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Determinants of Livelihood Diversification: The Case of Kembata Tambaro Zone, Southern Ethiopia

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Abstract
Population density has led to land scarcity in the rural farm households. This has adversely affected livelihood activities in agriculture leading to low income. For survival and sustenance, people tend to rely on multiple choices of non-farm activities to improve household's income and intensify their agricultural production on small land. However, livelihood diversification is determined by different factors in the study area. Thus, the aim of this study is to identify the determinants of livelihood diversification strategies at household level. The data used for this study were collected from nine villages of Kembata Tambaro Zone through personal interview using structured questionnaire. The data were obtained from 252 sample households who were selected by the purposive and stratified random sampling techniques. The finding of the survey result indicates that ninety seven percent of the respondents in the study area diversified in to non-farm activities. The Composite Entropy Index has been used for measuring livelihood diversification. The livelihood diversification index of 0.260 showed that majority of the household heads undertook one form of livelihood diversification strategies or another. Multiple regression model was applied to investigate the determinant factors influencing the households' level of livelihood diversification. In this regard, the econometric analysis demonstrated that out of the total 15 variables included in the model, only 7 variables including age, education, number of non-farm activities, market distance, number of livestock, credit cost and farm size are found to be the significant determinants. The results of this study suggested that there is a need to develop a number of strategies for the smallholders to facilitate successful livelihood diversification. This includes the development of rural infrastructure in terms of road connectivity, market and credit facility. Hence, a comprehensive development plan including both agricultural intensification and non/off-farm diversification should be strengthened.
Keywords: Livelihood diversification, Composite Entropy Index, multiple regression model, determinants of livelihood diversification, rural farm households, land scarcity, Ethiopia.

1. Introduction

Agriculture is an important sector for majority of the rural populations' livelihood in developing countries. It has been the predominant activity for most rural households in Sub-Saharan Africa (SSA) which offers a strong option for spurring growth, overcoming poverty, and enhancing food security (World Bank, 2008). The Ethiopian economy is largely dependent on the agricultural sector. Its contribution for GDP is 41 percent, export is 90 percent, employment is 85 percent and food security is high. The small-scale farming dominates the agricultural sector and accounts for 95 percent of the total area under crop and more than 90 percent of crop output. The livelihoods of 84% of the citizens depend on various agricultural productions (Fikremarkos, 2012).

However, the largest share of the small-scale production of crops goes to household consumption (66%), while 16% goes for seed and 14% for sale. The remaining share goes to wages, animal feed, *etc*. (CSA, 2010). In addition, farming as a primary source of income has become failed to guarantee sufficient livelihood for most farming households in Sub-Sahara African countries (Babatunde, 2013). This is because the agricultural sector in the Sub-Saharan African countries is highly characterized by decreasing farm sizes, low levels of output per farm, and a high degree of subsistence farming (Jirstrom *et al*., 2011). Furthermore, the agricultural activities in rural Ethiopia is also dominated by smallholders, the majority cultivating less than 0.5 ha and producing mostly basic staples for the subsistence of their households (Arega *et al*., 2013).

Thus, the expectation that achieving the goal of reducing poverty only through increasing agricultural productivity and redressing the issues of access to key agricultural resources without non/off-farm livelihood diversification could not be successful in the sub-Sahara African countries (Emanuel, 2011). The more choice and flexibility people have in their livelihood strategies through livelihood diversification, the greater the ability they withstand shocks and stresses (Ayalneh, 2002; Farrington *et al*., 2002). The diversity of rural households is an important feature of survival in rural areas (Belaineh, 2002). Because of primary dependence on subsistence crop production in Ethiopia, harvest failure leads to household food deficits, which in the absence of off/ non-farm income opportunities leads to asset depletion and increasing levels of destitution at the household level (Government of Ethiopia, 2009). Despite the significance of livelihood diversification against the inability of performance of Ethiopian agriculture to produce sufficient quantity to feed the rapidly growing population and improve household livelihood, it may be affected by different factors.

