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A TOBIT ANALYSIS OF PROPENSITY TO DISCONTINUE ADOPTION OF YAM MINISETT TECHNOLOGY AMONG FARMERS IN ANAMBRA STATE, NIGERIA

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ABSTRACT

This study analyzed farmers' propensity to discontinue adoption of yam minisett technology in Anambra State, Nigeria. Data were collected in 2015 with validated questionnaire from 134 proportionately and randomly selected yam farmers. Data collected were analyzed using the Tobit model. Results of the estimation showed that significant variables leading to discontinuance of adopted yam minisett technology were extension visit, participation in extension related workshops, feedback provision, input availability, and perception of yield. Foremost among these factors were extension visits and participated in extension related workshops which therefore should be sustained after farmers have adopted a technology.

Contribution/ Originality: This study is one of very few studies which have investigated propensity to discontinue adoption of yam minisett technology among farmers, using Tobit analysis. The paper's primary contribution is finding that determinants of discontinuance of adopted yam minisett technology were extension, participation in workshops, feedback, input availability and yield perception.

1. INTRODUCTION

Food crisis resulting from rapidly expanding annual population growth rate of 2.9% and food production rate of 2.5% per annum (Central Bank of Nigeria (CBN), 2014) is a major challenge to agricultural research and development policy in Nigeria.

Various efforts have been adopted by the government to boost food crop production and close the food supply and demand deficit in the country. One of such efforts is in the establishment of research and agricultural extension institutions to develop and spread improved agricultural technologies to the farmers, who are largely small scale operators (Remison, 1998; Onemolease and Adisa, 2005).

In order to ameliorate the food production problem, the National Root Crops Research Institute Umudike, Nigeria between 1972 and 1985 evolved and commercialized the yam minisett multiplication by minisett techniques that has high viability and grow at a faster rate (Onemolease and Adisa, 2005; Nnadi and Akwiwu, 2007).

Although yam minisett technology is a Laudable breakthrough in agricultural research, the present concern is on farmers' response in terms of its adoption and sustained use.

It is however, disheartening that after three decades of introducing yam minisett technology, the use has not been sustained by the farmers and seed yam is still being identified as a major constraint to yam production (Ezenwa, 2004; Nnadi and Akwiwu, 2007). However, no empirical data has explained the propensity to discontinuance adoption of the technology in Anambra State in spite of several related researches by Onyenweaku and Mbubah (1991); Adegeye and Adegeye (2001); Onemolease and Adisa (2005); Ezenwa (2004) and Oladele (2005). The paucity of empirical evidences on the concept justifies further investigation.

The objective of this paper is to determine the propensity of farmers to discontinue adoption of yam minisett technology among farmers in Anambra State, Nigeria.

2. METHODOLOGY

Anambra State is one of the 36 States of Nigeria and is located in the South-East zone of the country. It was created in 1991 and had a population figure of 3.669 million people and land mass of 4415.54 square kilometers, 70% of which is rich for agricultural production (Nkematu, 2000). The State is divided into four agricultural zones of Aguata, Anambra, Awka and Onitsha. The zones are further delineated into 24 extension blocks and 120 circles. Farming is the predominant occupation of the people, majority of who are small holders. The major crops cultivated are yam, cassava, rice, maize, cocoyam, cowpea, tomatoes and vegetables, while the livestock produced in the State include poultry, sheep, goats, pig and rabbit.

Three out of the four agricultural zones; Aguata, Awka, and Onitsha were purposively selected on the basis of the intensity of yam production. Two extension blocks were randomly selected from each extension block, making a total of 12 extension circles.

The total sampling frame of 202 yam farmers that adopted the yam minisett technology was obtained from the Anambra State Agricultural Development Project (ADP). The sample size model was used to determine the sample size for the study as;

$$n = \frac{N}{1+N(e^2)} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where,

n= Sample size for the study

N= Total sampling frame from the 12 circles

e= tolerable error level of 5% to obtain a sample size of 134 farmers

The total sampling frame of 202 was made up of 56, 77 and 69 obtained from Aguata, Awka and Onitsha agricultural zones respectively.

The proportionate sampling model as used by Ohajianya and Onuoha (2005) was used to determine the sample size selected from each agricultural zones as follows:

$$n_h = N_h\left(\frac{n}{N}\right) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where,

n_h= Sample size selected from each agricultural zone

N_h= Sampling frame in each agricultural zone

n= Sample size for the study

N= Total sampling frame from the three agricultural zones

to obtain a sample size of 134 farmers composed of 37, 51, and 46 from Aguata, Awka and Onitsha agricultural zones respectively. Random sampling technique was employed to select the 134 farmers for the study.

Data were collected between January and July, 2015 using structured and validated questionnaire. Data were analyzed using the Tobit model.

2.1. Model Specification

The decision to discontinue the adoption of yam minisett technology embodies the endogenous (the characteristics and benefits of the technology itself) and exogenous (institutional characteristics of the technology) such that the observed discontinuance of yam minisett technology is hypothesized to be an end result of these exogenous and endogenous variables at different points on the time and innovativeness continuum. Conventional variables in the studies of adoption bahaviour might have to be eliminated because adoption has already taken place. In order to achieve the objectives of this paper, the Tobit model was used to estimate the propensity of yam minisett farmers to exhibit discontinued adoption behavior. The Tobit model originally developed by Tobin (1958) may be expressed as follows;

$$Y=XB+e\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(1)$$

Where B is a vector of coefficients, X is a vector of independent variables and e is an error term that is assumed to be independently distributed with mean zero and a variance of S^2, Y is a latent variable that is unobservable.

