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ANALYSIS OF NATURE AND EXTENT OF LIVELIHOOD DIVERSIFICATION BY OIL PALM FARMERS IN SOUTHERN EDO STATE, NIGERIA

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ABSTRACT
The study examined the nature and extent of livelihood diversification of small-scale oil-palm farming households in Edo State, Nigeria. Primary data was sourced using structured questionnaire from 120 oil palm farmers selected through multistage sampling techniques. Data were obtained on personal characteristics, livelihood activities, income, and analyzed using descriptive statistics and Simpson Index of Diversification (SID). Findings revealed that livelihood activities engaged in by oil palm farmers were cultivation of maize (26.7%), cassava (26.7%), yam (16.7%), plantain (13.3%), hunting (30.0%), processing 37.5%), collection of forest fruits (35.8%), wage employment (32.5%), trading (30.8%), and artisan trade (39.2%). The enterprises engaged in by the farmers were oil-palm only (10.8%), oil-palm–on-farm (18.3%), oil-palm-off-farm (6.7%), oil-palm-non-farm (8.3%), oil-palm-on-farm-off-farm (10%), oil-palm-on-farm-non-farm (25%), oil-palm-off-farm-non-farm (4.2%), and oil-palm-on-farm-off-farm-non-farm (16.7%). The results of SID revealed that 89.2% of the households combined oil palm with other activities with mean value of SID (0.52) implying that the farmers were highly diversified. The study concluded that oil-palm households practiced a diversified livelihood. The study recommended the need to sustain oil-palm production and the development of appropriate strategies such as farmer-friendly and effective insurance products, especially for the resource-poor rural households to facilitate successful livelihood diversification and to protect the farmers from adverse shocks.

Keywords: Diversification, Livelihood, Non-farm, Off-farm, Oil-palm, On-farm.

INTRODUCTION
Oil palm (Elaeis guineensis) is one of the most important oil crops in Nigeria. The cultivation of oil palm serves as a means of livelihood for many rural families. The oil palm have multiple economic value ranging from the fresh fruits, fronds, the leaves, the trunk and the roots which are used for several purposes such as palm oil, palm kernel oil, palm wine, broom, and palm kernel cake (PIND, 2011). Majority (about 80%) of the household in the rural areas are subsistence in nature and are characterized by complex, diverse and are risk prone. In developing country like Nigeria, the plight of the rural households are at the lowest edge where agriculture has been relegated and further worsened by flagrant diversion of agricultural intervention funds accompanied by changing socioeconomic, political, environmental and climatic atmosphere (climatic change and variability) has continue to worsen the living conditions of households especially those living in the rural areas. They are also characterized by severe drought, rainfall dependence, poor soil fertility, high population growth and small

farm land that push the rural households to diversify their livelihood strategy into non-farm income activities. Livelihood diversification is 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 standards of living and the means of gaining a living (Dilruba and Bidhan, 2016).

The context of various risks implies that farm households livelihood diversification is primarily a risk management strategy; both risk adaptation in anticipation of shocks and coping after actual shocks. However, some researchers such as Kassa (2019) and Bolier *et al.* (2018) viewed it as a general compromise made against high risk to favour low output and maximize their personal income and to guarantee smooth consumption expenditure. Farmers also need to diversify due to their inability to specialize and to get sufficient income, and also the need to make self-insurance against drought. They noted that the better off rural households do not only diversify for survival but also for enhancing better financial returns and then accumulation of wealth for a better life. In addition to this, empirical studies consistently show that diversification enables farm households to have better incomes, enhance food security, and increase agricultural production by smoothing capital constraints and help coping with environmental stresses (FAO, 2017).

However, despite the increasing global and national concerns of improving food security, the empirical evidence on the nature and extent of livelihood diversification of rural households in Edo State especially those of oil palm farmers are scanty and not well documented. Motivated by this above gap, the empirical evidence that will be generated by this study will help to fill the knowledge gap in literature. Using Edo south as a typical ecological region, this study will focus on the identification of common livelihood activities and the extent of diversification practiced by the rural households in the study area. Edo south Agricultural zone is one of the economic hub for oil palm production in Nigeria. Therefore an understanding of the livelihood activities of the oil palm farmers in the study area means that stakeholders in rural economy will have the knowledge to provide necessary advice better the life of farmers to militate against the effects of food insecurity, poverty and environmental change.