Similarly, a report from World Bank (2005) indicated that in Ethiopia the poor to survive tend to diversify in the form of daily wage laborer, and to mitigate production risk of rain fed agriculture, choose low risk but low

return crops which contribute to poverty trap. Furthermore, Reta and Ali (2012) indicated that in rural Ethiopia if there had not been other sources of income apart from agricultural production, the land scarcity by the farmers coupled with agricultural risks could not generate enough income to feed household members and they cannot fulfill household needs. This suggests that diversifying income sources is necessary to create employment for new entrants into the labor force and supplement the income of landless and near landless families, but also increasing agricultural production and productivity and are so important means of ensuring food security; they enhance purchasing capacity or in-kind income (Mulat, 2001). As a result, given the inability of most Ethiopian smallholders to make a living from agriculture, increasing policy attention has turned to supporting alternative livelihood activities (Devereux S., 2000).

Furthermore, livelihood diversification is believed to be a solution, and an effective strategy for the reduction of poverty and food insecurity in rural Ethiopia (Yenesew S.Y., *et al.,* 2015). Enhancing agricultural production is considered as a panacea at all levels to improve the lives of rural people so that efforts and interventions of the public and the community to ensure food security focus on agriculture sector. However, farming on its own is increasingly unable to provide a sufficient means of survival in rural areas. Hence, families tend to diversify occupation to buffer the risk of bad weather, land constraints, and other problems that affect both crop and livestock production. They are usually engaged in multiple activities both with in agriculture and non-farming sectors (Demisse and Workneh, 2004). This interest in diversification in Ethiopia illustrates not only the current reality that many rural households are engaged in a diverse set of livelihood activities, but also that despite the reliance on agriculture as the driving force of the rural economy, over half of the population remain in poverty. In view of this dependency on agriculture and the concomitant level of rural poverty, investigations in to the nature of livelihood diversification also clearly reflect the desire to understand better whether promoting diversification offers potential for livelihood enhancement and poverty reduction (Deiniger and Okid, 2000).

The rural farm households in central zones of SNNPR in general and in the study area (Kembata Tambaro Zone) in particular are producing cereal crops which are highly dependent on the rain-fed agricultural production system. Furthermore, due to the insufficient land resource to absorb the household's full labor force and the rainfall variability, the rural farming households in the study area are becoming unable to meet the annual family food requirements. As a result, they are obliged to engage in different income generating non-farm activities like migration to Republic of South Africa and State Farms (Fincha, Dufti, …), trading, salary employed jobs and provision of services to supplement their cereal crops intensification and expand the household income.

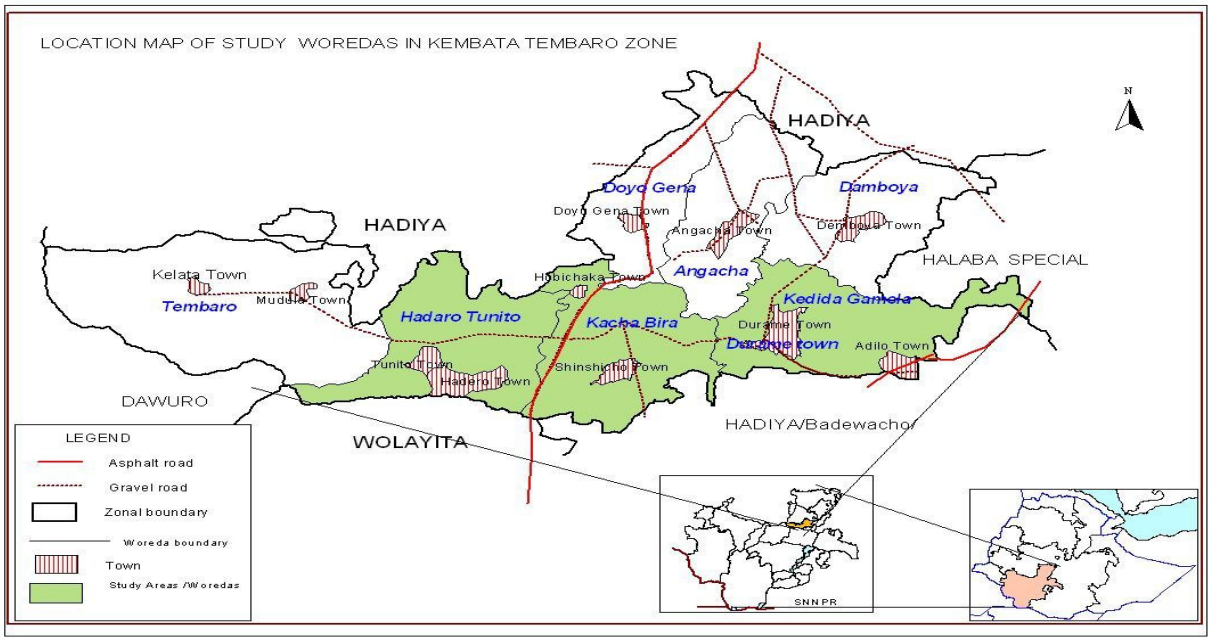
In the study area, even though, the rural farm households are involved in diverse livelihood activities, the households level of livelihood diversification to different income sources beyond agriculture vary across land holding size. Moreover, the farming households' level of livelihood diversification into non/off-farm activities is determined by different factors in the study area. It is thus, so important to identify the determinant factors of non/off-farm livelihood diversification strategies to improve rural farm households' livelihood diversification strategies. Therefore, the objective of this paper is to identify the determinants of livelihood diversification of the rural household in the study area.

