COSIT, TASUED
Journal of Science and Information Technology (JOSIT)

Determinant of Livelihood Diversification among Crop Farmers in Ondo State Southwest, Nigeria

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Abstract

Livelihood diversification is a vital strategy for enhancing rural household income and reducing poverty. This study investigates the determinants of livelihood diversification among crop farmers in Ondo State. Primary data were obtained from the respondents with the aid of structured questionnaire. A multistage sampling technique was employed to obtain information from 287 respondents. The data collected were analysed with descriptive statistics and Multivariate Probit Regression (MPR) was used to identify factors that made the farmers to diversify their livelihood. The findings revealed that the farmers diversified into livestock rearing, diversified into fisheries and aquaculture, agroforestry and non-agricultural venture. It revealed further that older farmers tend not diversify their livelihood activities compare to younger farmers. The higher the educational level of the respondents the more they are likely to diversify; household with high income from crop enables farmers to invest in alternative livelihoods; limited land availability made the farmers to diversify to other activities, Seasonal income from crop farm also influence the farmers to diversify into other activities. Based on the findings of this study, farmers should source for credit through cooperative society or obtain loan from microfinance institutions at low-interest. Land should be made available to youths to encourage them to embark in crop production.

Keywords: Determinants, Livelihood, Diversification, Crop, Framers

INTRODUCTION

The basis for human existence cannot be devoid of the consumption of crop and animal products. This has made every nation worldwide to pay attention to agriculture sector in the economy. Agricultural production mostly takes place in the rural areas making it a rural-based sector of the economy. Nigeria is agrarian nation where over 70% of the nation's population depend on agriculture for a living which over the years due to its crude and sedentary nature has failed to generate the required income for the farming households (Etuk et al., 2018).

Agricultural production in Nigeria is confronted with risks and uncertainties, such as flood, draught, epidemics, fluctuation of input and output prices, pilferages, climate change, poor storage facilities, poor road networks, , lack of modern processing techniques, natural disasters, government policies, unpredicted quantity of outputs due to inadequate use of improved inputs etc. This have resulted to exposing farming households to low income, poverty, poor standard of living and high insecurity of food level. Farming households who are involved in crops and livestock production therefore sought for means of escape from vulnerabilities in agriculture by inclining to diversification of their activities (John et al., 2020 and Chinalurum et al., 2024). According to Ahmad & Afzal, 2020 agriculture is susceptible to the effect of numerous nature-induced risks such as flooding, erosions, droughts and damage of embankment. This have resulted to various degrees of losses. In

Cited as:

Akinsulu, A.A.; Ajijola, S.; Opeifa, D.A.; Adeokun, A.A.. (2024). Determinant of Livelihood Diversification among Crop Farmers in Ondo State Southwest, Nigeria. *Journal of Science and Information Technology (JOSIT)*, Vol. 18 No. 2, pp. 250-259.

order to mitigate these losses farming households diversify their sources of livelihood. This comprises Other non-farm activities include mining, petty trade, utilities, manufacturing, transportation, construction, commerce, carpentry, and government works; on-farm activities include planting drought-tolerant crops and practicing mixed farming; and non-farm activities include income-generating activities that occur outside the farm, such as all wage or exchange labor on other farming activities; payments for labor, such as through the distribution of goods during harvest and contract labor without wage; and diversification strategies (Gautam and Andersen, 2016; Kabir et al., 2017 and Andualem and Umer 2023).

The consequences that arise from unexpected tremors and unexpected natural disaster in agriculture hve driven farming households toward alternative methods of generating income (Afodu et al., 2019). The rural households in Sub-Saharan African (SSA) countries usually have to adjust with income variability and poverty to move from subsistence agriculture to commercial agriculture because of the non-farm and farm opportunities and available resources for farming activities can be acquired (Coster et al., 2021).