MATERIALS AND METHODS

The Study Area

The study was conducted in the lowland Rainforest and Mangrove Savanna Zones of Edo and Delta States, Nigeria. The states are two of the 36 states in the country. Edo State lies between Latitudes 5^0 44´ and 7^0 34´ N of the equator and between Longitudes 5^0 04´ and 6^0 43´ E of the Greenwich Meridian. It shares boundary to the south by Delta State, in the West by Ondo State and in the East by Kogi and Anambra States (Emokaro and Erhabor, 2006). The State covers a land area of about 17,902 km^2 with a population of 3,218,332. Edo State is divided into 18 Local Government Areas (NPC, 2006). The State is characterized by a tropical climate which ranges from humid to sub humid at different times of the year. The State has three (3) distinct vegetations namely; mangrove forest, fresh swamp and Savannah vegetation. The mean annual rainfall in the northern part ranges from 1270 mm to 1520 mm while the southern part of the State receives about 2520 mm to 2540 mm rainfall respectively. Mean temperature in the State ranges from a minimum of 24 ^{0}C to a maximum of 33^0 C. The people of the State are mostly farmers growing a variety of crops such as cassava, rice, yam, plantain, pineapple and tree crops such as rubber, oil palm and cocoa. Other occupations of the State

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include small and medium scale businesses and jobs done by artisans and civil servants who engage in farming on part time basis (Emokaro and Erhabor, 2006).

Sampling Procedure and Sample Size

A multistage sampling technique was used for this study. The first stage involves purposive selection of Edo South Agricultural Development Zones. The second stage was purposive selection of four local Government Areas (LGAs) based on the rural nature and are more agrarian. These were Ovia North East, Ovia South West, Uhunmwode and Orhionmwon LGAs, respectively, were selected. Thirdly, three farming communities were randomly selected from each LGA making a total of twelve farming communities. Lastly, sampling frame (complete list of smallholder oil palm household) was obtained from the Agricultural Development Programme in the State from which 120 households' heads were randomly selected for the study.

Method of Data Collection

Primary data were used for this study. These were collected with the aid of structured questionnaire. Accurate data on income and livelihood diversification strategies were difficult to obtain in rural area surveys. This is due to the complexity of the income concept and income sources due to the fact that it is usually considered to be a highly sensitive and confidential data (Korie, 2011). In order to overcome this problem and collect acceptable data, heads of communities were contacted with frequent visit to establish good rapport with the participating communities. This method reduced measurement errors, which could have resulted from lack of trust. Data for the study were collected for a period of 6 months (February 2018 to July 2018), so as to capture reasonable numbers of farmers. The questionnaires that were directed to the farm household heads in the study area enabled the study to determine household income diversification and food security status of the farmers over this period. Research assistants were recruited and trained to collect information on: income level, socio-economic characteristics of the farm households, economic, social and natural endowments, human capital, financial sources, income activities, transfers, farming expenses and food security.

Methods of Data Analysis

Both descriptive and inferential statistics were used to analyze the data collected from sampled households.

Livelihood Diversification Measurement (Simpson Diversification Index)

Following Ahmed (2015); Khatun *et al*. (2012); and Babatunde *et al*. (2009), Simpson index was used in this study because of its computational simplicity, robustness and wider applicability. The formula for Simpson index is given as:

$$SID = 1 - \sum_{i=1}^{N} P_i^2 \quad \ldots (1)$$

and

$$P_i = \frac{X_i}{\sum X_i} \quad \ldots (2)$$

where;

X_i = income from i^{th} livelihood, i = 1, 2,…n

Pi = income proportionate of i^{th} income source in the total income source.

SID = Simpson Index of Diversification.

N = Total number of income sources

The value of the index lies between 0 and 1. The index is zero when there is a complete specialization and approaches one as the level of diversification increases. Following Ahmed (2015), the level of livelihood diversification was classified as follows:

1. No diversification (SDI $\leq$ 0.01)
2. Low level of diversification (SDI = 0.01 - 0.25)

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3. Medium level of diversification (SDI = 0.26 - 0.50)
4. High level of diversification (SDI ≥ 0.51).

RESULTS AND DISCUSSION

Livelihood Strategies Pursued by Oil Palm Farming Households

In order for oil palm households to achieve their livelihood goals such as productive activities and investment strategies in response to the prevailing economic, environmental shocks and unequal distribution of household resources and asset. These households pursue various strategies to survive and enhance their wellbeing.

Broad categorization of these livelihood strategies in the area was done based on clustering of the sources of income that were identified in the area. Table 1 gives the breakdown of the different livelihood strategies that households pursue in the study areas. The distribution of these strategies among the rural households is as follows; 10.8% of household derived their livelihoods from oil palm only activities, 18.3% of households where involved in oil palm plus on-farm livelihood strategies, and also 6.7% of households combined oil palm plus off farm livelihood strategies while 8.3% of households combined oil palm plus nonfarm livelihood strategies. Furthermore 10.0% of households participated in oil palm plus on-farm plus off-farm livelihood strategies while majority (25.0%) of the household chooses oil palm plus on-farm plus non-farm combination strategy. Analysis also shows that only 4.2% of the sample rural household engaged in oil palm plus off farm plus non-farm combination choice strategy and about 16.7% of the household engaged in Oil palm plus on-farm plus off-farm plus non-farm income producing livelihood strategies.

