

# Determinants of Members Utilization of Agricultural Inputs from Cooperatives: The Case of Dire Dawa Administration, Ethiopia

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## Abstract

The rural poor in developing countries are often at a competitive disadvantage in the wider economy because of persistent market, state and institutional failures. Smallholders may face difficulties in selling their small agricultural surpluses because of the prohibitively high transactions costs incurred in assembling, transporting and marketing these surpluses. Smallholders may be unable to access necessary public sector services needed to sustain and improve their livelihoods services such as input supply, output marketing, credit provision, or conflict mediation because the state's infrastructure is insufficiently responsive to their needs. Despite the focus on agricultural cooperatives, cooperatives in Ethiopia have been characterized with a number of limitations and challenges. Knowledge about their performance thus is of major importance for better understanding especially on perception of the members towards the cooperatives and other factors affecting member's participation in the day to day activity of the cooperative. In Dire Dawa the status of agricultural cooperatives are not clear. On the other hand there is no studies' focus on cooperative. Research based finding that focus on determinants members input utilization from cooperative and other service of the cooperative and perception of members towards the cooperatives are very crucial and significantly help policy makers and experts on the area to have the right understanding and undertake intervention that significantly enhance the performance of the cooperative Hence, the present study focuses on identifying determinants of members input utilization from cooperative, in addition to identifying member's perception towards the agricultural cooperatives. A total of 140 respondents were able to respond to self administered questionnaire. The respondents were selected using stratified sampling technique, Pre-tested self-administered questionnaire was administered to the respondents to collect necessary data for the study, and moreover, focus group discussion and detail personal interview were conducted for the qualitative data. Likert scales, binary logit and descriptive statistics were used for the analysis of the data gathered. The model results revealed that among 12 explanatory variables included in the model, 5 were found to be significant at less than 10% probability level. More specifically, these variables include Level of education, off/non-farm income, perception to input price, farm size, access to credit, distance of the cooperative from the farmer house, and patronage refund. The statistical analysis on the perception of members towards cooperative showed that there is significant difference in the perception of user and non user towards agricultural cooperative. Therefore, facilitating credit access to communities in the study area, promotion of off-farm activities, appropriation of surplus in the form of patronage refund, Above all promoting activities that improve perception and knowledge of members towards agricultural cooperative, are recommended.

**Keywords:** Agricultural input, Cooperatives, Dire Dawa, likert, logit and probit models

## 1. Introduction

The rural poor in developing countries are often at a competitive disadvantage in the wider economy because of persistent market, state and institutional failures. For example, smallholders may face difficulties in selling their small agricultural surpluses because of the prohibitively high transactions costs incurred in assembling, transporting and marketing these surpluses. Smallholders may be unable to access necessary public sector services needed to sustain and improve their livelihoods services such as input supply, output marketing, credit provision, or conflict mediation because the state's infrastructure is insufficiently responsive to their needs. There is a growing body of empirical evidence to suggest that membership cooperative one among several types of rural institutions that can help overcome these market, state and institutional failures (WB, 2007).

Agricultural cooperatives introduce desirable competition that raises market prices for the farmers' products. They also expand and capture a greater share of the existing market by pooling specified grade or quality and this helps to meet the needs of large scale buyers. Government support to agricultural cooperatives is essential for their diversification, expansion and sustainability and above all to protect the interest of the people with limited means. Liberalization doesn't prohibit this support. In fact, the World Bank and UN specialized agencies emphasize government support for the cooperatives development without impairing in any way their cooperative character i.e. governments have to be committed for the support by accepting the Sydney declaration of conference of ministers of cooperation of Asia and Pacific countries organized by ICA (Bernard *et al.* 2006).

In Ethiopia the development of primary cooperatives has shown a good progress. There are 17,423 primary cooperatives across the country operating in different sector of the national economy in 2009/10. They have 6,983,752 members and capital of Birr 874,009,157 and out of these 12,183 were agricultural cooperatives.

Most of the cooperative operate in the agriculture sector of the national economy. They involved in cereal marketing, input supply, credit service, irrigation, dairy, livestock and coffee marketing etc. There are also a few numbers of primary cooperatives that involved small-scale industry (FCC, 2009).

In Dire Dawa Administrative Council there are 327 primary cooperatives which operate in various sectors of which 38 of them are agricultural cooperatives. The agricultural cooperatives reported to have 6,825 male and 1,017 female members and a capital of Birr 3,179, 304.00. In the study Area the cooperative provide services like marketing farms product, supplying inputs like sorghum vegetables, and extend credit to the farmers (DRFCU, 2009).

Growing body of empirical evidence suggest that membership to agricultural cooperative to be one of the strategy among several types of rural institutions that can help smallholder farmers to overcome market, state and institutional failures (WB, 2007). In agricultural countries like Ethiopia agricultural cooperatives introduce desirable competition that raises market prices for the farmers' products. Agricultural cooperatives also expand and capture a greater share of the existing market and this helps to meet the needs of large scale buyers (Bernard *et al.* 2006).

In countries like Ethiopia since agriculture is the main sector of the national economy, the development of the country is directly correlated and determined by the progress of the agricultural sector. It is obvious that the development of the agricultural sector is significantly determined by a number of factors among which access to agricultural input supply and marketing of the agricultural produce is crucial (WB, 2007).

In Ethiopia farmers based Agricultural cooperatives are one of the many structures and organization significantly determining the development of the agricultural sector. In Ethiopia agricultural cooperative mainly function as a marketing agent and agricultural input supplier in the rural parts of the country. Agricultural cooperatives are also key strategies of the agricultural sector and crucial factors to ensure self-reliance, higher productivity, transfer of agricultural technologies, promotion of off farm petty industrial development among the farming communities. In Ethiopia although promotion of agricultural cooperatives are the key rural development strategies, agricultural cooperatives in Ethiopia have been characterized with a number of limitations and challenges (Daniel, 2006). In Dire Dawa the status of agricultural cooperatives are not clear, however in discussion with the farmer's union leaders and certain members of agricultural cooperative it was learned that the agricultural cooperatives have got a limitation especially in the area of efficient input supply and marketing of the agricultural produce. On the other hand there is no prior studies' in the study area focusing on agricultural cooperative that explored member's perception and determinants members' utilization different service from cooperative. Therefore, the present study focuses on identifying determinants of member's utilization of input from cooperative with the specific objectives of, to identify determinants of members utilization of agricultural input from Cooperative and describe members perception towards agricultural cooperatives.

