International Journal of Agricultural Sciences and Natural Resources
2014; 1(3): 40-44
Published online August 10, 2014 (http://www.aascit.org/journal/ijasnr)

Keywords
Adoption,
Improved Cassava Production Technology,
Probit Model

Received: February 16, 2014
Revised: August 07, 2014
Accepted: August 08, 2014

Analysis of factors influencing the adoption of improved cassava production technology in Ekiti state, Nigeria

Ojo S. O., Ogunyemi A. I.

Department of Agricultural and Resource Economics, Federal University of Technology Akure, Akure, Nigeria

Email address
davesojo1993@gmail.com (Ojo S. O.)

Citation
Ojo S. O., Ogunyemi A. I.. Analysis of Factors Influencing the Adoption of Improved Cassava Production Technology in Ekiti State, Nigeria. *International Journal of Agricultural Sciences and Natural Resources.* Vol. 1, No. 3, 2014, pp. 40-44.

Abstract
The study analysed the factors influencing the adoption of improved cassava production technology in Ekiti State, Nigeria. Data were collected using a well structured questionnaire assisted with interview schedule from one hundred and twenty respondents selected from six local government areas using the multistage sampling technique. Data were analysed using descriptive statistics, Probit model and budgeting analysis. Results of the socio-economic analysis revealed that about 73.3 percent of the respondents adopted improved cassava production technology and there were significant differences in the socio-economic variables of age, social status, farming experience, major occupation, number of years in cassava farming and farm size between the adopters and non-adopters of improved cassava production technology. Also the cost and return analysis showed that cassava production was profitable with the adopters of improved cassava production technology having higher and significant net returns over the non-adopters. The result of the probit model showed that age, marital status, household size, membership of cooperative society, ownership status, major occupation, contact with extension agent and feedback from the extension personnel were the significant determinants of adoption of improved cassava production technology in the study area. The study thus recommended that effort must be made to motivate farmers through extension agents to embrace improved cassava varieties which will increase cassava production and income to the farmers in Ekiti State and Nigeria at large.

1. Introduction

Agricultural growth is fundamental in fostering economic growth of any agrarian nation in order to feed the growing population (Datt and Ravallion, 1996). However, since area expansion and irrigation have not made much impact on agricultural development in the developing world, agricultural growth will depend more and more on yield increasing technological change (Hossain, 1989). In the same vein, the World Bank (2008) noted that the adoption of new agricultural technology, such as the high yielding varieties that led to a green revolution in Asia could lead to significant increases in agricultural productivity in Africa and stimulate the transition from low productivity subsistence agriculture to a high productivity agro-industrial economy. There is a need to focus attention on high yielding variety crops, most especially

cassava being one of the staple food crops in Nigeria. Cassava plays a vital role in the food security of the rural economy because of its capacity to yield under marginal soil conditions and its tolerance to drought. However, cassava production in Nigeria is still characterised by low yields compared to other cassava growing regions in the world due to some of these factors: planting of low yielding unimproved variety and cultivation of cassava on over used land with very short fallow period with little or none usage of organic or inorganic fertilizer among other factors. The trend in cassava production in Nigeria from 2000 to 2010 shows that area planted increased from 3.3 million hectares in 2000 to 3.875 million hectares in 2007 when it started declining to about 3.125 million hectares in 2010. During the period under review actual cassava production in million metric tonnes rose from 32.01 to 44.58 between 2000 and 2008 and thereby declined to 37.5 million metric tonnes in 2010. The average actual production per hectare was about 10.943 metric tonnes per hectareduring the period under review, whereas cassava production could be as high as 40 metric tonnes per hectare with the planting of improved varieties (FAO Statistics, 2012). Thus cassava production in Nigeria has not yet reached a maximum production level. If the demand for cassava and income generated from cassava production increase, farmers will be motivated to adopt productivity-enhancing technologies to increase yields and to expand cassava production even further (Nang'ayo et al., 2005). This study thus analysed the factors influencing the adoption of improved cassava production technology in Ekiti State, Nigeria. It specifically determined the adoption rate of improved cassava production technology, examined the determinants of the adoption of improved cassava production technology and the level of adoption of cassava technologies on farmers' income in the study area.

2. Methodology

2.1. Study Area

The study was conducted among cassava farmers in Ekiti State, Nigeria. The state is one of the highest producers of cassava in Nigeria (MANR, 2006). The climate of the state is highly favourable for the agrarian activities of its teeming population who grow crops such as cocoa, oil palm and arable crops like maize and cassava.

