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Determinants of Non-Farm Employment and Farm Production of Small Holder Farmers in Huambo District of Wolaita Zone, Ethiopia

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Abstract
Non-farm employment provides an important potential source of income for many landless and near-landless households in Ethiopia. The study identified household level determinants of non-farm activity participation in Humbo District of Wolaita Zone, Ethiopia using cross-sectional data obtained from 118 randomly selected farmers in 2018 production year. To achieve this objective, a binary logit model was used to analyze the determinants of participation in non-farm activities. 14 Variables were included in the model of which 5 variables were found significant. Training on entrepreneurship & input use were significant at 1 %, credit use & cultivated land were significant at 5% significance level and Age was significant at 10% significance level. Policy implication of this study was that the rural development strategy should not only emphasis in increasing agricultural production but affiliated attention should be given in promoting non-farm activities in the rural areas, accessing training on non-agricultural sector will expand the household's choice of non-farm activities and the rural policy would do well to provide better access to credit for the rural people by motivating micro-finance institutions.
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1. INTRODUCTION

1.1 Background of the Study

As government report (MoA, 2012) indicated that Ethiopia has been registering high economic growth (11%) in the recent years, however, there was significant poverty and chronic food insecurity in the country. Most of these food insecure households were subsistence farmers and vulnerable to weather fluctuation and high population growth had contributed to decline to the farm size and environmental degradation stay a problem (Tekle and Berhanu, 2015).

According to MoA,(2012), nearly 55 percent of all smallholder farmers operate on less than one hectare of land due to smaller farm size and low return from farming activity, majority of rural households were exposed to food insecurity and chronic poverty.

These problems were coupled with those relating to land tenure, lack of inputs, inadequate and fragmented farm size, pricing, marketing and overall macro-policies of the country. The development of agriculture had to be seen not only as a sectorial problem but also as an inter-sectorial problem Tewdros Girma and Van dea Berg (2012).

Many researchers had noted the vital role of non-agricultural activities in bringing about rural progress. In Ethiopia, based on a large-scale household survey in high potential agricultural areas of the country Off-farm income in Ethiopia is relatively low compared to other countries and is significantly related to the agricultural sector. It is estimated that crop income makes up 71 percent of total household income. Wage income makes up 10 percent of total household income, which roughly equates to the income share that households derive from livestock and livestock products. Enterprise income accounts for 8 percent of household income. (EFPRI, 2016).

But most Ethiopians are rural dwellers and subsistence farmers, the poorest 40 percent tend to be even more likely to live in rural areas and engage in agriculture, where there is high vulnerability of returning to poverty, especially for rural livelihoods dependent on rain fed agriculture (WB, 2016).

As a result, promotion of non-farm employment as a policy had gained widespread support across a field of development agencies ranging from the World Bank to nongovernmental organizations, especially in countries facing repeated income and consumption shocks.

The study was conducted in Wolaita zone, Humbo District, which was located in the Southern Nations Nationalities and Peoples Regional State were characterized by a large number of non-farm activities.

3. RESEARCH METHEDOLOGY

3.1. Description of Study Area

Humbo is one of the districts of Woliata Soddo zone located along Abaya, 408 km away from Addis Ababa, 178 km from Hawassa and 18 km from the zone's town, Woliata Soddo. The altitude Ranges from 1100 to 2355 m.a.s.l. The district covers a total area of 86,646 hectares. The area is sub divided into two agro ecological zones: lowland (*kola* 70%) with an altitude below 1500 m.a.s.l and midland (*weinadega* 30%) with an altitude range of 1500-2355 m.a.s.l. Total population of the District is estimated as 86,509 out of which 172,487 are male & 8,598 are female

(HDFEDO,2017).

Different types of non-farm activities could be performed by farmers in rural areas. These activities and their dominance vary from place to place. In the study area, the predominant non-farm activities were petty trade, daily labor, formal non-farm employment, firewood and charcoal sale, food preparation and sale, handicraft, carpentry, transportation of produces by donkey cart(from and to the market/farm), red ash, coble stone & sand extraction and sale, tailoring & butchery activities were predominant in Humbo District (HDAO, 2017).

