International Journal of Economics and Development Policy (IJEDP), Vol. 1 No.2, Dec, 2018, Abarshi, Pg. 21 – 31

An Empirical Assessment of Non-farm Income Yielding Activities Undertaking by Fadama Farmers in Bauchi State of Nigeria

Abarshi Musa Yusuf[1]

Department of Economics,
Gombe State University, Gombe,
Gombe State, Nigeria.

Abstract

This study is on non-farm income yielding activities undertaken by fadama farmers in Bauchi State. Its objectives are: to analysis non-farming income activities of fadama farmers; examine their diversifications among others. A stratified random sampling was adopted as a sampling technique. Data were collected from questionnaire administered to 900 sampled farmers' and 824 questionnaires made up of 455 beneficiaries and 369 non-beneficiaries were retrieved and analyzed. Data were analyzed using descriptive statistics and diversity index. The study found that Fadama intervention has help in providing farmers with hybrid seed varieties, water-pumps, and construction of culverts, fertilizer, etc. The result of Simpson's Index of Diversity (SID) showed fadama farmers have 0.47diversification index for their activities, while non-fadama farmers' have 0.0087 index. Thus, fadama farmers are more engaged in non-farming income yielding activities than non-fadama farmers. Consequently, the study recommends expansion of fadama activities, mobilization of donor agencies for interventions into fadama activities among others

Keywords: Fadama, Farmers, Non-Fadama Farmers, Non-Income Yielding, Simpson's Index of Diversity
JEL Code: O13, Q10, Q14

Contribution/Originality
This study is one of the few studies which investigated the non-farm income yielding activities undertaken by Fadama farmers (off-season) in Bauchi state. It has applied the Simpson's Index of Diversity. Thus, contributing in terms of agricultural development policy to the State.

1.0 Introduction

There has been a continuous and a relative declining dependence on agricultural activities in developing countries. This is partly explained by the desire for rural communities and households to be income and food secured. Undertaking a broad range of activities is indicative of move to secure income of households and the farming families (Omilola, 2009). Multiple reasons proffered in explaining such moves by rural households in the literature points to the desire by rural households to break away from vicious cycle of poverty, the demand by households for an increased and sustained income, the tendency for reduced income shocks and a smoothened fluctuation in income (Schwarze & Zeller, 2005: Saha & Bahal, 2010: Omilola, 2009).

The Non-farming income yielding activities provides both the explanations and the safety net on the decline in farm-income resulting from low farm productivity and output in rural economies. These situations encourage government to provide for an integrated program that reduces poverty and improves wellbeing which consequently guarantees food security for households. In Nigeria, infrastructure, wellbeing, poverty as well as diverse non-farming activities are integrated and hence, provide an enterprise that attract government as well as motivates rural folks into meaningful income

[1]Corresponding Authors Email and Phone: abarshiyusuf@gmail.com; +234 (0) 803 6817 825

yielding activities as a means of livelihood sustenance. Such income yielding non-farming activities are synchronizing fairly with rural activities and programs. By implication government policy and program unify agriculture and other activities in a conjuncture that is amenable to policy manipulation and changes. A government program that boosts rural activities, income and livelihood and integrates rural non-farming activities to agriculture is the dry season farming, commonly known as "Fadama" program.

In accordance with its various components, the Fadama programs constitute both agricultural production and agricultural diversification initiative by the government which provides rural livelihood diversification through varied strategies. Thus, on-farming income yielding activities represent a range of coping as well as poverty alleviation strategies put in place by government for the benefit of farming households as enshrine in the Fadama program.

However, public intervention programs such as the Fadama program foresaw the attendant risk and vulnerability to the future of farms and farming communities and hence try to provide circumventing strategies that include diversification of farming activities as one of its chief component. The questions then are; and how is the nature of the diversification introduced by Fadama in the area? And how far has this been achieved among the farmers in the study area? From the foregoing, the general objective of this study is to assess non-farming income yielding activities of the Fadama farmers. The specific objectives of this study are:

(i) To analyze the extent of non-Farming income yielding activities of Fadama-farmers.