2. Methodology

2.1. Descriptions of the study area

The study is conducted in Kembata Tambaro Zone which is found in SNNPR, Southern Ethiopia. The zone is located around 306 km south from the capital city of Ethiopia, Addis Ababa. Astronomically it is located or extends from $7^0$10'N to $7^0$50'N latitude and from $37^0$34'E to $38^0$08'E longitude. KTZ has an area of 1,356 km^2 with elevations ranging from 501 meter at Gibe River to about 3000 meter in the Ambaricho Mountain (SNNPR, BoFED, 2013). The zone experiences three agro-climatic zones namely Dega, Woinadega and Kola. 22.25 percent or 33,880.52 ha of the zonal surface area fall in the Dega climatic zone. Area covered by Woinadega zone is 70.75 percent or 107,732.44 ha. Kola zone covers an area of 10,659.04 ha. The rainfall is erratic. The weighted mean annual rainfall ranges from 1001-1400 mm. The spatial variation of mean annual temperature ranges from 12.6℃ to 27.5℃ (KTZ, DoARD, 2012). Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia, Kembata Tambaro Zone has a total population of 792,999, of whom 392434 were males and 400565 were females with 84.4% (669291) rural and 15.6% (123708) urban. The crude population density of the zone is 585 persons/km^2 (CSA, 2007). Small scale mixed farming is the dominant source of livelihood to the farmers. Wheat, *teff,* maize, sorghum and barely are the major crops of study area while coffee and ginger are the sole major cash crops. The zone is endowed majorly with cattle, sheep, goats and poultry production (Fig 1).

Fig.1 Location Map of Ethiopia, SNNPR, and Kembata Tambaro Zone



Source: SNNPR, BoFED: Data Collection Work Process (2013/14).

2.2. Data types, methods of collection and sampling procedure

Primary and secondary data were collected for the study. A huge amount of farm level primary data was collected from the study area individual farmers through personal interview using a well defined- structured questionnaire with close ended questions. Secondary data were obtained from different published and unpublished research journals, books and theses including reports of FAO and World Bank publications. The sampling procedures employed were the purposive and stratified random sampling techniques to select the sample farmers. At the first stage, out of seven districts, Kachabira, Kadida Gamela and Hadero tunto Zuriya were selected for the study purposes. At the second stage, three villages were selected randomly from each district. Finally, at the third stage with in these three villages, 28 farm households from each village were selected randomly for interview by chance meeting with them at the time of field survey. Overall 84 respondents from each of three districts and totally 252 farmers were interviewed to collect the farm level primary data.

2.3. Methods of Data Analysis

Two types of data analysis namely descriptive statistics and econometric analysis were used for analyzing the data from the farm households. The descriptive statistics was used to describe socio-economic characteristics of farm households. The Composite Entropy Index has been used for quantifying the level of livelihood diversification employed by the household heads. To analyze the determinants of livelihood Diversification, multiple linear regression function was used. The descriptive and econometric analyses were conducted using SPSS version 16.

