# SOCIOECONOMIC FACTORS AFFECTING LEVEL OF ADOPTION OF IMPROVED AGRICULTURAL TECHNOLOGIES AMONG FARMERS IN ORLU AGRICULTURAL ZONE, IMO STATE, NIGERIA.

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**ABSTRACT**
The study assessed socioeconomic characteristics affecting adoption of improved agricultural technologies by farmers in Orlu Agricultural Zone, Imo State Nigeria. The specific objectives were to: examine the socio-economic characteristics of farmers, identify the available sources of agricultural technologies, ascertain the types of improved agricultural technology available to the farmers, determine the level of adoption of these agricultural technologies and identity constraints to adoption of improved agricultural technologies in the Zone. Data were collected by the use of questionnaire administered to 120 farmers. Data were analyzed using simple statistical tools like, frequency, percentage, mean, standard deviation, likert type scale mearsuring instrument and multiple regression analysis model. Results showed that 50.8% of the respondents' were men and 58% married. Radio, extension agents and farmer cooperative organizations were their major sources of information with mean values of 2.75, 2.27 and 2.24, respectively. Mean values for fertilizer usage was 2.49, yam minisette multiplication was 2.30 and soil conservation practices was 2.4, as the most available improved agricultural technology available to the farmers. Pest and diseases control, Bee keeping and fertilizer usage are the most adopted technologies with mean values of 3.78, 3.47 and 3.73, respectively. Farm size, Extension agents' credibility and inadequate capital are the major constraints against the adoption of these technologies by farmers. Finally, the study identified sex, primary occupation, farm size, annual farm income, membership of social organizations and extension agents as socioeconomic characteristics affecting level of adoption of improved agricultural technologies in study area. The study therefore recommends among others that government should provide costly technologies to the farmers at a subsidized rate, encourage more people to take farming as a business and employ more extension agents for increased adoption level by farmers,
**Keywords**: agriculture, adoption level, farmers, improved technologies and socioeconomic characteristics

## INTRODUCTION

The role of agriculture as a source of employment and income amongst others cannot be overemphasized. In sub-Sahara Africa and the Pacific, the agricultural dependents populations are estimated to be over 60% while in latin America and high income countries, the populations are estimated to be 18% and 4% respectively (Would Bank 2006). It must be stated that the agricultural sector continues to play a dominant strategic role in the development and growth of most developing nations of the world.

Farming Matters (2013) emphases that the underlying factors affecting agricultural production included information, knowledge on available improved agricultural technologies and socioeconomic characteristics of farmers. Adetumbo *et.al* (2013) opined that access to information is one of the most valuable recourses in agricultural development. However, agriculture with its positive impact on the Nigerian populace is bedeviled with myriad of problems among others are poor transfer and utilization of technologies by farmers (Ogunleye and Oladeinde (2013).

Technology is the collection, skill, method and process used in the production of goods and services in accomplishments of objectives. There is need to understand the importance of technology in agriculture. Also, agricultural production has been an issue of paramount importance across the globe and in other to achieve sustainable agricultural food security, the use of technological improvement which is improved technologies has played a very important key role (Maertens and Barrette 2013). Adoption is the process by which an individual accept to use innovation or technology after due consideration of its merits and demerits. The initial steps towards the adoption of new practice are that the innovation is available to the farmers. Rogers and shoemaker (1971) and Asiabaka (2002) stated that adoption is a decision to make full use of new idea as the best course of action available over a period of time; this is why an innovation can be accepted or rejected after adequate consideration has been made. The adoption process consists of five stages or steps namely awareness, interest evaluation trials and adoption that an individual goes through in adoption of innovation/technology.

It is the duty of research to release research findings to Agricultural Extension Department through the Agricultural Development Programme (ADP) for dissemination to farmers for adoption in Nigeria. Consequently the extension service is responsible for informing, advising and teaching large number of

farmers and other input agencies in a timely fashion (Unanma *et. al* 2004) in Orlu Agricultural Zone of Imo State, Nigeria.