Table 1: Distribution of Household by Livelihood Strategy

Livelihood strategies	Frequency	Percentage
Oil palm only	13	10.8
Oil palm and on-farm	22	18.3
Oil palm and off-farm	8	6.7
Oil palm and non-farm	10	8.3
Oil palm, on-farm and off-farm	12	10
Oil palm, on-farm and non-farm	30	25
Oil palm, off farm and non-farm	5	4.2
Oil palm, on-farm, off-farm and non-farm	20	16.7
Total	**120**	**100**

Source: Field survey, 2018

On-Farm Activities of Oil Palm Farmers

According to Ellis (2000), a simple approach which delineates household into different sector was done by categorizing households who followed similar sector into agriculture (oil palm and on-farm), non-farm and off-farm activities. Oil palm activity focuses on activity relating to oil palm production. On-farm activities focused on both crop production and animal husbandry activities which took place inside their own farm. Table 2 presents information on different crops and livestock activities carried out by oil palm farmers in the study area. Analysis shows that 26.7% of the farmers planted cassava, 16.7% planted yam, 26.7% were also maize farmers, 9.2% planted cocoyam, 1.7% planted rice, 9.2% were involved in melon farms, 4.2% planted cocoa, 3.3% have pear farm, 4.2% were involved in coconut farm, 2.5% had citrus farm, and 13.3% were involved in plantain/banana farm, whereas 6.7% planted

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vegetables. Animal production such as poultry (6.7%), goat/sheep (5.8%), beekeeping and fishing (3.3%) was also practice by the oil palm farmers in the area.

Table 2: On-Farm Livelihood Activities of Oil Palm Farmers (n = 120)

On-farm livelihood activities	Frequency*	Percentage
Cassava	32	26.7
Yam	20	16.7
Maize	32	26.7
Cocoyam	11	9.2
Rice	2	1.7
Melon	11	9.2
Cocoa	5	4.2
Pear	4	3.3
Orange	3	2.5
Coconut	5	4.2
Plantain/Banana	16	13.3
Vegetables	8	6.7
Poultry	8	6.7
Goat/sheep	7	5.8
Beekeeping/fish farming	4	3.3
Total	**168**	

*Multiple responses existed
Source: Field survey, 2018

Off-farm Activities of Oil Palm Farmers

Off-farm activities of the farmers were agricultural activities that took place outside their own farm. The survey result in Table 3 revealed the presence of off-farm livelihood activities among the oil palm farmers. Processing was the most common off-farm activities observed among the oil palm farmers in the area. 37.5% of the farmers participate in agricultural processing and these activities include palm wine production, local gin production and oil milling activities. Another important off-farm activity in the area was wild fruits and herb collection and about 35.8% were involved while about 30.0% of the oil palm farmers were engaged in hunting activities. Only 15.8% were involved in firewood/charcoal production while 11.7% of the small-scale farmers undertake sale off farm labour in the area.

Table 3: Off-farm Livelihood Activities of Oil Palm Farmers (n = 120)

Off-farm livelihood activities	Frequency*	Percentage
Fire wood/charcoal	19	15.8
Wild fruits and herbs	43	35.8
Labour sales	14	11.7
Processing (local gin, palm wine, milling)	45	37.5
Hunting (using trap and firearm)	36	30.0
Total	**206**	

*Multiple responses existed
Source: Field survey, 2018

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Non-farm Activities of Oil Palm Farmers

Non-farm activities of the farmers were activities that took place outside the agricultural sector. Some of the respondents in this study pursue at least one type of non-farm livelihood activities to supplement their oil palm income. Table 4 presents information on the types of non-farm activities undertaken by the farmers in the study area. Handicraft activity was the most frequently stated non-agricultural livelihood activity of the oil palm households. Result indicates that 39.2% of the non-farm activities are derived from handicraft activities which include carpentry, tailoring, barber, bricklaying, driving, and mechanics. Another most common non-farm activity is wage employment which accounted for about 32.5%. Of the total non-farm livelihood activities and these were respondents working in construction sites, government offices, non-governmental organization, and multi-nationals such as oil servicing firm.