To measure livelihood diversification, Composite Entropy Index (C.E.I.) was used. The Composite Entropy Index (CEI) is computed as follows:

$$\text{C.E.I.} = -\left[\sum_{i=1}^{N} Pi\ Log_N Pi\right]\left[1-\left(\frac{1}{N}\right)\right] \qquad (1)$$

where, $Pi = \frac{Ai}{\sum Yi}$ Pi = Proportion of the income of i^{th} activity relative to all activities

Ai = Net income received from activity *i*, Yi = Net income from all livelihood activities

i =1, 2, ----N (N= number of different income sources)

CEI has an advantage in that it can be used to compare diversification across situations or cross-sectional units having different and larger number of activities since it gives due weight to the number of activities (Anna, 2002; Daniel & Johonson, 2004). The C.E.I. increases with rise in diversification and vice versa. It ranges between zero and one. Since the index uses - $log_N P$ as weights, it assigns more weight to lower quantity and less weight to higher quantity. It is to be noted that the maximum level of diversification is achieved, irrespective of the diversification measure used, when there is equal distribution of all livelihood activities. A combination of many activities with one activity dominating its income share would result in a lower value of livelihood diversification index. The value of the index will be higher when all livelihood activities income is distributed more equally among a larger number of activities.

In order to examine the determinants of livelihood diversification, the index of livelihood diversification was

regressed against selected variables. The livelihood diversification model is expressed as:

Livelihood Diversification Index = f(HHSIZE, HHEDU, AGE, EXPR, SEX (D), HRLABCO, FAMLABCO, NFRACT, LSTKNO, MKTDIS, CREDCOST, COOP(D), FRMSIZE, DISTHAD(D), DISTKACH(D) (2)

The estimating equation is represented as:

LDI = $_{\beta 0}$ + $_{\beta 1}$ HHSIZE+ $_{\beta 2}HHEDU$ + β_3 AGE + β_4 EXPR + β_5 SEX + β_6 HRLABCO + β_7 FAMLABCO + β_8NFRACT + β_9LSTKNO + β_{10}MKTDIS + β_{11}CREDCOST + β_{12}COOP + β_{13}FRMSIZE + β_{14}DISTHAD + β_{15}DISTKACH+ μ (3)

where, β0= constant term U= Error term assumed to have normal distribution with zero mean, and constant variance i.e.U∼N (0σ2) and E (Ui, Uj) =0ij.

Definition of Variables

Dependent variable (LDI): Livelihood Diversification Index (CEI ranges between 0 and 1). The index moves towards zero (CEI =0), when complete specialization in to agriculture and diversification in to only one non-agricultural activity exists where as when the number of livelihood diversification increases, CEI approaches to 1.

Table 1 Definition of explanatory variables in Linear Regression Model

Variables	Variables definition	Characteristics	Values	Hypothesized relationship
HHSIZE	Family size in the HH	Continuous	Number of family	Positive
AGE	Age of HHH	Continuous	Number of years	Negative
SEX	Sex of HHH	Dummy	1= male, 0= female	Positive/negative
HHEDU	Education of HHH	Continuous	Years of completion	Positive
FARMEXP	Farming experience of HHH	Continuous	Number of years	Positive
COOP	Cooperative membership	Dummy	1 = if a member, 0 = otherwise	Positive
HIRLABCO	Hired labor cost	Continuous	Cost incurred in Birr	Positive
FAMLABCO	Family labor cost	Continuous	Opportunity cost in Birr	Positive
NFRACT	Non-farm rural activities	Continuous	Number of activities	Positive
MKTDIST	Market distance from home	Continuous	Walking kilometer	Positive
LSTKNO	Livestock holding of the HH	Continuous	Number of livestock	Positive/negative
CREDCOST	Cost of credit	Continuous	Credit cost in Birr	Positive
FRMSIZE	Farm size	Continuous	Farm size in hectare	Negative
DISTKACH	HH in Kachabira district	Dummy	1 if Kachabira district, 0 else	Positive
DISTHAD	HH in Hadero tunto district	Dummy	1 if Hadero tunto district, 0 else	Positive

Note: HH = household, HHH = household head

The selection of these variables was based on economic theory, suggestions of previous similar studies and peculiar characteristics of the variables in the area of study. The OLS technique was used to estimate the model.