To meet the food requirement of the populace at affordable cost through the massive adoption of improved agricultural technologies no valid and concerted effort has been made to ascertain the adequacy of the socioeconomic characteristics effects on the level of technology adoption among the farmer as it affects its effectiveness of information dissemination and farmers adoption of improved agricultural technologies of the Orlu agricultural Zone of Imo State ADP.

This study therefore aimed at identifying socioeconomic characteristics affecting level of improved technologies adoption among the farmers in Orlu agricultural zone of Imo State as it affected the lives of the rural farm families with a view to unraveling the obstacles to effective communication and adoption of technologies. The specific objectives of this study included to;

1. examine the socioeconomic characteristics of the farmers;
2. ascertain major sources of agricultural information to the farmers
3 identity improved agricultural technologies available to the the farmers
4. determine the level of adoption of the various identified technologies disseminated to the farmer
5 identify constraints to adoption of improved agricultural technologies

**HYPOTHESIS OF THE STUDY**

There is no significant relationship between farmers level of adoption of improved technologies and their socioeconomic characteristics.

**METHODOLOGY**

The study was conducted in Orlu agricultural zone of Imo State of Nigeria. The state is located in the southeast agricultural zone of Nigeria and lies between latitude $4^0 45^0$N and $7^0 15^0$N and Longitude $6^0$50E and $7^0$25E with land area of 5530km$^2$. The state divided into three agricultural zones of the ADP namely Orlu, Okigwe and Owerri with 27 Local Government Areas (L.G.As). Orlu Agricultural zone has a population of 1,972,546 people with 11 LGAs. The settlement structure is still rural with over seventy percent (70%) of the people living in rural areas (ISGN, 2007). The state is culturally homogenous and predominately inhabited by the Ibos of Nigerian where Igbo language is spoken with minimal difference in dialect. The people are predominantly farmers as an average family engaged in the production of food crops like yam, cassava, cocoyam, rice and maize, and livestock like sheep, goat, rabbit, poultry birds and pig. Cash crops cultivated include palm produce, rubber, oil bean, pear, mango, and oranges. The people are predominantly Christians and English language is however the official language.

A multi stage sampling technique was used in selecting the sampling size. The first stage involves selecting 6 LGAs from the 11 LGAs which includes Oru-east, Oru-west, Uguta, Orsu Orlu and Isu. The second stage involved selection of four (2) communities from each of the six local government areas to give a total of sixteen (12) communities from the zone. The communities include Omuma and Akuma for Oru-east, Umekwe and Ihitte for Oru-west, Abatu and Enigbo for Uguta, Umuowa and Umuna from Orlu, Amaruru and Amadiaba for Orsu and finally Amandugba and Amura Amanze for Isu. Final stage involved selection of Ten (10) farmers from each of the twelve (12) communities to give a total of one hundred and twenty (120) respondents. All selections were done using random sampling technique since similar characteristics existed in the area. The lists of the communities and the farmers were collected from community development officers and the extension agents of the ADP respectively working in the various local government areas. Data were obtained using questionnaire administered to the 120 farmers. Simple descriptive statistics such as percentages, frequency distribution, mean standard deviation and likert scale type measuring instrument and regression analysis model were used to analyze the objectives.

The Likert-type rating scale measuring instrument used to obtain mean is represented by the formula:

$$X = \Sigma Fx$$
$$N \quad (1)$$

where X = mean score
Σ = summation sign
F = frequency
N = no of respondents.
x = no of nominal value of each response category

Simple statistics like frequency, percentage mean was used for objective 1. The different scale statement used were 'most available' 'available' and 'not available'; for objectives 2 and 3; 'Aware' ,'Interest' 'Evaluation' 'Trial' and 'Adoption' for objective 4 and ‟ 'very serious ‟ serious' and „'not serious ‟ for objective 5.

The means of it scaling statement was found for objectives 2, 3 and 5:

3+2+1 = 6/3 = 2.0

Therefore, 2.0, is the weighed means of the scaling statement.

