INNOVATIONS

Determinants of Small Holders' Farmers Participation in Agricultural Cooperatives in Case of Lemo Woreda, Hadiya Zone, Ethiopia

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Abstract: Ethiopia, whose economy is largely based on agriculture, agricultural cooperatives play pivotal role by providing farm inputs, searching markets for farm outputs and render various services for the societies. To improve these enormous roles of agricultural cooperatives this study was conducted to assess the determinants of small holder farmers' participation in agricultural cooperatives in Lemoworeda, Southern Ethiopia. A three stage sampling technique was used. In the first stage purposive sampling was conducted to select agricultural cooperatives found in Lemoworeda. In the second stage, 3 kebeles (the lowest administrative units in Ethiopia) which has both member and non-member of agricultural cooperatives were purposively selected by consulting experts working in Hadiya Zone and LemoWoreda Cooperative Promotion. In the third stage, sample respondents were randomly selected from selected kebele and agricultural cooperatives. Accordingly, a total of 150(80 nonagricultural cooperative members and 70 agricultural cooperative members) were randomly selected. Binary logit model was estimated as analytical tool to know the determinant of small holder farmers' participation using stata version 12. The model included one dependent and 12 explanatory variables. Logistic regression output revealed house hold education , farm size, members' perception on services provided by the cooperatives and presence of cooperatives in the kebele were positively and significantly related with level of participation at less than 5% confidence level. Similarly, off farm income is positively and significantly related to status of farmers' participation to agricultural cooperatives at less 10% significance level. But, other sources of credit access determine members' participation negatively at less than 1% significance level. The overall result indicates continuous training and improving services provided by agricultural cooperatives in the study area would improve the participation of the members. Cooperative leaders, government and nongovernmental organization should help to improve the cooperative members' participation level.

Key words:1. Agricultural cooperatives 2. Lemoworeda 3. Binary logit model

1. Introduction

1.1. Background of the Study

For several decades, agriculture has been the dominant sector in Ethiopia as a source of employment and of livelihood for the majority of the population, foreign earning, and contribution to the overall economy. Moreover, the report on the performance of the Ethiopian economy in the GTP I period clearly indicated that the agriculture sector[2], particularly of smallholder farmers agriculture continues to be the main driver of economic growth in the country (GTP II, 2016). On top of this, the rural population, almost all of which are smallholder farmers, is characterized by greater incidence of poverty and food insecurity compared to its urban counterparts (MoFED, 2012). To reducepoverty and food insecurity the Ethiopian government has placed large emphasis on promoting agricultural cooperatives as the main organizational vehicles (D. A.Tefera, *et al*, 2016).

According to the Ethiopian Agricultural Cooperatives Sector Development Strategy (2012-2016), agricultural cooperatives are agricultural-producer-owned organizations whose primary

[2] With an average real agricultural GDP growth rate of 6.6% per annum during the GTP I implementation period.

purpose is to increase member producers' production and incomes by helping better link with finance, agricultural inputs, information, and output markets. Moreover, Adurayemi C., (2014) asserted that agricultural cooperatives are formed to meet farmers' mutual needs and goals that none of them could achieve alone.

It was argued that agricultural cooperatives can increase farmers' productivity and incomes by pooling their assets and competencies together to overcome market barriers and other constraints via supporting collective service provisions and economic empowerment (FAO, 2012).Moreover, Pinto C.A., (2009) argued that agricultural cooperatives are democracies empowering smallholder poor farmers to own their own solutions; they increase security for the members; and they contribute directly and indirectly to empower members and the community at large.

Despite the aforementioned economic benefits and incentives associated with being a member of agricultural cooperatives, not all rural smallholder farmers are member in Ethiopia in general and SNNP in particular. According to a study by Bernard T. and Spielman D., (2009)based on 2005 sample data, only 9 percent and 3.8 percent of smallholder farmers were members of agricultural cooperatives in Ethiopia and SNNP, respectively.In general, cooperative membership still remains low in Ethiopia.

Apart from the above promising evidences on the role of cooperatives, the experience of agricultural cooperatives as a vehicle for development in Ethiopia, and to a great extent in Africa as a whole, has been mixed. According to Bezabeh (2011) as cited in Sifa C., (2013), the large-scale introduction of agricultural cooperatives in the 1970s and 1980s with compulsory membership was associated with declining agricultural output per capita and productivity. On the other hand, there have been cooperative success stories in Africa; for instance the dairy sector in Kenya,Catfish and vegetables in Nigeria and Niger, coffee in Ethiopia, and cotton in Mali, had shown that cooperatives can be instrumental to empower members (ACSDS, 2012). However,Sifa C., (2013) indicated that no African country has achieved a sustained and large scale increase in staple crop yields as a result of cooperative action and many cooperative development programs have failed to achieve their objectives.

