International Journal of Academic Research and Development
ISSN: 2455-4197
Impact Factor: RJIF 5.22
www.academicsjournal.com
Volume 3; Issue 5; September 2018; Page No. 211-219

Determinants of non-farm livelihood diversification across agro ecologically different rural settings

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Abstract
Non-farm livelihood diversification is a multi-dimensional concept which encompasses engagement on various activities other than agriculture. This research is aimed at assessing determinants of rural non-farm livelihood diversification among farming households across two agro-ecologically distinct rural settings (Weynadega and qola) in Saharti Samre Woreda, South Eastern Tigray. Cross-sectional survey was used as a survey design due to the nature of the study. Purposive sampling for sampled Tabias and simple random sampling for sampled farming households were used. Household survey, in-depth and key informant interviews and focus group discussions were used as data collection methods so as to generate firsthand information. Qualitative and quantitative information was analyzed thematically. Qualitative information recorded on notebook from FGDs, conversations with key informants, and in-depth interviews were organized and constructed coherently, analyzed in word description form. SPSS version 21was used as a tool to analyze quantitative information gathered through the survey instrument. The analysis was done using descriptive statistical analysis i.e. frequency distributions, percentages. In addition, a non-parametric statistical analysis, Chi-square, was used in order to analyze the relationship between and the dependent and independent variables. Although farming households predominantly pursue agriculture as their major livelihood strategy, they also pursue non-farm livelihood activities due to various reasons. Factors regarded as push rather than pull play significant role in influencing households to diversify their livelihoods to the non-farm sector. Household size and farm land holding size was among the determinants of diversification. Seasonality of agriculture was also found significant determinant of non-farm livelihood diversification. Besides, the increasing price of agricultural inputs was also found as a driving force for diversification.

Keywords: pull factors, push factors, determinants, diversification, livelihood

1. Introduction
Livelihood diversification is becoming one part of experiential aspect of rural households. In most developing countries, importance of non-agricultural activities is increasing and it is estimated to account for 30-50% of rural incomes (World Bank 2008, as cited in Woinishet, 2010: 8) [10]. Several international organizations like Overseas Development Institutes (ODI), Department for Foreign and International Development (DFID) and many others promote and argue that livelihood diversification acts as a safety net for poor rural households.

In Ethiopia, It is true that many researchers have examined sustainable livelihoods strategies, resilience of livelihoods, and rural non-farm livelihood activities. Some of them attempted to assess historical trends awhile some tried to address driving forces of diversification across time.

However, according to Tassew, (2002:5, as cited in Reta, 2010) [6], policy makers were favoring agriculture as means of rural livelihood strategy for a long time. This has been excluded rural non-farm livelihood diversification from much attention, thereby ignoring an important source of livelihood.

In fact, there are considerable numbers of studies conducted before on issues of non-farm livelihood diversification. For instance, Tegegne (2000) [9] conducted a study in southern Ethiopia indicating the tendency of farming households involved in non-farm livelihood activities because of the shortage of land, low yield of crops, lack of grazing land and so on.

In addition, studies conducted in North Shewa (Yared 2002: 347 and Degefa 2005: 106) [11] have shown the need and importance of diversification for household survival and secured livelihood.

There are many specific reasons suggested by many researchers why rural people diversify their livelihood other than to the agricultural employment.

(Mulat 2001:20) argued that diminished average farm size of households has also contributed to people's diversification of their livelihoods towards the non-farm sector. Nonetheless, most of the studies are scope limited which might not be applied to other parts due to variations in agro-ecology and other features.

As to Maxwell and *et al.*, (2013), *Saharti Samre* is among the most vulnerable *woredas* that are classified as drought prone and highly food insecure. Particularly, the chronically food insecure population of the *woreda* is included under productive safety net program. In this *woreda,* most households survive often on small plots of land characterized by low or even declining productivity. Due to the inability of their agriculture-based livelihoods to generate adequate food and income, households have seen their livelihoods deteriorate while surviving on food aid.

Hence, this study focuses on assessing the determinants

factors that push/ pull farming households to diversify their livelihoods to the non-farm sector. Furthermore, as long as non-farm livelihood diversification is divergent, multidimensional and context specific in its nature, the researcher thought that context based study can generate basic knowledge about the determinants of rural non-farm livelihood diversification in areas where there is distinct agro-ecological patterns.

2. Literature Review

2.1 Non-farm rural livelihood diversification

Rural livelihoods analysis is believed to have been born with the birth of peasant studies in the 1960s, given the dominance of peasant modes of production in many newly independent African countries (Start and Johnson, 2004:14 as cited in Fikru: 2008) [4].