One of the strategies of the households is to employed diversification of income sources to ensure higher level of income and minimize households' income variability (Dev et al., 2016). Farmers sourced their livelihood in through various aspects from the farming activities, off-farm, and non-farm activities, which together provides strategies for improving the living standards of the rural farmers. Livelihood diversification plays a decisive role for the reduction of poverty, food insecurity and to improve the welfare of rural communities (Abera et al., 2021).

The process by which rural households have embraced a range of pursuits and social support networks in their struggle for survival and an increase in their income and standard of living is known as livelihood diversification (Gebru, 2018). Through constant adjustments to a wide range of operations and businesses, farmers employ diversification to reduce the variability of household income, mitigate the effects of weather, and create additional revenue. (Loison et al, 2016) reported that the motivating forces of diversification include the reduction of income risks through missing market insurance; increasing income generation as the needed resources for the main activities are too scarce to provide the means of living sufficiently; exploiting positive interactions and strategic complementarities between various activities; and in the face of credit failures, to earn cash income and financial investment.

According to (Ilo, 2020) in Nigeria, as a way of avoiding risk from agricultural disasters or failure, farming households employed diversification or engage in other activities for revenue generation. Some households engaged in civil service jobs and non-farm activities like crafts, tailoring, and skills like barbing, bag weaving, weaving of hair, and repair of motorcycles while others moved into agricultural sectors or farming activities. Ilo, (2020), opined that most of the farmers are small scale holders who produce on a level only to feed the families and often do not get enough income from crop farm alone. Some rural farming households diversify into various non-farm and off-farm activities. Therefore, this study grouped the area of diversification of the crop farmers into the following: Livestock Rearing, Fisheries and Aquaculture, Agroforestry and Non-Agricultural Ventures. With the aim of investigating those factors that influenced crop farmers to diversify their means of livelihood, the study focused on the following:

1. To describe the socioeconomics characteristics of the farmers.
2. To identify various area of diversification of the farmer. To identify the socio-economic factors influencing crops diversification among rural farmers in Ondo State

METHODOLOGY

Study Area

This study was conducted in Nigeria's southwest, Ondo State. The state is bordered to the north by Osun and Ogun States, to the south by the Atlantic Ocean, and to the east by Edo and Delta States, to the west by Oyo and Ogun States, and to the north by Kogi, Kwara, and Ekiti States. With a high relative humidity of 77.1%, the year-round temperature ranges from 210 to 290 degrees Celsius. The vegetation in the state's high forest zone is lush. With a land area of 15,500 km2 (6,000 sq miles) and a population of 3,640,877, it is located between

latitudes 5045′ and 8015′ N and longitudes 4045′ and 60 E of the Greenwich meridian (National Population census, 2006). It has 18 Local Government Areas divided into four Agricultural Development Zones which are Ondo, Ikare, Owo and Okitipupa. Each Local Government Area (LGA) is divided into 8 cells, thus amounting to 144 cells in the state. Arable crops such as yam, maize, melon, cocoyam, cassava, plantain, with tree crops such as cocoa, oil palm, kola are also cultivated in this state.

Sampling Technique

The use of multistage sampling technique was employed to get number of farmers. Firstly, Ondo State was purposefully selected as representative of the crop farmers in Southwest Nigeria. Secondly, the list of Local Government Areas that are noted for crop production were obtained from the agricultural extension officers in the state and six LGA that were noted for crop production were randomly selected in the state. Thirdly, five communities were selected from each LGA and at the fourth stage, ten (10) households were randomly selected from each selected community, this gave a total of 300 respondents. Data was obtained with the aid of well-structured questionnaire from the respondents. However, data obtained from 287 respondents that gave valid information were used for the analysis.