## 2. METHODOLOGY

This chapter of the thesis consists of brief description of the study area, type and sources of data, method of data collection, sampling techniques, methods of data analysis, and definitions of variables and hypothesis.

### 3.1. Description of the Study Area

#### 3.1.1. Geographical Characteristics and Agro Climate

Dire Dawa Administrative council is located between 09° 28.1 to 09° 49.1 N to 41° 3 8.1 to 42° 19.1 E. The altitude of the Administrative council ranges from 1000 to 3000 masl while the mean annual minimum and maximum temperature ranges from 19 °c to 31.5 °c, respectively. December and January are relatively the coldest month, while May, June, and July are the hottest month. The mean annual rainfall of the administration is 640.3mm; the highest is in August.

Dire Dawa Administrative council enjoys bi-modal type of rainfall with April as a peak for the scanty rainfall and July for the heavy rains. The rain pattern is characterized by scanty rains in spring and heavy rain in summer. With June as a dry spell month, the rainy season is from October to January. From the seven rainy months only in the months of July and August the rainfall exceeds half the potential evapo transpiration. The mean annual rainfall in the study area various from 550 mm in the lowland northern part to above 650 mm in the southern mountain ranges. The temperature in the study area is generally high .The monthly mean maximum temperature ranges from 28.1 °c which is recorded in the month of December and January, to 34.6 °c recorded in the month of June. Likewise, the monthly mean minimum temperature varies from 14.5 °c in December to 21.6 °c in June (BFED, 2008).

#### 3.1.2. Demographic characteristics

The total population of the administrative council is estimated to be 342,827 out of which the rural population is 109,923 (32%) and that of the urban population are 232,854 (CSA, 2007). The overall population density of the administrative council is 196 people /km<sup>2</sup>.The average family size varies from 4.3 persons/households in the urban to 5.0 persons/household in the rural area. With considerable variation in proportion, five different

religious groups do exist in the administration. In Dire Dawa Administrative Council there are 327 primary cooperatives which operate in various sectors. They have 12, 396 members and a capital of birr 3,179, 304.00. Most of the cooperatives involved in the agriculture sector. Multi-purpose agricultural cooperatives are the largest in number among the agricultural cooperatives and they engaged in more than one field of activity. They market farmer's product, supply input and extend credit to the farmers (FCC, 2010).

### 3.1.3. Cooperatives

In Dire Dawa Administrative Council rural kebeles there are 38 primary agricultural cooperatives. The agricultural cooperative in the administrative region reported to have 5,808 male and 1,017 female members and a capital of birr 351,327. The cooperative undertake a number of activities such as market farmer's product, supply input and extend credit to the farmers and provide other technical support (DRFCU, 2010).

### 3.2. Sampling Design

A stratified sampling technique was employed to select 140 respondents from among the member of agricultural cooperative in the study area. Hence; the following steps were employed:

First, list of the 38 agricultural cooperative in all the 38 rural Kebele of Dire Dawa administration were prepared and the agricultural cooperatives were stratified based on the working capital of the agricultural cooperative. About 13 of agricultural cooperatives identified to have a contemporary working capital of birr 10,000 and above birr, while 25 agricultural cooperatives identified to have a contemporary working capital below 10, 000 birr. Second, two agricultural cooperative from each stratum with larger member were purposively taken and fresh list of cooperative members in the four agricultural cooperative were prepared in consultation with leader of the cooperative, rural Kebele administration representative and Dire Dawa regional cooperative union and development agents working in the area. Third, the researcher randomly select male households from the fresh list using probability proportional to size sampling (PPS) procedure. Thus, a total of 140 sample respondents which is 9 % of the total household in all the four cooperative were selected and included in the study.

**Table 1** Presents about sample respondent per cooperative

Name of the cooperative	Current Working capital	Cooperative Member			Sample per Cooperative
		M	F	T	
Bashan Behe	22,295.00 ETB	360	68	428	40
Wahile	19,641.00 ETB	359	54	413	38
Hulul Mojo	7430.00 ETB	296	46	342	32
Hula Hulul	9488.00 ETB	270	51	321	30
Total		1285	219	1504	140

Source: Cooperative union 2012 status update report

### 3.3. Methods of Data Collection

Both primary and secondary data were used in the analysis of this study. The enumerators who speak the local language Oromiffa and Somali were recruited from the study districts and trained on methods of data collection and interviewing techniques.

Moreover, the researcher explained the contents of the questionnaire to the enumerators. Field trips was made before the actual survey to observe the overall features of the selected cooperatives and to select farmers interviewed using lists taken from respective cooperatives. The questionnaire was pre-tested and its contents were refined on the basis of the results obtained during the pre-test. With regard to the collection of primary data, it was done in two different ways: trained enumerators held interview with sample farmers using the structured questionnaire; and the researcher undertake personal observations and informal discussions with farmers, cooperative officials and employees in the cooperatives. Continuous supervision was made to reduce error during data collection and to correct possible errors right on the spot. Secondary data were obtained from various sources such as reports of Federal Cooperative Commission, Dire Dawa Cooperative Promotion Commission, Dire Dawa rural Farmers' Cooperative union.

### 3.4. Methods of Data Analysis

The qualitative and quantitative were analyzed using appropriate methods of analysis. Descriptive statistic including chi-square and t-tests also used to describe explanatory variables. Likert scale of perception measurement used to measure perception of members towards agricultural cooperatives, while binary logit regression used to analyze determinants of members utilization of input from cooperative.

