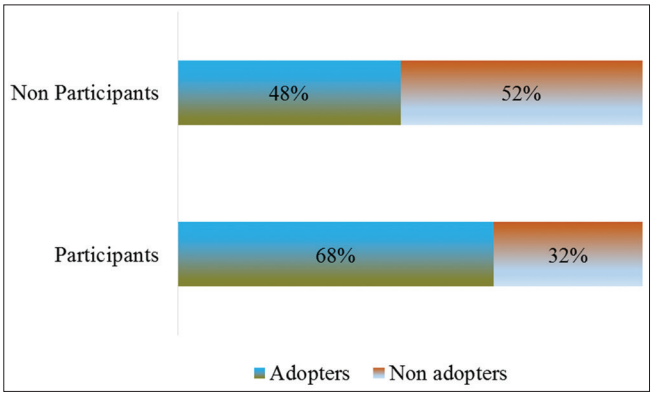

Figure 8: Descriptive relation of participation on coffee related field days and adoption

price, coffee market information and lack of improved coffee seed and seedlings. Based on the above findings, the study has drawn the following implication.

- Strengthening cooperatives and unions: Cooperatives and unions on the study area collect both dry and red coffee in relatively attractive price. The outlet has reduced additional transaction cost and also eliminates/reduces unnecessary chain actors such as brokers or assemblers. Farmers also collects dividend in proportion to the coffee they supplied to them. However, the main drawback of this market outlet is that they do not pay the money on the day farmer sale coffee. Farmers stay for a weeks or even months to collect the money. This makes the farmers to not sell their coffee to cooperatives which in turn leads to sell for local traders and brokers which fluctuates coffee price significantly. Therefore, strengthening the financial capacity of cooperatives and union should be a good option for farmers to sell their coffee product to these outlets so that coffee price could be modified and farmers could collect the margin they deserve.
- Supply of improved coffee seeds and seedlings: The study result identified lack of preferred coffee varieties' planting materials as the main constraint on the study areas. Encouraging smallholder farmers in supplying planting materials (seed/seedlings) to replace aged coffee for improved coffee technologies is a critical option to be given emphasis by stakeholders such as extension, research centers, Universities and NGOs. On other hands, government nurseries need to emphasize on seedling distribution to their maximum capacity.
- Sustainable seed system: There is no formally recognized enterprise which multiplies and supply coffee seed. Its only research center that have limited seed multiplication sites

which is incapable to satisfy huge and raising demand for improved coffee seed. There is high mismatch between coffee seed demand and supply. Concerning bodies need to be concerned the way coffee seed sources would be established for each coffee producing area.

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AUTHORS' CONTRIBUTION

The first and the second authors have involved in questionnaire preparation, survey designing and data collection. It was the first author who was analyzed and interpreted the data including literature review and write up. The third author has served as a reviewer and finalized the manuscript.

REFERENCES

1. ICC,/International Coffee Council. CC Development strategy for coffee, in: International Coffee Council 105th Session, London, 2010: PP. 21.
2. ICO/International Coffee Organization/Trade Statistics Tables. http://www.ico.org/trade_statistics.asp (accessed November 28, 2016).
3. Wiersum KF. Indigenous exploitation and management of tropical forest resources: an evolutionary continuum in forest-people interactions. Agriculture, Ecosystems & Environment. 1997;63(1):1-6.
4. DFSC and IPGRI. Forest genetic resources conservation and management, Vol.1: Overview, concepts and some systematic approaches. International Plant Genetic Resources Institute; Rome, Italy, 2001.
5. Olmos LC, Duque EA, Rodriguez E. State of the art of coffee drying technologies in Colombia and their global development. Revista ESPACIOS. 2017;38(29).
6. Adugna G, Bellachew B, Shimber T, Taye E. Kufa T. Coffee diversity and knowledge. Ethiopian Institute of Agricultural Research. Addis Ababa, Ethiopia, 2008.
7. USAID. Ethiopian coffee industry value chain analysis. Profiling the actors, their interactions, costs, constraints and opportunities; 18 June 2010.
8. Pokorna I, Smutka L. What is the structure of the coffee market: Can the real poor benefit from the coffee trade?. AGRIS on-line Papers in Economics and Informatics. 2010;2.
9. Bizualem A, Degye G, Zekarias S. Analysis of marketed surplus of coffee by smallholder farmers in Jimma zone, Ethiopia; Journal of Biology, Agriculture and Healthcare. 2015;5(5):242-251.
10. Dessalegn G, Solomon K. Evaluating coffee market structure and conduct in Bench Maji Zone, South West Ethiopia; Journal of Agricultural Economics, Extension and Rural Development: 2014;2(5):56-163.
11. ECTDMA/Ethiopian coffee and tea development and marketing authority. Coffee productivity and quality improvement package training manual (Amharic); Addis Ababa, Ethiopia, 2016.
12. JANRD/Jimma Zone Agricultural and Natural Resource Development. Profile and features of districts; unpublished report; Jimma, Ethiopia, 2016
13. Pinamang PA, Eyram NA, Nimo-Wiredu A, Adogoba D, Nsiah-Frimpong B, Haleegoah J, Adu-Appiah A, Owusu-Asante B, Adofo K, Baafi E. Root and tuber crops technologies adoption and impact study in Ghana: the case of improved sweet potato technologies; Final Report to the West Africa Agricultural Productivity Program, Ghana, 2017.
14. Adesina AA, Zinnah MM. Technology characteristics, farmers' perceptions and adoption decisions: A Tobit model application in Sierra Leone. Agricultural Economics. 1993;9(4):297-311.