Due to many reasons, rural livelihood and rural communities could pursue alternative livelihood strategies to ensure income and food security of their household members. The increasing population growth in rural Ethiopia obliged households to cultivate and making their living on extremely small size of land.

Unlike many studies that show their strict focus on agricultural intensification and extensification, there is a growing literature dealing with rural non-farm livelihood issues in Ethiopia.

Mulat's (1997) study findings indicate that there are five categories of factors that influence decision of households regarding participation in non-farm activities. These are: Personal attributes, farm income, farm attributes, food balance (defined as grain sales less grain purchase) and access to urban markets. "Participation in non-farm employment is largely dictated by the need to meet subsistence food requirements."

Tegegne's (2000) [9] study w h i c h was carried out in southern Ethiopia indicated that the farm sector is not adequate to support the high density of population in the study sites. Hence, Farmers in these study areas have greater tendencies to involve in nonfarm activities. Tassew's (2000) [8] study which was conducted in Ethiopia particularly Tigrai, also show that expenditure on farm input is dependent not only on agricultural production, but also on off-farm income because of capital market imperfections (borrowing constraints).

However, little is known on the current overall participation rate in Ethiopia. There is also no consensus on factors that affect participation decision into off-farm activities in Ethiopia. Some found that diversification is positively associated with wealth accumulation Block and Webb (2001). On the other hand, Berg and Kumbi (2006) [3] found that poorer households are more likely to engage in non-farm sectors (Woinishet 2010:8) [10].

2.2 Rural Livelihood Diversification in the Ethiopia Context

The Ethiopian economy is based on agriculture, which is the largest contributor to the economy that accounts for nearly 80% of employment and 45% of the national GDP. However, agriculture in Ethiopia is characterized by low labor productivity, a declining in farm size, soil degradation, subsistence farming, and tenure insecurity, lack of financial services, imperfect agricultural markets and poor infrastructure (Degefe and Nega, 1999, as cited in Reta: 2010) [6].

The policy focus is also to increase agricultural productivity and farm income so as to attain food self-sufficiency at a national, regional and household level. Substantial resources have been spent on agricultural research and extension to alleviate food shortage in the nation while research and extension activities have not been done adequately on the issues related to off/non-farm employment (Amare, and Belaineh, 2013:1) [2].

Nonetheless, due to many reasons, rural livelihood and rural communities could pursue alternative livelihood strategies to ensure income and food security of their household members. The increasing population growth in rural Ethiopia obliged households to cultivate and making their living on extremely small size of land.

2.3 Determinant Factors of Non-farm Livelihood Diversification

There is also no consensus on factors that affect participation decision into non-farm activities in Ethiopia. Some found that diversification is positively associated with wealth accumulation Block and Webb (2001). On the other hand, Berg and Kumbi (2006) [3] found that poorer households are more likely to engage in non-farm sectors (Woinishet, 2010:8) [10].

In poor rural areas, some households will make a positive choice to take advantage of opportunities in the non-farm livelihood economy. Rising incomes and opportunities off-farm then reduce the supply of labor non-farm.

However, other households are pushed into the non-farm sector due to a lack of opportunities on-farm, for example, as a result of drought or the small size of land holdings. This may result in a similar pattern of rising non-farm incomes.

This has been discussed with reference to many dichotomies which essentially refer to the same distinction: demand-pull/distress-push, coping/accumulating, need/opportunity, etc.

Demand-pull diversification is a response to new market or technological opportunities, while distress-push diversification is driven because there are no opportunities on- farm. Islam (1997) suggests that factors that lead to demand pull diversification include the increased income of lower and middle-income households and increased demand from urban areas for rural products. He identifies successive droughts that depress income and hence increase the need for alternative incomes offering low- skill income as a distress-push factor.

The factor that usually cited for leading to the practices of non-agricultural activities are seasonality, risk, labor market conditions, credit market, asset possessions, and coping strategies. Moreover, As to Adunga (2005), diminishing farm sizes and a decline in return to labor in farming under population pressure may encourage rural households to diversify their employment and livelihoods.

3. Methodology

To achieve objective of the study, qualitative and quantitative study approaches has been used. The research is a cross-

sectional study; aimed at collecting data at one point in time and describing the study population rather than showing the patterns of change which might be witnessed over time. The study employed primary and secondary data sources. The sources of the information were key informants, focus groups, fields, and sampled households. The secondary sources of information include books, articles, research journals, and different reports. Key informant interviews, focus group discussions, in-depth interviews and household survey used as data collection techniques. Structured and Semi-structured checklists were designed to manage the household survey, focus group discussions, Key informant interviews, and in-depth interviews.