The numbers of households engaged in trade in Humbo District were very high. The dominant form of trade was livestock trade, grain trade, pajama pea trade and coffee trade, and sheep and goat trade. Most trade was retail trade with little or no wholesaling activity. As was evident, trade was based mainly on agricultural activity.

Handicraft was practiced in all Kebeles in Humbo District. It was, however, predominantly practiced. The predominant handicraft activity in this District was blacksmithing, *(arata)* making skin for siting purpose and weaving. Handicraft activities were inherited from family and in some cases are learned from friends and neighbors. In many cases handicraft activity becomes a family affair in which members of the family participate. In the study area, family members' participation was mainly in the form of providing support services. For example, it was observed that in the case of blacksmithing. The household head does the main job of smelting and production, children and wife keep the fire going, assist in supplying materials, etc.

Handicraft activity was done mainly during a slack period and hence it does not conflict with farm schedules of the farmers. Farmers engaged in these activities were comfortably placed in the society as the communities were favorably disposed towards these activities and farmers wish to continue with these activities.

Data Types, Sources and Methods of Data Collection

For this study, both primary and secondary data from different sources were used.

Sampling Techniques & Sample Size Determination

Three stages random sampling procedure was used for the selection of sample household heads. In the first stage, Humbo District was selected purposively because it is one of the foods insecure, with large numbers of unemployment and non-farm practicing district. In the second stage, with the consultation of District experts, out of 41 *kebeles* of the district, 6 potential non-farm practicing *kebeles* were randomly selected.

In the last stage, from 2834 vegetable producers in Humbo district about 118 samples of household heads were randomly selected, using probability proportionality size following a simplified formula provided by (Yamane, 1967). Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 9% are used to obtain a sample size required which represent a true population.

Assuming e =9 % precision level.

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

$$n = \frac{2834}{1+2834(0.09^2)} = 118$$

Where n *is the sample size, N is the population size (sampling frame) which is 2834 HHs, e is the level of precession considered e= 9%.*

Methods of Data Analysis

Descriptive statistics

Descriptive statistics give a clear picture of the characteristics of farm and non-farm sample units. By applying descriptive statistics, one can describe, compare, and contrast different categories of sample unit (farm and non-form households) with respect to the desired characteristics.

Logistic regression model

Logistic regression model was used to identify the determinants of non-farm activities. In the studies on non-farm activities responses to the questions such as whether a household participates in non-farm activities could be "yes" or "no", a typical case of qualitative dichotomous variable. Ferder etal (1985) pointed out that the most commonly used qualitative response models are the logit model, which corresponds to a logistic distribution function, and the probit model.

These models specify a functional relation between the probability of participating in nonfarm activities and various explanatory variables. Hence, factors (independent variables) that affect farmers' participation in non-farm activities can be expressed both quantitatively and qualitatively. Both models have been used inter-changeably and give similar results. However, logit model is simpler in estimation than probity model (Aldrich and Nelson, 1984). Drawing upon Gujarati (2003) and Aldrich and Nelson (1984) the logit distribution function for the participation in non-farm activities is specified as:

$$p_i = \frac{1}{1 + e^{-z_i}} \quad \text{.....} \quad \text{.....} \quad \text{.....} \quad \text{.....} \quad \text{.....} \quad (1)$$

Where p_i: is the probability of participating in non-farm activities.