3. Results and Discussions

3.1. Descriptive results

Table 2 presents the description and summary statistics of selected socioeconomic characteristics derived from the sampled households, which were later used as dependent and independent variables in the econometric estimation. For the analysis of determinants of livelihood diversification, CEI was regressed on a set of household and contextual characteristics. The average age of the respondent farmers in the sample was 45 years and 91.3% of the sample household heads were male. Overall, there are on average 5.7 members in farm households. Education is believed to be an important feature that determines the readiness of household heads to diversify their livelihood. On average, they have approximately seven years of schooling. The average farming experience of household head is almost 20 years. About 53% of the households are members of a cooperative and the distance to the nearest market place is 6.5 km on average.

Table 2. Summary statistics and description of variables used in the analysis

Variables	Variables description	Mean	Std. Dev	Min	Max
CEI	Livelihood diversification index	0.2601	0.2436	0	0.6707
AGE	Age of household head (years)	44.87	8.84	31	91
SEX	Gender of HHH (1= male, 0= female)	0.91	0.28	0	1
HHSIZE	Family size in the HH (number)	5.70	1.50	3	11
HHEDU	Education of HHH (rears)	6.45	2.95	0	12
FARMEXP	Farming experience of HHH (years)	19.43	9.61	5	61
COOP	Dummy for cooperative membership (yes=1, no=0)	0.53	0.50	0	1
MKTDIST	Market distance from home (km)	6.54	4.45	0.75	17.5
HIRLABCO	Hired labor cost (Birr)	146.19	141.72	0	840
FAMLABCO	Family labor cost (Birr)	201.51	62.76	40	480
NFRACT	Non-farm rural activities (number)	1.76	0.85	0	4
LSTKNO	Livestock holding of the HH (number)	5.33	3.35	1	44
CREDCOST	Cost of credit (Birr)	1873.71	1923.79	0	6000
FRMSIZE	Land area cultivated by the HH (ha)	0.98	0.51	0.25	2.5
TOTINC	Average total household income per year (Birr)	70861.51	69423.79	4065.4	420310
FARMINC	Average total household farm income per year (Birr)	33246.11	25056.31	1965.4	155139
NONFRMINC	Average total household off/non-farm income per year (Birr)	37615.4	54209.72	0	326050
DISTHAD	Location dummy, 1 if Hadero Tunto district, 0 otherwise	0.33	0	0	1
DISTKACH	Location dummy, 1 if Kachabira district, 0 otherwise	0.33	0	0	1

Source: Computed from author's survey data 2014/15. HH = household, HHH = household head

The average land area cultivated by the farm household is less than one hectare and livestock kept per hectare in the study area is almost 5.3 on average. The credit cost of those households accessible to formal and informal credit facility is approximately 1875 Birr on average. The average number of non/off-farm activities in the study are is 1.76. Mean value of family labor used by the sample households was 201.5 man days where as hired labor used was 146 man days. Total annual household income is about 70860 Birr per year from all income sources. Farming accounts for 47% of this total; the other 53% is off and non-farm income. This share of off-farm income fits reasonably well into the available literature for Sub-Saharan Africa (DAVIS *et al*., 2007; Haggblade *et al.*, 2007; Haggblade *et al.*, 2010; WOLDENHANNA and OSKAM, 2001), although the definition of what exactly constitutes off-farm income slightly varies across studies.

Table 3 explains the level of livelihood diversification pattern and estimated Composite Entropy Index with diversification trend and participation rate. The results revealed that about 97% of the total sampled households pursued some level of diversification in their livelihoods. Only 3% of households did not diversify and relay only on income from farming activity. Of the sampled households, the majority (41.3%) were diversified their income sources into one source of income. Table 3 also reveals a 0.000 (CV 0) index for diversification in to one activity and 0.594 (CV 10) index for diversification in to four activities. The result shows that as the number of livelihood diversification increases the CEI increases and would become one for perfect livelihood diversification. However, a 0.661 (CV 10) index for diversification in to four activities has a lower value of livelihood diversification index as compared to a 0.665 (CV 25) index for diversification in to three activities due to the fact that the value of CEI index will be higher when all livelihood activities income is distributed more equally among a larger number of activities. Overall, the Composite Entropy Index for the whole sample is 0.260 (CV 94). This shows that households undertook one form of livelihood diversification or another. However, majority of the household heads were engaged in to one or two livelihood diversification activity.