Decision rule: Any mean value greater or equal to 2.0 is positive.

Any mean value less than 2.0 is negative.

For objective 3, the mean was calculated thus;

6 +5+4+3+2+1=21/6=3.3

Decision rule; Any mean value greater or equal to 3.3 is positive.

Any mean value less than 3.3 is negative.

**HYPOTHESIS**

To determine the relationship between the socioeconomic characteristics of the rural farmers in Orlu Agricultural Zone and their level of adoption of improved agricultural technologies the ordinary least square (OLS) multiple regression technique was employed.

Specified as

Y = F(X1, X2, X3…10X + E)

Where Y = level of adoption of farmers X1, X2, X3… X10 = socio-economic characteristics of the farmers.

X1 = Sex: Dummy variable 1 =male, 0= female

X2 = Age (number of years).

X3 = Marital status: 0 = single, 1 = married, 2 = separated, 3 = divorced, 4 = widowed

X4 = Educational level (in years):

X5= household size (family members).

X6 = Main occupation**:** 1=farming alone, 2= farming with other businesses.

X7 = Experience of farmers (in years).

X8 = Contact With extension Agents (every 3 months).

X9= Social Organization membership: Dummy variable 0= no, 1=yes

X10= Annual farm income (in Naira)

In testing the hypothesis, four functional forms of the ordinary least squares multiple regression model; linear, semi-log, double log and exponential were tried to determine the functional form that fits best in the model on the basis of having the highest value of $R^2$ , F-value and highest number of significant variables .

**Socioeconomic Characteristics of the Respondents**

Table 1 shows that majority (50.8%) of the farmers are males and 48.2% females. It also shows that 77.5% of the farmers are between the ages of 40 and 60 years. Married people accounted for 65.8% of the farmers and this may indicate that they may have access to lands and bank loans. The study further shows that 52.8% of the farmers have farming as their only business. Up to 88.3% of the farmers attended both primary, secondary school and tertiary levels. Adejo *et.al* (2012) stated that technological changes are achieved through education. The highest household size for farmers was between 5 and 8 persons. Majority (95.6%) belonged to difference social organizations and this facilities easy dissemination of information. Ibe (2002) described cooperative as a veritable tool for mobilizing desperate small farmers' holders in the rural areas to increase their farm holdings. The average farm size and income of the farmers was 1.6 hectares and N80,000.00 (Naira) respectively. This indicated poor annual farm income for a third world like Nigeria with exchange rate of US1.00 Dollar to N460 Naira (CBN 2018).

**Table1 Distribution of respondents according to socioeconomic characteristics**

| Socio-economic characteristics | Frequency | Percentage | Mean |
|---|---|---|---|
| **Sex** | 61 | 50.8 | |
| Male | 59 | 49.2 | |
| Fema le | | | |
| **Age (in years)** | | | |
| 29-30 | 5 | 4,2 | |
| 31-40 | 12 | 10 | 49.8 |
| 41-50 | 40 | 33,3 | |
| 51-60 | 53 | 44,2 | |
| 61-70 | 10 | 8,3 | |
| **Marital Status** | | | |
| Married | 67 | 55.8 | |
| Single | 19 | 15.8 | |
| Divorced | 19 | 15.8 | |
| Separated | 15 | 12.6 | |
| **Educational Attainment (in years)** | | | |
| **Non** | 14 | 11.7 | |
| 1-6 | 20 | 16.7 | 9.3 |
| 7-12 | 52 | 43.3 | |
| 13-1 | 34 | 28.3 | |
| **Household Size (No of persons)** | | | |