The study *Tabias* were selected purposively from the *wereda* for they have two distinct agro-ecological characteristics (*qola* and *weynadega*). Once the two *Tabias* are selected purposively, respondents were selected by a simple random method. A random number table is generated using computer for each *Tabia* based on the target population. Finally, 100 and 80 sample respondents were selected from *Addis Alem* and *Lemlem Arena* respectively.

Key informant interviews were conducted with four different kebele officials.

In-depth interviews were made with 4 purposely selected (two male and two female) individuals who have been engaged on non-farm livelihood activities. Four focus group discussions (8, 8, 9 and 11 individuals in each group and two FGDs for each *Tabia*) were carried out in the two *Tabias*. Qualitative and quantitative information was analyzed thematically. Qualitative information recorded on notebook from FGDs, conversations with key informants, and in-depth interviews were organized and constructed coherently, analyzed in word description form.

SPSS version 21was used as a tool to analyze quantitative information gathered through the survey instrument. The analysis was done using descriptive statistical analysis i.e. frequency distributions, percentages. In addition, a non-parametric statistical analysis, Chi- square, was used in order to analyze the relationship between and the dependent and independent variables.

4. Findings

4.1 Socio-demographic characteristics

4.1.1 Household characteristics

Among the 180 sampled household, 145 samples (75%) were male headed households, and the remaining 35 (25%) were female headed households. In *Tabia Addis Alem*, only 23 (23 %) households out of the total of 100 are female-headed while 77 (77%) of the households are male headed. in *Tabia Lemlem Arena*, 12 (1 5 %) household are female-headed out of the sampled 80 households and the remaining 68(85%) are male headed. It is vital to observe whether non-farm livelihood diversification varies by household characteristics

4.1.2 Household size

The average household size in *Tabia Addis Alem* is 5.09 with whereas the average household size in *Tabia Lemlem arena* is 5.11. The maximum and minimum household size in both *Tabia*s is 7 and 3 respectively.

4.1.3 Farm land holding size

The average farm land size in *Tabia Addis Alem* is 2.37 hectare while it is 3.3 hectare in *Tabia Lemlem Arena*

4.2 Determinants of Non-farm Livelihood Diversification

Multiple motives prompt households and individuals to diversity their livelihoods. Determinant factors of livelihood diversification might be seen as push or pull factors or choice or necessity. Some households diversify their livelihoods to the non-farm sector because of experiencing forcing circumstances while others diversify due to pull factors.

Table 1: Cross tabulation of non-farm livelihood diversification by household characteristics in Tabia Addis Alem (weynadega)

		Household characteristics					
		Male headed		Female headed		Total	
		No.	%	No.	%	No.	%
Non-farm	Diversified	59	76.6	19	82.6	78	78.0
livelihood	Not diversified	18	23.4	4	17.4	22	22.0
diversification	Total	77	100.0	23	100.0	80	100.0

$x^2 = 0.370$, sig. (2-tailed) = 0.543

Source: survey result, 2016

As shown in the above table, the household characteristics of respondents did not affect their tendency to diversify their livelihoods to non-farm sector. The Chi-square test indicates that respondents' household characteristics is (being male or female headed) insignificant ($\chi 2 = 0.370$, sig. (2-tailed) = 0.543) in determining household`s livelihood diversification on the non-farm sector.

Table 2: Cross tabulation of non-farm livelihood diversification by household characteristics in Tabia Lemlem Arena (qola)

		Household characteristics				Total	
		Male headed		Female headed			
		No.	%	No.	%	No.	%
Nonfarm	Diversified	25	36.8	9	75.0	34	42.5
livelihood	Not diversified	43	63.2	3	25.0	46	57.5
diversification	Total	68	100.0	12	100.0	80	100.0

$x^2 = 6.102$, sig. (2-tailed) = 0.014

***Source*:** survey result, 2016

As indicated in the table above, among the male headed households, 36.8 % of them diversified while the remaining 63.2 % of them did not diversify their livelihoods to the non-farm sector. Among the female headed households, 75 % of them diversified while 25 % of them did not diversify their livelihood to the non-farm activities. The nonparametric test depicts that respondents' household characteristics significantly ($\chi 2 = 6.102$, sig. (2-tailed) = 0.014) determine households' engagement on non-farm livelihood diversification.

In comparing the two agro-ecologically distinct study sites, household characteristics significantly determines non-farm livelihood diversification among farming households in *Tabia Lemlem Arena (qola)* while insignificantly determines non-farm livelihood diversification in *Tabia Addis Alem (weynadega)*. In conclusion, households' characteristics play a different role in determining farming households' non-farm

livelihood diversification across the two agro- ecologically different study areas.