(ii) To examine the nature of Fadama farmers' diversification.

(iii) To assess the farmers level of activity diversification.

(iv) To make policy recommendation to government and intervention agencies

2.0 Literature Review

Literature on activity diversification is vast and encompassing in their outlook. For instance, Schwarze and Zeller (2005), reviewed income diversification among rural households within the vicinity of Lore Lindu national park in Indonesia, revealed a dual shift in diversification from agricultural activities and an increase mix of income activities. They showed 68% contribution to household incomes from diversification; 32% due from non-agricultural activities and that the households derive 40% of their income from non-agricultural activities, it accounts for 10% of the poorest households. The study further revealed that socio-economic status and access to social capital have positive impact on farmers' activity diversification.

Similarly, Bila, Mshellia & Landi (2015) investigated off-farm activities of households and its contributions to household income in Hawul, Borno state of Nigeria. The study found more female gender participation in off-farm activities and most of the participants are married and with off farm income within the range ₦11,000.00 to ₦20,000.00 and are experienced and have less than a hectare of farm size. They recommended that household members should be encouraged to take up off-farm employment as it will raise their standards of living.

Also, Ibidapo, Oso & Ogundipe (2017) investigated the contribution of non-farm activities in combating unemployment in rural areas of Ondo-east local government area of Ondo state, Nigeria. They found that factors influencing small holder participation were education, wage earned, access to credit, and distance. The study suggested that non-farm activities should be undertaken as it provides safety net, reduces unemployment, supplement household income and alleviates poverty among households. Finally, they recommended improved access to roads, credit and education to boost participation.

Moreover, Asfaw, Simane, Hassen, & Bartider (2017) studied the determinants of non-farm livelihood diversification: evidence from rain-fed-dependent small-holder farmers in North central Ethiopia (Woleka Sub-Basin). They discovered constraints to non-farm diversification, include lack of access to adequate capital, poor infrastructures and lack of training. The study revealed the better off household's heads as those having access to micro finance, extension service, and social responsibilities. They suggested strengthening agricultural extension services, providing micro-finance; entrepreneurial training and skill development as well as infrastructure will enhance participation of small-holder households' farmers in non-farm activities. Thus, the study recommended the need for integrated non-farm livelihood strategies into rural farming economies.

Furthermore, Gecho (2017) studied rural households' income diversification for the case of Wolaita Zone, Southern Ethiopia. Findings from the study indicated that rural households in the area practiced diversified income sources 57.7 % by combining agriculture with other activities with some pursue non-farming activities as the primary source of income as against agriculture. As regards to the wealth status, the study found that poor households derive 50% of their income from non-agricultural activities and the later only 6.4% of better households. Factors such as sex, farm size, livestock ownership, oxen ownership, education, leadership, annual cash income and market distance determined participation in income diversification activities. The study recommends paying attention to challenging bottlenecks.

However, emphasized that activity diversification contributes positively to livelihood through non-farm income activities that tends to improve sustainability through reduced vulnerability to stress and shocks (Awotide, Kehinde & Agbola, 2010; FAO, 2014). Livelihood contribute to access to assets

and are determined by social factors (social relations, institutions, organization) and exogenously determined by economic and natural trends (Awotide, *et al.*, 2010).

2.1 Conceptual Framework

The concept of activity diversification in the literature is conceptualized to be synonymous as livelihood diversification (LD) as posited by Saha and Bahal (2010). It images the rural people as people no longer confined to crop production, fishing, livestock rearing, forest management but combine a range of occupations to construct a diverse portfolio of activities (Khatun & Roy, 2012). Activity diversification refers to the strategy adopted in different parts of the world by people to make ends meet and in the process improve on their wellbeing. Furthermore, Khatun and Roy (2012) held the view that non-income activities serve as a process by which rural households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and improvement in their standard of living. It is a continuous adaptive process in which such households add or drop existing activities, maintain old activities or drop others in order to maintain diverse and changing livelihood portfolios (Saha & Bahal, 2010). Also, rural livelihood diversification represents phenomenon where rural households engage in multiple activities (either on-farm or off-farm, agricultural or non-agricultural) in order to survive and improve their standards of living (Asmah, 2010). This term 'Livelihood Diversification' is intertwined across several fields and disciplines and as such has a mixed up of definitions. According to Ellis (2000), rural livelihood diversification can be defined as the process by which rural households construct an increasing diverse portfolio of activities and assets in order to survive and improve their standard of living. Thus, this definition has been adopted for this study.