| | | | |
|---|---|---|---|
| 1-4 | 45 | 37.5 | |
| 5-8 | 67 | 55.8 | 5.3 |
| 9-12 | 5 | 4.2 | |
| 13 and above | 3 | 2.5 | |
| **Farm Size (in hectares)** | | | |
| 1-2 | 56 | 38.3 | |
| 3-4 | 46 | 46.7 | 1.7 |
| 5-6 | 10 | 14.2 | |
| 7-8 | 7 | 0.8 | |
| 9-10 | 0 | 0 | |
| **Annual farm income** | | | |
| Below 150000 | 40 | 33.3 | |
| 150000-200000 | 54 | 45.0 | |
| 200000-250000 | 20 | 16.7 | 86,375 |
| 250000-300000 | 6 | 5.0 | |
| 300000-above | 0 | 0 | |
| **Membership of Social Organization** | | | |
| Yes | 112 | 93,3 | |
| No | 8 | 6,7 | |
| **Main Occupation** | | | |
| Farming | 65 | 54.2 | |
| Farming and business | 55 | 45.8 | |
| **Extension contact (in three months)** | | | |
| **Non** | 40 | 33.3 | |
| 1-2 | 68 | 56.7 | 1.5 |
| 3-4 | 12 | 10 | |
| 5-6 | 0 | 0 | |

Field Survey 2019

**Sources of Agricultural Technology Information.** Table 2 shows that the mean score values of Extension agents (2.27), Mobile phone calls (2.00), Farmers cooperative organization (2.13), Customers (2.00), fellow farmers (2.17), Radio (2.73), were positive. They are therefore major available sources of agricultural technology information in the study area since it agreed with that of Onoh and Onoh 2012. The results further indicated that television, posters agricultural shows research institutes were not major sources of agricultural information on improved farm technologies.

**Table 2: Distribution of respondent According to source of agricultural technology information**

| Sources of agricultural technology information | (3) Most available | (2) Available | (1) Not available | Mean (X) | Std dev |
|---|---|---|---|---|---|
| **1) Professional interpersonal source** | | | | | |
| Extension agent | 85 | 25 | 10 | 2.27 | 0.89 |
| Staff of research institute | 11 | 30 | 79 | 1.43 | 0.86 |
| Agricultural show | 5 | 15 | 100 | 1.21 | 0.94 |
| Mobile phone calls | 35 | 50 | 35 | 2.00 | 0.76 |
| **2) Non-professional interpersonal source** | | | | | |
| Fellow famers | 80 | 31 | 9 | 2.13 | 0.86 |
| Village head | 50 | 40 | 30 | 2.17 | 0.82 |
| Farmers cooperative organization | 70 | 28 | 22 | 2.40 | 0.88 |
| Customers | 38 | 44 | 38 | 2.00 | 0.80 |
| **3) Printed Source** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Imo ADP news letter | 30 | 35 | 55 | 1.79 | 0.84 |
| Posters | 33 | 51 | 36 | 1.98 | 0.76 |
| Academic journal | 16 | 24 | 80 | 1.47 | 0.89 |
| Agricultural News letters | 5 | 28 | 87 | 1.32 | 0.88 |
| **4) Broadcast Sources** | | | | | |
| Radio | 98 | 12 | 10 | 2.72 | 0.95 |
| Television | 35 | 50 | 35 | 1.90 | 0.94 |
| **5) Internet Sources** | | | | | |
| Online articles and journals | 3 | 30 | 40 | 0.32 | 0.87 |
| Agriculture site | 2 | 21 | 97 | 1.21 | 0.91 |
| Google | 35 | 45 | 40 | 1.96 | 0.79 |

**Source**: Field Survey Data, 2019

**Improved agricultural technologies**

Table 3 showed that the mean values for use of organic manure (2.30), fertilizer usage (2.49), improved seed varieties (2.24), yam minisette multiplication (2.30), soil conservation methods (2.44), pest and disease control technologies (2.35), and crop rotation practice (2.37) were seen as the most available technologies in the study area. The result also indicated that agro-chemicals (1.91), Precious technology (1.06), biotechnology, Tractors and machinery (1.89) were not available to farmers. This may suggest high costs, technical knowhow and availability of these technologies