2.2. Sampling Technique

A multistage sampling technique was used for this study. The first stage was the purposive sampling of two Local Government Areas in each of the three ADP Zones of the state based on their agrarian nature and large production of cassava tuber. The second stage was selection of four communities in each of the Local Government Areas selected using simple random sampling technique. Six respondents were randomly selected from each of these communities. In all, the sample size was 144 respondents. The farmers were then stratified into adopters and non-adopters. Out of the 96 respondents interviewed under adopters, only 88 were retrieved for final use and out of 48 respondents interviewed under non-adopters, only 32 were retrieved.

2.3. Sources and Method of Data Collection

Data were collected from primary source with the aid of a well structured questionnaire assisted with interview schedule.

2.4. Analytical Techniques

Data collected were analysed using descriptive statistics, budgeting and probit analyses. The probit model is generated by a simple latent model of the form shown below in equation;

$$Y^* = X_j \beta + \varepsilon$$

where ε is a normally distributed error term.

Y, (the dependent variable), the variable was zero for non-adopters 1 for adopters

X_i is a set of independent variables.

β_i is a vector of parameters to be estimated,

ε_i is an error term.

The independent variables included in the model are; age, gender, marital status, education, farm size, farming experience, access to extension, opportunity to feed back from the extension personnel, source of labour, major occupation and household size.

3. Result and Discussion

3.1. Socio-economic Characteristics of Adopters and Non-adopters of Improved Cassava Production Technology in Ekiti State

Table 1 presents some socio-economic characteristics of the surveyed cassava farmers by adoption status. The average farming experience for adopters of improved cassava production technology was 16 years with the minimum of 2 years and maximum of 55 years. In the case of non-adopters, the average farming experience was 28 years ranging from 3 to 28 years. However, significant difference at 1 percent was found between improved cassava adopters and non-adopters with regard to their farming experience. Non-adopters of improved cassava production technology were found to have higher number of years of experience in the study area. This makes it so difficult for some of them to leave their old practices and adopt improved cassava varieties. This finding suggests that improved cassava adoption is negatively correlated with years of farming experience. This is consistence with Adesina and Baidu-Forson (1995) who found years of

farming experience as a significant factor in adoption analysis. The difference in the mean age of the adopters and non-adopters was significant at 5 percent. This finding suggests that farmer's adoption of improved cassava production technology depend on their age. However, it contrasts with the findings of Diagne *et al.,* (2009) and Mendola (2006) who found no significant difference between the average ages of cassava technologies adopters and non-adopters. There was no significant difference in the educational status of adopters and non-adopters of improved cassava production technology because most of the farmers in the study area were educated. This contradicts the findings of Oluch-Kosura et al., (2001) that education is an important factor and positively affecting the process of technical adoption. There was no significant difference in the household size of adopters and non-adopters. Furthermore, there was a significant difference in farm size of adopters and non-adopters, with adopters having larger farm size than the non-adopters. The finding was consistent with the finding of Diagne *et al.,* (2009) and Mendola (2006) who found a significant difference in farm size between the technology adopters and non-adopters with the adopters cultivating larger farm size.

There was a significant difference in the major occupation of adopters and non-adopters. This was consistence with the findings of Adesina and Baidu-Forson (1995) who found adoption to be positively correlated with major occupation in Guinea with regard to farmer adoption of mangrove rice varieties.

Table 1. *Socio-Economic Characteristics of Cassava Farmers.*

Variable	Adopters	Non-Adopters	Difference
Mean Age	45.53 (1.09)	53.25 (2.87)	-7.72 (3.08)**
Household Size	4.65 (0.24)	4.94 (0.42)	-0.25 (0.48)
Education (Years)	7.96 (0.72)	6.66 (1.12)	1.30 (1.33)
Farm Size (in hectares)	3.47 (0.40)	1.97 (0.41)	1.49 (0.57)**
Farm Experience (Years)	16.47 (1.26)	18.25 (3.23)	-11.06 (3.47)***
Years in Cassava Farming	12.18 (0.97)	20.59 (2.96)	-8.41 (3.12)**
Major Occupation	2.71 (0.19)	1.66 (0.22)	1.04 (0.30)***
Social Status	1.27 (0.59)	1.69 (0.15)	-0.42 (0.16)**

Figures in parenthesis mean standard error, *** and ** were Significant level at 1% and 5%

3.2. Adoption Rate

In this study, an adopter is defined as a respondent that had grown at least one of the introduced improved cassava varieties for at least one season prior to year 2012 and had the variety on his farms in the year 2012. Over the years, improved varieties have been disseminated to farmers in Ekiti State by Agricultural Development Project (ADP) and International Institute for Tropical Agriculture (IITA). About 73 percent of the respondents had adopted at least one of the improved cassava varieties introduced to them. The highest number of adopters was found in Ikole Local Government Area while Irepodun/Ifelodun Local Government Area had the lowest number of adopters. The highest number of adopters that was found in Ikole Local Government Area could be traced to the Agricultural Development Project (ADP) headquarters located in the Local Government Area.