#### 3.4.1. Perception measurement-likert technique

Attitude Scaling known as Summated ratings which is also known as Likert technique were be used to address objective two of the study that is to measure perception towards agricultural cooperatives. Likert technique is a widely used technique in behavioral research for developing an attitude Scale (Likert, 1932 as

cited in MER, 1998). This method helps the researcher in the development of the right attitude Scale. Using the Likert model, the researcher investigated perception towards agricultural cooperatives. The scale was constructed through the following steps. First, a large number of attitude statements were collected, selected and distributed among the social scientist to comment whether the statements are capable of measuring attitudes towards agricultural cooperatives. Second, the statements were then screened, modified, revised and edited in accordance with the feedback. The statements appeared to be double barreled, confusing or ambiguous concept were either modified or discarded. Thirdly, attitude scale was constructed with five response categories' that is, strongly agree, agree undecided, disagree, and strongly disagree. Each response category of positive item was assigned with scores 5,4,3,2 and 1 respectively. These scores were reversed for negative items. The respondents were asked to react to each of the statement of scale in terms of their own agreement or disagreement with the statement.

Thus, after score was assigned to each statement a total attitude score were computed for each subject by simply adding the score earned by each individual on each statement. Selection of item/statement was done through the procedure of item analysis. Finally, by summing up the mean value of each statement, the attitude was coded with positive and negative values towards the attitude object, i.e. Perception of farmers towards cooperatives. Percentage, mean and standard deviation were also used to explain the perception of respondents towards each perception object. The correlation matrix, which is used to see the degree of association between each statement, was also presented. Accordingly, the result of correlation matrix shows consistency or agreement of values within cases.

However, in some cases, the presence of some items influences negatively. Hence, reliability analysis was undertaken for all statements to see the degree of scale reliability of each attitude statements and to determine potential items which influence respondents' perception towards cooperatives. The alpha ( $\alpha$ ) level of all statements is 0.64. All items with a value of greater than 0.64 were dropped as they are not reliable to estimate respondents' attitude.

### 3.4.2. The Logit and probit models

The inadequacy of the LPM suggests that a non-linear specification may be more appropriate. The candidate in this case was be an S-shaped curve bound in an interval 0-1 (Pindyck and Rubinfeld, 1981; Gujarati, 1995). The suggestion of the authors is that the S shaped curves satisfying the probability model are those represented by the cumulative logistic function and the cumulative normal distribution. The logit model assumes cumulative logistic probability function, whereas the probit probability model is associated with the cumulative normal distribution.

In this regard, a selection is between logit and probit models. However, the statistical similarities between the two models make such a choice difficult. The choice of any model is therefore, not dominant and may be evaluated a posterior on statistical grounds, although in practice there is no strong reason for choosing one model over the other. Gujarati (1995), and Pindyck and Rubinfeld (1981) illustrated that the logistic and probit formulations are quite comparable, the main difference being the former has slightly fatter tails; that is the normal curve approaches the axes more quickly than the logistic curve.

Although logit and probit yield similar parameter estimates, the logistic distribution (logit) has an advantage over others in the analysis of dichotomous outcome variable in that it is extremely flexible and easily used function from mathematical point of view and subjects itself to meaningful interpretation (Adersi, 1990; Hosmer and Lemeshew, 1989). Pindyck and Rubinfeld (1981) also indicated that the logit model has advantages over the probit model in that it transforms the problem of predicting probabilities within (0, 1) interval to the problem of predicting the odds of an event occurring within the real line.

#### Specification of the logit model

The objective of this study was to analyze the hypothesized independent variables in relation to utilization of agricultural input supply through cooperatives (to use the agricultural cooperative as an input supplying agent or not to use). The dependent variable is a dummy variable, which takes a value zero when the cooperative member is non-user and one, otherwise; whereas the independent variables are either continuous or dummy/discrete variables hypothesized to affect utilization of agricultural inputs through the cooperative.

Following Hosmer and Lemshew (1989), the logistic distribution function for analyzing the utilization of agricultural input through the agricultural cooperative is specified as:

$$PB_{iB} = \frac{1}{1 + e^{-z_{iB}}} \dots\dots\dots(1)$$

Where  $PB_{iB}$  is the probability of utilization of agricultural inputs using the agricultural cooperatives for the  $i^{th}$  cooperative member and  $Z_{iB}$  is a function of  $m$  explanatory variables ( $XB_{iB}$ ), and expressed as:

$$Z_{iB} = \beta_{0B} + \beta_{1B}XB_{1B} + \beta_{2B}XB_{2B} + \dots + \beta_{mB}XB_{mB} \dots\dots\dots(2)$$

Where  $\beta_{0B}$  is the intercept and  $\beta_{iB}$  are the slope parameters in the model. The slope indicates how the log-odds in favor of decision to utilize agricultural inputs through agricultural cooperative as explanatory variables change.

Since the conditional distribution of the outcome variable follows a binomial distribution with a probability given by the conditional mean  $P_{iB}$ , interpretation of the coefficient was understandable if the logistic model can be rewritten in terms of the odds and log of the odds, (Gujarati, 1995). The odds to be used can be defined as the ratio of the probability that a cooperative member uses ( $P_{iB}$ ) to the probability she does not use ( $1-P_{iB}$ ).

But from (1), it follows that

$$(1 - p_i) = \frac{1}{1 + e^{Z_i}} \dots\dots\dots (3)$$

$$\text{Therefore, } \left( \frac{p_i}{1 - p_i} \right) = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \dots\dots\dots (4)$$

And

$$\frac{p_i}{1 - p_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{\beta_0} + \sum_{i=1}^m \beta_i Y_i \dots\dots\dots (5)$$

Taking the natural logarithms of the odds ratio of equation (5) will result in what is called as the logit model as indicated as below.

$$\ln\left(\frac{P_o}{1 - P_o}\right) = \ln\left[e^{\beta_0} + \sum_{i=1}^m \beta_i X_i\right] = Z_o \dots\dots\dots (6)$$

If the disturbance term  $U_{iB}$  is considered the logit model becomes:

$$Z_o = \beta_0 + \sum \beta_i X_i + U_i \dots\dots\dots (7)$$

Therefore, the above binary logit econometric model was utilized for this study to analyze factors that influence utilization of agricultural inputs among the cooperative members through agricultural cooperatives utilization decision of use agricultural inputs through the cooperatives.