Consulting the literature, we found limited studies on the determinants of participation in cooperatives. Besides, the findings are also less conclusive. For instance, studies by Addai N. K., *et al*, (2014) from Ghana, and Fischer E., and Qaim M., (2012) from Kenya, found that cooperative membership has no effect on farmers' productivity. On the other hand, studies by Abate G. T., et al., (2013) from Ethiopia, and Verhofstadt E., and Maertens M., (2013) from Rwanda, found that membership in agricultural cooperative has positive effect on livelihoods of smallholder farmers.

Regarding participation, studies by *Thomas W., et al., 2015,* D. Abebaw, M.G. Haile, 2013, Minot N., Daniel A., 2012, Nugussie Z., 2010, Bernard T., and Spielman D. J., 2009) are conducted at country level in Ethiopia while limited study has been carried out in LemoWoreda of Hadiya zone . However, almost all the studies have considered the whole array of cooperative societies at aggregated level. Fischer and Qaim, (2012) asserted that the potential benefits of cooperative societies are highly sector and product specific. Hence, aggregate analysis could miss the very nature of agricultural cooperatives owing to aggregation bias and hence might lead to misleading results. Besides, the studies considered only limited and similar demographic and socio-economic variables in trying to explain participation decision.

Consequently, the concerns above gives rise to fundamental questions: What are the real factors that influence farmers whether to participate in agricultural cooperatives? In this study, therefore, through addressing the existing research gaps, in this study we were tried toassess the determinants of Small Holders' Farmers Participation in Agricultural Cooperatives in Case Of LemoWoreda, Hadiya Zone, Ethiopia. Specifically, this study assessed the socio-economic characteristics of participants and non-participant of agricultural cooperatives, the factors affecting membership participation of smallholders' in agricultural cooperatives.

2. Methodology of the study

2.1. Description of the Study Area

Lemoworeda is located between 7°14'- 7°45' N latitude and 37°05'- 37°50' E longitudinal line which covers an area of 50,299 hectare. The woreda is bordered by Silte Zone in the North, KembataTembaro Zone in the South, and GomboraWoreda of Hadiya Zone in the North West, Ana LemoWoreda of Hadiya Zone in the North East, and ShashogoWoreda of Hadiya Zone in the East and SoroWoreda of Hadiya Zone in the South West. The woreda is found around the capital of Hadiya zone, Hosanna town, which is located at 235 km south west of Addis Ababa. Total population of the woreda was 169,895 of whose 83,875 were men and 86,020 were women (LWFEDO (2017). The livelihoods of the population in the woreda largely depend on mixed agriculture. The major crops grown in the area include Wheat, *teff*, Barely*, Inset*, bean, and Potato. Cash crop such as *khat*is also available in few parts of the Woreda. Livestock production like Cattle, Small ruminants, Equines are major reared in the woreda(LWANRDO, 2017).

2.2. Source and type of Data

In order to address the research questions, this study mainly used primary data which collected using structured household survey questionnaires from selected Woreda and sampled households. The secondary data which collected from Woreda, zonal, regional as well as federal level cooperative support organizations have been utilized to substantiate the finding from primary data analysis.

2.3. Sampling Technique and Sample Size

The target population of the study is all small holder farmers (i.e. Both members and non-members of agricultural cooperatives) reside in LemoWoreda of Hadya Zone.

In this study a multi-stage sampling technique was used to select the sample farm households. In the first stage, Lemoworeda was objectively selected for having meaningful and well organized agricultural cooperatives. In the second stage, 3 kebeles (the lowest administrative units in Ethiopia) which has both member and non-member of agricultural cooperatives were purposively selected by consulting experts working in Hadiya Zone and LemoWoreda Cooperative Promotion. In the third stage, sample respondents were randomly selected from selected kebele and agricultural cooperatives. Accordingly, a total of 150(80 nonagricultural cooperative members and 70 agricultural cooperative members) were randomly selected. Finally structured and pretested questionnaire was prepared and administered to the sample farm households to collect data. The data was collected via face to face (in-person) interview by well-trained enumerators.

2.4. Methods of data analysis

Both descriptive statistics and econometric model were employed related with the type of data and specific objectives of this study. STATA version 12 was used to analyze the data obtained from primary sources. Descriptive statistics such as mean, standard deviation, and percentages were used to see the relationships between explanatory variables and the level of small holder farmers' membership in agricultural cooperatives.