Data obtained were analysed using descriptive statistics (percentages) to describe the socio-economic characteristics of the respondents. Mulltivariate Probit Regression (MPR) was used to identify those factors that influenced crop farmers to diversify their activities. Multivariate Probit Regression is chosen as the appropriate model to analyze the categorical outcome variable, representing different types of livelihood diversification strategies adopted by rural farmers in the study area. Multinomial Logit (MNL) or Multivariate Probit (MVP) regression models are more appropriate when there are more than two alternatives. The MNL is popularly used to determine livelihood diversification studies but it does not account for influences that lead a household to decide and use livelihood strategies simultaneously, instead it clusters the categories of livelihood strategies. MNL also follow the assumptions that if a household has been clustered in a given category, it does not participate in another category.

The factors that influence a person's decision to diversify their source of income can be examined using a Multivariate Probit (MVP) model. The MVP model is a correlated binary response regression model that allows the error terms to freely correlate and estimates the effect of independent variables on several dependent variables simultaneously (Greene, 2012). Alternative livelihood strategies are used effectively when they are independent of one another. The options for livelihood diversification are not dependent on one another because rural households are willing to select several strategies at the same time. Therefore, MVP was used to examine the factors that affect farmers in the study area diversification sustainable livelihoods of rural 7 (National Population census, 2006). The household of an i^{th} crop farmer (i = 1, 2,..... N) is faced with a decision regarding the selection of available livelihood strategies. Let U0 be the household's utility from selecting a crop farm, and Uk be the household's utility from selecting the K^{th} livelihood strategy, where K is any alternative strategy. Which one is more useful is revealed by the observed choice between the two. Therefore, if $U_k > U_o$, the household chooses the Kth livelihood strategy.

$Y\_ik^* = X\_i\ \beta\_k + \varepsilon\_i$.....(1) is the formula for the net benefit latent regression model, where Yik^* is the unobserved variable that represents the latent utility of selecting strategy k.

When choosing a livelihood strategy, Xi is a vector of observed characteristics.
β = denotes an unknown vector, and ε is a vector of error terms.

The utility Yik^* that the household derives from choosing a livelihood strategy is a latent variable determined by observed explanatory variables (X) and the error term (ε):

$$Y_{ik} = \begin{cases} 1\ if\ Y_{ik} > 0 \\ 0\ otherwise \end{cases} \text{.....(2)}$$

Yik^* is an unobservable latent variable that indicates the likelihood that a person will select k different livelihood strategies. The following is a specification for the model:

$$\begin{aligned} Y_{i1} &= \beta_1 X_i + \varepsilon_{i1} \\ Y_{i2} &= \beta_2 X_i + \varepsilon_{i2} \\ Y_{i3} &= \beta_3 X_i + \varepsilon_{i3} \\ Y_{i4} &= \beta_4 X_i + \varepsilon_{i4} \text{.....(3)} \end{aligned}$$

where, Y_{i1} = 1, if household choose livestock (0 otherwise), Y_{i2} = 1, if households choose fisheries and Aquaculture (0 otherwise), Yi3 = 1, if farmer chooses Agroforestry (0 otherwise), Yi4 = 1, for non-farm ventures (0 otherwise). Xi = vector of factors influencing the choice of livelihood strategy, β is a vector of unknown parameters and εi is the error term.

$$Y = f(X_1 + X_2 + X_3 \dots \dots X_n)$$
$$(P(Y = j|X) = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} \cdots\cdots\cdots\cdots\cdots\cdots \quad (4)$$

where;
Y = Areas for Diversification (Livestock Rearing, Fisheries and Aquaculture, Agroforestry and Non-Agricultural Ventures)
X_1 =Age (years)
X_2 = Gender (male =1, Female =0)
X_3 = Level of education (None = 0, Primary =1, Secondary =2, Tertiary = 3)
X_4 = Household size (Number 1, 2, 3, ……*N*)
X_5 = Monthly farm income (₦)
X_6 = Farming experience (years)
X_7 = Limited land (Dummy: limited = 1 unlimited = 0)
X_8 = Unreliable or seasonal income (Dummy 1 = limited, unlimited = 0)
X_9 = Increase in price of goods and services (Dummy 1 = limited, unlimited = 0)
X_{10} = Climate change (Experience climate change = 1, Otherwise = 0)
X_{11} = Access to new markets (Yes = 1, non-access = 0)
X_{12}= Urbanization and migration (Migration = 1, Otherwise = 0)
β_o= is the intercept term.
B_1, β_2, ……, β_{12} are the estimated coefficients.