### 3.4.3. Statistical tests of multicollinearity problem

Before executing the econometric model, all the hypothesized explanatory variables were checked for the existence of multicollinearity problem. The problem of multicollinearity may arise due to a linear relationship among explanatory variables. Multicollinearity problem might cause the estimated regression coefficients to have wrong signs, smaller t-ratios for many of the variables in the regression and high  $R^2$  value. Besides, it causes large variance and standard error with a wide confidence interval. Hence, it is quite difficult to estimate accurately the effect of each variable (Gujarati, 1995, 2003).

Different methods are often suggested to detect the existence of multicollinearity problem. Among them, variance inflation factors (VIF) technique was employed to detect multicollinearity in continuous explanatory variables and contingency coefficient (CC) for dummy variables (Gujarati, 1995). According to Gujarati (1995) VIF ( $X_i$ ) can be defined as

$$VIF(X_i) = \frac{1}{(1 - R_i^2)}$$

Where:  $R^2$  is the multiple correlation coefficients between  $X_i$  and other explanatory variables.

For each selected continuous explanatory variables, ( $X_i$ ) was regressed on all other continuous explanatory variables, and the coefficient of determination ( $R_i^2$ ) was constructed for each case. The larger the value of  $R_i^2$  results in the higher the value of VIF ( $X_i$ ) which causing higher collinearity between variables. For continuous variables, as a rule of thumb, values of VIF greater than 10, are often taken as a signal for the existence of multicollinearity problem in the model (if the value of  $R_i^2$  is 1, it would result in higher VIF and cause perfect multicollinearity between the variables) (Gujarati, 1995).

In the same line, the Contingency coefficients were computed for dummy variables from chi-square ( $\chi^2$ ) value to detect the problem of multicollinearity (the degree of association between dummy variables). According to Heal (1984), the dummy variables are said to be collinear if the value of contingency coefficient is greater than 0.75 (cited in Paulos, 2002).

$$CC = \sqrt{\frac{\chi^2}{n + \chi^2}}$$

Where:

C.C is contingency coefficient, n is total sample size,  $\chi^2$  = chi-square values.

Hence, in this study before starting the analysis of the variables using the binary logit all the hypothesized independent variables were tested for the presence of multi-collinearity. Therefore, for this reason VIF values were computed for continuous variables. Correspondingly, to check multicollinearity of the dummy/discrete variables, contingency coefficient (CC) was used. The computed values of the contingency coefficients for the independent dummy/discrete variables were lower which indicates that there is no serious

problem of multicollinearity effect among the variables. The result of contingency coefficient computed from the survey data are presented on Appendix. The model was assessed for its goodness of fit and the result indicate that the model has a value of chi-square at less than one percent level of significance that shows the parameter in the model except the constant are different from zero. The maximum likelihood method was used to estimate the coefficient of the explanatory variables.

## 4. RESULTS AND DISCUSSIONS

### 4.1. Descriptive Analysis

This chapter comprises the study findings to be discussed under different sections. Accordingly, categorization of explanatory variables in to dummy and continuous variables and agricultural cooperative member's perception towards the cooperative and determinants of agricultural input utilization among members of the agricultural cooperative through the cooperative will be discussed in detail successively.

#### 4.1.1. Descriptive statistics analysis result of explanatory dummy variable

The explanatory dummy variables hypothesized to influence member's utilization of agricultural input utilization from agricultural cooperative were sex of respondent, access to credit, and perception towards input price. The sample size of the study was 140 cooperative members out of which 82 were identified to be users while the remaining 58 identified to be non-users. Sex of respondents is one of explanatory dummy variable hypothesized to determine member's utilization of input from cooperative. Sex determines members role in their day to day activity and decision makings, whether to involve in indoor activity or outdoor activity. Due to cultural barriers most of the time men take the lion's share in day to day decision making. The result of the survey in table 2 indicated that out of the total sampled respondents 32(23%) are female and 108(77%) are male. The survey result also indicated that the majority of the respondent 59(72%) of them were male, while 9(11%) were female. As it is shown in Table 2. 49(84%) of males and 9(16%) females were found to be non-user of agricultural inputs through agricultural cooperative.

Table 2 1Presents about summary of the relation between explanatory dummy variable with agricultural input utilization through agricultural cooperative

Sex	User		Non-User		Total		X <sup>2</sup>
	№	%	№	%	№	%	Value
Female	23	28	9	16	32	23	3.026*
Male	59	72	49	84	108	77	
Perception of input price							
Positive	45	55	19	33	64	46	45.214**
Negative	37	45	39	67	76	54	
Credit accessed							
Yes	64	78	14	41	78	56	40.016**
No	18	22	44	59	62	44	

Source: own survey data, 2012; \*\*\*, \*\* and \* refers significant at 1%, 5% and 10% probability level

In the other hand proportionally more female 9(16%) were found to be non user of agricultural input using agricultural cooperative. Moreover, the result of this survey indicates significant association ( $P=0.082$ ;  $X^2 = 3.026$ ) between utilization of agricultural input and sex of the respondents across the categories, it is observed in the finding of this study that more female respondents reported as non-user of agricultural input using agricultural cooperative. The possible explanation may be female respondent have less decision power in comparison to that of male respondent.

Perception of respondent to input price is also the other variable hypothesized to influence respondent utilization of input from cooperative. As indicated in the table2,64 (46%) of the respondents were found to have positive attitude while the remaining respondent 76(54%) identified to have negative attitude to agricultural input price. The finding of this study also showed strong association between perception to input price and agricultural input utilization through cooperative at 5 percent significant level ( $P=0.020$ ,  $X^2 =0.214$ ).The possible explanation might be the fact that positive attitude towards input price encourage members to utilize input from cooperative. The finding of the study come up with similar result with Alemayehu, (2007) who reported significant association between perception towards input price with agricultural input utilization from cooperative.