Table 3: Cross tabulation of non-farm livelihood diversification by household size in *Tabia Addis Alem (weynadega)*

		Household size									
			3		4		5		6		7
		No.	%	No.	%	No.	%	No.	%	No.	%
Non-farm	Diversified	3	60.0	12	54.5	33	78.6	21	100	9	90.0
livelihood	Not diversified	2	40.0	10	45.5	9	21.4	0	0.0	1	10.0
diversification	Total	5	100.0	22	100.0	42	100.0	21	100.0	10	100.0

$x2 = 14.767$, sig. (2-tailed) = 0.005

***Source*:** survey result, 2016

The average household size *in Tabia Addis Alem* (*weynadega*) is 5.09. As shown in the table above, among respondents who have household size three individual members, 60% of them have diversified their livelihoods to non-farm livelihood activities. Among the survey respondents who have household size four individual members, 54.5% of them diversify their livelihoods to the nonfarm sector. Among the respondents who have household size five individuals, 78.6% of the households diversified their livelihoods to the non-farm livelihood activities. Among the other respondents whose household size is six individuals, all 100% of them have diversified to the non-farm options of livelihoods. Out of those respondents that have larger household size (7 member individuals), 90% of them diversified their livelihoods to the non-farm sector.

The non-parametric test depicts that respondents' household size significantly ($\chi2 = 14.767$, sig. (2-tailed) = 0.005) determines households' engagement on non-farm livelihood diversification. Therefore, the size of a given household has an impact on the households' engagement on non-farm livelihood activities. This implies the households with the larger member individuals, the higher probability to diversify to the non-farm livelihood options.

The reason why households with relatively large number of member individuals tend to diversify their livelihoods to the non-farm livelihoods, data has been extracted from the study participants. Households are expected to satisfy the needs of member individuals including basic household consumption. Households with relatively large number of member individuals face difficulties to fulfill the needs of their household using income earned only from the farm sector. As a result, they tend to diversify their livelihoods to non-farm livelihood options that can support their major livelihood. In addition to this, engagement of some members of a given household on non-farm livelihood activities reduces consumption level of agricultural produces at the household level and prevents from selling of fixed assets of the household from consumption.

Table 4: Cross tabulation of non-farm livelihood diversification by household size in *Tabia Lemlem Arena (qola)*

		Household size									
		No.	3	No.	4		5	No.	6	No.	7
			%		%	No.	%		%		%
Non-farm	Diversified	0	0.0	5	33.3	14	38.9	11	50.0	4	100.0
livelihood	Not diversified	3	100	10	66.7	22	61.1	11	50.0	0	0.0
diversification	Total	3	100.0	15	100.0	36	100.0	22	100.0	4	100.0

$x^2 = 8.843$, sig. (2-tailed) = 0.065

Source: Survey, 2016

The mean household size in *Tabia Lemlem Arena* is 5.11. As shown in the above table, the household size of respondents did not affect their tendency to diversify their livelihoods to non-farm sector. The Chi-square test indicates that respondents' household size is statistically insignificant ($\chi2 = 8.843$ sig. (2-tailed) = 0.065) in influencing households to diversify to the non-farm sector.

Comparing the two agro-ecologically distinct study sites, household size significantly determines non-farm livelihood diversification among farming households in *Tabia Addis Alem (weynadega)* while it has insignificant influence on nonfarm livelihood diversification in *Tabia Lemlem Arena (qola)*. This implies household size plays a different role in determining farming households' non-farm livelihood diversification across the two agro- ecologically different areas. The reason why household size plays different role in the two *Tabias* is that, households in *Tabia Lemlem Arena (qola)* did not face much difficulty to fulfill their household requirements through income earned from farming. Most of the respondents in this *Tabia* perceived that the agricultural produce they yield farm their farm land is adequate so as to support household requirements.

4.2.3 Farm land size

Farming households have different farm land size due to various reasons. It is expected that there might be variations among farming households' engagement on non-farm livelihoods due to holding of different farm land size. So as to see the association between non-farm livelihood diversification and farm land size, non-parametric test (Chi-square) is used. The following tables show test of association between these variables in *the respective Tabias.*

Table 5: Cross tabulation of non-farm livelihood diversification by Farm land size in *Tabia Addis Alem (weynadega)*

		Land holding size in Hectare													
		1.75	%	2.00	%	2.25	%	2.50	%	2.75	%	3.00		3.25	%
Non-farm	Diversified	No.		No.		No.		No.		No.		No.	%	No.	
		14	100.0	29	96.7	10	100	7	50.0	1	14.3	17	81.0	0	0.0
livelihood	Not diversified	0	0.0	1	3.3	0	0.0	7	50.0	6	85.7	4	19.	4	100.0
diversification	Total	14	100.0	30	100.0	10	100.0	14	100.0	4	100.0	21	100.0	4	100.0

x^2= 50.105, sig. (2-tailed) = 0.000

***Source*:** *survey result, 2016*

Note: the farm land size that households cultivated includes share cropped in farm lands from original land holders and relatives.

