# DETERMINANTS FOR THE ADOPTION OF FARMING TECHNOLOGIES IN JENKWE DEVELOPMENT AREA OF NASARAWA STATE, NIGERIA

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## ABSTRACT

*The study focused on the factors influencing the adoption of farming technologies among farmers in Jenkwe Development Area (JDA) of Nasarawa State of Nigeria. The research respondents consisted of 96 farmers from five districts of the development area selected through simple random sampling technique. Primary data were obtained by means of structured interview schedule administered to the respondents. The results were analysed using descriptive statistical tools involving frequency, percentage and means in respect to farmers' characteristics. Regression analysis using the Statistical package of Social Sciences (SPSS) was used to determine the relationship among the variables. The results showed significant negative relationship between adoption and number of farm plots and farm size positively significant correlation with years of farming experience and farm income. Based on the results, the study recommended that technologies dissemination to farmers should be based on economic benefit and assessable to all farmers in the study area.*

***Keywords:*** *Jenkwe Development Area (JDA), Technologies, National Agricultural Extension and Research Liason Services (NAERLS), Monthly Technical Review Meetings (MTRMs); Nasarawa State Agricultural Development Programme (NADP).*

## INTRODUCTION

Jenkwen Development Area (JDA) of Nasarawa State of Nigeria is a typical rural setting. Like most rural areas of developing countries, people in JDA depend mainly on agriculture for their livelihood. According to Onyenwaku (1991), income and standard of living are generally low in rural areas. This is occasioned by incidence of poverty and low standard of living probably brought about by poor agricultural productivity. Utilization of agricultural technologies could provide avenue for improving the quality of life of rural communities. Successive administrations in Nigeria have come with several policies and programmes aimed at delivering agricultural production technologies to farmers and the Nasarawa Agricultural Development Programme (NADP) is one of such strategies. The NADP is established

to accelerate rural and agricultural development through the provision of education, information and guidance using its extension activities. Nevertheless, Oladele (2002) observes that the efficiency of technologies generated and disseminated depended on their effective utilization by farmers. Alao (1979) emphasizes that diffusion of innovation is based on model that examines the socio-demographic factors to explain differentials in adoption rates among farmers without regard to examining technologies themselves and the ability of the farmers to adopt them.

NAERLS (2007) reports existence of few fragmented studies on adoption of farm innovation in Nigeria before the introduction of Training and Visit extension system. However, despite the introduction of T and V system, in the states of central zone of Nigeria (including Nasarawa State) where JDA is located, the level of adoption of all recommended technologies was still low. Nasarawa Agricultural Development Programme (NADP) was established primarily to promote extension activities with the view to increasing crop production and income of small scale farmers. Programme's area of jurisdiction included Western, Central and Southern Zones with headquarters at Keffi, Akwanga and Obi respectively. All the three zones comprised 156 cells, 1248 sub-cells or circles scattered all over Nasarawa State for the purpose of effective extension delivery. Through the organizational set up of the NADP, relevant farming technologies are disseminated to farmers by the extension agents. Monthly Technical Review Meetings (MTRMs) take place regularly with the scientists present to teach the Subject Matter Specialists (SMSs) current innovations. Jointly, they formulate production recommendations to be communicated as massages to farmers through the village extension agents (VEAs).

NAERLS (2007) reports that most of the technologies disseminated in Nigeria including the study areas were crop-based namely: crop varieties, land preparation, plant spacing, weeding, and herbicides to save human labour in weeding, pesticides, fertilizer application and technologies related to women-in-agriculture (WIA). To ensure acceptability of the innovation, the NADP elicits for farmers cooperation in the study area. On-farm testing is carried out to evaluate acceptability during which technical, social, economical, cultural and institutional constraints are taken into account. Farmers selected as contacts for the extension agents are usually willing active farming population of the study area. Abgamu (2006) believes that farmers' participation is essential for gathering indigenous knowledge and for incorporating time-proven solutions into recommendation of improved technology that is suited to local farm circumstances. This situation depicts that farmers in JDA were adequately informed of the improved farming technologies developed for their locality. Their involvement in the technologies evaluation would possibly lead to greater and more readily acceptable technologies. This study was designed to find out determinants of adoption of farming technologies among farmers in JDA of Nasarawa State of Central Nigeria. The specific objectives were to:

(i) Identify the socio-economic characteristics of farmers in the study area.
(ii) Determine the effect of some farmers' characteristics on the adoption of farming technologies in the study area.