Access to credit is also the other variable hypothesized to determine input Utilization from agriculture. It is clearly showed in the table 2 that78 (56%) of the respondent found to have credit access while, 62(44%) of the total respondents responded that they did not. Of the total respondent identified to use input from cooperative 64(78%) of the respondent reported to have credit access while proportionally small number among the user 18(22%) reported no access to credit service. The finding of this study showed a significant and positive association at less than 1 percent significant level ( $P=0.000$ , Chi square = 40.016) between access to credit and agricultural input utilization among the member of the cooperative from the cooperative. The possible

explanation of this may be credit helps the farmer in paying the prepayment to the cooperative in order to get sufficient amount of fertilizer. It also helps in renting land and purchasing other inputs that increase production. In general, it plays an important role in using fertilizer. This study come up with a similar finding by Teferi(2003) who reported significant and positive association between access to credit service and agricultural input utilization through different local and agricultural institution in his study among small holder farmers in Farta woreda.

#### 4.1. 2. Descriptive analysis result of continuous variable of sample households'

The explanatory continuous variables hypothesized to determine members utilization of agricultural input utilization from agricultural cooperative were educational grade, family size, years of cooperative membership, off and non-farm income, distance to the nearest market, amount patronage refund, and farm size.

Table 3.2Presents about summary of the relation between explanatory continuous variable with agricultural input utilization through agricultural cooperative

Variables	User N = (82)		Non-User N = (58)		t-value
	Mean	STD	Mean	STD	
GRADATND	8.46	3.068	2.24	3.192	6.498***
FAMILYSIZE	4.71	1.774	7.28	2.864	-6.543***
LNGTMMBR	3.34	-0.878	2.02	1.304	-2.154***
INCMOFRM	6486.85	5758.177	892.21	2596.105	6.888***
HURTCOP	1.02	0.812	1.50	0.684	-3.673***
DSTMARKT	1.51	1.042	1.114	0.990	2.129**
PATREF	1266.46	1815.129	516.38	1457.208	2.608**
FARMSIZE	3.72	1.520	1.680	1.315	8.277***

Source: own survey data, 2012; \*\*\*, \*\* and \* refers significant at 1%, 5% and 10% probability level

Educational grade is one other variable hypothesized to influence member's utilization of agricultural input from cooperatives. As indicated in table 3 the mean educational level score of User was 8.46 while 2.24 for Non- user group of respondents. The educational level of user and non-user groups of sample respondents was found to be statistically significant at less than 1% probability level ( $t=6.498$ ,  $P=0.000$ ). This indicates sample respondent with higher educational level are more likely use agricultural input through cooperative. The possible explanation for the finding may be the higher level of education help the farmer to have better knowledge about the service, benefit and obligation of agricultural cooperative. Hence, those farmers with higher formal education are in a better position to know the benefits of cooperative so that they better access and use agricultural input through the cooperatives. Daniel (2006), in his study of cooperative member found higher educational status of cooperative member to positively and significantly influence member's utilization as a marketing agent and service suppliers.

The other continuous explanatory variable hypothesized to influence members utilization of input from cooperative is family size of the respondents. The variable assumed to have negative influence on utilization of agricultural input through the cooperative or rural agricultural cooperatives union. As it can be seen in table 3 the mean score family size for users and non-users were 3.00 and 2.85 respectively. The descriptive statistics analysis test ( $t=0.493$ ,  $p=0.139$ ) reveals as there was no statistically significant mean difference of users and non-users groups of respondents at; showing no relationship between family size and agricultural input utilization through cooperatives.

Years of cooperative membership is continuous explanatory variable hypothesized to influence member's utilization of agricultural input through cooperative. As shown in table 3 the cooperative users had on average 3.34 years of membership experience whereas the non-users had on average 2.02 years of membership duration. There is statistical significant difference between cooperative users and non-users in years of membership. The users have more years of membership experience than the non-users. The descriptive statistics analysis test ( $t=-2.154$ ,  $p=0.000$ ) reveals as there was statistically significant mean difference of users and non-users groups of respondents at less than 1% probability level; showing strong relationship between agricultural input utilization through cooperative and length of cooperative membership in year. Similar result was also reported by Teferi (2003).

Income from off and non-farm activity also hypothesized to influence members utilization of input from cooperative is family size of the respondents. The mean score of non-user and user of agricultural input utilization were 6485.85 and 892.21 respectively. The finding of this study come up with significant mean difference between the mean of agricultural input user through cooperative and non-user groups of respondents at less than 1 percent ( $P=0.000$ ,  $t=6.888$ ) level of significance. The possible explanation may be additional income from off farm activity encourage the farmers to purchase and use the recommended agricultural input. Likewise the additional income improves the farmers' financial position that in turn enables them to invest in purchasing the needed amount of farm inputs especially fertilizer and renting land. In his study of cooperative

member klein(1997) reported members having higher income from off farm activity to utilize cooperative as a center of input supply and mark. Similarly, this study come up with significant association between higher level of income from off farm activity and utilization of cooperative as a center of agricultural input utilization.

Distance of the cooperative from the farmer house also the other continuous variable hypothesized to influence member's utilization of agricultural input from cooperative. The proximity of the cooperative for the farmer house reduces the cost of time and labor that the farmer spent in searching for a buyer for his cereal and transportation of agricultural input. The descriptive statistics analysis test ( $t=-3.673$ ,  $p=000$ ) reveals as there was statistically significant mean difference of users and non-users groups of respondents at less than 1% probability level; showing strong relationship between distance of the cooperative from the farmer house and agricultural input utilization through cooperatives. The mean score of distance of the cooperative from the farmer house for users and non-users were 1.02 and 1.50 km respectively. Moreover, the bivariate analysis test indicted a strong positive association ( $r=0.298$ ;  $p=0.00$ ) between distance of the cooperative from the farmer house and agricultural input utilization. The possible explanation for this may be being at short distance in the house of the household from the cooperative reduces cost for input transportation and encourages use of input through cooperative. The finding of this study found to be similar with the finding of Daniel (2006), who come up with a report showing that short distance to cooperative office to significantly and positively influence members service utilization through cooperative in his study of performance of primary agriculture and determinants of members decision to use as a marketing agent in Adaa Liben and Lume districts.