A binary logistic regression model was used to know the correlation between the dependent and independent variables of the study. The dependent variable in this study is the level of small holder farmers' membership in agricultural cooperatives. Thus, farmers' membership in agricultural cooperatives was measured as a binary dummy variable (1 = Member of agricultural cooperatives, 0 = otherwise). The detail of explanatory variables used is explained in the next section.

A binary logistic regression model was used to investigate factors affecting farmers' membership in agricultural cooperatives in the Lemo of the Hadiya zone. As outlined above, this model was employed because of the binary nature of the dependent variable (level of membership). Hence, the logistic model is specified as follows:

$$P\left(Y_{t=1/X_t}\right) = \frac{\exp\left(X_t B\right)}{1+\exp\left(X_t B\right)}$$

An equivalent form can be stated as

$$\boldsymbol{ln(y) = ln\left(\frac{Y}{1-Y}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \ldots + \beta_n X_n + u_i}$$

Where,

Y =The predicted probability of the event (farmers' level of participation in agricultural cooperatives), which is coded with 1= participants; and 0= non-participants).

1 − Y= the predicted probability of the non-participants of the agricultural cooperative

β_0= Constant

β_n= Coefficients of explanatory variables

X_n= Predictor variables

U_i= Error term.

Probability that binary assumes the value one is,

$$\text{Prob}(q_{it} = 1) = \frac{\exp\left(B_0 + B_x\right)}{1+\exp(B_0 + B_x)}$$

Description of Variables

A) Dependent Variable /Farmers' cooperative membership status/

The dependent variable for the first objective of this study is cooperative membership status of farmers. As membership is a dichotomous variable, that is, one can be member or non-member of agriculture cooperative, 1 is assigned to members and 0 for non-members.

B) Explanatory Variables

a. **Sex of the Household Head**

As studies (Fashogbon A., *et al*., 2015,Fischer E., and Qaim M., 2012,*Thomas W., et al., 2015*) revealed, sex of the household head determines the probability of being a member of agricultural cooperatives. It is a dummy variable and we assign 1 if the head is male and 0 if female and hence female is the reference category. Almost all studies agreed being female tends to reduce the probability of participation. We expect similar influence of this variable on the likelihood of cooperative participation in this study.

b. **Age**

Household heads' age can influence the decision to participate in farmer group arrangement as farmers' attitude towards risk and technology is likely to vary with age of the farmer. Previous empirical findings are mixed in this regard. For instance, the study by Fashogbon A., *et al*., (2015) indicated that while age negatively influences farmers' participation decision. However, the study by D. Abebaw, M.G. Haile, (2013) found the reverse.

c. **Education of Household Head(EHH)**

It is widely recognized that human capital in the form of education determines farmers ability to perceive, interpret and better adapt to changing conditions. Previous empirical findings are mixed on the influence of education on farmers' membership participation in rural farmer organizations. For example, a study byIssa N., &Chrysostome N. J., (2015) found that education has negative effect while studies by Odegbile, O.S., et al, (2015),*Minot N. & Daniel A. (2012)*demonstrated that education positively influences the likelihood of participation. In this study, education will enter the model as a dummy variable where 1 is assigned to literate and 0otherwise but we do not assign any sign expectation to the response of participation to changes in schooling.

d. **Household Size(HS)**

Household size which can determine the availability of family labor can also influence cooperative membership. Previous empirical findings are mixed on how household size determines membership status. For instance, Bernard T., &Spielman D. J. (2009) and Odegbile, O.S., et al, (2015) found that the likelihood of a household to be a cooperative member significantly increases with household size. Conversely, Fischer E., and Qaim M., (2012) did not find statistically significant association between these variables. Thus, we include household size in the model, measured in adult equivalent units as a continuous variable, without assigning any a priori sign expectation.

e. **Farm Size(FS)**

The size of land holding is expected to determine participation in cooperatives. Studies by Issa N., & Chrysostome N. J., (2015)from Rwanda, Fischer E., and Qaim M., (2012) from rural Kenya, and Bernard T., & Spielman D. J. (2009)from Ethiopia suggest that land holding size positively influences membership participation in cooperatives. Contrary to this, Fashogbon A., *et al*., (2015) from rural Nigeria reported that landholding size negatively influences the likelihood of membership in cooperatives. On the other hand, Nugussie Z. W. (2010)from Northern Ethiopia explained that land

holding size has no significant effect on membership. Hence, we introduce landholding size in the model as continuous variable but without any a *priori* sign expectation.

