

## SOCIO-ECONOMIC DETERMINANTS OF FARMERS' ADOPTION OF AGRICULTURAL DEVELOPMENT PROGRAMME EXTENSION TECHNOLOGY PACKAGES IN IVO L.G.A OF EBONYI STATE

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### ABSTRACT

*The study analyzed the Socio-Economic determinants of farmers' adoption of Agricultural development programme extension technology packages in Ivo L.G.A of Ebonyi State. Multi-stage sampling procedure was employed to select 80 farmers and 8 extension agents who formed the respondents for the study. Data were collected through the aid of questionnaire and interview schedule and the analysis was done using both descriptive and inferential statistics to realize each specific objective. The results showed that most of the farmers (82.50%) and extension agents (75%) were males respectively. Evidence showed that the mean age of the farmers was 37 years while the mean age of the extension agents was 44 years. It was obvious that 67.50% and 75% of the farmers and extension agents were married. The mean annual income of the farmers and extension agents were ₦98, 070 and ₦504,200 respectively. The result showed further that about 81.9% change in the dependent variable (adoption of extension technology packages) was caused by variations of socio-economic characteristics included in the regression model. The following were the research recommendations; Educational facilities should be made available for rural farmers to enhance easy adoption of ADP extension technology packages in order to their enhance production; government and NGOs should endeavour to subsidize the cost of ADP extension technology packages in order to enhance easy adoption by rural farmers; and credit institutions are advised to give farmers loans in order to enhance their accessibility of ADP extension technology packages in the area.*

**Keywords:** Adoption, Extension, Technology, Packages, Rural farmers

### INTRODUCTION

#### 1.1 Background Statement

It is obvious that improvements in agricultural science and technology have brought about dramatic changes in the agricultural sector which has led to the increased need and opportunity for investigating the effectiveness of agricultural extension services in various parts of the world (Oladele, 2005). They further noted that Farmers in the rural areas are beneficiaries of the numerous innovations that an extension worker carries about which aims at rural development and the priority of agricultural development in Nigeria is to be self sufficient in food supply. However, in the past, the traditional system allowed for subsistence farming, where individuals were able to feed and there was self-sufficiency in basic food needs. Millions of small farmers produced enough food for themselves and everyone was responsible for the food requirement of the family members and self and the surplus was marketed. Substantial quantities of

export crops such as cocoa, groundnut, oil palm and coffee were also produced (Oladele, 2005).

The integrated Agricultural Development Programme (ADP) that could also be described as Agricultural Development Project started in 1975 as an enclave project which covered three small geographical areas Funtua in Kaduna, Gusau in Sokoto and Gombe in Bauchi states. These formed the first generation of ADPs in Nigeria. The programme gradually expanded with the establishment of other enclave ADPs in Lafia, Akungba, Bida, Ilorin, Oyo North and Ekiti- Akoko, in Kogi, Ondo, Niger, Kwara, (Ladele, 1990 in Kemi, 2016). Muna (2010) noted that agricultural development is almost impossible without the presence of extension service which includes extension education. According to Oladele (2005), agricultural education is becoming increasingly important in countries which depend heavily on agriculture for both the living of the majority of their population and their export earnings. Trager (2016) noted that agricultural extension includes; the

promotion of any aspect of technology development, method of resources acquisition by farmers, method of involvement of new technologies, the kind of support a given technology requires, sources of finance for it and its maintenance method. Seevers and Graham (2012) opined that agricultural extension is the exchange of knowledge with the aim of helping rural families to develop skills needed to solve their immediate problems and improve their standing of living.

The role of extension is to empower farmers and enable them to identify and analyze their agricultural problems to be able to make correct decisions (Kimaro, Mukandiwa and Mario, 2010). Alunas (2014) reported that almost all countries in the world deliver some type of extension service to help rural people advance their agricultural productivity and improve their living standard. Extension is responsible for serving about one billion small scale farmers in the world (Davis et al., 2012). The purpose of extension is to empower farmers and enable them to identify and analyze their agricultural problems and be able to make the right decisions (Kimaro *et al.*, 2010). Jain (2010) pointed out that the central task of extension is to assist rural families to be able to help themselves through application of science to their daily life of farming and home-making and that it uses communication of valuable information, which helps people make sound decisions. Another importance of extension is reaching a larger number of farmers while providing a greater amount of higher quality information to anyone interested.