In a related study Shehu and Saddique (2014), consider non-farm activities to include all forms of non-farm businesses carried out in non-farm sector. According to this study such non-farm activities include; trading, manufacturing, mining and all forms of human services. Similarly, Ibekwe, Ohajianya, Onyyeamonuwa and Okorie (2010) opined that non-farm activities constitute an important component of livelihood among rural households. In a Similar definition by Ojeleye, Sale and Oyewole (2014), non-farm activities of household refer to income not generated through agricultural activities and encompasses own account, workers and working proprietors of unincorporated enterprises and consist of profit earned from non-farm enterprises, owned by households or individually operated cottage industries like handicraft, petty trading, transport, small industry, services, and miscellaneous non-farm activities.

2.2 Theoretical Framework

This study is based on a sociological theory often used by social scientist and is regarded as social "capital framework". The social framework method of analysis is built around social trust and norms

anchored on collective action (Rinjn *et al.*, 2012). This framework proposes a network for collective action for the development of both social and human capital and the achievement of collective goals in a setting. The logic in social capital is a sociological thesis that encourages social mobilisation towards social transformation as a development strategy. The model integrates social trust and norms of reciprocity among individuals, groups and community to attain poverty alleviation and economic development. The structure and knowledge from this model has encouraged its adoption for this study.

3.0 Methodology

3.1 The Study Area

The study areas considered for this work is the Bauchi State agricultural zones under the state Agricultural Program (B.S.A.D.P), made up of 3 zones: the northern zone, the Eastern zone and the Western agricultural zone of the state. The demographic characteristics relevant to the study in the council areas are as summarized in Table 3.1.

Table 3.1: Demography of the study area.

Zones	Selected Council Areas	Gender Classification of the Population of Council Areas		Identified Users Population of Fadama in the Area
		Male	Female	
Northern	1. Jama'are	541.021	61461	183
	2. Itas-Gadau	102,123	101,106	129
	3. Warji	169,410	164,250	204
Central	1.Ganjuwa	109,163	107,620	67
	2.Ningi	122,006	121,298	351
	3.Warji	42,080	43,065	135
Western	1.Toro	156,899	156,469	219
	2.Dass	37,352	37,947	305
	3.T/Balewa	93,339	97106	101

Source: Bauchi State agricultural zones under the state agricultural program (2013)

Bauchi state has a population of about 4.6 million people and has 20 local government areas. Going by the ADP Zoning of the state and the 2007 population figures for the zones and their relative fadama participation characteristics are as in Table 3.1 above. Population figure for the various council areas of the state as obtained from population data base of the national population 2007 was considered and summarized in the table above. For instance, northern zone and in particular Jama'are was found as having a population of 54,021 males with 51,461 females and an estimated 183 Fadama User groups.

3.2 Study Design

The field survey design was adopted and 9 Local Government Areas were selected and divided into three senatorial zones. Questionnaires were administered proportionately among 20 households' heads

in each of the farming communities sampled based on stratified random sampling techniques. A total of 900 questionnaires were distributed and 824 were received and analysed.