Z_i:is afunction of n-explanatory variables(x) and expected as :

$$z_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_n X_{in} \quad \ldots(2)$$

Where:β_0 is the intercept

$B_1,\beta_2 \ldots \beta_n$ are coefficients of the equations in the model

The slop tells how the log-odd in favor of participating in non-farm activities as independent variable change.

$$p_i = \frac{1}{1+e^{-(\beta_0+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_N X_N)}} \quad \ldots\ldots\ldots\ldots\ldots\ldots(3)$$

This means that we cannot use the OLS procedure to estimate the parameters. But this problem is more apparent than real because this equation is intrinsically linear which can be shown as follows. If p_i is the probability of participating in non-farm activities, then $(1-p_i)$ the probability of not participating in non-farm activity can be written as

$$1 - p_i = \frac{1}{1+e^{z_i}} \quad \ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Therefore, taking the ratio of the probability of participating to non-participation can be written as:

$$\frac{p_i}{1-p_i} = \left[\frac{1+e^{z_i}}{1+e^{-z_i}} = e^{z_i} \ldots\ldots \right] \ldots\ldots\ldots \quad \ldots\ldots(5)$$

$\frac{p_i}{1-p_i}$ Now is simply the odd ratio in favor of participating in non-farm activities.

It is the ratio of the probability of that the farmer will participate in non-farm activities to the probability that he will not participate. Finally taking natural log of equation 5 we get:

$$L_i = \ln \frac{p_i}{1-p_i} = z_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_n x_{in} \quad \ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Where L_i is log of the odds ratio, which is linear not only in x but in also parameters. Thus, if the stochastic disturbance term (u_i) is introduced the logit model becomes:

$$z_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_n x_{in} + u_i \quad \ldots\ldots\ldots\ldots\ldots\ldots(7)$$

In this study the above econometric model was used to analyze the data. The model was estimated using the iterative maximum likelihood estimation procedure. This estimation procedure yields unbiased, efficient and consistent parameter estimates.

3.5.3. Parameter estimation

In order to fit the logistic regression model the estimation of the values of the unknown parameters β_0 and β_i's is required. Unlike the linear regression which uses the least square estimation (OLS) method, this model estimates the parameters using the Maximum Likelihood (ML) method (Gujarati,2003). Due to the non-linearity of the logistic regression model, an iterative algorithm is necessary for parameter estimation. (Gujarati,2003) pointed out that of ML is a very general method of estimation that is applicable to a large variety of problems. The ML method of estimation suggests choosing as estimates the values of the parameters that maximize the likelihood of function (Gujarati, 2003). In many cases, it is convenient to maximize the logarithm of the likelihood function rather than the likelihood function it-self and the same results are obtained.

Before taking the selected variables into the logit model, it is necessary to check for the existence of multicollinearity among the continuous variables and verify the degree of association among discrete variables. The reason for this is that the existence of multicolliniarity will affect the parameter estimates seriously. The Variance Inflation Factor (VIF) was used to test for the existence of multicollinearity between continuous explanatory variables. VIF shows how the variance of an estimator is inflated by the presence of multicollinearity (Gujarati, 2003). If R^2 of the multiple correlation coefficient that results when the explanatory variable, Xi, is regressed against all the other explanatory variables, VIF is computed as follows:

VIF (Xi) = (1- R^2) $^{-1}$

As R^2 Approaches 1, the VIF approaches infinity. That is as the existence of collinearity increases, the variance of the estimator increases, and in the limit it can become infinity. If there is no collinearity between regressors, the value VIF will be 1. As a rule of Thumb, Values of VIF greater than 10 is often taken as a signal for the existence of multicollinearity problem in the model (Gujarati, 2003). Similarly, there may also be interaction between two qualitative variables, which can lead to the problem of multicollinearity or association.

To detect this problem, coefficients of contingency were computed from the survey data. Contingency coefficient is a chi-square based measure of association. A value of 0.75 or more indicates a stronger relationship (Healy, 1984). The contingency coefficients are computed as follows:

$$C = \sqrt{\frac{\chi 2}{\chi 2 + N}}$$ Where C= coefficient of contingency $\chi 2$ = chi-square test and N=Total sample size

4. RESULTS AND DISCUSSION

4.1. General characteristics of sample households

The age structure of the sample households showed that the average of the participant farmers was about 45 years where as that of non-participant was 40 years. As t-test shows there was significant mean difference in average age of the two groups (t=2.16, p=0.023) (Table 3).