However, the following factors affect the responses of farmers on innovations such as cultural influence, educational level, attitudes of the extension staff, bulkiness of the innovations, low income levels by the farmers etc. When these factors are properly understood in the areas of crop production, animal production, apiary, horticulture, etc. All these serve as income earners for the farmers in the country (Kemi, 2016).

Agricultural technology packages include different techniques, methods and practices which are adopted by farmers in the different stages of agricultural production. Adedjo *et al.*, (2017) defined technology as an organized capacity for some purposive activity. These processes may include; plants and animals breeding, the introduction of new crops, livestock and fisheries, mechanization, infrastructural development and inputs; planting distance, fertilizer application, etc.

Swanson (2006) noted that there have been a number of criticisms regarding the acceptance of agricultural innovation generally in developing countries. These includes (a) a pro-innovation and the sources of failure of unsuccessful innovation (b) a tendency to blame the farmers or the peasant for failure to adopt rather than question the appropriateness or profitability of innovation (c)

inadequate attention to the interrelated process involved in innovation generation and utilization (d) failure to develop the appropriate technology for adoption by farmers. Other issues affecting efficiency of the extension system include poor organizational structure, poor administrative and institutional structure, lack of clientele involvement in the planning process, and untimely provision of extension services (Swanson and Samy, 2003). Kemi (2016) pointed out that a limited number of extension workers in relation to the number of farmers, lack of funds for supporting farmer field schools and farmers demonstration plots constrain flow of information reaching farmers. Abdullah and Samah (2013) pointed out that weak perception of technology, low education of farmers, disorganization, and limited knowledge among extension workers are some of the factors that affect the success of extension trainings.

Kemi (2016) stated that the unhealthy perception of extension prevails in many developing countries, as a result of a weak extension lobby, imperfect initial organizational set-up, an inherent lack of trust in extension by most of the research organizations, and traditionally poor career development conditions in the profession of extension. Furthermore, many research works have been conducted on the importance of extension service delivery to farmers among which include; Kemi, Israel, Abdulazeez and Foluke (2016) who researched on the determinants of level of participation of farmers in group activities in Kwara State, Nigeria. Alunas (2014) worked on assessment of the factors impacting agricultural extension training programs in Tanzania. Lawal (2014) Assessment of Factors Affecting the Acceptance of Agricultural Innovations in Zurmi Local Government Area, Zamfara State Nigeria. None of these vividly evaluated the Socio-Economic determinants of farmers' adoption of Agricultural Development Programmes extension technology packages in Ivo L.G.A of Ebonyi State.

Therefore, despite so many literatures listed above and many others, there seems to be a dearth in empirical knowledge on the Socio-Economic determinants of farmers' adoption of ADP extension technology packages in Ivo L.G.A of Ebonyi State. Thus, this research will be conducted with the broad objective of analyzing the Socio-Economic determinants of farmers' adoption of ADP extension technology packages in Ivo L.G.A of Ebonyi State. Specifically, the study: (i) described the socio-economic characteristics of farmers who use ADP extension technology packages; (ii) identified the Socio-Economic factors determining farmers' adoption of ADP agricultural extension technology packages in the study area.

The null hypothesis states that the selected socio-economic factors of farmers do not significantly determine their adoption of ADP agricultural extension packages in Ivo L.G.A of Ebonyi State.

## 2.0 METHODOLOGY

The study area was conducted in Ivo Local Government Area of Ebonyi State. The area is located in the southern senatorial district of Ebonyi State. The L.G.A is bounded in the North by Ohaozara L.G.A, in the south by Uturu in Abia State, in the East by Afikpo South L.G.A and by Awgu, Enugu State in the west. Ivo as a local Government Area got its name from the predominant river by name, Ivo River which is the major source of water to the inhabitants of the area. The L.G.A is made up of 11 political wards which include; Ngwogwo, Amagu, Amaeze, Akaeze, Umobor, Ndiokoroukwu, Amonye, Okue, Akazeukwu, Ihenta and Obinagu. There are basically four autonomous communities in the area; Ishiagu, Akaeze, Okue and Ihie. The topography of the area is relatively flat and with vegetation which can be said to be grassy with the predominant tree plant being the oil palm tree. This area has a soil which is mainly clayey in nature and this creates room for swampland which is suitable for the growing of swamp rice.