The odds ratios associated with these coefficients provide insights into the relative likelihood of adopting each diversification strategy compared to a reference category, adjusting for the effects of other predictors. This model specification allows for the examination of how various factors influences the crop farmers' decisions regarding different livelihood diversification strategies, providing valuable insights for rural development policies and interventions.

RESULT AND DISCUSSIONS

The results in Table 1 shows the socio-economic distribution of the respondents. It revealed that 38.48% of the rural farmers were within 31-40 years, with mean age of 43 years, this shows that most of the rural farmers were still young and within their productive age. The majority (67.94%) of the farmers were male while 32.06% were female. This implies that both male and female were actively involved in crop farming in the study area. The majority (72.13%) of the farmers were married, ten percent (10.45%) were single, 6.97% were divorced, 10.45% were widowed. This implies that majority of crop farmers in the study were married, the financial demand of the family may influence them to diversify into various sources of income.

The result revealed further that 3.48% did not had formal education, 24.04% had primary education, 48.78% had secondary education while 23.70% had tertiary education. This implies that majority of the farmers had formal education at different levels and this might have a significant impact on their exposure to diversify their livelihood source.

The distribution of the respondents based on household revealed that 26.13%, 16.38% and 57.38% of the respondent farmers had 1-3, 4-6 and 7-9 persons in their households respectively with mean of 7 persons per household, which indicates that majority of the farmers have large household size.

The average monthly income realized from crop farming household in the study area is ₦62,000. This low income may influence the farmers to diversify their income source.

Considering the farm size of the farmers, 28.02% cultivated less than one hectare of land, 55.05% cultivated between 1.01-2.00 hectares of farmland and 16.03% cultivated between 2.01-3.00 hectares of farmland. The average area of farmland cultivated is 1.62 hectares which is an indication that the farmers embark on small scale production. This may lead to low income from crop farm which militated them to source income from other investment.

The average farming experience is 20 years which is an indication that most of the crop farmers have several years of experience about their crop farming.

Table 1. Socioeconomic characteristics of the farmers.

Variable	Frequency	Percentage	Mean	Standard deviation
Age (Years)				
≤30	10	3.48	43	7.14
31-40	75	26.13		
41-50	91	31.71		
51-60	72	25.08		
61-70	30	10.45		
>70	9	3.15		
Total	287	100.00		
Gender				
Male	195	67.94		
Female	92	32.06		
Total	287	100.00		
Marital status				
Single	30	10.45		
Married	207	72.13		
Divorced	20	6.97		
Widowed	30	10.45		
Total	287	100.00		
Level of education				
None	10	3.48		
Primary	69	24.04		
Secondary	140	48.78		
Tertiary	68	23.70		
Total	287	100.00		
Household size (No of persons)				
1-3	75	26.13	7	1.34
4-6	47	16.38		
7-9	165	57.49		
Total	287	100.00		
Household monthly income from crop (Naira)				
<50,000	15	5.23	62,000	12821.20
50,001 – 100,000	85	29.62		
100,001-150,000	125	43.55		
>150,000	62	21.60		
Total	287	100.00		
Land holding (Hectare)				
<1	83	28.92	1. 62	0.67
1.01-2.00	158	55.05		
2.01-3.00	46	16.03		
Total	287	100.00		
Farming experience (Years)				
1-10	30	10.45	20	5.58
11-20	158	55.05		
21-30	49	17.07		
Above 30	50	17.42		
Total	287	100.00		

Source: Field Survey, 2024.