f. **Off-farm Income(OFI)**

Off-farm employment and the resulting income which increases farmers' financial capacity to purchase inputs and other resources needed is also expected to impact farmers' membership participation in cooperatives. For instance, Issa N., & Chrysostome N. J., (2015), in the case of Rwanda coffee sector, have reported that households' participation in farmer organization has a strong positive association with off-farm income. D. Abebaw, M., G. Haile (2013) from Ethiopia also found similar influence of off-farm income on the likelihood of participation in cooperatives. In this study, therefore, we introduce off-farm income as a continuous variable, and similar relationship between the probability of cooperative membership and off-farm income is expected.

g. **Credit Access(CACC)**

Both farming alone and farming under the supervision of cooperatives entails costs of different types and sizes which requires finance. Therefore, we do believe that access to credit can influence membership in cooperatives. Nevertheless, the evidences are mixed. For instance, Issa N., & Chrysostome N. J., (2015) found that access to credit reduces membership participation while the study by Fischer E., and Qaim M., (2012) demonstrated that access to credit positively influences membership. In this study, access to credit is introduced into the model as a dummy variable where 1 is assigned for a household with credit access and 0 otherwise. But we don't assign any sign expectation.

h. **Number of Oxen Owned**

As studies revealed, the number of Oxen owned by households can also affect farmers' cooperative membership participation. For instance, Bernard T., &Spielman D. J. (2009) from Ethiopia indicated that there is positive association between numbers of oxen owned and membership participation. Contrary to this, Nugussie Z. W. (2010) from Northern Ethiopia explained that the number of oxen owned reduces the likelihood of membership participation. Hence, in this study, we do not assign any sign expectation on the direction of influence of oxen owned on membership.

i. **Distance to the Nearest Market(DISNM)**

The availability of road infrastructure between production site and the market determines the cost of transporting inputs and produces, and hence profitability. Consequently, market distance is likely to determine farmers' cooperative membership participation for collective action is believed to reduce costs. In this study, therefore, we introduce distance to the nearest market measured in Kilo meters, as a continuous variable, with a positive sign expectation.

j. **Distance to the Nearest Paved Roads(DtoNPR)**

Distance to the nearest paved roads is also likely to induce costs of production to rise. Hence, rationale smallholder farmers are expected to join cooperatives if the claimed distance is higher. A study in Kenya by Fischer E., &Qaim M., (2012) indicated that distance to the nearest paved roads positively and significantly affects membership participation in cooperatives. It is a continuous

variable measurable in KM, and similar relationship between the probability of cooperative membership and distance to the nearest paved roads is expected in this study.

k. **Extension Contact(EXC)**

Contact with extension agents is believed to be a better means through which smallholders get information, and hence we hope that this variable can influence participation. But the evidences are inconclusive. That is, a study by Msimango B. and Oladele O., (2013) and Abebaw D., and M.G. Haile (2013) reported that contact with extension agents positively affects participation while Fashogbon A., *et al*., (2015)demonstrated a negative association between these variables. Extension contact can be introduced as a dummy variable (I.e., 1 for those having contact to extension agent and 0 otherwise) but we don't expect the sign it would take.

l. **Farmer's Perception About the Role of Cooperatives(FPRCOP)**

Despite the studies conducted so far didn't incorporate smallholders' perception about the role of cooperatives, we believe that farmers' perception can explain their membership participation status. That is, we believe those farmers with positive perception about the importance and services of cooperatives (other things being the same) tend to have better membership participation. In this paper, we introduce perception as a dummy variable where 1 is assigned to good/positive perception and 0 for bad/negative perception. Thus, we assign a positive sign to the effect of good/positive perception on the likelihood of membership.

m. **Presence of Cooperatives in a Kebele(PRECOK)**

Cognizant the fact that distribution of cooperatives is not uniform in all Kebeles in our country, we appear to argue that presence/absence of cooperatives in the smallholders' Kebele may impose influence on farmers' participation in cooperative. This is mainly because when cooperatives are located in Kebeles other than the location of farmers with considerable distance, transport costs may tend to be higher which may limit engagement in cooperative activities. Thus, we expect that presence of cooperative in smallholders' Kebele positively influences the likelihood of membership participation in agricultural cooperatives.

3. Results and discussion

This section focuses on results and discussion which obtained from the sample survey from farmers. The sectionfirst presentsresult of descriptive statistics and in the second section econometric analysiswas presented.