Multistage sampling technique was used in the selection of the respondents for the study. In the first stage all the four autonomous communities were purposively selected because of predominance of ADP contact farmers in the areas. In the second stage, a random sampling technique was used to select twenty (20) ADP contact farmers from each of the four autonomous communities making a total of eighty (80) farmers that was used for the study. In the third stage, two (2) extension agents were as well randomly selected from each autonomous community to give a total of eight (8) extension agents that were used for the study.

Data for the study were collected from primary sources only. The data were collected through the use of questionnaires administered to literate farmers and extension agents, while interview schedule was employed to collect data from farmers who found it difficult to read. The data collected were analyzed using relevant descriptive and inferential statistics in line with the different objectives. Objective i, was achieved using frequency, percentage and mean and objective ii was achieved using multiple regressions.

### 2.1 Model Specifications

#### Multiple Regression Model

Multiple regression analysis was used to achieve ii

$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9)$   
...The implicit form of the model 3.1

$Y = g_0 + g_1X_1 + g_2X_2 + g_3X_3 + g_4X_4 + g_5X_5 + g_6X_6 + g_7X_7 + g_8X_8 + g_9X_9 + ut$ ...The explicit form of the model is represented thus; 3.2

Where;

Y = number of technology packages adopted

$X_1$  = Age of respondent (years)

$X_2$  = Gender of Respondent (1= male, 2=female)

$X_3$  = Income level of respondents (naira)

$X_4$  = Household size of respondents (number of persons)

$X_5$  = farm size of respondents (ha)

$X_6$  = Educational qualification of respondents (years)

$X_7$  = Marital status (1=married, 2= single, 3= Divorced, 4=Widowed)

$X_8$  = Years of Farming Experience (years)

$X_9$  = Member of cooperative (1=Member, 2=Non member)

$g_1$ -  $g_9$  = estimated parameters

$g_0$  = autonomous level of production known as the constant.

### 2.2 Test of Hypothesis

The stated hypotheses ( $H_0$ ) were tested using the F- test at 5% level of significance. The formula for calculating F-cal is shown below;

$$F\text{-cal} = \frac{R^2(N - K)}{(1 - R^2)(K - 1)} \quad \dots\dots 3.3$$

Where;

$R^2$  = Coefficient of multiple determination

N = sample size

K = number of variables

**Decision Rule:** If  $F_{cal} > F_{tab}$ , reject the null hypothesis otherwise accept.

## 3.0 RESULT DISCUSSION

### 3.1 Socio-economic characteristics of Respondents

The result of the analysis presented in Table 1 showed that most of the farmers (82.50%) and extension agents (75%) were males whereas 17.50% and 25% were females for farmers and extension agents respectively. This implies that majority of the respondents who were into farming were males. This is in line with the result of Ogunsumi (2008) who reported that most of the farmers and extension agents in the area were males.

With regards to age, the result made it evident that a good number of the farmers (60%) were between 30 – 40 years while 50% of the extension agents were between 41 – 50 years. Furthermore, it showed that nobody among the extension agents was above 60 years while only 2.50% of the farmers were above 60 years. The result further showed that the mean age of the farmers was 37 years while the mean age of the extension agents was 44 years. The implication of this finding is that most of the farmers and extension agents fell within the age of active agricultural productivity. According to FAO (2012), the age for agricultural productivity is between 30 – 45 years. This is the age when the farmers are agile and zealous.

For marital status, it was obvious that 67.50% and 75% of the farmers and extension agents were respectively married while nobody was

divorced among the extension agents but it was seen that 2.50% of the farmers were divorced. This means that most of the farmers and the extension agents were married and have their families to take care of. This finding concurs with the findings of Rewald (2001) which reported that most of the farmers and extension agents were married.