## METHODOLOGY

The study is located in the middle Belt zone of central Nigeria. JDA lies between latitudes 70$^{l}$ and 90$^{l}$ North and longitudes 70$^{l}$ and 100$^{l}$ East. Its vegetation is characterized by both flood plain complexes of savannah and mixed leguminous, wooded Savanna mixed with formation of tree, shrubs and grasses and oil palms. It covers area of 550km$^2$ (NADP, 2007) with estimated 70 percent of the people engage in rain-fed subsistence agriculture within the rural setting. Most of the farmers in JDA grow food crops such as yams, millet, beans, groundnuts, beniseed, cassava, and fume acorn and melon seed. A large proportion of the population keeps livestock like goats, sheep, pigs, poultry and cattle. Due to its location, the study area has a climate typical of the tropical zone. It has a maximum temperature of 81.70$^{l}$F and a minimum temperature of 61.70$^{l}$F. Rainfall varies from 121.73cm in some places to 145cm in others (MOI, 2001). The months of December, January and February are cold due to harmattan winds across the North-East. The Development Area is characterized by two distinct seasons: dry and wet. The dry season spans from November to February while wet or rainy season lasts from March to October. The rural economy of the study area is characterized by subsistence (small scale and fragmented) land holdings. Farmers in JDA largely rely on traditional method of cultivation by hoe and cutlasses and crop protection is mostly carried out by way of subsistence orientation.

The population of JDA was put at 325,500 (NPC, 1991). The administrative set up of JDA is made up of five districts namely: Duduguru, Musha, Gidanye, Agwade and Agyaragu Town (JDA, 1999). The entire five districts were selected for the study because the districts belong to the same ecological zone and the ethnic groups that make up the development area have cultural linkage with long record of harmonious co-existence with one another as informed by their historical past. Farmers in the study area comprised 10,000 farm families who have been residing in the five districts for a very long time (NADP, 2007). A simple random sampling technique was used to select 96 respondents. The sample size for this study was regarded as reasonable due to the need for a detailed work and large variables to work with. Furthermore, general area for the study was not excessively large.

Data for the study were generated from primary sources in March, April and May 2009. Structured schedule was developed to collect information on socio-economic variables. Simple percentage, frequency count and mean were used for the analysis of socio-economic variables. The structured interview schedule was validated by some professionals in the Department of Agricultural Economics and Extension of the Nasarawa State University, Lafia Campus. The interview schedules were pre-tested at weekly intervals in each of the districts selected for the study and ten enumerators who understood the local languages were used to assist in administering the interview schedule and noting the respondents responses. The data from the study area were subjected to regression analysis using the statistical package for social science (SPSS) as presented below:

$Y = a + bX_1 + bX_2 + bX_3 + bX_4 + bX_5 + bX_6$

Where:

$Y$ = adoption score
$X_1$ = age (years)
$X_2$ = education (years)
$X_4$ = no. of plots
$X_5$ = farm size (ha)
$X_6$ = income (N,000 Naira)

## RESULTS AND DISCUSSION

### Socio-economic Characteristics of Respondents

Data on Table 1 reveal that farmers in the study area were of middle age which made adoption of improved technologies generally difficult as "aged" people are less likely to bear the risk of trial which is associated with adoption of new technologies. Similar findings from the study area revealed that farmers maximum level of educational attainment were primary/secondary school which inferred low level of education. This made them less likely to understand the scientific basis of agriculture. Imoh and Essien (2005) reported that farmers' level of education influence adoption of technology positively.

Most of the respondents had more than 10 years experience in farming. Years of experience in farming are important because management skills of farmers improve with experience. The results of the study further showed that 90.11 percent of the farmers surveyed were holders of between two to three plots, more than half of which owned between 2 - 5ha, suggesting that they were subsistent farmers. Olayide (1982), reports that majority of Nigerian farmers were usually small-scale farmers. The results of the study, also, showed that average income of a farmer was N61,151.85 per year. This suggested possible reason for embarking on farming as occupation in the study area; and this has great correlation with income generation.

### Relationship between Some Farmers Characteristics and Adoption of Technologies

Table 2 shows the correlation and regression analyses between selected socio-economic variables and adoption of farming technologies. The result showed that at $p< 0.05$ level of significance, adoption has positive and significant relationship with experience, farm size and income. Conversely, number of plots has negative but significant relation with adoption. The coefficient of determination ($r^2$) explains the degree of variation in adoption score (Y) attributable to experience, farm size, income and number of plots. The inference is that 78.9 percent of the variation in $Y$ was attributable to all the significant variables. Table 2 further shows the regression analysis used to determinate the magnitude of change in adoption score ($Y$) by all significant variables ($X$). R-square ($R^2$) shows the total percentage variation in Y variables

(adoption score) explained by the joint contribution of X variables has significant relationship with Y. Age, education, experience, number of farm plots, farm size and income which explained 16.5 percent of the variation in adoption score (Y).