Areas of Diversification of Farmers

Table 2 shows the result of areas of diversification of the crop farmers. The result shows that 15.8% of the crop farmers diversified into livestock rearing only, 8.71% diversified into fisheries and aquaculture, while 6.97% diversified into agroforestry, 5.92% diversified into non-agricultural venture. Also 6.62% diversified into livestock rearing, fisheries and aquaculture, 10.45% diversified into livestock rearing and agroforestry. 6.97% diversified into livestock rearing and non-agriculture venture. 4.87% diversified into livestock rearing, fisheries and aquaculture and agroforestry; 2.79% diversified into livestock rearing, fisheries and aquaculture and non-agricultural venture, also 4.18% of the farmers diversified into livestock rearing, agroforestry and non-agricultural venture only, while 5.23% diversified fisheries and aquaculture and agroforestry, 10.45% of the farmers also diversified into fisheries and aquaculture, agroforestry and non-agricultural venture. 3.48% diversified into fisheries, aquaculture, agroforestry and non-agricultural venture, 4.18% diversified into agroforestry and non-agricultural venture. Finally, 3.48% of the farmers diversified into livestock rearing, fisheries and aquaculture, agroforestry and non-agricultural venture. This finding demonstrated that the vast majority of crop farmers in the research region made a living through other pursuits. This outcome is consistent with research by a number of authors, including Abera et al. (2021), which finds that the agricultural sector by itself cannot be relied upon as the primary activity for rural households and as a way to improve livelihoods, reduce poverty, and achieve food security. In Oyo State, Nigeria, Coster et al. (2021) also discover that farmers engage in a variety of revenue-generating activities among rural farming households.

Table 2. Distribution of farmers according to their area of diversification.

Variable	Frequency	Percentage
Livestock Rearing only	45	15.68
Fisheries and Aquaculture only	25	8.71
Agroforestry	20	6.97
Non-Agricultural Ventures	17	5.92
Livestock rearing, Fisheries and Aquaculture	19	6.62
Livestock rearing and agroforestry	30	10.45
Livestock rearing and non-agriculture venture	20	6.97
Livestock rearing, Fisheries and Aquaculture and agroforestry	14	4.87
Livestock rearing, Fisheries and Aquaculture and Non-Agricultural venture	8	2.79
Livestock rearing, agroforestry and Non-Agricultural venture	12	4.18
Fisheries and Aquaculture and Agroforestry	15	5.23
Fisheries and Aquaculture and Non-Agricultural Venture	30	10.45
Fisheries and Aquaculture, Agroforestry and Non-Agricultural venture	10	3.48
Agroforestry and Non-Agricultural venture	12	4.18
Livestock rearing, Fisheries and Aquaculture, Agroforestry and Non-Agricultural venture	10	3.48
Total	287	100

Source: Field Survey, 2024.

Factors Influencing Willingness to Diversify

The results in Table 3 shows factors influencing crop farmer's decision to diversify their means of livelihood. The diagnostic statistics (Wald chi2 and Prob> chi2) of the Multivariate Probit (MVP) regression model shows that the model is fit and significant at 1% probability level. The result shows that age is significant at ($p<0.05$) and inversely related diversification of farmers into livestock and fisheries and aquaculture. This implied that the older farmers the lower the likelihood of diversifying into livestock rearing and fisheries and aquaculture. This shows that youths were more engaged in livestock and fisheries and aquaculture, this may be due to high energy required in various activities in these enterprises, because youths are energetic than older farmers.

The coefficient of gender is significant at ($p<0.1$) and negatively related to diversification of the respondents. It reveals that females are more likely to diversify into rearing of livestock compared to males. This implies that female farmers diversify into rearing of livestock than their female counterparts.