The result on household size portrays that 60% of the farmers had household size of between 9 – 12 persons while 87.5% of the extension agents had household size of between 4 – 8 persons. It was also revealed that the mean household size for the farmers and the extension agents were 9 and 5 respectively. This means that the farmers had higher household size than the extension agents probably because of the fact that the extension agents must have had higher adoption of family planning techniques than the farmers. This is in agreement with the report of Alunas (2014) in assessment of the factors impacting agricultural extension training programs in Tanzania which observed that most of the extension agents in Tanzania adopted family planning.

For farm size, research evidence disclosed that 63.75% of the farmers had farm size of between 0.5 – 1.0 hectare in scattered plots while about 50% of the extension agents had farm size range of 1.1 – 2.0 hectare in scattered plots. The result further showed a mean farm size of 0.6 and 1.4 hectares respectively for farmers and extension agents. This connotes that the extension agents had bigger farms than the farmers maybe because of their ability to hire lands for agricultural production more than the farmers who do not have much fund. This was *in tandem* with the finding of Swanson (2004) in extension strategies for poverty alleviation in a global economy which reported that extension agents have higher ability to engage in commercial farming than small scale farmers.

The evidence from the research disclosed that 65.00% of the farmers earned below ₦100,000 while 100% of the extension agents earned above ₦400,000 annually. The mean annual income of the farmers and extension agents were ₦98, 070 and ₦504,200 respectively. This implied that the

extension agents earned higher than the farmers in the area. This could be attributed to the fact that most of the extension agents who are enrolled in government payroll still engage in other economic activities like farming and business in order to enhance their income unlike the farmers who do not receive pay from the government. This concurs with the findings of Seevers and Graham (2012) who reported that extension agents earned higher than rural farmers in India.

The analysis on educational level divulge that 48.75% of the farmers spent between 13 - 18 years in acquiring formal education which implied that they attended secondary school education while 75% of the extension agents spent above 24 years in acquiring formal education which signifies that they attained tertiary education. The implication was that farmers had received less quality education than the extension agents. This is because though farmers do not require much education to engage in farming activities, extension agents require good education to be able to carry out their duties as trainers of farmers in different agro-enterprises. This corroborates the findings of Tladi-Sekgwama and Tselaesele (2010) who argued that extension agents require quality education as a prerequisite for effective and efficient extension service delivery to farmers in Botswana.

The research findings showed that 63.75% of the farmers had been into farming for between 11 – 15 years while 62.5% of the extension agents have been into extension service delivery for between 5 – 10 years. The mean years of experience were 11 and 7 for farmers and extension agents respectively. This implied that the farmers had spent much more time in farming.

The result on membership to cooperatives showed that all the extension agents were members of cooperative societies whereas only 13.75% of the farmers were cooperative members. The implication of this was that only a few farmers were consistently in contact with the extension agents through cooperative associations.. However, this study refuted Oladele (2005) who reported that most of the rural farmers in the area were cooperative members.

**Table 1: Socio-Economic Characteristics of Farmers and Extension Agents in the Study Area.**

SN	Socio-economic characteristics	Farmers (Freq = 80)		Extension agents (Freq = 08)	
		Frequency (%)	Mean	Frequency (%)	Mean
X <sub>1</sub>	<b>Gender (dummy)</b>				
	Male	66 (82.50)		06 (75)	
	Female	14 (17.50)		02 (25)	
X <sub>2</sub>	<b>Age (years)</b>				
	Below 30	10 (12.50)		01 (12.5)	
	30 – 40	48 (60.00)	37	02 (25)	
	41 – 50	15 (18.75)		04 (50)	44
	51 – 60	05 (6.25)		01 (12.5)	
	Above 60	02 (2.50)		00	
X <sub>3</sub>	<b>Marital Status (dummy)</b>				