The distance between the farmer houses with the district market determine the amount of time and finance utilized and determine the utilization of agricultural input utilization. The mean score of Distance of the district market (main market) from the farmer house in the above table. The mean of distance of the district market of non-user was 1.51 and 1.14 for user group of respondents. The distance of the district market of user and non-user groups of sample respondents was found to be statistically significant at less than 1% probability level ( $t=2.129$ ,  $P=0.000$ ). It also shows access to easy transportation facility to sell farm produces in this market and purchase agricultural input. Similar finding was reported by Alemayehu, (2007).

Patronage refund also the other continuous explanatory variable hypothesized to influence member's utilization of agricultural input from cooperative. As it was reported on the table 3, the mean of patronage refund for users and non-users were 1266.46 and 516.38 respectively. The descriptive statistics analysis test ( $t=2.608$ ,  $p=000$ ) reveals as there was statistically significant mean difference of users and non-users groups of respondents at less than 1% probability level; showing strong relationship between patronage refund and agricultural input utilization through cooperatives. The possible explanation may be farmers will be encouraged to market more purchase and utilize agricultural input if there is surplus appropriation in the form of patronage refund. This study come up with similar finding with Alemayehu (2007), In his study of cooperative members in Kembata and Hadiya found that user of patronage refund to be active in the day to day activity of the cooperative and reported patronage refund utilization to encourage member's utilization of service from the cooperative.

Farm size holding is the other continuous variable hypothesized to influence member's utilization of farm input from cooperative. The mean score of farm size holding for users and non-users were 3.72 and 1.680 respectively. The descriptive statistics analysis test ( $t=8.277$ ,  $p=000$ ) reveals as there was statistically significant mean difference of users and non-users groups of respondents at less than 1% probability level; showing strong relationship between farm size holding and agricultural input utilization through cooperatives. The possible reason may be the usage of agricultural input requires Substantial economic resources of which land is the principal one. It can also argued that the larger the total area of the farmland the farmer owns, the higher would be the output and agricultural input required. Farmers with higher level of output expected to use more input than those who have not. This study come up with similar study with Teferi (2003) who reported significant and positive association between farm size and member utilization of the cooperative as a marketing agent and input supplier.

#### 4.2. Determinants of members utilization of Agricultural Inputs from Cooperatives

As indicated in the table 4 the binary logit model result, the maximum likelihood estimates reveals that utilization of agricultural input through agricultural cooperative among member of the agricultural cooperative is determined by the interaction of different potential: personal/demographic, socio-cultural and economic; and institutional factors. To test the measure of goodness of fit in logistic regression analysis, the likelihood ratio test (LR) that says chi-square distribution with degree of freedom (DF) equal to number of independent variables included in the model (Gujarat, 1995); consequently, the chi-square computed indicated, as the model was significant at 1% significance level. This implies that the null hypothesis stating the coefficients of independent variables less the intercept are equal to zero was rejected and the alternative hypothesis of non-zero slope was accepted. The other measure of goodness-off-fit in the logistic regression model is by observing the value in the prediction table as the model correctly predicted it or not. The fit is said to be good if the overall correct prediction rate exceeds 50% (Gujarat, 1995). In line with this the observation is categorized user if the computed

probability of user is greater than or equal to 0.5 (50%), and as non-user, otherwise. Accordingly, the result indicated that 84.5% of the non-user and 91.5 % of the users were correctly predicted at the cut value of 0.5; and overall, the model correctly predicted 88.6 % of the sample cases. Hence, the model predicted users and non-users categories of agricultural input utilization using agricultural cooperative accurate.

**Table 4.** Presents about the Maximum likelihood estimates of the binomial logit model (N=140)

	Coefficient	S.E.	Z	P> z	Marg. effect
GRADATND	0.2170604	0.1053183	2.06	0.039**	0.0464619
FMLYSIZE	-0.2719256	0.1446215	-1.88	0.060*	-0.0582058
LNGTMMBR	0.0771529	0.2514196	0.31	0.759	0.0165146
INCMOFRM	0.0001469	0.0000755	1.95	0.052*	0.0000314
ATUDINPTPRC	0.4291329	0.2564786	1.67	0.094*	0.0918561
HFRMSZ	0.3163471	0.2064618	1.53	0.125	0.3163471
NMBRLVSK	0.009068	0.1818557	0.05	0.960	0.009068
USDCREDIT	0.2940876	1.01191	0.29	0.771	0.0629496
OTERMKT	-0.5464585	0.6311371	-0.87	0.387	-0.5464585
DSTMARKT	0.286391	0.3145552	0.91	0.363	0.0613021
HURTCOP	-0.703993	0.3392349	-2.08	0.038**	-0.1506901
PATREF	0.000108	0.0001931	0.56	0.576	-0.0000231

Pearson - $\chi^2$ value	51.20***	df=12
-2Log Likelihood	-46.453088	
Prediction success	88.6 %	
Over all prediction for non-users	84.5%	
Over all prediction for users	91.5%	
Number of observation	140	

\*\*\*, \*\* and \* refers significant at 1%, 5% and 10% probability level

Source: model output

**Education grade level of household head (GRADATND):** Educational grade level of household head is explanatory variable included in the logit model that showed significant relation with member's utilization of agricultural input from cooperative. Educational grade attended by the respondent found to significantly and positively influence members utilization of agricultural input from cooperative at 5 % probability level. The result of the logit model indicates that member's utilization of agricultural input from cooperative increases the level of educational grade attended by the respondent increase. The possible reason could be higher educational level enhance the capacity of an individual to easily understand the value and advantage of utilizing the service from the agricultural cooperative while lower educational level of the respondent inhabit understanding. The marginal effect result shows that members utilization of agricultural input from cooperative increase by 4.7 percent for each higher educational grade level attended by the respondent. The possible elaboration for this may be the fact that education helps members to rationally and critically analyze, interpret and make use of the advantage of using the service from cooperative. Daniel (2006), in his study of cooperative member found higher educational status of cooperative member to positively and significantly influence member's utilization as a marketing agent and service suppliers.