Table 12. General characteristics of sample households

Variables	Average			t-value
	Participant =70 Mean(SD)	Non-participants=48 Mean(SD)	Total=118 Mean(SD)	
Family size	6(1.9)	4(1.69)	5(1.88)	2.191**
Age of hhs	45(11.5)	40(10.2)	43(11.2)	2.16**
Dependency ratio	0.88(.32)	0.93(.24)	0.90(.29)	0.94 **

Source: Survey data, 2017/18 ** significant at 5 percent level.

4.2 Characteristics of farm economy

Land (ha): The average size of cultivated land owned by the sample respondents were about 0.593 hectares, the minimum and maximum being 0.3443 and 0.7581 hectares, respectively. Farmers who participated and non-participated in on-farm had almost similar size of average owned cultivated land 0.75 and 0.507 hectares, respectively.

4.3. Characteristics of non-farm activities

Non-farm income provides farm households with insurance against the risk of farming and there by enables them to adopt new technologies More importantly, non-farm activities offer cyclical and seasonal employment, to supplement meager farm incomes in many drought-prone areas of Ethiopia. As the survey results depicted, the total sample households 32 percent reported that the non-farm income accounted for the highest proportion of the annual household income but 43 percent of the sample respondents reported that agriculture accounted for the highest share but the reaming 25 percent had got almost equal portion of annual house hold income from both the non-farm and farm activities.

Table 13. Proportion Of annual household income from different sources

Income of the households	Participant(=70)		Non participant(=48)		Total =118	
	N	%	N	%	N	%
Agriculture takes highest proportion	35	50	16	33	1	43
Non-farm takes highest	20	29	18	38	38	32
Both agriculture and non-farm activity are equal	15	21	14	29	29	25
Total	70	100	48	100	97	100

Source: Survey data, 2017/18; ** significant at 5 percent level.

The distribution of income from non-farm activities shows 52 percent earning the range from less 500 birr to 1500 . This figure dropped to 22 percent earns in the range of less than 500 birr and 17 percent for 500 to 1000 birr income groups. Those farmers earning above 1000 birr were only 13 percent.

Table 14. Distribution of non-farm income

Income Range	Participant=70	%	Non participant=48	%	Total =118	%
< 500 birr	18	26	8	17	26	22
500-1000	12	17	8	17	20	17
1001-1500	12	17	4	8	16	13
1501-2000	0	0	0	0	0	0
>2001	0	0	0		0	0
Total	42		20		62	

Mean income=69.13
Maximum =1300
Minimum =0.00 χ^2=518.353[a] P=0.000

Source: Survey data, 2017/18; *** significant at 1 percent level.

4.3.1 Trade

Trade in the study area was not only bound with in the *woreda* locality but also buying and selling was made also other places out of the study area. Traded items like cereals, coffee and livestock were bought on market day and were sold on the same or another market day or at another place. Commercial activities were an important source of income for farmers in the study area.

Food crops were bought from surplus peasant associations in or outside the *woreda* and sold in deficit areas.. Although trade is a supplementary activity most farmers got satisfactory profits. Among the sample non-farm participant farmers 17, 12.5, 33 and 37.5 percent got little, satisfactory and outstanding profit, respectively.

Table 15. Performance of trade

Performance	Participant=70	%	Non participant=48	%	Total =118	%
Outstanding profit	40	57	18	37.5	58	49
Satisfactory	13	18.5	16	33	29	25
Little profit	4	6	6	12.5	10	8
No profit	13	18.5	8	17	21	18
Total	70	100	48	100	118	100

Source: Survey data, 2017/18

Trade as a source of income for the farmers was hindered by certain constraints. According to farmers , the main constraint for trade in the study area is lack of startup capital. About 24 respondents or 20 percents from those engaged in the non-farm activities said lack of capital was the main challenge. Lack of skills and lack of pack animals and access to market were also mentioned as the bottlenecks for trade activity