The average farm land size in *Tabia Addis Alem (weynadega)* is 2.37 hectare. Among the respondents whose land holding size is 1.75 hectare, 100% of them tend to diversify their livelihoods to non-farm livelihoods. Among the farming respondents with farm land size of 2.00 hectare, 96.7% of them diversify their livelihoods to non-farm livelihood activities. From the farming respondents with farm land size of 2.25 hectare, 100% of them diversify livelihood activities outside agriculture. Among the farming respondents holding 2.50 hectares of farmland, 50% of the households diversified their

livelihoods to non-farm livelihood options. Among the respondents who have 3.00 hectares of farm land, 81% of them diversify their livelihoods to the nonfarm livelihood activities. Lastly, among farming households holding 3.25 hectares of farm land, none of them had diversified their livelihoods outside agriculture.

The non-parametric test (Chi-square) indicates that respondents' farm land size is statistically significant ($\chi 2$ = 50.105 sig. (2-tailed) = 0.000) in influencing households to diversify to the non-farm sector. This implies, households holding small size of farm land, the higher probability to engage on non-farm livelihood activities.

Discussion results of this study also supports this test result. According to the study participants of *Tabia Addis Alem (weynadega)*, holding small farm land size limits households from producing crops enough to support their household members and cover other expenses. Although variations in land fertility might result differences in agricultural production, size of farm land matters to produce what is needed by a given farming households. This implies the households with relatively small farm land size, high probability to engage on non-farm livelihood activities.

Nonparametric test has been also used to see the relationship between non-farm livelihood diversification and farm land holding size in *Tabia (qola).*

Table 6: Cross tabulation of non-farm livelihood diversification by farm land size in *Tabia Lemlem Arena (qola)*

		Farm land holding size in Hectare											
		No.	2.75	No.	3.00	No.	3.25	No.	3.50	No.	3.75	No.	4.00
Non-farm	Diversified		%		%		%		%		%		%
		8	66.7	9	45.0	8	53.3	4	25	2	33.3	3	27.3
livelihood	Not diversified	4	33.3	11	55.0	7	46.7	12	75.0	4	66.7	8	72.7
diversification	Total	12	100.0	20	100.0	15	100.0	16	100.0	6	100.0	11	100.0

x^2=6.895 sig. (2-tailed) = 0.229

***Source*:** *survey result, 2016*

As shown in the above table, the respondents' farm land size did not affect their tendency to diversify their livelihoods to non-farm sector. The Chi-square test indicates that respondents' farm land holding size insignificant ($\chi 2$ = 6.895, sig. (2-tailed) = 0.229) in influencing households to diversify their livelihoods to the non-farm sector.

Comparing the influence of respondents' farm land holding size on non-farm livelihood diversification in the two agro-ecologically distinct study sites, farm land size significantly determines non-farm livelihood diversification among farming households in *Tabia Addis Alem (weynadega)* while it has insignificant statistical value on nonfarm livelihood diversification in *Tabia Lemlem Arena qola).* Thus, farm land size plays a different role in determining farming households' engagement on non-farm livelihood activities across the two agro- ecologically different areas.

Table 7: Cross tabulation of non-farm livelihood diversification by perception of households about the productivity of their farm land in *Tabia Addis Alem (weynadega)* Perception of household heads' about the productivity of their farm land

		Adequate		Inadequate		Total	
		No.	%	No.	%	No.	%
Non-farm	Diversified	10	55.6	68	82.9	78	78.0
livelihood	Not diversified	8	44.4	14	17.1	22	22.0
diversification	Total	18	100.0	82	100.0	100	100.0

x^2 = 6.444 sig. (2-tailed) = 0.011

***Source*:** survey result, 2016

As indicated in the above table, among of the respondents who thought the agricultural produce the yield from their farm land in 2006/7 harvest season is inadequate, 82.9% of them diversified their livelihoods to the non-farm livelihood options

while the remaining 17.1% of respondents did not diversify Their livelihoods to the non-farm sector. On the other hand, among the respondents who thought they have got adequate production from their farm land, 55.6% of them diversified their livelihoods to the nonfarm livelihood activities while the remaining 44.4% of the respondents did not diversified. The Chi-square test indicates that respondents' thought about the production they yield of their farm land is found significant ($\chi 2 = 6.444$, sig, (2-tailed) = 0.011).

Nonparametric test is also used to check whether perceptions of households about the agricultural produce they got from their farm land determines non-farm livelihood diversification in *Tabia Lemlem Arena (qola)*.