**Off/non-farm income (INCMOFRM):** the variable was significant at 10 percent significance level and positively related with members agricultural input utilization from agricultural cooperative in the study area. The result of the logit model indicates that member's utilization of agricultural input from cooperative increase as the level of off farm income increase by the respondent. The possible reason could be higher income from off farm and non-farm activity enable the respondent to cover the cost required to the service than those with lower level of income from off and non-farm activity. The marginal effect result shows that member's utilization of agricultural input from cooperative increase by 0.003 percent for each additional income from off farm and non-farm activity. The possible explanation for this may be additional income obtained from off farm activity encourage individual cooperative member to use recommended agricultural inputs with less pressure to cover the cost. In his study of cooperative member Klein(1997) reported members having higher income from off farm activity to utilize cooperative as a center of input supply and mark. Similarly, this study come up with significant association between higher level of income from off farm activity and utilization of cooperative as a center of agricultural input utilization.

#### Family size

The result of the logit model analysis also reported that family size significantly and negatively influences member's utilization of input from cooperative. Family sizes significantly and negatively influences member's utilization of agricultural input from agricultural cooperative at less than 10% probability level. The possible reason behind this finding in the study area might be large family size forced a household to spend significantly

higher share of their income to meet the immediate need of the household than to invest in other long term benefiting investment. The marginal effect result shows that for each additional member of the family, the probability of the decision to utilize agricultural input from the cooperative decrease by 5.8 percent. Similarly, Fasil (2006) reported that an increase in numbers to significantly affect members participation and utilization of different service from agricultural cooperative.

#### **Members Perception towards input price**

Members perception towards input price is the other explanatory variable hypothesized and included to influence members utilization of agricultural input from cooperative. Member's positive perception to agricultural input price from cooperative was found to significantly influence member's agricultural input utilization at less than 10 percent probability level. The marginal effect result shows that positive perception to input price from cooperative increase the probability of utilizing agricultural input from cooperative by 9.2 percent. The possible reason for this finding may be positive perception to agricultural input from cooperative encourages member's utilization of agricultural input from the cooperative with an objective of maximizing their benefit. Similar finding also reported by Daniel (2006) in his study of performance of primary agricultural cooperatives and determinants of members' Decision to use as marketing agent in Adaa Liben and Lume districts.

**Distance in time between cooperative and farmer house (HURTCOP):** The result of the study confirmed the distance of the house hold home from the agricultural cooperative significantly and positively relate with the utilization of agricultural input using agricultural cooperative as an input supplier. The logit model result indicated that households in short distance from the cooperative found to be more users as compared to those individual far from the station of the agricultural cooperative. The marginal effect result shows that for each less additional hour required between the cooperative and house of the household member's utilization of agricultural input from cooperative increase by 15.1 percent. The possible explanation for this is that as the farmer is close (near) to the cooperative, they will have more knowledge about the cooperative and its benefits. The finding of this study found to be similar with the finding of Daniel (2006), who come up with a report showing that short distance to cooperative office to significantly and positively influence members service utilization through cooperative in his study of performance of primary agriculture and determinants of members decision to use as a marketing agent in Adaa Liben and Lume districts.

## **4.2. Members Perception towards Agricultural Cooperative**

This section presents the result and discussion on the perception of agricultural cooperative members towards agricultural cooperative as measured by the Likert Scale designed specifically to answer research objective number two of this study 'what types of perception members hold towards agricultural cooperative?' Accordingly, different perception statements were presented to the sampled cooperative members.

### **4.2.1. Reliability analysis for perception statements agricultural cooperatives**

As shown in appendix 2 of the total twelve statements, two statements (Agricultural cooperative never contribute for poverty reduction, NAGCNM, Agricultural cooperative work to improve quality of life among its members, AGSUP) were found with alpha value of greater than 0.064. Hence, these two statements were dropped and the remaining ten reliable statements were used to analyze respondents' perception towards agricultural cooperative.

### **4.2.2. Interpretation of empirical results:**

To get an overview of the degree of members perception towards agricultural cooperative both agricultural input user using cooperative and non user were grouped in to three categories that is, Less favorable (below 29.88), favorable (29.9 to 35.44) and more favorable (above 35.343). The groups were formed on the basis of calculated mean score and standard deviation of the overall perception scores obtained by the respondents as a whole. The groups were formed on the basis of calculated mean score and standard deviation of the overall perception scores obtained by the respondents as a whole. The distribution of respondents in each group under both User and Non User category is given in table 14. It can be observed from the data in the table that more than two-third of the respondents 102(73%) were reported from the category of moderate attitude, whereas nearly one-fifth 21 (15%) of the respondent were placed in more favorable attitude while only 17(12%) percent could be placed in the category of less favorable attitude towards agricultural cooperative. It is interesting to note that large numbers of both agricultural input user through cooperative and non-user through cooperative were reported in medium attitude group 60(73%) user and 42 (72%) of the total agricultural input non user through cooperative. It was further noted that 16(21%) user and 4(7%) Non user respondents fell in the category of more favorable attitude, while only 5(6%) percent User and 4(7%) non user respondents were found to be from the category of less favorable perception towards membership of agricultural cooperative. An observation of the data further indicates that those respondents identified to use agricultural input through agricultural cooperative are found to have comparatively higher level of positive degree of attitude than that of respondent identified in the category of non-user. The same finding also obtained variable like being in position and benefit from the patronage refund positively and significantly affected utilization of

agricultural input using agricultural cooperative as a supplying agent in the study area.