**Table 3: Mean distribution of respondents according to improved agricultural technologies available**

| Agricultural technologies | (3) Most available | (2) Available | (1) not available | Mean | Standard deviation |
|---|---|---|---|---|---|
| Use of organic manure | 60 | 40 | 20 | 2.30 | 0.82 |
| Beekeeping technology | 40 | 59 | 30 | 2.08 | 0.76 |
| Agro-chemical usage/application | 26 | 59 | 35 | 1.93 | 0.71 |
| Fertilizer usage/application | 71 | 37 | 12 | 2.49 | 0.83 |
| Improved seed varieties | 46 | 57 | 17 | 2.24 | 0.72 |
| Tractor and machinery | 21 | 20 | 79 | 1.23 | 0.91 |
| Crop processing technology | 39 | 43 | 38 | 2.01 | 0.80 |
| Yam minisette production | 57 | 41 | 22 | 2.30 | 0.81 |
| Soil conservation practices | 66 | 41 | 13 | 2.44 | 0.81 |
| Fish farming techniques | 31 | 35 | 54 | 1.81 | 0.84 |
| Inter cropping practice | 44 | 52 | 24 | 2.17 | 0.75 |
| Yam staking | 48 | 55 | 17 | 2.26 | 0.74 |
| Pest and disease control technology | 62 | 38 | 20 | 2.35 | 0.83 |
| Planting time and spacing practice | 50 | 48 | 22 | 2.23 | 0.77 |
| Mobile technology | 15 | 25 | 80 | 1.46 | 0.89 |
| Precision technology | 1 | 5 | 114 | 1.06 | 0.98 |
| Biotechnology | 2 | 8 | 110 | 1.10 | 0.97 |
| Crop rotation | 57 | 49 | 15 | 2.37 | 0.77 |
| Irrigation practice | 67 | 48 | 5 | 2.52 | 0.77 |

**Source**: Field Survey Data, 2019

**Level of adoption of these technologies**

Table 4 shows, use of that organic manure (3.6) beekeeping technology (3.15) agro-chemical (3.33) fertilizer applications (3.73), improved seeds (3.32) yam minisette production (3.17) soil conservation methods (3.44) inter cropping (3.11) yam staking (3.21) pest and disease control measures , (3.78) planting time and spacing (3.28) and irrigation (4.22) are the technologies that have been adopted more by the respondents in the study area. Asiabaka et al (2001) recorded that the high level of adoption of innovation could be that the farmers had good

chances of making money through high yields and probably also based on the material nature of the technology due to its ease of transfer. Agwu (2001) adoption level with regards to technologies could be associated with the farmers' high awareness of the fact that these technologies increase yields despite family labour or hired labour. Meanwhile tractors and machinery 1.88, mobile technology 1.96, precision technology where not adopted. Also, the mean farm size of the farmers is 1.7 hectares of land and cannot allow for effective tractor work. This may suggest that land tenure systems, high costs, technical knowhow and availability of these technologies may be existing in the area.