3.1. Descriptive statistics

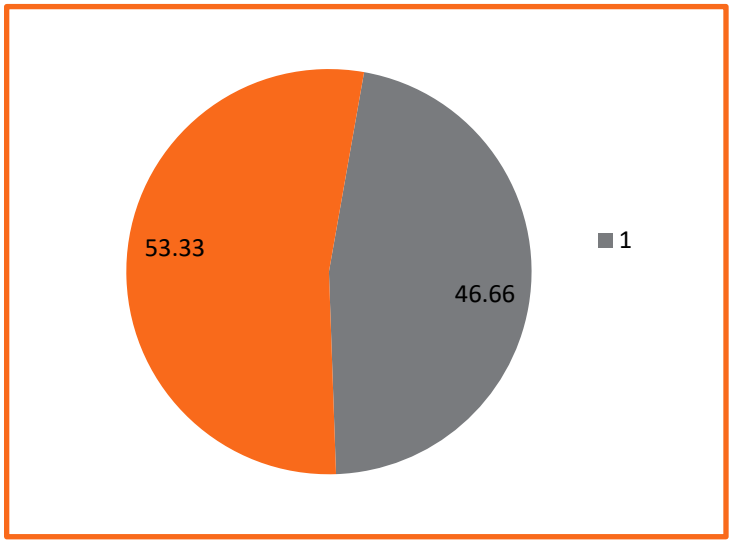

Figure 3.1: The distribution of participant and non-participant sample smallholder farmers.

1= participants 0= Non participants

From the total sample small holder farmers taken 70(46.66) % of them were participants in agricultural cooperatives while 80(53.33%) of them were not the participants in any agricultural cooperatives.

Demographic Characteristics of the Respondents

Table -1 depicts that out of total sample stallholder farmers 88% of them were male headed households' and the remaining 12% of them were Female headed households. Farmers enhance in experience and comprehensiveness while they spent their time onfarming activities. Therefore, the more they spent on farming activities the more they get betterfarming experience. The majority of farmers were found within age range of 25 to 35 thissame age range is true for non- participants whereas the majority of participants age range liesbetween 46 to 55 implies that there were non-participant young group in agricultural cooperatives.With regard to marital status of the respondents, the majorities 76.67% of them were married and 23.33 percent of them were unmarried.

Educational status of the household head is also an important element in smallholder economic activities. The survey result showed that 18.67% of the sampled farmers never attended any schooling, while 81.33% were literate at different levels of schooling. In other way,85.72% of participant farmers were literate whereas 14.28were illiterate. From non-participant 22.5% of them were illiterate while 77.5%were literate. Therefore, education is the major demographic characteristics and explanatory variable that differentiates participants from non-participants in agricultural cooperatives. It determines the farmers ability to communicate and acquire information and more likely to adopt new ideas, So that literate sample smallholder farmers were more participants than illiterate farmers.

Table 1: Demographic Information of the small holder's farmers

Description		Participant		Non-participant		Total sample	
		Frequency	%	Frequenc y	%	Frequency	%
Sex	Male	62	88.6	70	87.5	132	88
	Female	8	11.4	10	12.5	18	12
Age	25-35	15	21.43	35	43.75	50	33.33
	36-45	20	28.57	22	27.5	42	28
	46-55	30	42.86	15	8.75	45	30
	56-65	3	4.29	5	7.14	8	5.33
	>66	1	1.43	3	3.75	4	2.67
Marital status	Married	50	71.43	65	81.25	115	76.67
	Unmarried	20	28.57	15	18.75	35	23.3
Education	Illiterate	10	14.28	18	22.5	28	18.67
	Basic education	23	32.86	31	38.75	54	36
	Elementary	30	42.86	20	25	50	33.33
	High school & above	7	10	11	13.75	18	12
Household size	1-3	15	21.43	32	40	47	31.33
	4-6	22	31.43	28	35	50	62.5
	>6	33	47.14	20	25	53	35.33

Source: own survey, 2019

The total number of family members in a household isimportant for the variability of economically active labor. The above Table -1 result showed that the majority ofthe family sizes for participants lie in the age range above 6. Whereas the majority ofthe family sizes for non-participants lie in the age range 1 to 3. This implied that the number of household sizeis greater forparticipants when compared to non-participants.

