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Socioeconomic Factors Affecting Adoption of Innovation by Small-Scale Oil Palm Farmers in Nsukka Agricultural Zone of Enugu State, Nigeria

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ABSTRACT

The study analyzed the socioeconomic factors affecting adoption of innovation by small–scale oil palm farmers in Nsukka agricultural zone of Enugu State, Nigeria. Data were collected with the aid of validated and structured questionnaire administered to 180 randomly selected small-scale oil palm farmers based on their socioeconomic characteristics, adoption of improved technology in oil-palm production and constraints to adoption of improved technologies in oil-palm production. Data were analyzed using percentages, frequency tables, mean scores and ordinary least square (OLS) regression technique. The result showed that the farmers were mostly low income earners, aged, male dominated and with farm holdings less than one hectare. There were high adoption rates of organic fertilizer, weed control by cover crops and harvesting with matchet. On the other hand, adoption of inorganic fertilizer, chemical pest, weed control and use of hybrid oil palm seedlings were low. Constraints to adoption included; poor extension contact, poor access to land, scarcity of farm inputs and unawareness of technologies with mean values of 2.89, 2.74, 2.59 and 2.55 respectively. Similarly, lack of planting materials and access to fund with mean values of 2.19 and 2.43 respectively were not constraints to adoption of improved technologies. The study thus recommended for attention to be paid towards educating the local people on the importance of using improved or hybrid seedlings and making lands available to farmers.

Keywords: adoption, oil-palm, small-scale, farmers, Nsukka

1. Introduction

Agricultural development is one of the most powerful tools to end extreme poverty, boost prosperity and feed the entire world. Agriculture is very crucial to economic growth. It accounts for 22.35% of gross domestic product (GDP) in Nigeria (FAO, 2021). A number of studies have indicated that agricultural production in Nigeria is still characterized by small farm holders (Obinyan, 2000; Taiwo *et al.,* (2015). The socioeconomic characteristics of the small farm holders have crucial influence on agricultural production. Food production could be affected by the farmers' age, access to credit, gender, farm size, educational level and farming experience (Onoh *et al.,* 2020).

Oil-palm is one of the world's most important oil crops. It is cultivated throughout the tropical belts of Africa, Asia and Latin America. It is widely traded internationally (Byerlee *et al.,* 2017). It can produce more vegetable oil per unit of land than any other crop. As a result of this comparative advantage, oil palm is commonly used for direct human consumption as biofuel and as an ingredient in many processed foods, cosmetics, pharmaceuticals and other industrial products (Corley & Tinker, 2016). The global area under oil palm increased from less than 5 million hectares in 1980 to more than 20 million hectares in 2018 (FAO 2019).

Nigeria was the leading oil palm producer in the world, however there has been noticeable decline since 1965 as a result of the discovery of crude oil. By 1966, other competing countries such as Malaysia and Indonesia surpassed Africa's total palm oil production (FAO, 2011).

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In 2021, the production of palm oil in Nigeria was estimated to be 1,280 thousand metric tons. Between 2010 and 2021, the oil palm crops in the country increased, registering the highest growth in 2010. In the last three years, the production remained stable at over one million metric tons. Nigeria is one of the leading five producers of palm oil production worldwide (Varrella, 2021). From being one of the leading exporters of crude palm oil in the 1960s, Nigeria became a net importer. In a bid to close the supply gap and encourage local investment, the Federal Government included Refined Palm Oil (RPO) as one of the items that importers were restricted from accessing foreign exchange at the interbank market (Guardian Newspaper, 23rd June, 2019). Also, an increased duty charge of 35% on Crude palm oil (CPO) was introduced. The CBN introduced the Anchor-Borrowers programme. This programme was meant to provide single – digit interest rate on loans to farmers through the Deposit Money Banks and other participating financial institutions. For the palm oil sector, the interest on loan facility was put at 9% per annum. In 2019, the Federal Government of Nigeria also mandated CBN to support corporate bodies and individuals that were engaged in production of ten (10) specified agricultural commodities including palm oil.

2. Materials and Method

The study was conducted in Nsukka agricultural zone of Enugu State, Nigeria. The zone is made up of three Local Government Areas, namely; Nsukka, Uzouwani and Igboetiti. Nsukka agricultural zone has a mass area of 45.38km^2 and a population of 309,633 (NPC, 2006). The study area experiences two major climatic seasons: the wet season (which last between March and October) and a four month dry season (usually between November and February). The people are predominantly Igbos. The major economic activities include farming, trading, craft making and processing.