**Table 4: Mean distribution of respondents according to level of adoption of these improved agricultural technologies**

| Agricultural technologies | (1) Aware | (2) Interest | (3) Evaluation | (4) Trial | (5) Adoption | Mean | Standard deviation |
|---|---|---|---|---|---|---|---|
| Use of organic manure | 10 | 19 | 25 | 21 | 45 | 3.60 | 1.44 |
| Beekeeping technology | 14 | 17 | 24 | 23 | 42 | 3.41 | 1.43 |
| Agro-chemical usage/application | 15 | 21 | 25 | 28 | 31 | 3.31 | 1.39 |
| Fertilizer usage/application | 10 | 12 | 23 | 30 | 45 | 3.73 | 1.48 |
| Improved seed varieties | 10 | 14 | 48 | 24 | 24 | 3.32 | 1.20 |
| Tractor and machinery | 65 | 21 | 18 | 15 | 1 | 1.88 | 1.58 |
| Crop processing technology | 15 | 20 | 20 | 20 | 45 | 3.43 | 1.27 |
| Yam minisette production | 20 | 18 | 28 | 30 | 24 | 3.17 | 1.37 |
| Soil conservation practices | 15 | 17 | 23 | 30 | 35 | 3.44 | 1.43 |
| Fish farming techniques | 18 | 27 | 36 | 21 | 18 | 2.95 | 1.26 |
| Inter cropping practice | 15 | 10 | 25 | 30 | 40 | 3.35 | 1.37 |
| Yam staking | 10 | 10 | 24 | 35 | 41 | 3.33 | 1.47 |
| Pest and disease control technology | 8 | 18 | 15 | 30 | 49 | 3.78 | 1.51 |
| Planting time and spaci0ng practice | 15 | 16 | 29 | 29 | 37 | 3.50 | 1.34 |
| Mobile technology | 48 | 41 | 22 | 6 | 3 | 1.96 | 1.45 |
| Precision technology | 53 | 61 | 6 | 0 | 0 | 1.61 | 1.27 |
| Biotechnology | 50 | 65 | 3 | 2 | 0 | 1.64 | 1.49 |
| Diary farm | 48 | 45 | 15 | 10 | 2 | 1.94 | 1.46 |
| Crop rotation | 5 | 26 | 12 | 33 | 44 | 3.40 | 1.40 |
| Irrigation practice | 5 | 8 | 16 | 18 | 73 | 4.22 | 1.68 |

**Source**: Field Survey Data, 2019.

**Constraints to adoption agricultural technologies**

Table 5 shows that the mean values of costly of technology (2.00), lack of interest (2.08), technology failure (2.25), farm size (2.50) lack of technical knowhow (2.33), inadequate capital (2.44), lack of awareness (2.26), and land tenure system (2.04) were seen as possible constraints against the adoption of improved agricultural technology. The farmers did not consider social factors (1.24), poor radio signal (1.76) as major constraints in the study area

**Table 5: Mean distribution of respondents according to constraints against the possible adoption of improved agricultural technologies.**

| Constraints | (3) Very serious | (2) Serious | (1) Not serious | Mean | Standard Deviation |
|---|---|---|---|---|---|
| It is too costly | 38 | 44 | 38 | 2.00 | 0.80 |
| It is complex | 32 | 52 | 36 | 1.94 | 0.75 |
| Lack of interest | 45 | 40 | 35 | 2.08 | 0.82 |
| Technology failure | 50 | 50 | 20 | 2.25 | 0.76 |
| Farm size | 70 | 40 | 10 | 2.5 | 0.82 |
| Lack of technical skill | 52 | 55 | 13 | 2.33 | 0.74 |
| Poor extension service | 35 | 48 | 37 | 1.98 | 0.77 |

| | | | | | |
|---|---|---|---|---|---|
| Inadequate capital | 66 | 41 | 13 | 2.44 | 0.81 |
| Lack of awareness | 48 | 55 | 17 | 2.26 | 0.74 |
| Poor managerial skill | 33 | 49 | 3 | 1.96 | 0.78 |
| Divisibility of technology | 28 | 40 | 52 | 1.8 | 0.82 |
| Land tenure system | 40 | 45 | 35 | 2.04 | 0.63 |
| Extension agent credibility | 32 | 55 | 33 | 1.99 | 0.74 |
| Poor radio signal | 25 | 41 | 54 | 1.76 | 0.81 |
| Cultural factor | 25 | 30 | 65 | 1.67 | 0.87 |
| Social factor | 27 | 35 | 58 | 1.74 | 0.84 |