Table 3 Livelihood Diversification Indices computed in the study area

Diversification trend	Frequency	%	C.E.I				
			Mean	Std. dev	Min	Max	C.V. (%)
0	7	2.8	.000	.000	.000	.000	0
1	104	41.3	.000	.000	.000	.000	0
2	88	34.9	.436	.074	.169	.671	17
3	49	19.4	.507	.127	.177	.665	25
4	4	1.6	.594	.059	.533	.661	10
Total	252	100	.260	.244	.000	.671	94

Source: Based on author's survey data 2015

3.2. Empirical findings

This section presents the factors that affect livelihood diversification in the study area. The Ordinary Least Square regression model containing dependent and independent variables that are expected to determine the level of livelihood diversification are summarized in Table 4. The data was analyzed for the year 2014/15. The farming

households rely on multiple choices of non-farm activities to improve household's income. The determinants of livelihood diversification were analyzed on the index of livelihood diversification (Composite Entropy Index).

Econometric software known as "SPSS" was used. The multicollinearity problem of the 15 independent variables together with district dummy variable was checked by running OLS for all variables (continuous and dummy variables) and obtained Variance Inflation Factor (VIF). The results suggest that there was no significant problem of multicollinearity and no very high degree of association in the data what the analysis used.

Table 4 presents the OLS estimates underlying livelihood diversification index regression model. The R^2 of 81.6%, the standard error of 0.1083 and the mean VIF of the coefficients equal to 2.163 indicated a good fit for the estimated equation. Out of the total fifteen independent variables entered into the model, seven variables including age of the household head, education of the head, number of non/off-farm activities, market distance, number of livestock, credit facilities and farm size were the significant determinants of livelihood diversification. There was also significant difference in the level of livelihood diversification for Kachabira district compared to Hadero tunto district.

Table 4. OLS regression results of Livelihood Diversification Index

Dependent variable: Livelihood Diversification Index

R^2= 77.9% F= 64.655*** Mean VIF= 2.163

Variable	Coefficients	Std. error	T value
(Constant)	-0.144	0.0549	-2.619***
Family size	0.0034	0.007	0.478
Age	-6.347E-3	3.117E-3	-2.036**
Sex (D)	0.028	0.029	0.955
Education of the Head	.051	.021	2.480**
Farming experience	-7.29E4	0.001	0.625
Cooperative (D)	-0.023	0.015	-1.563
Hired labor cost	-0.199	0.233	-0.855
Family labor cost	-2.07E4	1.555E4	-1.334
Number of non-farm activities	0.322	0.0127	25.276***
Market distance (km)	.052	.019	2.761**
Number of livestock	-.103	.041	-2.478**
Credit cost	1.171E-5	5.867E-6	2.401**
Farm size (ha)	-.279	.080	-3.498***
Haderotunto district (D)	.039	.035	1.094
Kachabira district (D)	.074	.037	1.970**

**Significant at 5% level, ***Significant at 1% level Source: Based on Author's survey data 2015.

Age of the household head (AGE): Age of the household head negatively affected the level of livelihood diversification at 5 percent significance level. A one percent increase in age of the household head caused decrease in the level of diversification by 0.006347 percent. The possible reason may be it is related to the natural factors in that as age of the farm household increases, the farmer will be getting older and older and may not be capable of diversifying as many livelihood activities as possible and may concentrate only to the on-farm agricultural activities for the purpose of maximizing subsistence consumption needs. This result also concurs with Apata (2010) and Kassiye (2013) finding that the age of a household head negatively affected livelihood diversification in Nigeria and Ethiopia respectively. On the other hand, opposite results were also found by the studies of Barrett and Reardon (2001), and Block and Webb (2001). The researchers argued that aged household head may have a larger family size and expected to have extra and unemployed labor, which will lead them to allocate some proportion of their labor outside the agriculture sector.