	Married	54 (67.50)		06 (75)	
	Single	17 (21.25)		01 (12.5)	
	Divorced	02 (2.50)		00 (0.00)	
	Widowed	07 (8.75)		01 (12.5)	
X <sub>4</sub>	<b>Household size (no of persons)</b>				
	Below 4	05 (6.25)		01 (12.5)	
	4 – 8	19 (23.75)		07 (87.5)	5
	9 – 12	48 (60.00)	10	0 (00)	
	Above 12	08 (10.00)		0 (00)	
X <sub>5</sub>	<b>Farm size (ha)</b>				
	Below 0.5	22 (27.50)		1(12.5)	
	0.5 – 1.0	51 (63.75)	0.6	3 (37.5)	1.4
	1.1 – 2.0	13 (16.25)		4(50)	
	Above 2.0	04 (5.00)		Nil	
X <sub>6</sub>	<b>Total Annual Income (₦)</b>				
	Below 100,000	52 (65.00)	98,070	0 (0)	
	100,000 – 200,000	17 (21.25)		0 (0)	
	201,000 – 400,000	09 (4.16)		00 (0)	
	Above 400,000	02 (2.08)		08(100)	504,200
X <sub>7</sub>	<b>Educational Level (years spent)</b>				
	Below 6	10 (12.50)		0 (00)	
	6 – 12	22 (27.50)		0 (00)	
	13 – 18	39 (48.75)	15	0 (0)	
	19 – 24	08 (10.00)		02 (25)	
	Above 24	01 (1.04)		06 (75)	25
X <sub>8</sub>	<b>Years of Farming Experience (years)</b>				
	Below 5	06 (7.50)		01 (12.5)	
	5 – 10	17 (21.25)		05 (62.50)	07
	11 – 15	51 (63.75)	11	02 (25)	
	16 – 20	04 (5.00)		00	
	Above 20	02 (2.5)		00	
X <sub>9</sub>	<b>Membership to cooperatives</b>				
	Yes	11 (13.75)		08 (100)	
	No	69 (86.25)		00	

Source: Field Survey, 2019

**Please note: Figures outside brackets represents frequencies while the ones in the brackets represent percentages**

#### **Socio-Economic factors determining farmers' Adoption of ADP Extension Technology Packages in the Area**

A coefficient of multiple determinations,  $R^2$  of 81.9% was obtained from multiple regression analysis. This means that about 81.9% of the variations in the dependent variable (adoption of extension technology packages) were caused by variations of independent variables included in the regression model. This high value of  $R^2$  shows that the selected factors of the respondents have strong influence on their adoption level. Furthermore, the overall influence of the independent variables was shown by F-statistics which was significant at 1% level of significance. It is believed that the power of explanatory variables was not exaggerated since  $R^2$  was closely related to  $R^2$  adjusted in numerical value. The low value of Durbin-Watson constant indicates absence of autocorrelation in the regression model meaning that the model was well-specified because

important variables were not omitted. It is therefore assumed that the forecasting power of the regression result is very high due to its statistical reliability and dependability as shown by the low value of standard error.

The coefficient of age was positive and statistically significant at 1%. This implies that any increase in the age of the farmers will increase their adoption of extension technology packages and vice versa. This does not align with the researcher's a priori expectation since increase in age may decrease the farmers' agility, zeal or interest in farming and as well lead to decrease in adoption of extension technology packages. This does not agree with the finding of Alimba (2012) which reported that older farmers are risk averse and so may not adopt improved technologies. Umeh *et al.*, (2015) further

opined that increase in age decreases adoption of improved rice production technologies among rural farmers in Ebonyi state.

The research finding showed that gender was positive and not statistically significant. This connotes that gender of farmers influences the adoption of extension technology packages among rural farmers in the area. This does not align with the a priori expectation given that both males and females have equal opportunities to adopt extension technology packages if they have the capacity to do so. This also, differs with the findings of Roseboo (2004) who opined that both males and females have equal adoption to improved technologies in India.

Income was positively signed and statistically significant at 10%. This means that any increase in the amount of annual income generated by the farmers will lead to direct increase in the adoption of extension technology packages among the farmers and vice versa. This corroborates with the finding of Adejoh, Madugu and Shaibu (2017) who reported that increase in income increases adoption of improved rice production technologies among farmers in Abuja, Nigeria.

Household size was positively signed and statistically significant at 5%. The meaning of this was that any increase in the household size of the farmers will directly lead to increase in the adoption of extension technology packages in the area and vice versa. This agrees with the a priori expectation since any increase in the household size of the farmers may increase their source of extension information and awareness on technology availability and thus result to increased adoption among farmers. This concurs with Okwoche, Obinne and Onugba (2011) in adoption of herbicides and fertilizers among rural farmers of Zone B area of Kogi State Agricultural Development Project, Kogi State, Nigeria who opined that increase in farmers' household size is a advantage to farmers' information source on fertilizer adoption in the area. However, Agwu (2006) in adoption of improved oil palm production and processing technologies in Arochukwu Local Government Area of Abia State, Nigeria reported that increase in household size increases the farmers' expenditure and so decreases

ability to pay for improved production technologies in the area.