Table 16. Constraints associated with trade

Problems	Participant =70	%	Non-participant =48	%	Total=118	%
Lack of initial capital	35	50	24	50	59	50
Lack of pack animal	12	17	5	10	17	14
Lack of skills	14	20	16	33	30	25
Lack of access of credit	9	13	3	7	12	11
Total	70	100	48	100	118	10

Source: Survey data, 2017/18

The survey results show that 40 percent of the households participating in non-farm activity were engaged in trade. The mean annual income from trade was about 678.70-birr with a minimum and a maximum of 100 birr and 2350 birr, respectively. About 8 households (17 percent) earned income from trade less than 500 birr. But 60 percent of the non-farm households earned income from trade ranging from 500 to 1000 birr and 10 percent of the non-farm households earned income from trade ranging from 1001to 1500 birr and 10 percent of the non-farm households earned income from trade ranging from1501 to 2000 birr respectively. While the rest 3 percent earn more than 2000 birr from trade. The dominant forms of trade items include cash crop trade, grain trade, cattle trade, fruits, vegetable and animal bi-product. In transporting trade items transportation animals such horses, mules and donkey play an important role. Besides, this self-carried, hired vehicles and hired labor were used (Table 22).

Table 17. Income from Trade activity

Income range	**Participant=70**		**Non- participant=48**		**Total=118**	
	N	%	N	%	N	%
< 500 birr	13	18.5	8	17	21	18
500-1000	27	38.5	29	60	56	47
1001-1500	23	33	5	10	28	24
1501-2000	6	9	5	10	11	9
>2001	1	1	1	3	2	2
Total	70	100	48	100	118	100
Mean income= 678.70 birr						
Maximum= 2350 birr						
Minimum=100 birr	χ^2=2465.9 P=0.576					

Source: Survey data, 2017/18; * significant at 10 percent level.

4.3.2. Handicraft activities

There are a number of crafting activities in which farmers can potentially participate in the study area. Among the non-farm participant farmers 23.7 percent were engaged in crafting activities. These include blacksmiths, weaving, tannery, pottery, carpet making and carpentry. Craft workers produce carpet, clothes, iron-tips, knives, simple chisels, axes, water and cooking pots for the community. The number of households participating in blacksmithing, weaving, tannery thorn (arata) making from skin for sitting purpose , pottery and carpentry 23 , 8, 18, 7and 8 respectively (Table 23). As the respondents engaged in handicrafts reported, 64 house holds participating in handicrafties and 54 percent out of 118 household participated on this activities .

Table 18. Engagement in and type of handicraft activities

Engagement in and type of handicraft activities	**Participant**		**Non-participant**		**Total**	
	N	%	N	%	N	%
Households engaged in handicraft:						
yes	36	51	28	58	64	54
No	34	49	20	42	54	46
Handicraft activity						
Blacksmithing	23	33	19	40	42	36
Weaving	12	17	3	6	15	13
Tannery making Thorn (arata)	23	33	10	21	33	27
Pottery	6	9	7	15	13	11
Carpentry	6	8	9	18	15	13
Total	70	100	48	100	118	100
χ^2 =221.315						

Source: Survey data, 2017/18; ** significant at 5 percent level.

The mean annual household income from handicraft activities was 358.733birr, the highest and the minimum income reported by the being 1800 birr and 140 birr respectively (Table 24)

Table 19. Income from handicraft activity

Income range	**Participated =70**	**%**	**Non-participated =48**	**%**	**Total non-farm income 118**	**%**
< 500 birr	22	31	16	33	38	32
500-1000	22	31	12	25	34	29
1001-1500	16	23	12	25	28	24
1501-2000	10	15	8	17	18	15
>2001	0	0	0	0	0	0
Total	70	100	48	100	118	100
Mean income= 376						
Maximum= 1800						
Minimum = 40	t==2565.9P=0.536					

Source: Survey data, 2017/18; *** significant at 1 percent level.

Farmers reported a number of problems associated with handicraft activities. These were lack of startup capital, lack of pack animals, lack of skill and lack of credit (absence of cooperatives) and negative perception of the community about the hand crafts. Lack of capital and markets were reported by most farmers (Table 25).