Table -2: Socio –economic characteristics of sample respondents

Description		Participant		Non-participant		Total	
		Frequenc y	%	Frequency	%	Frequenc y	%
Farm size(hectares)	**<1**	10	14.29	25	31.25	35	23.33
	1.5- 2	18	25.71	35	43.75	53	35.33
	2.5-3	27	38.57	20	25	47	31.33
	>3	15	21.43	0	0	15	10
Source of annual income		Frequenc y	%	Frequency	%	Frequenc y	%
	On farm	41	58.57	71	88.75	112	74.67
	Off- farm	29	41.43	9	11.25	38	25.33

Source: own survey, 2019

Land is one of the most important factors of agricultural production in our country. In the mannerlivelihoods of the farming communities in the study area are highly depend on agriculture wherecrop production is the dominant one. Farmers need to have sufficient land for cultivation as toproduce different crops. As above table observed that from the total sample small holder farmers 23.33%,35.33%, 31.33% and 10% of them owned the land size of less or equal to 1ha, 1.5ha to 2ha,2.5ha to 3ha and above 3ha respectively. The study showed that 14.29% participant farmers have farm landsize of less or equal to one hectare while 25.71%, 38.57% and 21.43% of them owned 1.5ha to 2ha, 2.5hato 3ha and above 3ha respectively. Among non-participant farmers, those holding land size of less or equal to onehectare were 31.25% while 43.75%,25% and 0% of them owned 1.5ha to 2ha, 2.5ha to 3ha and 3ha respectively.Farmers‟ income sources in rural areas are crucial to accumulate assetand being strong enough to join agricultural cooperatives. As the information indicated in the table-2, 74.67% of the sample small holder farmers were obtained their annual income from on farm activities while 25.33 of them obtained their annual income from off-farmactivities. This indicated that the majority of smallholder farmers obtained their annual income fromon farm. The study revealed that, 41.43% of participant have access to non-farm activities in the study area and generates some additional income. However, only 11.25% of non-participant farmersthey have access to non-farm activities in the study area

Table-3: Oxen ownership status of sampled farmer

No. of Oxen	Participant		Non- participant		Total sample	
	Frequency	%	Frequency	%	Frequency	%
0	4	5.71	29	36.25	33	22
1	13	18.57	35	43.75	48	32
2-3	33	47.14	16	20	49	32.67
>3	20	28.6	0	0	20	13.33

Source: own survey, 2019

As we can observe from table-3, 5.71 % of participant;36.25 % of non-participants and 22 % of the whole sampled farmers have no any oxen.About 8.57% of participants and 43.75% of non-participants were with oneox. Thus 32% of sample respondents owned only one ox. Further, 4447.57 % of participants own 2 to 3 oxen.However, only about 20% of non-participants own 2 to 3 oxen. Only 13.33% of sampledfarmers reported as they own more than three oxen and all these farmers are participant.

Table-4: Socio- institutionalcharacteristics.

Description		Participant		Non-participant		Total	
		Frequency	%	Frequency	%	Frequency	%
Access to Extension Service	Yes	53	75.71	35	43.75	88	58.67
	No	17	24.29	45	56.25	62	41.33

Access to Credit service	Yes	29	41.43	48	60	77	51.33
	No	41	58.57	32	40	73	48.67
Access to Market Information	Yes	43	61.43	35	43.75	78	52
	No	27	38.57	45	56.25	72	48

Source: own survey, 2019

Data in table-4 showed that, from sample small holder farmers in the study area,58.67% of the respondents had access to agricultural extension service; whereas, the remaining 41.33 % of the respondents had no access to extension service. In side of participants 5.71% of themrespondent that there is access to extension services and the remaining 24.19 % of them said that there is have access to extension service.This implies that small holderfarmers who had access to extension service would be more participant in agricultural cooperatives thanthose who had no access to extension service.

Regarding access to credit service , about 60% of the respondents responded that they had access to credit; whereas, the remaining 40% of them hadno access to credit service. In particular, about 58.570 percent of the participants indicated that they had no access to credit. This implies that most of the respondent had not joined agricultural cooperatives if they have access to other source of credit servicein the area.

Access to marketing information is very important for farmers to know about the type of productsproduced by other farmers, current market price and possible strategies shall be taken to savethemselves from unfair pricing by private traders and illegal brokers. From the total samplehouseholds52%of them had access to market information from different formal sources,while 48%of them had no access to market information therefore; they are supplying their product withoutbeing well informed about the current situation in the market. From participants 61.43% ofthem had access to market information while 38.57% of them had no access to marketinformation. 43.75% of non- participant farmers have access to market informationwhereas, 56.25% of them had no market information. Therefore, from the result we conclude that participant farmers have relatively better access tomarket information than non- participants. This may be due to the procedure followed by the established cooperatives.