Farm size was positively signed and statistically significant at 1%. This implies that any increase in the farm size of the farmers will increase their adoption of extension technology packages and vice versa. This agrees with the researcher's a priori expectation since increase in farm size leads to increase in zeal and readiness to adopt improved technologies to enhance easy production and ensure quality produce. This is in tone with findings of Sani, Abubakar, Yakubu, Atala and Abubakar (2014) who reported that farmers with higher farm size had higher adoption of improved technologies than those whose farm size was small.

The coefficient of educational qualification was positive and statistically significant at 10%. This implies that any increase in quality of education acquired by the farmers will directly lead to increase in the farmers' adoption of extension technology packages. This is in line with the a priori expectation of this study which noted that access to quality education aids farmers to quickly understand the usefulness of an extension technology and as such enhance adoption. This corroborates the findings of Ofuoku, Egho, Enujeke (2009) who argued that increase in access to quality education increases farmer's adoption of improved technologies in the area.

Marital status was negative and not statistically significant. This implied that marital status does not influence adoption of extension technology packages among the farmers. This is true with the a priori expectation since the married, single, divorced, widowed and separated can adopt extension technology packages if they are capable and willing to do so. This corroborates with the work of Otunaiya and Akinleye (2010) which reported that marital status did not influence adoption of improved maize varieties among farmers in the area. However, Onoh and Peter-Onoh (2012) disclosed in adoption of improved oil palm production technology among farmers in Aboh Mbaise Local Government Area of Imo State that married people have higher family responsibilities to meet and so are under much pressure to adopt improved technologies in order to improve yield for better family enhancement.

**Table 2: Multiple Regression Analysis on the Determinants and Influence on Perception and Adoption of Extension Technology Packages in the Area**

Variable name	Regression coefficient	Standard error	T-value	Level of significance
Constant	2.278	0.401	5.680	***
Age	0.499	0.087	5.736	***
Gender	0.060	0.118	0.508	NS
Income level	0.013	0.011	1.180	*

Household size	0.014	0.009	1.555	**
Farm size	0.472	0.053	8.905	***
Educational qualification	0.321	0.400	0.803	*
Marital status	-0.005	0.007	-0.714	NS
F-ratio	108.31			
R <sup>2</sup>	0.819			
Adj R <sup>2</sup>	0.827			
Standard Error of Estimates	0.303			
Durbin-Watson Constant	1.420			

**Source: Field Survey, 2019**

Note: \*\*\* at 1%, \*\* at 5%, \* at 10% and NS is not significant

The resultant model was presented thus;

$$Y = 2.278 + 0.4996X_1 + 0.060X_2 + 0.013X_3 + 0.014X_4 + 0.472X_5 + 0.321X_6 - 0.005X_7 + 0.592$$

(0.408)\* (0.087)\*\*\* (0.118)<sup>NS</sup> (0.011)\* (0.009)\*\* (0.053)\*\*\* (0.400)\* (0.007)\*

### Test of Hypothesis

The result of the F-test on the hypothesis which stated that; the selected socio-economic factors of farmers do not significantly influence their adoption of ADP agricultural extension programmes packages in Ivo L.G.A of Ebonyi State was tested at 5% level and since F-cal (108.31) > F-tab (2.12), the null hypothesis was rejected and the alternative accepted. This means that the selected socio-economic factors of farmers do significantly influence their adoption of ADP agricultural extension programmes packages in Ivo L.G.A of Ebonyi State.

### 4.0 CONCLUSION AND RECOMMENDATIONS

The study therefore concludes that socio-economic characteristics of the farmers influence their adoption of Agricultural Development Programmes technologies in the study area. Hence the following were recommended;

- (i) Educational facilities should be made available for rural farmers to enhance easy adoption of ADP extension technology packages in order to enhance their production;
- (ii) Government and NGOs should endeavour to subsidize the cost of ADP extension technology packages in order to enhance easy access and adoption by rural farmers;

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