Table 8: Cross tabulation of non-farm livelihood diversification by perception of households about the productivity of their farm land in *Tabia Lemlem Arena (qola)* Perception of household heads' about the productivity of their farm land

		Adequate		Inadequate		Total	
		No.	%	No.	%	No.	%
Non-farm	Diversified	27	37.5	7	87.5	34	42.5
livelihood	Not diversified	45	62.5	1	12.5	46	57.5
diversification	Total	72	100.0	8	100.0	100	100.0

$\chi^2 = 7.366$, sig. (2-tailed) =0.007

***Source*:** survey result, 2016

As shown in the above table, among the respondents who thought the agricultural produce the yield from their farm land is inadequate, 87.5 % of them diversified their livelihoods to the non-farm livelihood options. Even though the remaining 12.5 % of respondents perceive that their agricultural produce is inadequate, they did not diversify their livelihoods to the non-farm sector. On the other hand, among the respondents who thought they have got adequate production from their farm land, 62.5 % of them did not diversified their livelihoods to the non-farm livelihood activities while the remaining 37.5 % of the respondents had diversified.

The Chi-square test indicates that respondents' perception about the productivity of their farm land is found significant ($\chi 2 = 7.366$, sig, (2-tailed) = 0.007).

Comparing the perceptions of farming households across the two *Tabias*, majority of respondents in *Tabia Addis Alem (weynadega)* tend to perceive their farm land productivity as inadequate while majority of the respondents in *Tabia Lemlem Arena (qola)* perceived the productivity of their farm land as adequate. However, respondents' perception of the productivity of their farm land is found statistically significant in determining non-farm livelihood diversification in both *Tabias*. This implies, when household heads perceived their farm land productivity is inadequate, the greater probability to engage on non-farm livelihood activities.

Table 9: Cross tabulation of non-farm livelihood diversification by seasonality of agriculture in *Tabia Addis Alem (weynadega)* Seasonality of agriculture as a factor for non-farm livelihood diversification

		Factor for diversification		Not factor for diversification		Total	
		No.	%	No.	%	No.	%
Non-farm	Diversified	69	85.2	9	47.4	78	78.0
livelihood	Not diversified	12	14.8	10	52.6	22	22.0
diversification	Total	81	100	19	100	100	100

$\chi^2 = 12.826$, sig. (2-tailed) = 0.000

***Source*:** *survey result, 2016*

As can be seen from the above table, among the respondents who consider seasonality of agriculture as a factor to engage on non-farm livelihood activities, 85.2% of them diversify their livelihoods to the non-farm livelihood activities while the remaining 14.8% of respondents did not diversify their livelihoods to the non-farm sector. On the other hand, among the respondents who did not consider seasonality of agriculture as a determinant for non-farm livelihood diversification, 47.4% of them diversified their livelihoods to the non-farm livelihood activities while the remaining 52.6% of the respondents did not diversify. The Chi-square test indicates that respondents' seasonality of agriculture is statistically significant ($\chi 2 = 12.826$, sig. (2-tailed) = 0.000) in influencing households' non-farm livelihood diversification.

Table 10: Cross tabulation of non-farm livelihood diversification by seasonality of agriculture in *Tabia Lemlem Arena (qola)* Seasonality of agriculture as a factor for non-farm livelihood diversification

		Factor for diversification		Not factor for diversification		Total	
		No.	%	No.	%	No.	%
Non-farm	Diversified	5	26.3	12	19.7	17	21.3
livelihood	Not diversified	14	73.7	49	80.3	63	78.8
diversification	Total	19	100.0	61	100.0	80	100.0

$\chi^2 = 0.382$, sig. (2-tailed) = 0.536

***Source*:** *survey result, 2016*

As shown in the table above, seasonality of agriculture did not affect respondents' tendency to diversify their livelihoods to non-farm sector. The Chi-square test indicates seasonality of agriculture is found insignificant ($\chi 2 = 0.382$, sig. (2-tailed) = 0.536) in determining non-farm livelihood diversification.

Considering the role of seasonality of agriculture in determining non-farm livelihood diversification of farming households across the two agro-ecologically unique areas, it is found significant determinant of non-farm livelihood diversification in *Tabia Addis Alem (weynadega)*. On the other

hand, seasonality of agriculture is found insignificant determinant of households' engagement on no-farm livelihood activities in *Tabia Lemlem Arena (qola).* Therefore, the influence seasonality of agriculture on non-farm livelihood diversification is different across agro-ecologically distinct settings.