The sampling employed was multi-stage sampling technique. Four communities were randomly selected from each Local Government Area. The communities included: Eha-Alumona, Ibagwa–Agu, Opi, Okukpa, Adaba, Igga, Nimbo, Adani, Ukehe, Umudulo, Nkpologwu, and Ukwaja. Fifteen farmers were randomly selected from each community to give a total of 180 farmers for the study. The data used were collected using two main sources; primary and secondary. The primary data were collected using structured questionnaire while the secondary data were obtained from publications such as journals, conference proceedings, annual reports, etc. The data collected were analyzed using descriptive and inferential statistical tools. The descriptive statistical tools used included percentages, frequency tables and mean scores while ordinary least square regression model was used to test hypothesis between selected socioeconomic variables of farmers and their adoption of innovation.

3. Results and Discussion

3.1. Socioeconomic characteristics of small-scale farmers

The socioeconomic characteristics of small-scale farmers analyzed included age, sex, annual income, education, household size, farming experience, farm size, and social organizational membership. The result revealed that majority (84.44%) were males with mean household size of 9 persons. Also a good number of the farmers (26.11%) had secondary school education with a mean annual income of N112, 255.40 and farming experience of 9 years respectively. Their mean farm size was only 0.66 hectares. This implies that the farmers were mostly low income earners, aged, male dominated and farm size less than one hectare. The result agrees with the findings of other studies on the socioeconomic characteristics of rural farmers in Nigeria. Onasis *et al.* (2009) averred that oil palm production in Nigeria is male dominated and in very small plots of farm holdings less than one hectare. Nnadi *et al.,* (2012) also stated that Nigerian farmers are aged with very low income. Similarly, Fasina, *et al.* (2020) concluded that education is important to the improvement of agricultural productivity such that formal education opens the mind of their knowledge. They stated that with good education, farmers will possess improved decision-making skills and hence better manage resources to exploit farms of various sizes.

Table 1: Distribution of farmers based on socioeconomic characteristics (N=180)

Variable	Frequency	Percentages (%)	Mean
Age (years)			
21 – 30	11	6.11	
31 – 40	30	16.67	
41 -50	38	21.11	51.36
51 -60	52	28.89	
61 – 70	43	23.89	
> 70	6	3.33	
Sex			
Male	152	84.44	
Female	28	15.56	
Household size			
1 – 5	37	20.56	
6 – 10	65	36.11	9.14
11 and above	78	43.33	
Educational level			
No formal education	14	7.78	
Primary education	38	21.11	
Secondary education	47	26.11	
NCE/OND	36	20.00	
B.SC/HND	24	13.33	
M.Sc./PhD	5	6.67	
Farming experience			
1 – 5	40	22.22	
6 – 10	58	32.22	9.17
11 and above	82	45.56	
Farm size (Ha)			
< 1	177	98.33	0.66
1 – 2	3	1.67	
Annual income (₦)			
1.000 – 100.000	36	20.00	112.255.4
100.001 – 200.000	95	52.50	
200.001 – 300.000	32	17.50	
Above 300.000	17	10.00	

Source: Field survey, 2021

3.2. Adoption of improved technology in oil-palm production

Table 2 shows that weed control by cover crop, harvesting with matchet, use of organic fertilizer and local processing had high adoption rates with mean values of 2.40, 2.36, 2.35 and 2.29 respectively while use of inorganic fertilizer, chemical pest control, biological weed control and use of hybrid oil palm seedling had low adoption rates. Gere *et al.* (2020) stated that farmers' knowledge and value of innovation influence their adoption behavior. The higher farmers' level of awareness, the higher their adoption. Agwu (2006) on the other hand, saw low adoption behavior to high cost of farm operations, unavailability of improved planting materials and complexity of some of the innovations.

3.3. Constraints to adoption of improved technologies in oil-palm production

The result in table 3 shows that poor extension contact, poor access to land, scarcity of farm inputs and unawareness of technologies were the constraints to adoption of improved technologies in oil palm production with mean values of 2.89, 2.74, 2.59 and 2.55 respectively. On the other hand, lack of planting materials and access to fund with mean values of 2.19 and 2.43 respectively were not constraints to adoption of improved technologies. The result agreed with the findings of Gere *et al*. (2020) who saw access to land and high cost of inputs as constraints to adoption of innovation among oil palm farmers in South-South agro-ecological zone of Nigeria. Asiabaka *et al.,* (2001) similarly expressed the need for farmers to be fully aware of an improved technology before adoption could take place.

Table 2: Rate of adoption of improved technology in oil – palm production

Improved Technologies	Very high	High	Low	Mean
Polybag nursery practice	40	67	73	1.82
Hybrid oil palm seedling	28	70	82	1.70
9 meters triangle planting	33	82	50	1.91
Weed control by cover crop	100	52	28	2.40
Chemical weed control	73	82	25	2.27
Biological weed control	24	59	97	1.59
Chemical Pest control	36	33	111	1.58
Inorganic Fertilizer Use	15	71	94	1.56
Organic Fertilizer Use	85	73	22	2.35
Harvesting with Chisel	59	89	32	2.15
Harvesting with Matchet	94	59	28	2.36
Local Processing	84	65	31	2.29
Use of Modern Processing	41	70	69	1.84

Source: Field Survey Data, 2021

Table 3: Distribution of farmers according to constraints to adoption of improved technologies in oil palm production.