Table 2 shows that TME 419 was the most widely adopted variety among the introduced improved cassava varieties in the state with 60.63% of the adopters adopting the variety, and Emure Local Government Area had the highest number of TME 419 adopters (85%) followed by Ikole Local Government Area 80(%). Ado and Ise-orun Local Government Area had the least of TME 419. The variety that was least adopted was TMS30572. It was only adopted by farmers in Ado and Ikole Local Government Area and this could be traced to the establishment of Cassava Adding Value for Africa (CAVA) and Agricultural Development Project (ADP) located in these Local Government Areas. TME 419 is very popular and widely adopted by farmers in the study area because of its thin stem and larger yield compared to other varieties introduced. Farmers in the study area established the fact that TME 419 was the best technology introduced to them because of its disease resistance and low water moisture content compared to other varieties.

Table 2. *Adoption of Improved Cassava Production Technology According to Varieties.*

Adopted Technologies	Frequency	Percentage
TMS 00/0203	32	26.67
TMS 0040	43	35.83
NR 01/0004	14	11.67
CR 41-10	29	24.16
TME 419	73	60.83
TMS 30572	6.0	5.0

Note: Multiple responses

3.3. Effect of the Adoption of Improved Cassava Production Technology on Farmers' Income

The result of the budgeting analysis is presented in Table 3. The major components of the variable cost are cost of cassava cuttings and labour cost. There were significant differences at 5% level of significance in the cost of cassava cuttings, labour cost, Total Variable Cost, Total Cost, Revenue, Gross Margin and Net Revenue of improved cassava production technology adopters and non-adopters in the study area. The average yield per hectare for adopters of 22000kg and 13500kg for non-adopters also showed significant difference at 5%.

Table 3. *Budgeting Analysis per Hectare of Cassava Farmers in the Study Area.*

Variables	Adopters	Non-adopters	t-ratio
Farm Size (ha)	3.47 (3.68)	1.97 (2.39)	12.34
Output per ha (kg)	22000 (4.45)	13500 (3.56)	7.34
Cassava cuttings (₦)	7231.67 (200.1)	2000.00 (685.42)	21.32
Labour cost(₦)	12054.17 (3600.2)	9145.83 (1216.5)	6.61
Total Variable Cost(₦)	66850.84 (23070)	44041.88 (6095.2)	8.49
Total Fixed Cost (₦)	20491.66 (560.63)	15000 (2300.1)	13.36
Total Cost	87342.5 (29930)	57041.88 (2019.1)	9.44
Revenue (₦)	160707.50 (27000)	75791.67 (5673.2)	27.86
Gross margin (₦)	93856.66 (31070)	31749.79 (7010.4)	22.29
Net Profit (₦)	73365.00 (27060)	18749.79 (3500.4)	28.52
GM per ha	27048.09	16116.64	
Net Profit per ha	21142.65	9517.66	

3.4. Determinants of Adoption of Improved Cassava Production Technology

The result of determinants of adoption of improved cassava production technology by farmers in the study area is shown in Table 4. The likelihood estimates of the probit model indicated that the chi-square (X^2) statistic of 93.39 was highly significant ($P<0.0001$) suggesting that the model has a strong explanatory power. The pseudo coefficient of multiple determination (R^2) shows that 67.58 percent variation in the dependent variable was explained by the included independent variables. This implies that the model showed a good fit to the data.