4.4.6 Households' accessing financial credit

Farming households might access financial credits from different credit sources. Those who accessed financial credit might use it for different purposes. It is assumed households' accessing financial credit have an impact on diversifying their livelihoods to the non-farm sector. Non-parametric test of association (Chi –square) is used as a statistical tool to test the association between these two variables. The following tables illustrate test of association between these variables in respective agro ecologically distinct study sites.

Table 11: Cross tabulation of non-farm livelihood diversification by households' accessing financial credit in *Tabia Addis Alem (weynadega)*

		Households accessing financial credit					
		accessed		Not accessed		Total	
		No.	%	No.	%	No.	%
Non-farm livelihood diversification	Diversified	23	71.9	55	80.9	78	78.0
	Not diversified	9	28.1	13	19.1	22	22.0
	Total	32	100.0	68	100.0	100	100.0

$\chi 2 = 1.029$, sig. (2-tailed) = 0.310
***Source*:** survey result, 2016

As shown in the above table, the household accessing credit did not affect their tendency to diversify their livelihoods to non-farm sector. The Chi-square test indicates that respondents' accessing financial credit is statistically insignificant ($\chi 2 = 0.370$, sig. (2-tailed) = 0.543) in influencing households to diversify to the non-farm sector.
The impact of accessing financial credit on farming households' engagement on nonfarm livelihood options has been also tested in *Tabia Lemlem Arena (qola)* using nonparametric test (Chi-square).

Table 12: Cross tabulation of non-farm livelihood diversification by households' accessing financial credit in Tabia Lemlem Arena (qola)

		Households' accessing financial credit					
		Accessed		Not accessed		Total	
		No.	%	No.	%	No.	%
Non-farm livelihood diversification	Diversified	26	45.6	8	34.8	34	42.5
	Not iversified	31	54.4	15	65.2	46	57.5
	Total	57	100.0	23	100.0	80	100.0

$x^2 = 0.787$, sig. (2-tailed) = 0.375
***Source*:** survey result, 2016

As shown in the above table, the household accessing financial credit did not affect their tendency to diversify their livelihoods to non-farm sector. The Chi-square test of association indicates that respondents' accessing financial credit is statistically insignificant ($\chi 2 = 0.787$, sig. (2-tailed) = 0.375) in influencing households to diversify to the non-farm sector.
In conclusion, respondents' accessing financial credit is found statistically insignificant in determining households' engagement on non-farm livelihood activities in both study areas –*Tabia Addis Alem (weynadega)* and *Lemlem Arena (qola).* This implies, accessing financial credit by itself is not a sufficient condition for households to diversify their livelihoods to the non-farm sector. According the to the study participants, financial credit that households accessed from different sources is mostly used to purchase agricultural inputs, fatten livestock, to pay previous credits, asset building and fulfilling household's basic needs. Furthermore, issues of collateral make difficult accessing credit especially from the government. The major sources of financial credit include the government, NGOs, friends and local lenders, friends /relatives, and Idir.
According to the survey respondents, currently, vulnerability contexts such as drought, paste disease and low harvest are not determinants of diversification in the study area.
In addition to the above quantitatively investigated determinants of non-farm livelihood diversification from the survey respondents, data regarding other determinants of nonfarm livelihood diversification has been collected from study participants.

4.3 Discussion results

4.3.1Push Factors

Hypothetically, price of agricultural inputs is expected to have an impact in influencing farming households to engage on non-farm livelihood activities. According to some discussion participants, ever increase of price of agricultural inputs (fertilizers, improved seeds and pesticides) are becoming driving forces for household's diversification to nonfarm livelihood activities. This was the most underlined issue by majority of participants in the FGDs and in-depth interview.
According to the view of participants, costs of modern farm inputs are becoming intolerable and challenging farming households. As reported by the interviewees, the farm land production did not help them to support their household requirements and cover the entire costs of these modern farm inputs.
Some years back, the price of agricultural inputs was relatively fair, tolerable and affordable by farming households. However, unexpectedly, the price of agricultural inputs (fertilizers, improved seeds, and pesticides) has scale up and farming households face difficulty to afford it. This in turn, forced farming households to look at another livelihood option so as to buy these high price level agricultural inputs. Thus, farming households engaged themselves in nonfarm livelihood activities to generate income.
A 47 years old man who lives in Addis Alem *Tabia* noted that: The life of rural households is highly dependent on agriculture (subsistence Farming) in particular. Hence, farming households exert their full effort on agriculture to produce the extent possible to support the basic needs of their households. At the same time, government is introducing various mechanisms and farming implements to enhance farm productivity. And we know that this enable farming households to produce more than the conventional way we do ever before. However, the price of these agricultural implements is showing a radical increase from time to time. To your surprise, few years back, the price of fertilizer (DAP)

was 300 birr per quintal but now the price of the same size fertilizer is around 650 birr and we are obligated to take it with price limit set by the government. I do not know why this happen. Whatever we produce a lot, we have to pay back to government for inputs we taken and applied in the agricultural farm land. Imagine, the farm land we have could not produce agricultural output that can feed us as well as generate income from crop sale to repay what we bought from the government. Because of this, we seek another alternative livelihood that can help us to generate income to cover the costs of agricultural inputs.