**Source**: Field Survey Data, 2019

**Multiple regression result**

Table 6 : Multiple regression models were used to estimate the relationship between the level of adoption of improved agricultural technologies and their socio-economic characteristics. The double-log function was chosen as the lead equation among the four functional forms tried in the equation. It has the highest R squared value ($R^2$), the highest F-value, lowers standard of error Y estimate and highest number of significant figures. Multiple regression result shows sex, primary occupation, educational qualification, farm size, household size, extension contact and annual agricultural income are the socio-economic variables that have significant ($R^2$ =74%, Standard Error = 0.082) relationship with the level of adoption of improved agricultural technologies. They have positive relationship which implies that any improvement on these variables will bring about improvement on the level of adoption while sex, farm size and household size have an inverse relationship. This implies that an increase in those variables will bring about reduction in the level of adoption of improved agricultural technologies by farmers in the study area and vice versa. However, at 5% significance, sex, primary occupation social organizations and farm size are significant while at 1% educational level, household size extension contact and annual agricultural income are significant. Mcheod (1995) who identified with the findings opined that farmers communicate most frequently with those who are most similar and familiar to them. These farmers are more likely to obtain information from and be influenced in their farming practices and management decision by fellow farmers other than extension workers.

**Table 6: multiple regression result on relationship between the socio-economic characteristics of rural farmers in Orlu agricultural zone and their level of adoption of improved agricultural technologies..**

| Explanatory remark | Linear function | Semi-log function | Double-log function | Exponential function |
|---|---|---|---|---|
| Constant | 228.0312 | 185.1451 | 141.3588 | 98.6754 |
| $R^2$ | 0.4963 | 0.4752 | 0.7453 | 0.6057 |
| f-value | 21.9465 | 16.1076 | 73.7105 | 36.1209 |
| Sex ($X_1$) | -1035564 | -4.0214 | -0.0042 | 0.0006 |
| | (-1.64276) | (-1.718) | (-1.9518)* | (-1.0769) |
| Age ($X_2$) | -15.2586 | -3.2751 | 0.0758 | -0.04180 |
| | (-1.754) | (-2.5716)** | (-1.4598) | (-1.3875) |
| Marital status ($X_3$) | 1.4718 | 2.9015 | 0.0589 | 0.0053 |
| | (1.457) | (1.264) | (1.6802) | (1.2918) |
| Primary occupation ($X_4$) | 11.8937 | 3.2489 | 0.0259 | 0.005 |
| | (1.4957) | (1.6352) | (1.9601)* | (1.5752) |
| Educational | 12.7048 | 3.4198 | 0.0548 | 0.07284 |
| Qualification ($X_5$) | (3.1039)** | (2.0357)* | (2.810)** | (4.6085) |
| Farm size ($X_6$) | -10.6528 | -4.9124 | -0.1604 | -0.0064 |
| | (-1.2891) | (-2.3106) | (-1.9048)** | (-2.0418) |
| Household size ($X_7$) | -10.7215 | -5.1403 | -78729 | 0.0033 |
| | (-2.6986)** | (-1.2498) | (-3.5408)** | (-1.4986) |
| Annual agricultural | 12.2579 | 3.1075 | 0.1592 | 0.0046 |

| | | | | |
|---|---|---|---|---|
| income ($X_8$) | (2.9104)** | (-1.2408) | (2.6164)** | (3.4193)** |
| Social Organization ($X_9$) | 12.0584 (1.0519) | 3.2159 (1.1047) | 0.0167 (1.4512)* | 0.0059 (2.3.3276)** |
| Extension Contact ($X_{10}$) | 13.8291 (1.6845) | 5.6345 (1.7289) | 0.1282 (2.6103)** | 0.0078 (1.8314) |
| Standard error | 15.5491 | 12.7919 | 0.0827 | 0.4393 |
| No of observation | 120 | 120 | 120 | 120 |

Degree of freedom 109
*Significant at 5%
** Significant at 1%
Figures in bracket are T ratios
Source, field survey, 2019

**CONCLUSION AND RECOMMENDATIONS**

The study examined the socioeconomic characteristics affecting the level of adoption of improved agricultural technologies in orlu agricultural zone of Imo State of Nigeria. Agricultural extension plays its central roles in the transformation of agricultural production to meet the ever increasing demand for food by the generalities of human race. Agricultural improved technologies/innovations play a significant role in fighting poverty and lowering per unit cost of production in agriculture. Different sources of improved agricultural technologies like fertilizer applications and bee harvesting technique were identified. Many of the technologies for the study were adopted and the important socioeconomic characteristics affecting the level of adoption in the study area included sex, marital status, educational attainment, farm size, social organization membership, extension contact and annual farm income. The study therefore recommended that male farmers should be encouraged in farming activities. Also, farmers should participate in social organization like cooperatives. More extension workers should be employed in addition to encouraging more young people to be involved in agricultural production.