The findings of the study identified years of experience, farm size, farm income and number of plots were all significant determinants of farming technologies adoption in JDA. The coefficients of these significant variables accounted for 78.9 percent of the variability in the level of technology adoption. The number of plots has negative coefficient suggesting that farmers in the study area were at subsistence level and relied on wide use of family labour, the situation which made cultivation on large scale difficult. This problem was compounded by the use of hand tools (low level technology) by most respondents. Implication of this was that the farmers in the study area were risk aversed. Equally, farm size showed negative relation of coefficient possibly because the more the farm size the less the farmers were worried about adoption of new farm practices since they possibly believed they could still meet their demand for sustenance.

The non-significance of the coefficient for age and education is probably because the availability of subsidized fertilizers and improved seeds would serve as the basic motivating factor for technology adoption. The positive relationship between years of experience and adoption implied that adoption of improved technologies tended to be accepted by experienced farmers as they understand the importance of technologies in farming. While positive relationship between income and adoption implied availability of income which enhances farmers' ability to purchase the inputs embodied in the new technology and pay for hired labour needed for the use of these inputs and improved management practices for greater productivity.

## CONCLUSION AND RECOMMENDATIONS

The most important findings of the study were that years of experience and farm income were positively related to adoption while farm size and number of plots were negatively related to technology adoption. Age and education of the respondents were found to be negatively and insignificantly related to technology adoption. Based on the findings of the study, the following recommendations were made:

(i) Technology dissemination to farmers should be based on economic benefit and should also be simple and suited to the education/technological level of the farmers. Such technologies should as much as possible fit into the prevailing farming system of the respondents.

(ii) Technologies recommended to the study area: such as fertilizer, pesticides and herbicides should be made available to farmers at affordable rate and should be timely so as to minimize discontinuation of adoption.

(iii) Participation of youth in agricultural empowerment schemes due to their relative high level of adoption of innovation compared with their other contemporaries should be encouraged.

**Table 1:** Percentage distribution for respondents by age, education level experience number of farm plots, farm size and income

| Variable | Percentage | Central Tendency |
|---|---|---|
| Age (years) | | |
| Up to 30 | 6.32 | |
| 30 - 39 | 22.10 | |
| 40 - 49 | 41.05 | Mean = 44.51 |
| 50 - 59 | 24.21 | Std. Dev. = 8.881 |
| Education level | | |
| No Education | 38.38 | |
| Adult Education | 5.10 | |
| Primary | 27.27 | |
| Secondary | 25.25 | |
| Tertiary | 4.04 | |
| Experience (year) | | |
| 5 - 9 | 16.30 | Mean = 9.59 |
| 10 and above | 83.70 | Std. Dev. =071 |
| No of farm plot | | |
| 1 | 9.89 | |
| 2 | 30.77 | Mean = 2.46 |
| 3 and above | 59.34 | Std. Dev. = 0.71 |
| Farm size (ha) | | |
| Up to 2 | 14.13 | |
| 3 - 5 | 38.04 | Mean = 5.45 |
| 6 - 8 | 30.44 | Std. Dev. 2.79 |
| 9 - 11 | 13.04 | |
| 12 and above | | |
| Income level (N'000) | | |
| Up to 10,000 | | |
| 30,000 - 40,000 | 1.04 | |
| 50,000 - 60,000 | 20.80 | |
| 70,000 - 80,000 | 33.33 | Mean = N61151.85 |
| 90,000 - 100,000 | 15.63 | Std. Dev. = N22886.49 |
| 100,000 and above | | |

***Source:*** Field Survey, 2009

**Table 2:** Correlation and Multiple Regression Showing the Relationship and Effect of Some Socio-Economic Variables of Farmers on Adoption

| Variable | Correlation Coefficient (r) | Coefficient of determination ($r^2$) | Regression Coefficient | T-Value H0 |
|---|---|---|---|---|
| Age | -.0.19 | .361 x 10-3 | -102 | -875 |
| Education | -.075 | .0563 x 10-2 | .028 | -.249 |
| Experience | .190* | .0361 | .44 | 1.337 |
| No. of farm plots | -.229* | .0524 | -242 | -2.298* |
| Farm size | -.198* | .0382 | .231 | 2.225* |
| Income | .172* | .0296 | .185 | 1.552 |

Source: Field Survey, 2009

Number of independent variables = 6; Number of respondent = 96
R is significant at p> 0.05 level; T - square ($R^2$) =0.129
Adjust ($R^2$) = 0.059

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