Constraints to adoption	SA	A	D	SD	Mean	Remark
Not aware of technologies	39	52	58	31	2.55	Agree
Lack of fund	61	42	32	45	2.43	Disagree
Poor extension contact	82	28	39	31	2.89	Agree
Poor access to land	44	70	38	27	2.74	Agree
Scarcity of farm inputs	47	37	69	26	2.59	Agree
Lack of planting materials	29	41	45	65	2.19	Disagree

Source: Field Survey Data, 2021

3.4. Relationship between the socioeconomic variables and adoption of innovation

The estimates of the ordinary least square regression analysis of relationship between socioeconomic characteristics and level of adoption of innovation of oil palm farmers (Table 4) showed that the lead equation used was semi log functional form. It has the highest number of significant variables, R^2 value of 0.741 which implies that about 74% of the variation in adoption of innovation was determined by the socioeconomic characteristics. The coefficient of age (t=3.333), educational level (t=2.091), farming experience (t= 5.559), farm size (t = 2.074), organizational membership (t= 2.311) and income level (t= 4.001) were significant at $P < 0.001$ and $P > 0.05$ critical levels. The coefficient of age was directly related to adoption which implies that as the farmers get older, their level of adoption gets increased. Oil palm takes some time to mature and in most cases requires permanent ownership of land which younger farmers may not have. With good education, farmers will possess improved decision - making skills and hence better manage resources to exploit farms of various sizes. Onoh *et al.* (2020) agreed with the findings that education positively influences adoption.

Table 4: Analysis of relationship between socioeconomic variables and adoption of Innovation

Explanatory Variables	Linear function	Exponential function	Semi -log function	Double Log function
X_1 (Age)	0.000(5.113)**	0.000(3.884)**	0.000(3.333)*	0.000(2.666)**
X_2 (Sex)	10.450(0.081)*	0.009(2.088)*	0.005(2.143)	0.000(1.799)
X_3 (Household size)	0.000(2.049)*	0.005(2.355)*	0.009(5.855)	0.006(2.232)*
X_4(Educational level)	0.002(2.673)**	1.900(1.529)	0.015(2.091)**	0.000(1.989)*
X_5 (Farming exp.)	0.006(2.183)*	0.000(2.252)*	0.000(5.559)**	0.000(4,032)**
X_6 (Farm size)	0.000(3.953)	0.000(1.995)	0.000(2.074)*	0.006(2.383)*
X_7 (Org. Membership)	0.033(1.513)	12.553(1.358)	0.000(2.311)**	28.108(0.888)
X_8 (Income Level)	0.002(3.993)**	0.001(5.575)**	0.000(4.001)**	0.000(2.440)
Constant	34.11	30.30	31.22	27.81
R^2	0.710	0.669	0.741	0.690
F- Value	22.33	20.71	27.22	21.66
N (No. of observation)	180	180	180	180

Source: Field Survey Data, 2021

The result is in contrast with the works of Ibekwe *et al.* (2010) who found a negative relationship between age and farm income in the Southeast Nigeria. They argue that the older the farmers, the weaker they become. Consequently, they may not have enough energy to engage in farming activities given that agricultural activities in the areas were labour intensive and that most of the farmers do not have sufficient funds to hire workers.

4. Conclusion and Recommendations

The study investigated the socioeconomic factors affecting the adoption of innovation by small scale farmers in Nsukka agricultural zone of Enugu State Nigeria. The farmers were mostly low income, aged, male dominated and farm size less than one hectare. Weed control by cover crop, harvesting with matchet, use of organic fertilizer and local processing had high adoption rates with mean values of 2.40, 2.36, 2.35 and 2.29 respectively while use of inorganic fertilizer, chemical pest control, biological weed control and use of hybrid oil palm seedling had low adoption rates. Poor extension contact, poor access to land, scarcity of farm inputs and unawareness of technologies were the constraints to adoption of improved technologies in oil palm production with mean values of 2.89, 2.74, 2.59 and 2.55 respectively. On the other hand, lack of planting material and access to fund with mean values of 2.19 and 2.43 respectively were not constraints to adoption of improved technologies. The coefficient of age was directly related to adoption which implies that as the farmers get older, their level of adoption gets increased. The study thus recommends for attention to be paid towards educating the local people on the importance of using improved or hybrid seedlings and making lands available to farmers.

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