4.2 Econometric Analysis

Finding the factors that determine small holder farmers' membership in agricultural cooperatives goes beyond the descriptive analysis and requires employing econometric model. Binary econometric analysis helps us to identify factors which influence farmers' membership in agricultural cooperatives. As it was discussed in the methodology part of this study, a logit model is estimated to identify the major determinants of small holder farmers' membership in agricultural cooperatives. The variables described in the descriptive analysis are used as explanatory variables in logit model. Using level of farmers' membership in agricultural cooperatives as a dependent variable where by a value of 1 is given to farmers being member of agricultural cooperatives and 0, otherwise.

Below table regresses the binary response variable, the probability of being membership of agricultural cooperatives (P(Y=1)). A glance at the results shows that most of the explanatory variables in the model have the signs that conform to the researcher's prior expectations. It is also evident that most of the variables are statistically significant at 1% and 5% confidence level.

Table 4.2: Output of logit model

Variables	Coefficients	P-Value	Marginal Effect
SEX	0.32^{***}	0.10	0.07
AGE	-0.41	0.42	0.65
EDUC HH	0.56^{**}	0.03	0.71
HHSIZE	0.12^{**}	0.04	0.45
FARMS	0.045^{*}	0.001	0.12
OFF INC	0.67^{***}	0.06	0.34
CREDIT ACC	-0.09^{*}	0.00	0.8
NO OXEN	1.06	0.12	0.21
DIS NM	0.28	0.29	0.18
EX SERVICE	0.08	0.73	0.034
FPRCOOP	0.71^{**}	0.01	0.55
PERCOk	0.82^{*}	0.00	0.68

Source: own survey, 2019

Note: *, ** and * indicate that the coefficients are statistically significant at 1%, 5% and 10% level**

Interpretation of significant Variables from the logistic regression out put

Sex: In line with expectation, sex was found to have positive relation with farmers' membership of agricultural cooperatives and is statistically significant at 10% level of significance. The marginal effect shows being male increases the probability of membership of agricultural cooperatives by 32%. This finding was consistent with the research result of Fashogbon A., et al., 2015,Fischer E., and Qaim M., 2012,*Thomas W., et al., 2015*

Education of household head (EHH): The coefficient on education reflects the prime role that human capital plays in determining small holder farmers' membership of agricultural cooperatives. Educational status of the household head is positively related with the dependent variable (membership of agricultural cooperatives) and is statistically significant at less than 5% level of significance. The marginal effect shows, other things remaining constant, probability of being member of agricultural cooperatives increases by 56% as head of the household becomes literate. It is explained in terms of contribution of education on improving farmers' ability to perceive, interpret and better adapt to changing conditions. Thus, being literate improves the chance of becoming membership of agricultural cooperatives in the sample households. The study is supported by the finding of Odegbile, O.S., et al, (2015),Minot N. & Daniel A. (2012)

Household size (HHS): House hold size is significant at 5 percent level of significance and related positively with probability of being membership of agricultural cooperatives. Under celeries paribus condition, the marginal effect depicts probability of being membership of agricultural cooperatives increases by 12% as household size increases by one.

Farm size (FARMS): Size of farm land, which is significant at 1% probability level, has positive influence on the probability of household's being membership of agricultural cooperatives in the study area. It implies that the probability of being membership of agricultural cooperatives increases with large farm size. This agrees with the hypothesis that farmers who have larger farm land holding would obtain large output and extension services. Farmers with higher level of output expected to use the cooperative than those who have smaller land size, due to the fact that, larger farmers are associated with higher possibility to produce more output and demand more services provided by cooperatives. The marginal effect of 0.045 for the total cultivated farm size implies that other things kept constant, the probability of being membership of agricultural cooperatives increases by 4.5% as the total cultivated farm size increases by one hectare.

Off farm income (OFF INC): This represents the amount of non-farm income (in cash or in kind) the farmer or any member of the household has earned in the year. Households engaged in non-farm activities are better endowed with additional income to by services provided by cooperatives. As expected, the contribution of non-farm income is positively and significantly (10% probability level) associated with farmers' membership of agricultural cooperatives. The marginal effect indicates that, other things being constant, the probability of the small holder farmer to be membership of agricultural cooperatives increases by 67 % as the household earned one more unit of money from non-farm income.The logic behind is that off farm income helps the farmer to afford services provided by agricultural cooperatives. The finding is supported by D. Abebaw, M., G. Haile (2013).