If data for the dependent variable is above the limiting factor, zero in this case, y is observed as a limiting factor. If Y is at the limiting factor, it is held at zero. This relationship is presented mathematically in the following two equations:

$$Y=Y \text{ if } Y> Y_0,\ Y=0 \text{ if } Y\geq Y_0$$

Where Y_0 is the limiting factor.

These two equations represent a censored distribution of the data. The Tobit model can be used to estimate the expected value of Y_i as a function of a set of explanatory variables (Xi) weighted by the probability that Yi>0 (Tobin, 1958). Maddala (1983); Oladele and Kareem (2003) and Oladele (2005) show that the expected intensity of adoption, E (y)= X^BF (z) + δF (z) and z=XB/δ; where =. F (Z) is the value of the derivative of the normal curve at a given point (unit normal density), z is the z-score for the area under the normal curve and s is the standard error of the error term.

Table 1 shows the definition of variables used in the estimated Tobit model.

Table-1. Definition of variables

Variables	Description	Quantification of variable
Dependent variable	Famer's propensity to discontinued adoption	low=0 medium =1 high=2
Discontinued Adoption		
Explanatory variables		
Attitude	change in	1 for yes,
	attitude after adoption	0 otherwise
Extension visit	Extension visit to	1 for yes,
	reinforce the technology	0 otherwise
Feed back provision	Opportunity for expression	1 for yes,
	of reactions to the technology	0 otherwise
Marketability	opportunity to market	1 for yes,
	Surplus yields	0 otherwise
Input availability	Availability of	1 for yes
	required input to sustain adoption	0 otherwise
Perception of yield	Assessment of	1 for yes
	yield potential of technology	0 otherwise
Participation in	Opportunity	1 for yes,
Extension related Workshops	of farmers to participate in extension related workshops	0 otherwise

Source: Survey Data, 2015

The coefficients for variables in the model, B, do not represent marginal effects directly, but the sign of the coefficient will give the researcher information as to the direction of the effect.

3. RESULTS AND DISCUSSION

The results for the estimated model of farmer's propensity to discontinued adoption of yam minisett technology are presented in Table 2.

Table-2. Estimated Tobit model of farmer's propensity to discontinuance adoption of yam minisett technology

Variables	Coefficients	Z- values
Intercept	8.096	6.539**
Attitude	0.317	1.833
Extension visit	0.692	3.057**
Feedback provision	-0.553	-2.542*
Marketability	-0.218	-1.468*
Input availability	0.503	-2.596*
Perception of yield Participation in	-0.378	-2.512*
extension related workshops	-0.447	-3.093**
sample size (n)	134	
Log likelihood	-165.73	
S.E of regression	1.056	

*significant at 5% level

**significant at 1% level

Source: Survey Data, 2015

Five of the variables included in the model are significant, with extension visits and participation in extension related workshops indicating very strong significance at 1% level. This implies that the lack of extension visits to farmers who have adopted the yam minisett technology and their lack of or inadequate participation in extension related workshops would lead to discontinuance. Extension visits to farmers and their participation in extension related workshops will help to reinforce the message and enhance the accuracy of implementation of the yam minisett technology packages. The result on extension visit agrees with that of Oladele (2005) while the finding on participation on extension related workshops is in consonance with Adesina and Baidu-Forson (1995). The provision of feed back on the adopted technology is significant at 5% level. This may be due to the fact that when farmers are unable to express their reaction to researchers and extension agents on the technology they have adopted, withdrawal from such technology will follow. This finding agrees with that of Oladele (2005). Input availability is significant at 5% level. This may be attributed to the fact that the lack of input required for the implementation of the technology package may lead to the rejection of such technology.

Oladele and Kareem (2003) reported that 60% of arable farmers in Oyo State, Nigeria had stopped using fertilizer due to the unavailability, and the untimely and high cost of the input. Perception of yield is inversely related and significant at 5% level which implies that more farmers perceived yam minisett technology as having poor yield. These significant variables are the factors that predispose discontinued adoption of yam minisett technology in Anambra State, Nigeria.Marketability of seed yams got from the practice of the technology and attitude of farmers are not significant at 5% level. Therefore, these variables are not important factors that predispoce discontinued adoption of yam minisett technology in the study area.

4. CONCLUSION AND RECOMMENDATIONS

This study adds to literature on adoption behavior by showing the factors that predisposes discontinued adoption of yam minisett technology. The study has empirically provided insights into the problems that are likely

to occur after the dissemination and adoption of technology by farmers. It has also explored different perspectives by which the explanation of farmer's tendencies to discontinued adoption of technology could be viewed.

Results of Tobit model estimation shows that important variables that stimulate adoption could turn around to cause farmers to discontinue practice of such technology. It is recommended that extension visits and participation in extension related workshops should be sustained after farmers have adopted technology.
Similarly, input supply should be timely and affordable to the farmers.

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