**REFERENCES**

Adejo, P E, Edoka M H, and Adejelob S O (2012). Indigenous Practices and the challenges of Climate change among small scale farmers in Deina Local Government Area of Kogi State Nigeria; proceeding of the 17th Annual National Conference of Agricultural Extension Society of Nigeria (AESON) held at University of Nigeria Nssuka. Pp 70-77.

Adetumbi, S, Ige, O.O, Akin, A, Adewale, J.G. (2013). Assessment of use of selected Information and communications technologies (ICTs) for extension service delivery; Implications for agricultural development in Nigeria. International journal of agricultural Management and Development (IJAMAD), pp. 131-139.

Agwu, A.E (2001) Adoption of Improved Cowpea Production techniques by farmers in north East savanna zone of Nigeria; proceedings of seventeenths annual conferences of Agricultural society of Nigeria; August 19-22, pp.74-78.

Asiabaka, C.C., Morse, S. and Kenyon I. (2001). The Development Dissemination of and Adoption of technology directed at improving the availability of clean yam planting Materials in Nigeria. Report of study mission commissioned by UK Government For international Development (UFTD) crop protection programme (CPP). 11-22, June 2001.

Asiabaka,C.C. (2002) Agricultural Extension: A handbook for Developing Practitioners . Mayfield Unlimited Services. Pp 165-180.

Awride., B.A, Digne, A, and Omonona, B.T (2016) Impact Improved Agricultural Technology Adoption on sustainable Rice Production and Rural Farmers Welfare in Nigeria: A Local average treatment (LATE) technique . a paper presented at the African economic conference . October 30-November 2, Kigali , Ruwanda.

CBN, 2018. Central Bank of Nigeria, December quarterly publications.

Farming Matters (2013). Education for Change. A quarterly magazine for sustainable agriculture September Edition. A Publication of Institute for Low External Input Agriculture (ILEIA),Pp 8-9

Ibe, A.C. {2002) Successful Management of Cooperatives. Awka Nigeria , Sale York International.

Imo State Government of Nigeria (2007). Achike Udenwa, Imo State Governor 1999-

2007; In the Eye of History, Lagos, Greenleaf Communications Limited.

Kasie M. Shiferaw N, Muricho, G. (2011) Agricultural technology, Crop income and poverty Alleviating in Uganda. World agricultural development Journal 39(10) pp.1784-1785

NPC (2006). National Population Commission of Nigeria. Provisional Census for Nigeria.

Rogers and Shoemaker (1971). Communications of Innovations. A Cross Cultural Approach 2rd Edition, London. The free press Collier, Macmillan publisher pp 11-28

Maertens and .Barrett (2013) Measuring Social Networks effect on agricultural technological Adoption. American journal of agricultural Economics.

Mcheod R .J. (1995) management Information Systems; A Study of Computer based Information System (6th ed) New Delhi; Practice Hall of India

Ogunleye, Y.I. and Oladeinde, C. (2013). The role of Community self Projects in Rural Development of Kwara State , Nigeria . International Journal of Development and Sustainability , 2(1) in press.

Onoh, P.A. and Onoh, C.A. (2012). Adoption of Improved Oilpalm Production Technology Among farmers in Abor Mbaise Local Area of Imo State Nigeria . International Journal of Agriculture and Rural Department 15(2); 966-971.

Unanma RPA, Owudike OC, Uwegbute,AC, Edeogu, HO, and Nwosu AC. (2004), Linkage Strategies for Sustainable Agriculture in Nigeria; Research – Extension-Farmer-Imput- Linkage System (REFILS). Michael Okpara University of Agriculture Umudike Publications. p.157

World Bank Report (2006). Agriculture for Development. Washington D.C