According to the coefficient of educational attainment, diversification into non-agricultural endeavors is more likely the more educated one is. This suggests that compared to farmers who lack education, educated farmers are more likely to diversify into non-agricultural pursuits. Additionally, literate farmers are better at making decisions that will boost their productive income, which is why they diversify into off-farm or non-farm pursuits to make extra cash. This may be because the majority of highly educated farmers work in positions that pay salaries. in addition to growing crops. This study supports the findings of Coster (2021).

The likelihood of diversifying into agroforestry and non-agricultural ventures increases with monthly income, according to the coefficient of monthly income ($p<0.01$). This implies that rich farmers are more likely to diversify to both agroforestry and non-agricultural ventures than poor farmers. This may stem from the fact that the higher income realized may be enough to cater for the family.

The availability of limited land ($p<0.01$) shows that the higher the limited land opportunities the higher the likelihood of the farmers to diversify into livestock rearing and fisheries and aquaculture. This implies that farmers faced with challenges of limited land are more likely to diversify to livestock rearing and fisheries and aquaculture. This is due to the fact that livestock production requires smaller land size than crop farm.

Increase in price of goods and services ($p<0.01$) will likely result to diversification to non-agricultural ventures. This implies that farmers faced with increased price of food items are more likely to diversify to non-agricultural ventures to increase their income stream. This may result from high cost of goods and services as the money realized from crop farm alone will not be able to cater for the family needs

The coefficient of seasonal income reveals that there is likelihood of the farmers to diversify to livestock rearing and agroforestry. This could arise because the farmers would realize some income from sales of livestock and agro-forest products such as firewood, searching for snail, wild fruits and others when the crops are yet to mature for harvesting.

Many farmers that live in urban and peri-urban have greater tendency to diversify into livestock rearing. This may be due to limited land availability and higher demand for livestock in urban areas.

Table 3. MVP results of factors influencing diversification among crop farmers in Ondo State, Nigeria.

	Livestock Rearing		**Fisheries and Aquaculture**		**Agroforestry**		**Non-Agricultural Ventures**	
Variable	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**
Age	-0.048**	0.043	-0.065*	0.005	-0.006	0.795	0.007	0.751
Gender	-0.524*	0.093	0.091	0.760	0.427	0.173	0.205	0.483
Level of education	-0.150	0.395	-0.033	0.843	-0.246	0.191	0.385**	0.035
Household Size	0.003	0.976	-0.114	0.308	0.138	0.270	0.061	0.585
Monthly income	0.001	0.478	0.001	0.297	0.001***	0.000	0.001***	0.000
Farming experience	0.012	0.900	0.040	0.671	-0.111	0.263	0.062	0.486
Limited land	0.986***	0.003	0.978***	0.004	-0.398	0.224	0.052	0.868
Increase in price of goods and services	-1.204	0.228	-1.372	0.179	-4.063	0.981	3.990***	0.000
Climate change	0.331	0.367	0.295	0.412	-0.275	0.479	-0.503	0.162
Access to new markets	0.325	0.474	0.350	0.439	-0.181	0.677	-0.107	0.793
Seasonal income	0.855**	0.031	0.632	0.107	0.259**	0.043	-0.035	0.924
Urbanization and migration	-1.321**	0.013	-0.829	0.117	0.271	0.599	0.005	0.992
Constant	1.496	0.240	2.729**	0.027	0.366	0.783	-0.876	0.493
Diagnostic statistics								
Wald chi2(68)	84.39***							
Prob > chi^2	0.000***							

Source: Field Survey, 2024 ***, ** and * means significant at 1%, 5% and 10% respectively.

CONCLUSION

Nigeria is a nation that did not have stable financial equilibrium, these have made many farmers to adopted diversification strategies to meet up with the trend. These include engaging in non-farm activities such as trading and craftsmanship or combining multiple agricultural ventures to enhance their income and economic resilience. According to the study's findings, the average age and amount of farming experience are 43 and 20 years, respectively. Of the farmers, 67.94% were men, and 72.13% were married. Seven is the average size of a household. Mean monthly income of ₦62,000 and farmland of 1.62 hectares.