Education of head (EDU): As expected, the educational level was found to affect positively the livelihood diversification of the households at 5% significance level. The result indicated that improvement in the education level increase the possibility of engagement in non/off-farm activities. This implies that the highly educated persons diversify their livelihood options through opting for salaried jobs, self employment activities, etc., whereas low educated and illiterate persons engage themselves in wage earning. This result was supported by various studies done by Kimhi and Lee (1996), Ellis (1998), Barrett *et al*,. (2001), Dilruba and Roy (2012) and Eneyew (2012). On the other hand, the studies conducted by Bryceson (2002) in rural SSA countries and Kassiye (2013) in Ethiopia found opposite results in that educational level of the farm household has a negative impact for livelihood diversification.

Number of livestock (LSTKNO): Contrary to the expectation, livestock holding affected the level of livelihood diversification significantly and negatively at 5% level of significance. As the livestock number increases by one unit, the probability of engagement in livelihood diversification decreases by 0.10 percent. The possible reason could be households who obtained the required amount of cash from livestock may not need to involve in non/off-

farm activities for additional income whereas farmers with lower livestock holding may be obliged to diversify livelihoods into off/non-farm activities to fulfill household assets. This finding is similar with the findings of Adugna (2008), Eneyew (2012), Yisehak *et al.* (2014) and Yenesew *et al.* (2015). However, Amare and Belayneh (2012) found that livestock holding significantly and positively influence livelihood diversification. Households with more livestock holding do have the capacity to participate in lucrative non/off-farm employment activities than those households with no or small size livestock holding.

Number of non-farm activities (NFRA): As hypothesized, the numbers of non/off-farm activities have a positive and significant influence on the livelihood diversification at less than 1% level of significance. The positive coefficient indicates that the level of livelihood diversification of households who have been engaged in large number of non/off-farm activities increased by 0.32 percent. This means households involved in various non/off-farm activities have livelihood diversification opportunities. This finding concurs with that of Apata (2010) in that households with increased number of non/off-farm activities can make more money from non/off-farm sources.

Market distance (MKTDIST): The walking distance to the nearest market yielded positive and significant influence on the level of livelihood diversification at 5 percent level of significance. As the market distance increases by 1 km the level of livelihood diversification of the household increases by 0.052 percent. The possible reason for positive and significant relationship between market distance and non/off-farm diversification could be that residing nearer to the market enables farm households to engage in non/off-farm activities particularly trading and service provision. This result agrees with Amare and Belayneh (2013) finding that market distance positively influenced livelihood diversification in Ethiopia. Contrary to this result, Yenesew *et al.* (2015) and Eneyew (2012) found negative correlation between market distance and livelihood diversification.

Credit facilities (CREDCOST): As expected, access to formal credit was found to have a positive effect on the level of livelihood diversification at 1 percent level of significance. The positive coefficient indicates that as farm households access to credit facilities increases, the possibility of farming rural households' engagement into non/off-farm livelihood diversification strategies increases by 0.00001171%. Since resource-base is very poor for most of the rural households, providing credit to them will improve their livelihood. This result concurs with the finding of Dilruba and Roy (2012) in West Bengal. On the contrary to this result, Apata (2010) in Nigeria found that the higher access to credit for production the lower the level of diversification.

Farm size of the household (FRMSIZE): The farm size is significantly and negatively related to livelihood diversification at less than 1% level of significance. The negative coefficients indicated that the households with large farm size are less diversified and rely more on agriculture livelihood strategy. The livelihood diversification of large farm households into non/off-farm activities other than agriculture decreases by 0.28% as the farm size increases by one hectare. From this result it is evident that small holder farm households diversify more than large farm households. The possible reason can be a smaller amount of cultivated land is not enough to the households to make a sufficient living from farm production alone, causing them to work for supplementary non/off farm income generating activities. This finding is in agreement with that of Adugna (2008), Fikru (2008) and Yenesew *et al.* (2015). On the contrary to this result, Kebede *et al.* (2014) found that the total cultivated land size has positive and significant influence on non/off-farm production perhaps households with better holding opted for additional income in casual labor works to smoothen their farm operations.