Apart from the use of descriptive statistic such as; tables, mean, frequencies etc, this study also adopts the use of a livelihood diversification index. It is one of the most reliable indexes of diversification used in calculating activity diversification. In this study attempt is made to compare activity diversification between fadama and non-fadama farmers in the study area. Fadama activity as a means of livelihood is equated to livelihood diversification (LD). The activity has become a household strategy in which farmers in different part of the world attempt to make ends meet and in the process improve on their well-being (Saha & Bahal, 2010). Hence according to the Saha and Bahal (2010) diversification of livelihoods: to add and drop new activities to farming and hence to maintain diverse and changing livelihood portfolio, involves adopting a range of activities such that farmer's income is diversified to include other sources of income such as; farm income, non-farm (farm agricultural income sources) and off-farm income (Saha & Bahal, 2010). Attempt is made in this study to calculate index of income diversification of Fadama and non-fadama beneficiaries. To do this, the Simpson Index of Income Diversity (SID), was adapted and applied in the study. The Simpson diversity index is used to calculate a measure of (a) Diversity: taking into account the number of something and its abundance (b) It is also often used in ecological studies to measure species diversity and can also apply to the study of diverse ideas or opinions (c) it used in knowing the range and variety of data when dealing with large data sets.

The proponents of this index model include: (i) Edward H. Simpson who used the index to measure the degree of concentration when individuals are classified into two types; (ii) Hirschman, further rediscover the index model and hence was named Herfindahl index or the Herfindhl-Hirchman index (HHI).

The assumptions behind the index model are: (i) all species are equal i.e. implying richness measure and lack of distinctions in and among the data sets. Thus, the index treats species in abundantly the same way; (ii) All individuals are equal; this implies no distinction between largest and smallest individual; (iii)The index also assumes specie abundance. Thus implying that it uses appropriate, and comparable units. The model of Simpson's index had been variedly applied in ecological and related studies. For example, Hunter and Gaston (1988) used the SID index to compare partitions.
The SID Model is specified as:

$$ {}^{q}D = \frac{1}{M_{q-1}} = \frac{1}{\sqrt[q-1]{\sum_{i=1}^{R} p_i p_i^{q-1}}} = \left(\sum_{i=1}^{R} p_i^{q} \right)^{1/(1-q)} \qquad \ldots\ldots\ldots\ldots (1.0) $$

$$ {}^{1}D = \frac{1}{\prod_{i=1}^{R} p_i^{p_i}} = \exp\left(-\sum_{i=1}^{R} p_i \ln(p_i) \right) \qquad \ldots\ldots\ldots\ldots (1.1) $$

The General form of the SID is:

$$^{q}D := \left(\sum_{i=1}^{R} p_i^q\right)^{1/(1-q)} \quad \ldots\ldots\ldots (1.2)$$

Where the denominator M_{q-1} = average proportional abundance of the types (species in the data set)

q-1 = generalize mean with exponent q-1

R = total number of types in the data set and the i^{th} type is p^i and also represent nominal weight

Q=1 is undefined

As q ⟶ 1, equation (1) becomes equation (2)

Where, P_i is the proportion of income coming from source *i*, with the value of SID index always lying between 0 and 1.

4.0 Results and Discussions

Data collected from field and BSADP were handled through a statistical package call SPSS and result found were tabulated and classified and analysed as below.

Table 4.1: Frequency distribution and diagnostic statistics of activities and mean annual income of dominant livelihood activities undertaking by farmers in the study area

Livelihood activities	Frequency	Percentage	Minimum income per annum (₦)	Maximum income per annum(₦)	Mean income	Standard deviation
Farming	283	62.26	50,000	28,789,020	2,399,085.0	12,349,085
Small business	46	10.10	25,150	9,914,805	826,233.75	1,801,085.75
Hand-work	47	10.38	15,900	10,457,018	871,418.17	1,855,518.17
Livestock	64	14.10	7,300	13,457,980	1,121,498.3	11,114,198.3
Others	14	3.16	1,800	6,616,080	551,340.0	16,614,280

Source (Field survey, 2013)

Table 4.1 reveal farming predominate livelihood activities in the study area both in terms participation (283), minimum (₦50,000) and maximum (₦28,789,020) realized income by the participating households. Non-farm income activities contributing to livelihood include livestock (64), handwork (47), and small business (46); with a minimum and maximum income of ₦15,900; ₦25,150; ₦7,300 and ₦10,457,018; ₦9,914,805; ₦13,457,980, respectively. Others constitute 14 or 3.16% with a minimum and maximum income of ₦1,800 and ₦6.616,080. The table depicts an outcome that

suggests additional income as emanating from non-farm income source and hence contributes to livelihood in the area.