As the respondents engaged in the handicrafties reported , they learnt the skill of the work from family , neighbors or friends and training/ education.

Table 20. Constraints associated with handcraft

problems	Participant =70	%	Non participant =48	%	Total=118	%
Lack of initial capital	31	44	7	15	38	33
Lack of pack animal	15	21	17	35	32	27
Lack of skills	10	15	7	15	17	14
Lack of access of credit	10	15	4	8	14	12
Negative perception of community	4	5	13	27	17	14
Total	70	100	48	100	118	100

χ^2=176.690[a] P=0.174

Source: Survey data, 2017/18

4.3.4 Sale of food and local drinks

Sale of food and local drinks is mostly practiced in most villages of study area. About40 percent of those who participated in non-farm activities were engaged in sale of food and local drinks. When compared with other non-farm activities, females dominated in the sale of food and drinks than males. The mean family members engaged in this sector were 3 with minimum of 1 and a maximum of 4 out of48 participant farmers engaged in this non-farm activity.

The mean annual income reported from the sale of food and local drinks was162 birr with a minimum of 140and a maximum of 2500 birr. Among the sample respondents who participated in the sale of food and drinks, 25 percent had got an income greater than 2001 birr but the rest75 percent had got less than 2001birr (Table27).

Table 21. The Income Range from sale food and drinks

Income range	Participant=70		Non-participant=48		Total =118	
	N	%	N	%	N	%
< 500 birr	0	0	0	0	0	0
500-1000	10	14	19	40	29	25
1001-1500	10	14	10	20	20	16
1501-2000	40	58	0	0	40	34
>2001	10	14	19	40	29	25
Total	70	100	48	100	118	100

Mean income= 161.69
Maximum =2500
Minimum=0.00
t=328.675 P=0.000

Source: Survey data, 2017/18; ** significant at-5 percent level.

The major problems reported by the respondents in respect of this activity included lack of initial capital to undertake the activity and lack of market for the produce. Group discussion with the farmers revealed that most of them were engaged in the sale of food and local drinks to supplement the agricultural income. Among the sample respondents no farmers was found engaged in this non-farm activity as major source of livelihood to the family. The respondents under take this activity integrating it with the farm activity.

4.4. Determinants of farmers' to participation in non-farm activities

The logit model was used to analyze the determinants of farmer's to participate in non-farm activities. The farm households either participate or not participating in non-farm activities. Consequently, the variable to show participation in non-farm activity was used as a binary dependent variable, taking a value 1 indicating the farmer is participating at least in non-farm activities and 0 other wise. Fourteen explanatory variables (9 continuous and 5 dummy) were included in the model.

Table 29 shows the signs, magnitude and statistical significance of the estimated parameters and how much the observed values were correctly predicted by the logistic regression model.

Table 22. Variables in the Equation

Variables	Coefficients	St. Error	Odd Ratio	Significant level
DEPRATIO	-2.077	1.714	0.125	0.226
AGE	-.025	0.012	0.976	0.050*
FAMILY	-.108	0.226	0.898	0.633
MRSTT	-.880	.899	0.415	0.328
SEX	-0.395	1.994	0.673	0.843
EDU	0.185	0.810	0.831	0.819
TLU	-0.255	0.248	0.775	0.305
LAND	3.089	1.305	21.959	0.018**
CREDIT	1.824	0.818	6.197	0.026**
TRAIN	1.262	0.472	0.283	0.002***
EXTN	-.180	0.163	0.835	0.268
INPUT(1)	-5.230	0.952	0.005	0.000***
OXEN	0.570	0.438	1.769	0.193
MKSTI	-0.058	0.134	0.944	0.664
CONSTANT	9.555	4.494	14111.265	0.034**
Chi-square = 90.012***				
Correctly predicted on non-farm = 85.4				
Correctly predicted farm participant= 90.0				
Over all correctly predicted = 88.1				
-2Loglikelihood= 69.44				
Cox and Snell R^2 = 0.634				
Nagelkere R^2 = 79.00				

Source: Survey data 2017/18; ***,**, * significant at 1%, 5% and 10% probability level.