Table 4. *Determinants of Adoption of Improved Cassava Production Technology. * indicate significance at P>5%*

Variables	Coefficient	T-value
Age	-0.9793*	-3.03
Gender	-0.9775	-1.75
Marital Status	-0.8235*	-2.06
Family size	0.3965*	2.74
Education	0.0826	0.90
Type of farm	-0.4416	-1.17
Ownership status	-1.6242*	-2.84
Cooperative society	1.3447*	2.19
Major occupation	0.4860*	2.26
Distance to farm	0.0168	0.53
Farm size	-0.0574	-0.46
Source of Finance	-0.4278	-0.87
Source of Labour	-0.3172	-0.11
Contact with extension	0.9164*	2.35
Feedback from ext. agents	2.9999*	2.54
Constant	11.9548	
Chi Square	95.39	2.57
Pseudo R^2	67.58	

The study revealed that age of respondents, marital status, family size, ownership status, cooperative membership, major occupation, contact with extension and feedback from extension were significant factors in the adoption of improved cassava production technology in the study area. However, age of respondents, marital status and ownership status though significant in the adoption of the improved cassava production technology, had inverse relationship with probability of adoption of improved cassava production technology. The study further revealed that though education, distance of farm, positively influenced adoption of improved cassava production technology, they were however not significant.

4. Conclusion and Recommendation

Adoption of improved varieties alongside crop management techniques is considered as an important input for the achievement of increased agricultural productivity and food security status of farm households in Nigeria. Factors influencing the extent of adoption of various technologies on cassava production in Ekiti State were analysed. The factors that contributed majorly to the adoption of cassava improved technologies among the respondents include age, family size, ownership status, cooperative membership, farming as major occupation, access to extension agent and opportunity to feedback. As revealed by the findings of this study, it is very clear that adoption of improved cassava production technology will definitely increase the productivity per hectare of the farmers' in the state and thereby increase their standard of living. The study thus recommended that effort must be made to motivate farmers through extension agents to embrace improved cassava varieties which will increase cassava production in Ekiti State and Nigeria at large.

References

[1] Adesina, A.A. and J. Baidu-Forson. 1995.―Farmers‘ Perceptions and Adoption of New Agricultural Technology: Evidence From Analysis in Burkina Faso and Guinea, West Africa. ‖ *Journal of Agricultural Economics.* 13 (1995):1-9.

[2] Datt, G., Ravallion, M., 1996. How important to India‘s Poor is the sectoral composition of growth? World Bank Economic Review 10 (1), 1-26.

[3] Diagne A, Adekambi S. A, Simtowe F.P,. 2009. The impact of Agricultural Technology adoption on Poverty: The case of NERICA rice varieties in Benin.

[4] Ekiti State Government (2006)' History and information of the fountain of knowledge'ministry of information, (2006)

[5] Food and Agriculture Organisation, (FAO) (2012). Cassava Production Statistics. http:/www.fao.org

[6] Hossain, M., 1989. Green Revolution in Bangladesh: Impact on Growth and Distribution of Income. University Press Ltd, Dhaka.

[7] IITA (2004) "Annual Report of the International Institute of Tropical Agriculture", IITA report, Ibadan, Nigeria, Project%20E%202004.pdf (last consulted: 16 June 2009)

[8] IITA, (2006); Cassava the Multipurpose Crop.

[9] MANR (2006). Report on Cassava in Ekiti State of Nigeria. Ministry of Agriculture and Natural Resources.

[10] Manyong V.M., A.G.O. Dixon, K.O. Makinde, M. Bokanga and J. Whyte, (2003); The Contribution of IITA-Improved Cassava to Food Security in Sub-Saharan Africa: An Impact Study. International Institute of Tropical Agriculture, Ibadan, Nigeria.

[11] Mendola M. 2006. Agricultural technology adoption and poverty reduction: A propensity score matching analysis for rural Bangladesh. *Food policy* 32 (2007): 372-393.

[12] Oluoch-Kosura WA, Marenya PP, Nzuma MJ (2001). Soil fertility management in maize based production system in Kenya. Current options and the future strategies. Paper submitted at the seventh Eastern and Southern Africa regional maize conference, Nairobi, pp. 350-355.

[13] Omonona B T, Oni O A and Uwagboe A O.(2003), "Adoption of Improved Cassava Varieties and its Welfare Impact on Rural Farming households in Edo State, Nigeria. Journal of Agricultural and Food Information.

[14] World Bank. 2008. World Development report. Agriculture for development. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/0 (accessed June, 2009)

[15] Nang'ayo F: G. Omanya; M. Bokanga; M; Odera; N. Mushiri; Z.Ali and P.Werehire. (eds). (2005) A Strategy for Industrialisation of Cassava in Africa: proceedings of the Small Group Meeting, 14-18 November 2005, Ibadan, Nigeria. Nairobi, Kenya: African Agricultural technology Foundation