Table 4.2: Income diversity

Income Sources	**Beneficiary Income**	**Proportion of Income**	**Non-beneficiary Income**	**Proportion of Income**
Livestock income	13,409,980	0.0375671699	13,150,180	0.266
Farm Income	28,789,020	0.1731434159	25,480,750	0.514
Business Income	9,914,805	0.2866093024	6,320,880	0.128
Handwork	10,457,018	0.0228437779	____	___
Other Income	6,616,080	0.0091443684	4,575,123	0.0924
Total Income	**69,186903**	**1.0000000001**	**49,526,933**	**1.0003764651**

Field survey: 2013

Table 4.2 provides an insight on farmer's sources of extra income. These sources are farm income, business income, Handwork and others. Farm income is highest when compared to income from other sources (N28,789,020). It remains the highest when compared to farm income realized by non-beneficiaries. This is followed by Livestock income (N13,409,980). Hand work, Business income and others sources respectively that account for N10,457,018 N9914, 805; and N6616,080.

Table 4.3: Assessments of diversification activities of farmers.

Activities description	Beneficiary	Non Beneficiary
Numbers of activities	5	4
Simpson's Index (SID)	0.47	0.007984

Source: Computed from field Survey data (2013)

Tables 4.2 and 4.3 above are a presentation of income and activities diversification statistics for the two farmer categories.

Examination of Table 4.2 shows that income realized by beneficiary farmers are higher comparable to non-beneficiary farmers. Also that Fadama users are involved in more (5) income generating sources than non-beneficiary farmers (4). Simpson's index of diversity (SID) for the two farmer categories is also different. Fadama beneficiaries are shown to be more diversified (0.47) than non-Fadama farmers (0.007984).

In Bauchi state, livelihood strategies and income sources of benefitting farmers was found to revolved around few extra income earning activities aside farming: such as; livestock farming, small businesses, handwork and others. The expectation by households is that been involved in additional source of generating income that is different from farming, present the likelihood of smoothening income and reducing poverty not compared to those engaged in farming as the only source of income for the household.

The Simpson's Index of Diversity (SID) of Fadama beneficiary's activities diversification (0.47) suggests a certain level of activity diversification since the index lies between 0 and 1. Thus, Fadama beneficiaries in the sampled location to a certain extent are slowly diversifying their activities away from farming to include other activities. This is based on the belief that multiple income generating activities are necessary to manage risk and meet Household consumption need.

The comparative analysis of the diversification index for the non-beneficiaries reveal equally some margin of activity diversification by non-fadama farmers. However, the index figure of 0.47 for beneficiaries is greater, and is indicative of moderate activity diversification than the index for the non-beneficiaries (0.007984) which shows low diversification activity. By implication fadama farmers are more diversified than non-fadama farmers. This is in line with the study of Afor (2011) on Fadama program in Kebbi State, the study reveals that diversification in the area of income and crop productivity by farmers in Kebbi State as a strategy to tactically avert cost and risk by farmers in the area. The outcome of the study on Bauchi State shows that Fadama activity has the impact of not only averting costs and risks but also poverty through diversifying income. This agrees with FAO (2005), that points out that irrigation development could lead to new opportunities for rural Households

5.0 Conclusion and Recommendations

The main objective of this study was to assess non farming income yielding activities of Fadama farmers in Bauchi state. The study assesses Fadama intervention activities and non-farm income yielding activities of farmers in Bauchi state and found that the program had progressively provided benefiting farmers with requisite benefits. Fadama program was found not only involved in providing diverse intervention activities in the area that help farmers towards realizing their farming potentials, but that Farmer's in the area were found engaged in diverse activities in addition to farming (4 additional non-farm income yielding activities by beneficiaries and 3non-farm-incomeyielding activities by non-beneficiaries) indicate activity diversification. The index of diversity was found to be 0.47 index of diversity for Fadama beneficiaries, which is far greater than 0.007984 for non-Fadama beneficiaries in the area. Thus, Fadama farmers are more diversified and active in non-farm income yielding activities in addition to farming than non-Fadama farmers; by this the study recommends increased Fadama assistance to farmers and massive mobilization of donor agencies towards enlarging the scheme and improving farmer's education.