The likelihood ratio test statistic exceeds the Chi-square critical value with 13 degree of freedom. The result is significant at less than 1 percent probability level indicating that the hypothesis that all the coefficients except the intercept are equal to zero is rejected. The goodness of fit of the model was found to be 1 percent. And the log likelihood was 69.44. Another measure of goodness of fit used in logistic regression analysis is the count R^2which indicates the number of sample observations correctly predicted by the model. The count R^2 is based on the principle that if the estimated probability of the event is less than 0.5, the event will not occur and if it is greater than 0.5 the event will occur (Gujarati, 2004). In other words, the i^{th} observation is grouped as participant if the computed probability is greater than or equal to 0.5,and as a non-participants otherwise. The model results show that the logistic regression model correctly predicted 88.1 percent of the sample households. The sensitivity (correctly predicted non-farm participant) and the specificity (correctly predicted non-participant) of the logit model are 85.4 and 90 percent, respectively. Thus, the model predicts both groups accurately (Table 29).

In this study, fourteen explanatory variables were used. Out of the fourteen proposed variables, five of them were statistically significant in the model while the rest were not significant at less than ten percent probability level. The interpretations of the significant explanatory variables are given below:

Age of the household (AGE): This variable is significant at 10 percent probability level and negatively associated with the participation in non-farm activities. The sign shows that as the age of the household increases, the probability to be non-participant in non-farm activity increases. All other things being kept constant, the odds ratio in favor of showing interest to participation in non-farm activities decreases by a factor of 0.976 as the age of the household head increased by one unit. Hence the younger households have to rely on non-farm employment to support their livelihood. A study conducted by **Destaw (2003) and Berhanu (2007)** have also presented similar result.

Credit service (CREDIT): This variable has a positive correlation with participation in nonfarm activities at 5 percent probability level. The result shows the variable is a positive impact on the probability of participating in non-farm activity in the study area. The odds ratio in favor of participation in non-farm activities increases by a factor of 6.197 for farmers who have credit service. This is because making awareness for credit use (liquidity) enables the household to finance purchase of equipment's, skills acquire, capital for initial investment and purchase of inputs. The study conducted by (Bezu and holden,2008) supports the finding of this study.

Use of Inputs (INPUT): This variable has a positive correlation with participation in nonfarm activities at less than 1 percent probability level. The result shows the variable is a positive impact on the probability of participating in non-farm activity in the study area. The odds ratio in favor of participation in non-farm activities increases by a factor of 0.005 for farmers who have access to input. This refers Farmers with higher non-farm earnings were more risk taking as was evident in their higher level of input usage. Non-farm earnings thus had a positive sign for input usage. The study conducted by **(Tassew., 2000)** supports the finding of this study.

Cultivated Land (LAND) This variable has a positive correlation with participation in nonfarm activities at less than 5 percent probability level. The result shows the variable is a positive impact on the probability of participating in non-farm activity in the study area. The odds ratio in favor of participation in non-farm activities increases by a factor of 21.959 for farmers who have access to land. Cultivated land is assumed to influence non-farm activity positively. This means access to land that encourages farmers to participate in non-farm activity, increases non-farm income. This is because farmers with cultivate more land diversified income may tend to undertake various production decisions such as sharecropping, land-renting, etc. The study conducted by **(Davis,J.R, 2003)** Supports the finding of this study.

Entrepreneurship Training (TRAIN): This variable is significant at 1 percent probability level and positively associated with the participation in non-farm activities. All other things being kept constant, the odds ratio in favor of showing interest to participation in non-farm activities decreases by a factor of 0.283 as the training on entrepreneurship of the household head increased by one unit**.** A positive association between training on entrepreneurship and non-farm employment was empirically established. Better trained individuals possess skills which facilitate successful involvement in non-farm activities. For Żmija (2001) entrepreneurial development in rural areas has been connected with a progressive modernization of agriculture and is connected with multifunctional rural development.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1. Summary and Conclusions

In countries like Ethiopia, where the subsistence agriculture and the small holder farming dominates the overall National Economy, small holder farmers often face scarcity of capital and are prone to livelihood risk. This problem can be solved through increasing agricultural productivity and non-farm income there by improving the ability of households to stabilize their income and food purchasing power.