Based on the findings of this study, farmers should increase their farm size for increase in income, some government reserves that are arable land should be allocated to interested farmers and organized market of agricultural produce should be should be established in each local government area in the state.

REFERENCES

Abera, A., Yirgu, T. and Uncha, A. (2021). Determinants of rural livelihood diversification strategies among Chewaka communities resettlers of southwestern Ethiopia. Agric & Food Secur 10:30.

Afodu, O. J., Afolami, C. A., Akinboye, O. and Ndubuisi-ogbonna,L (2019). Livelihood diversification and its determinants on rice farming households in Ogun State, Nigeria. African Journal of Agricultural Research 14(35):2104-2111.

Ahmad, D., & Afzal, M. (2020). Flood hazards and factors influencing household food perception and mitigation strategies in Pakistan. Environmental Science and Pollution Research, 27(13), 15375–15387.

Andualem, K. & Umer, A. (2023). Determinants of rural households' livelihood diversification strategies: In the case of north Wollo zone, Amhara National Regional State, Ethiopia, Cogent Economics & Finance, 11:1, 2185347, DOI: 10.1080/23322039.2023.2185347.

Chinalurum, C. A., Ojoko, E. A. and Junaidu, M. (2024). Determinants of livelihood diversification among farming households in Nigeria. Journal of Agripreneurship and Sustainable Development (Jasd),7(2), 78 – 85.

Coster, A. S., Balogun, O.L. & Adekoya, M.I. (2021). Determinants of diversification of income source among rural farming households in Oyo State, Nigeria. Ife Journal of Agriculture, 33, (2).

Dev, T., Sultana, N. and Hossain, Md. E. (2016). Analysis of the Impact of Income Diversification Strategies on Food Security Status of Rural Households in Bangladesh: A Case Study of Rajshahi District. American Journal of Theoretical and Applied Business, 2(4), 46-56.

Etuk, E.A., Udoe, P.O. and Okon, I.I. (2018). Determinants of livelihood diversification among farm households in Akamkpa Local Government Area, Cross River State, Nigeria. Agrosearch (2018) 18 (2): 101 – 112.

Gautam, Y., & Andersen, P. (2016). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. Journal of Rural Studies, 44, 239–249. https://doi.org/10.1016/j.jrurstud.2016.02.001.

Gebru, W. G., Ichoku, H. E. and Eze, O. P. (2018). Choices and implications of livelihood diversification strategies on smallholder farmers' income in Saesietsaeda Emba District, Eastern Tigray Region of Ethiopia.

Greene, W. H. (2012). Bivariate and multivariate Probit model. Econometric analysis. Seventh edition. Prentice-Hall. 77- 799.

International Labour Organistion (ILO) (2020). Covid-19: Stimulating the ecnomy and labour Demand. Retrieved from http;//www.ilo.org/globl/labour theilo/newroom/news/WCMS_740893/lang—en/index.htm.

John, A. O., Afolake, A. C. and Lawrence, B. O. (2020). Effect of livelihood diversification and technology adoption on food security status of rice farming households in Ogun State Nigeria, Agricultural Socio-Economics Journal, 20(3):23-244. DOI:http://dx.doi.org/10.21776/ub.agrise.2020.020.3.7

Kabir, M. J., Cramb, R., Alauddin, M., Roth, C., & Crimp, S. (2017). Farmers' perceptions of and responses to environmental change in southwest coastal Bangladesh. Asia Pacific Viewpoint, 58(3), 362–378. https://doi.org/10.1111/apv.12165.

Loison, S. A., & Loison, S. A. (2016). Rural livelihood diversification in Sub-Saharan Africa: A literature review rural livelihood diversification in Sub-Saharan Africa: A literature review.

National Bureau of Statistics (2022). Ondo State Population statistics