References

Afor, I. E. (2011). Economic analysis of farmer's livelihood diversification strategies under the Fadama II program in Kebbi State, Nigeria. Being an MSC Thesis Submitted to the department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, A.B.U Zaria.

Asmah, E.E. (2010). Rural livelihood diversification and agricultural sector reforms in Ghana. www.case.ox.ac.uk/conferences/2011-edia/papers/5110

Awotide, O.D., Kehinde, A.L., & Agbola, P.O. (2010). Poverty and rural livelihood diversification among farming households in south west Nigeria. *Journal of Food, Agriculture and Environment, 8*(1), 367 – 371.

Asfaw, A., Simane, B., Hassen, A., & Bartider, A. (2017). Determinants of livelihood diversification: Evidence from rainfed dependent small-holder farmers in North central Ethiopia. *Woleka Sub Basin*, 22-36. https//doi.org/10.1080121665095.2017.141411.

Bila, Y., Mshellia, B., & Landi, J. H. (2015). Off-farm activities and its contribution to household income inHawul,Borno state, Nigeria. *IOSR Journal of Agriculture and Veterinary Science, 8*(10), 09 – 13.

Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*, Oxford: Oxford University Press.

FAO (2005). Aqua-stat; FAO information system on water and Agriculture. Available at http://www fao.org/document/8350e/8350009.htm

FAO (2006). Livelihood diversification and natural resources access: FAO corporate document repository.

FAO (2014). Rural livelihood diversification and natural resources; Natural resources management and environment department, FAO corporate document repository.

Gecho, Y. (2017). Rural farm households' income diversification: The case of Wolaita Zone, Southern Ethiopia. *Social Sciences, 6*(2), 45 – 56.

Ibekwe, U. C., Eze, C. C., Ohajianya, D. O., Orebiyi, J. S., Onyemauwa, C. S., & Korie, O. C. (2010). Determinants of non-Farm income among farming Households in South-Easter Nigeria. *Journal of development and Agricultural Economics, 2*(7), 49-52.

Ibidapo, I., Oso, S., & Ogundipe, M. H. (2017). The contribution of nonfarm activities in combating unemployment in Ondo east local Government area of Ondo state Nigeria. *Greener Journal of Agricultural Sciences*, 7(7), 175 – 181,

Khatun, D. & Roy, B.C. (2012). Rural livelihood diversification in west Bengal: Determinants and constraints. *Agricultural Economics Research Review*, *25*(1), 115 – 124.

Omilola, B. (2009). Estimating the impact of agricultural technology on poverty reduction in rural Nigeria. *International Food Policy Research Institute discussion paper 00901*. Pages 30.

Ojeleye O.A., Saleh M.K., & Oyewole S.O. (2017). Non-farm income and food security status of small scale farming households in Nigeria. *Research Journal of Agriculture and Forestry Sciences*, 2(12), 1 – 7.

Saha, B., & Bahal, B. (2010). Livelihood diversification pursued by farmers in West Bengel. *Indian Res, Journal Ext, Edu*., 10(2), 1 – 9.

Schwarze, S., & Zeller, M. (2005). Income diversification of rural households in Central Sulawesi, Indonesia. *Quarterly journal of international Agriculture, 44*(1), 61 – 73.

Shehu, A., & Siddique, S. F. (2014) A propensity score matching analysis of the impact of participation in non-farm enterprise activities on household wellbeing in rural Nigeria. *UMK Procedia*, 1:26–32.