The principal objective of this study was to identify and analyze the determinants of farmers' participation in non-farm activities and also intended to describe the characteristics of the non-farm and farming activities of the area.The data used for the study were collected from 118 households drawn from Humbo woreda farming system. A multi-stage sampling was used to select households. In the first stage, six kebeles were randomly selected out of the 41 found in the woreda. Taking a list of households in the selected kebeles, which was obtained from the kebele offices, the households in each kebeles were classified in to non-farm activity practitioners and non-practitioners. In the second stage, simple random sampling based on probability proportional to size was used to select respondents from each household category. In addition, secondary data were extracted from relevant sources to supplement the data obtained from the survey.

Regarding the determinants of participation in non-farm activity, fourteen variables hypothesized to explain farmer’s participation in non-farm activities were used to estimate the logit model. The results of the binomial logit model revealed that two variables were significant at 1 per cent probability level; two variables were significant at 5 percent probability level ;one was significant at 10 per cent probability level while nine other variables were insignificant. Age of household was significant at less than 10 per cent probability level. Entrepreneurship training and input was significant at 1 per cent probability level. Credit and land use was significant at 5 per cent probability level. In this study, the conclusion and policy recommendations were given based only on those variables, which were significant.

For the determinants of non-farm activity, distance to market was negatively related with participation in non-farm activities. The variable land had positive and significant influence on participation in nonfarm activities. This is access to land increase farm income to support their livelihood compared to landless. This is because, younger farm households cannot get enough land to support their livelihood compared to the older farm households. Therefore the younger households have to rely more on non-farm employment than the older ones to support their livelihood. The variable education also had a positive and significant influence on participation in non-farm activities. Non-farm activities require some skill and training hence households with some skills and education tend to engage in non-farm activities. The other important variable that influences the non-farm activities participation is access to credit. This variable positively correlated with the dependent variable. This is because the presence of credit enables the household to finance purchase of equipment, skill acquisition, capital for initial investment and purchase of inputs.

Understanding the determinants of non-farm activities and the characteristics of the farm and non-farm activities would help policy makers to design and implement more effective policies and programs for non-farm enterprises and there by helps to pave way for the increase in agricultural production. In this respect, this study provides a base and point of departure for similar studies in the future.

Based on the findings of the study, the following points need to be considered as possible policy implications in order to increase agricultural production and enhance productive participation in non-farm activities.

5.2. Recommendation

- The results show that farmers engaged in non-farm activities earn diversify income and lessen risks from farming. The fact that non-farm income is positively related with agricultural income and those farmers with higher non-farm income is better-off than those with low non-farm income. Therefore the rural development strategy should not only emphasis in increasing agricultural production but concomitant attention should be given in promoting non-farm activities in the rural areas.
- The findings of the study revealed that farmers who trained on entrepreneurship are more likely to involve in non-farm activities. Thus entrepreneurship training could be an effective instrument in increasing participation in non-farm activities. Therefore the task of upgrading the skills and production techniques of local farmers should be given a special attention. Development programs to promote non-agricultural employment should focus on strengthening of existing skill development centers at local level.
- Credit is a key input in every development program; this is particularly true for rural development because so long as sufficient credit is not provided to the development programs of poor sections of the society, the goal of development cannot be achieved. This holds true particularly for the progress of non-farm activities in the study area. As the study results show, farmers who have credit service increasingly participate in non-farm activities. This is because credit removes the financial constraint and enables them to finance the initial capital of the nonfarm sector. Therefore, the rural policy would do well to provide better service to credit for the rural people by motivating micro-finance institutions.

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