Location dummy (KACHADIST): The location of households in Kachabira district positively affected the level of livelihood diversification at 5% significance level. The households in Kachabira were more diversified than that of the omitted households in Kadidagamela district. A household in Kachabira district increased his/her level of livelihood diversification by 0.07 percent. The possible justification may be the resource endowments differences between the districts that create variations in diversification activities among districts.

3.3. Elasticity of Livelihood Diversification

Elasticity of livelihood diversification measures the response of farming household livelihood diversification to changes in every significant factor influencing it. Elasticity coefficients of livelihood diversification were computed for age, education of the head, farm size and number of non-farm activities. The others are market distance, the number of livestock and credit cost.

Table 6 Elasticity coefficients of Livelihood Diversification among farm households

Variables	Mean	Regression Coefficient	Elasticity
Dependent variable: CEI	0.2601		
Independent variables:			
- Age	44.869	-6.347E-3	-1.0949
- Education of head	6.452	0.051	1.2651
- Number of non-farm activities	1.759	0.322	2.178*
- Farm size	0.980	-0.279	-1.052
- Market distance	6.537	0.052	1.3069
- Number of livestock	5.330	-0.005	-0.1025
- Credit cost	1873.71	1.171E-5	0.0844

Source: Computed from multiple regression analysis print out. (2015) * = elastic variable

Table 6 reveals that only number of non-farm activities was elastic and positive while other independent variables were inelastic and positive except age, farm size and number of livestock whose elasticities were negative for livelihood diversification model. The most important factors that significantly increase livelihood diversification in order of importance included number of non-farm activities, market distance, education of head, age of the household head and farm size.

The elasticity of livelihood diversification as a result of number of non-farm activities was 2.179. This means that on average for a 100 percent increase in number of non-farm activities the index of livelihood diversification will increase by 217.9 percent. The coefficient of elasticity of livelihood diversification as a result of decrease in farm size was -1.052. This shows that 100 percent increase in farm size will decrease the index of livelihood diversification by 105.2 percent. Number of livestock elasticity coefficient in livelihood diversification was -0.1025. This means that for the more number of livestock the household head owned will reduce the index of livelihood diversification by 10.25 percent. The market distance elasticity of 1.3069 means that on average for every 100 percent increase in km of market distance, the index of livelihood diversification will increase by 130.69 percent. The elasticity of livelihood diversification as a result of educational level was 1.2651. This means that for the more educated the household head is, the index of livelihood diversification increases by 127 percent. Similarly, an increase of the same magnitude in credit cost would lead to 8.44 percent increase in livelihood diversification. On the other hand, the age elasticity of -1.0949 means that as the household head gets old by one year, the index of livelihood diversification will decrease by 1.0949 percent.

4. Conclusions and Policy Recommendations

Agriculture is the main source of livelihood for the people in the rural areas and form of thriving rural economy. All households in the study area derive income from farming, which on average accounts for 47% of total household income. Population density has led to land scarcity in the rural farm households. This has adversely affected livelihood activities in agriculture leading to low income. Farm households tend to rely on alternative income sources to improve their household income and increase agricultural production. The finding of the survey result indicates that ninety seven percent of the respondents in the study area diversified in to non-farm activities. The livelihood diversification index of 0.260 (CV 94) showed that majority of the household heads undertook one form of livelihood diversification strategies or another.

The study conducted in the study area has concluded that the rural households in this zone are likely to have a diversified livelihood when they have higher educational level. The scope for livelihood diversification also gets boosted when there are more number of non-farm activities and better access to credit facilities. Finally, market distance and small farm size have a strong influence on the rural livelihood diversification. The econometric analysis demonstrated that education of household head, increased number of non-farm activities, credit facilities and market distance enhanced livelihood diversification. Hence, it is essential to expand the rural micro-credit facilities and make them accessible to farm households at favorable terms. Policies on creating rural employment opportunities are also essential which will help farm households to engage in different income generating activities. Based on the results of market distance and location difference of the households, encouraging and improving the on-going effort of rural urban infrastructure (main roads and feeder roads) is certainly important. Finally, the findings suggest that rural development policies aimed at poverty reduction should focus equally on both the agricultural intensification and livelihood diversification strategies for small holders.

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