4.3.2 Pull factors

Unlike push factors which force households to diversify their livelihoods to the non-farm sector necessarily, pull factors are factors that attract farming households to be engaged on non-farm livelihood activities. Even though push factors highly determine households' livelihood diversification to the non-farm sector, there are some pull factors that motivated households to no-farm livelihood diversification.

Some of the study participants in the FGDs and in-depth interview noted that the positive changes they witnessed on individuals/ households who have been involved in non-farm livelihood activities attracted them to do so. Individuals/ households who had been engaged on non-farm livelihood activities build some fixed assets such as, built a house with collated iron, bought some oxen, and other cattle using the income they generated from such activities. This in turn, motivated other households to be engaged on non-farm livelihood activities.

In addition to this, some young members of a given household who have been engaged on some non-farm livelihood activities share their friends about the opportunities that are available with regard to engagement on non-farm livelihood activities. Here, the social networks of youngsters play a significant role in motivating them to engage on non-farm livelihood activities.

Besides, some study participants from *Tabia Lemlem Arena (qola)* noted that the proximity of their village to the *woreda* town and relatively to *regional* capital has also contributed to their engagement on some non-farm livelihood activities. The presence of transportation access to towns helped households to probably engage on non-farm livelihood activities available in urban areas.

Therefore, rural urban linkage interms of (availability of transport access and relatively 'short distance') between the villages of farming rural households and urban centers found as a determinant factor for households' livelihood diversification to the non-farm sector.

5. Conclusions

In most developing countries, importance of non-agricultural activities is increasing and it is estimated to account for 30-50% of rural incomes (World Bank 2008 as cited in Woinishet 2010: 8) [10]. Although agriculture is the dominant economic activity and the primary source of livelihoods for rural households, livelihood sources have now become diverse.

Determinants of non-farm livelihood diversification are found to have varied role on non-farm livelihood diversification across three two agro-ecologically distinct study areas. Some of the factors were found significant determinants of non-farm livelihood diversification across the two agro- ecologically different study areas- *Tabia Addis Alem (weynadega*) and *Tabia Lemlem Arena (qola).* Some other variables were determinant factors for households to diversify their livelihoods to the non-farm sector in either of the two study *Tabias* while some found insignificant determinants of non-farm livelihood diversification in both *Tabia Addis Alem (weynadega)* and *Lemlem arena (qola).*

Household characteristics (being male or female headed) was found insignificant influencing factor for households so as to diversify their livelihoods to the non-farm sector in *Tabia Addis Alem (weynadega)* while it was found significant determinant factor of non-farm livelihood diversification in *Tabia Lemlem Arena (qola).*

On the contrary, household size significantly determines households' engagement on non-farm livelihood activities in *Tabia Addis Alem (weynadega)* while it has no impact on non-farm livelihood diversification in *Tabia Lemlem arena (qola).*

Respondents' farm land size is also significantly influencing households' engagement on non-farm livelihood activities in *Tabia Addis Alem (weynadega)* while it has no impact on nonfarm livelihood diversification in *Tabia Lemlem arena (qola).*

The other factor that have a significant influence on farming households engagement into non-farm livelihood activities in both *Tabia Addis Alem (weynadega) and Lemlem Arena (qola)* is households' perception about the productivity of their farmland. This implies when farming households perceived that the agricultural produce the yield from their farm land in a given harvest season is inadequate, more likely to engage on nonfarm livelihood activities.

In addition the above quantitatively addressed determinants of non-farm livelihood diversification ever increase of price of agricultural inputs, rural urban linkage, growing - opportunities on the non-farm sector also considered as determinants of non- farm livelihood diversification by the study participants. Although determinants of non-farm livelihood diversification might be regarded as push or pull factors, subjects of this study indicated that diversification is highly determined by the factors regarded as push factors than pull factors or necessity category than choice category.

5.3 Implications for further Research

This study, in the course of the literature review and the actual research and analysis, has identified a number of specific themes for further research. These themes include:

The relationship between credit and non-farm livelihood diversification;

New approaches and models for credit provision in rural areas.

The influence of the relative prices of farming inputs on livelihood diversification;

The role of non-farm livelihood expertise and livelihoods of rural households;

Agro- ecology and rural non-farm livelihood diversification;

Rural development programs and non-farm livelihood diversification

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