Household access to credit: The results of the study revealed that the variable under consideration is negatively related and significant at less than 1 percent probability level with the probability of being membership of agricultural cooperatives. Holding other things constant, the marginal effect of the variable shows probability of being membership of agricultural cooperatives decreases by 9% as a farmer has access to another source of credit service. The possible explanation is that access to another source of credit services reduces probability of being member of cooperatives of farmers who have interest to be member of agricultural cooperatives to receive credit from the cooperatives. The result of this study is also consistent with the finding of Issa N., &Chrysostome N. J., (2015).

Farmer's Perception about the role of cooperatives (FPRCOP): This variable is found to be significant at 1% level of significance in determining farmers' membership of agricultural cooperatives in the study area. The result shows that the variable is found to have positive impact on the probability of farmers' being membership of agricultural cooperatives. The marginal effect of 0.71 implies that, ceteris paribus, the probability of being membership of agricultural cooperatives increases by 71% for farmer who has positive perception about the benefit and services provide by cooperatives in the area.

Presence of cooperatives in a Kebele (PRECOK): As expected, presence of cooperatives in a Kebeleis significant at less than 1% level of significance and positively correlated with the probability of being membership of agricultural cooperatives. The marginal effect revealed, keeping other variables constant, probability of being member of agricultural cooperatives increases by 82% if agricultural cooperatives present in the smallholders' Kebele. This is mainly because when

cooperatives are located in Kebeles other than the location of farmers with considerable distance, transport costs may tend to be higher which may limit engagement in cooperative activities.

4. Conclusion and Recommendations

4.1 Conclusion

Cooperative literature lists considerable potential benefits to farmers forming such organizations. In Ethiopia, one of the major benefits of agricultural cooperatives lies in the improvement of market access to smallholder farmers, seriously constrained by a low level of commercialization.The general objective of this study is to examine the determinants of farmers' participation in agricultural cooperatives. Specifically, it assesses the socio-economic characteristics of participants and non-participant of agricultural cooperatives, the factors affecting membership participation of smallholders' in agricultural cooperatives. For the attainment of these objectives, the study used 2019 survey database collected from 150 farm households in LemoWereda, Hadya Zone, SNNPR sponsored by Wachemo University. Descriptive and econometric models were used to identify factors and to whatextent those factors influenced farmers' likelihood to participate in agricultural cooperatives.

The descriptive statistics revealed that, out of the total 150 sampled household heads, 70 of them were found to be participated inagricultural cooperatives in the survey year while the remaining 80 household heads were non -participated. Significant differences were noted among participantsand non-participants in terms of age, education level, family size, farm size, access to credit service, access to market information, access to DA contact and ownership of oxen. The result showed that, about 85.75% participants were literate. This implies that, the literate smallholder farmers participate more in agricultural cooperative than non- participants. As ahousehold gets older, his/her farming experience improves, hence her/his probability to joinagricultural cooperatives increases.

Accordingly the logit analysis method was employed to identify the determinantsof participation in agricultural cooperative in the study area. Twelve variables were hypothesized to explain probability participation decision, eight were statistically significant. The factors that significantly and positively influenced the likelihood of farmers participating in agricultural cooperative were sex, education level, household size, farm size, off -farm income, presence of cooperative in kebele and farmers perception about the role of cooperative. Theresult indicated that increase in the values of the variables also increased farmer'sparticipationdecision in agricultural cooperative .Only household credit access negative but significantly influenced farmersparticipation in agricultural cooperative, ndicatingthataccess to another source of credit services reduces probability of being member of cooperatives of farmers who have interest to be member of agricultural cooperatives to receive credit from the cooperatives.

4.2 Recommendations

From the key findings of this study, the following recommendations were made;

- To improve the participation of young smallholder farmers in to agricultural cooperatives, the woreda rural development department should work in collaboration with lower level of management to communicate about the status of each cooperative.
- The positive association of education with participation indicated that literacy is very important determinant. It enhances the farmersability to receive and understand information relating to cooperatives. Therefore, the stakeholders at different levels of management should give due attention to enhance farmers education level through adult education.
- The finding of this study indicates that continuous training and improving services provided by agricultural cooperatives in the study area would improve the participation of the members. Therefore, Cooperative leaders, government and nongovernmental organization should help to improve the cooperative members' participation level.
- Strengthen established cooperatives and create more groups in the study area by funding and organizing them by government, non-governmental organizations and stakeholders. This will improve farmer knowledge and grant them access to market information. They could enjoy from economies of scale, as this would encourage market participation by farmers.

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