#### 4.2.3. Rank order correlation of perception statement

It is apparent from the data that agricultural cooperative enable the wider agricultural community to access agricultural input at a fair price and membership to agricultural cooperative have a number of advantage and members benefit are significant than non-members. Furthermore, respondents across the category have expressed strong agreement with the statement that membership have advantageous.

**Table 51** Presents about rank order of perception statement among the respondent

S.N.	Perception Statement	Members perception	
		MPS	RANK
1	Agricultural cooperative ensure benefit of few(N)	2.90	10
2	The managements of agricultural cooperative cannot be trusted(N)	3.06	8
3	Agricultural cooperative never meet their objectives(N)	3.01	7
4	Agricultural cooperatives are established to meet the political interest of the government(N)	2.94	9
5	Services by the cooperative including provision of agricultural inputs are not up to the standard and accompanied by a number of complications(N)	3.23	6
6	The wider agricultural community is directly benefiting from the agricultural cooperative(P)	3.42	3
7	Agricultural cooperative enable the wider agricultural community to access agricultural input at a fair price (P)	3.70	1
8	Member ship to agricultural cooperatives have a number of advantage members benefit are significant than the non members(P)	3.63	2
9	Agricultural cooperative enable the agricultural community to get different benefit that was not their before(P)	3.34	5
10	Agricultural cooperative created a culture of cooperation and collective decision making among the community(P)	3.37	4

MPS = Mean percent square  $r =$  Spearman's rank order correlation efficient \*\*\*Correlation is significant at 1% level significance

Moreover, the rank correlation value between perception of respondent and agricultural input utilization was found  $r=0.786$ ,  $P=0.010$  which is highly significant at 1 percent level of significance. The data support the proposition that there is an association between attitude of cooperative members towards the cooperative and agricultural input utilization through agricultural cooperative. The statistical analysis showed that there is significant difference in the perception of user and non-user towards agricultural cooperative. Therefore it could safely be concluded that both category of respondents possess different types of perception towards agricultural cooperatives.

**Table 6.** Difference between user and non-user respondents regarding their perception towards agricultural cooperative

No	Attitude towards agricultural cooperatives	User		Non user		T	Sig
		Mean	Std.dev	Mean	Std.dev		
		31.91	2.500	33.48	2.755	-3.504	0.001

Source: own survey data, 2012, significant at less than 1% significant level

## 5. Conclusion and Recommendations

Based on the findings of this study, the following issues are forwarded as recommendations that help to improve the efficiency of agricultural cooperative. In this study it was observed that educational level of respondent to significantly determine member's utilization of agricultural input from cooperative. Therefore, it is recommended that the agricultural cooperative to focus on improving the educational status of its members in addition to undertaking awareness creation targeting promotion service provided and advantage of utilizing service from agricultural cooperative.

The other important factor that positively influenced member's utilization of agricultural input from cooperative was perception of members towards input price from agricultural cooperatives. Hence, the regional and national cooperative agencies and other stakeholders are strongly suggested to strengthen their effort on undertaking activities promoting positive side of cooperative in addition to developing a system by which information related price of service by the cooperative regularly released and members and other non-members updated in a regular manner. Above all, changing the attitudes of the farmers towards their cooperatives is a crucial factor in improving the performances of the cooperatives in the study area. Most of the sample farmers need only immediate economic advantages from the cooperatives i.e. getting fertilizer in credit. They don't pay

attention to the sum total of the different advantages they can get in the long-run if they actively participate and strengthened their cooperatives. The concerned bodies should create awareness about a cooperative and the agricultural development it can bring to the area in the long-run. Continuous education and enlightenment of the farmers will have a positive impact on their attitudes towards the cooperatives.

Off farm/ non-farm income were also the other variable identified to significantly determine member's utilization of agricultural input from cooperative. The price of agricultural input is increasing from time to time and the increasing price of agricultural input discourage farmers utilization of the service hence, stakeholders are suggested to focus on strategies targeting enhancement of household income. To this end it is suggested that strengthening members participation in other off and non-farm activity could be one of the strategy that help in addition to supporting members increase their income from the agricultural sector. Since, this additional income improves farmers' financial position that in turn enables them to invest in purchasing the needed amount of farm inputs especially fertilizer and renting land.

The other variable found to significantly and negatively affecting member's utilization of agricultural input from cooperative is members of family size. It was found that high number of members in the family to negatively influence member's utilization of agricultural input from cooperative. This implies that higher number of individual in the family hinder households utilization of improved agricultural practice an influence negatively affect long term wellbeing of the household in particular and the nation in general. Hence. Concerned stalk holders are strongly recommended to support the cooperative in their effort of promoting family planning practice.

The other variable found to influence member's utilization of agricultural input from cooperative is distance in an hour between the house of the household and the cooperative. This implies that lack of developed infrastructure in the area to negatively influence determine utilization of improved agricultural practice by the targeted household. Hence, recommended that relevant stakeholders to strengthen their effort of establishing the cooperative or establish a at sub kebele level so that the distance between the household and the cooperative minimized significantly.

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## 6. Appendix

### Appendix I. Contingency coefficient for dummy/categorized variables

	USDCREDIT	OTERMKT	ATUDEINP
USDCREDIT	1.0000		
OTERMKT	0.2186	1.0000	
ATUDEINP	0.1228	0.1348	1.0000

### Result of multicollinearity test for continuous variables (N=140)

Variable	Collinearity Statistics	
	Tolerance	VIF
Patronage refund	0.457	1.172
Education level	0.157	6.365
Family size	0.459	2.179
Number of years of membership	0.462	2.164
Off/non-farm income	0.849	1.177
Farm size	0.160	6.240
Total livestock holding	0.891	1.122
Distance of the cooperative from the farmer house	0.874	1.144
Distance of the district market (main market) from the farmer house	0.897	1.126
Constant		

Source: own survey data, 2012