Table 4: Non-farm Livelihood Activities of Oil Palm Farmers (n = 120)

Non-farm livelihood activities	**Frequency***	**Percentage**
Trading (retailing, wholesale shops)	37	30.8
Money lender (village money lender)	6	5.0
Artisans (carpentry, tailoring, bricklaying and barber	47	39.2
Traditional healing practice	7	5.8
Wage employment(government office, NGOs, multinational)	39	32.5
Renting properties (land, houses in rural and urban area.)	14	11.7
Remittances/pension	31	25.8
Total	**181**	

*Multiple responses existed
Source: Field survey, 2018

Further to Table 4, 30.8% of the households were involved in trading livelihood. In most villages visited running small shops was common. Some of the oil palm farmers purchase goods such as spare parts, plastics, cloth from the city and sell them in the villages. Some others were involved in sales of kerosene and fuel while some took parts in sales of building materials. Income from remittance/pension accounted for about 25.8% of the total non-farm income. The main remitters were children living in town and outside the country. Other non- farm activities include; renting of properties such as land and houses (11.7%). Some of the oil palm farmers does this to supplement their financial needs by renting out their houses in urban and rural area and they also lease out some of their land for cash though this undermine their crop production. About 5.8% of the non-farm activities were based on traditional healing practice while 5.0% participate in money lending business to generate income for the households.

Nature of Household livelihood Diversification

The study followed the same methodology used by several studies that used the Simpson index to measure the pattern of livelihood diversification (Ahmed, 2015; Shaha and Bahal, 2010; and Babatunde *et al.*, 2009). Analysis of the result shows that majority of the rural households diversified their livelihoods into several income sources and earned significant amount of income from each source as summarized in Table 5. The result showed that 10.8% of the respondents did not diversify. This implies that these farmers got all their income (100% income) contributed from a single source. Analysis of the result also showed that about 3.3%

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of the households had index score of between 0.02-0.25. This means that farmers in this category belong to low levels of livelihood diversification indicating that about 75% of household income is contributed by a single source. Analysis also shown that 24.2% of the sampled household were moderately diversify meaning that these households had an index score of 0.26-0.50 indicating that up to 50% of households income came from a diversified income sources while majority (61.7%) of the households were highly diversified with index score of 0.51 and above indicating that these household income sources are almost evenly spread. This result shows that most of the smallholder oil palm farming did not depend on oil palm farming alone because of risk associated with market price fluctuation, drought, excessive rainfall, fire, climate change, etc.; this strategy is adopted to ensure secured livelihood. In all, about 89.2% of the households in the study area diversified their livelihood activities. This finding agreed with that of Ahmed (2015) who found that rural farming household does not make a living from a single livelihood activity and is also in line with finding of Ellis (2000) for most sub-Saharan African countries.

Table 5: Distribution of Households by level of Diversification

SDI Range	Number of household	Percentage	Level of diversification
≤0.01	13	10.8	No diversification
0.02−0.25	4	3.3	Low
0.26 −0.50	29	24.2	Moderately
≥0.51	74	61.7	Highly
Total	120	100	

Source: Field data, 2018

Analysis of Extent of Diversification along the Livelihood Strategies

Table 6 present result of the extent of diversification along the various livelihood strategies of the oil palm farming households. The diversification index scores varies from 0.00 (oil palm only choice) and 0.69 (oil palm plus on-farm plus off-farm plus nonfarm choice). A breakdown of the statistics along the livelihood strategies shows that oil palm, on-farm, off-farm and non-farm choice combination strategy have the highest mean diversification index score of 0.69 with a standard deviation of 0.08. This implies that there is very high extent of income diversification among households within this group. The result in the table also shows that average value of Simpson diversification index score for all the household was 0.52 which belong to the high level category of livelihood diversification index. This result indicates that oil palm farmers in the study area on the average are highly diversified in their livelihoods activities.

Table 6: Extent of Diversification across Livelihood Strategies

Livelihood strategies	No. of household	Average SDI	Std. Dev.	Min.	Max.
Oil palm only	13	0.00	0.00	0.00	0.00
Oilpalm plus on-farm	22	0.53	0.14	0.14	0.73
Oil palm plus off-farm	8	0.41	0.08	0.21	0.50
Oil palm plus non-farm	10	0.39	0.13	0.04	0.50
Oil palm plus on-farm plus off-farm	12	0.60	0.11	0.31	0.75
Oil palm plus on-farm plus non-farm	30	0.62	0.10	0.19	0.75
Oil palm plus off-farm plus non-farm	5	0.53	0.13	0.20	0.66
Oil palm plus on-farm plus off-farm plus non-farm	20	0.69	0.08	0.40	0.80
Total	120	0.52	0.23	0.00	0.80

Source: Field data, 2018

CONCLUSION AND RECOMMENDATIONS

The study has shown that oil palm activity is not the sole source of livelihood that oil palm farmers use to generate income and the number of households who derive their livelihoods from non-farm sector is increasing. Among different livelihood groups, the level of diversification is highest for oil palm plus on-farm plus off-farm plus non-farm. In general, the livelihood is less diversified for the oil palm plus non-farm groups in the study area. The government should develop appropriate strategies, especially for the resource-poor rural households to facilitate successful livelihood diversification and farmer-friendly and effective insurance products should be developed to protect the farmers from adverse shocks.

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