DETERMINANTS OF THE ADOPTION OF IMPROVED CASSAVA VARIETIES (TME 419 AND NR 8082) AMONG FARMERS IN ABIA STATE.

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ABSTRACT

The study ascertained the determinants of adoption of two improved cassava varieties developed and transferred by National Root Crops Research Institute (NRCRI) Umudike to farmers in Abia State and the whole of South-East Agro-ecological Zone of Nigeria. The study was based on the mandate of Natural Root Crop Research Institute, Umudike, which are development of Root and Tuber crops Technologies and dissemination of the technology to the farmers. The objectives of this study were to ascertain the determinants of the adoption of two improved cassava varieties among farmers in Abia State, determine the socio-economic profile of respondents, investigate the level of adoption of these varieties, discuss farmers perception of these cassava varieties, identify and analyzed the determinants of adoption of this technology. The data were collected by means of simple random sampling. The data were collected from 150 farmers randomly selected from five out of 17 LGAs, in Abia State. An interview schedule with a well' structured questionnaire was used for the study. The data were analyzed by means of frequency tables, percentages, means, classical model and probit model analysis. The result of probit model analysis on determinants of adoption of these varieties shows an R^2 value of 0.3842 for TME 419 and 0.2677 for NR8082 varieties. This indicates that 38.4% of the variation of adoption of TME 419 cassava variety was explained (or accounted for) by the independent variables considered in this study. Similarly, the analysis revealed that 27% of variation in adoption of NR8082 cassava variety was accounted for by the variables examined in this study. The significant determinants of adoption of the two improved varieties were: educational status, farming experience, sex, membership of co-operative society, extension contact, adaptability of technology and compatibility of technology which significantly and positively influenced adoption. Age, sex and complexity of technology had negative influence on adoption. The level of adoption of these varieties had a grand mean of 3.89 which was higher than the mean adoption score of TME419 but lower than that of NR8082 showing that NR8082 has higher level of adoption than TME 419. The result exposed the reasons for adoption and non adoption of these varieties, the problems facing cassava farmers in the study area, the suggested remedies by the farmers. Since farmers accepted these two varieties in their varying degrees as a result of their qualities, it was recommended that cassava research institute would continue to multiply these improved and accepted varieties to the farmers for increased productivity.It was also recommended that Agricultural inputs be made available for farmers at subsidize rates, such as fertilizers, improved planting materials like cassava varieties, that are resistance to attacks of higher animals like goat. Labour subsidy, provision of loan and establishment of nearby markets for cassava farmers will help to improve agricultural production in the study area as well as reducing the problem of Economic /food crisis in the economy today.

INTRODUCTION

Agriculture is the main source of living in Nigeria, and has always played a pivotal role in the history of Nigeria's economic development (Imoudu, 2005). Over several decades, agriculture has provided food, security, employment, foreign reserve and reduced poverty, making the sector a bedrock of the national economy, (CBN, 2003). The pattern of Nigerian Agriculture is dualistic and this reflects on the existence of small resource-poor peasant farmers existing alongside a few large-scale commercial cultivators. The farmer use traditional methods and produce mainly for subsistence, while the latter employ modern inputs and management to optimize operational activities (ECA, 2002).

For some time now, it has been established that there is a problem of low production in Nigerian agriculture. The yield of most crops from farmer's field is very low. This perennial decline in the agricultural sector of the nation has attracted attention, and the relatively low performance of Nigeria agricultural sector is attributed to the features of the National Agricultural System such as structural dualism, farming system, land use pattern and marginalization of the agricultural sector (Imoudu, 2005). The marginalization of the agricultural sector was not without grave implications for the sector and the economy in general. The inability of the agricultural sector to play its vital roles in the economy lies at the heart of the nation's economic performance, which is the bane of the nation's sustainable development (CBN, 2003).

This decline in agricultural production is reflected in the poor yield of most crops. About 11 million tones of cassava roots are produced annually and the average cassava production in farmers plot in 1978 was 10 tonnes per hectare, but with improved varieties of cassava from National Root Crops Research Institute (NRCRI) Umudike and International Institute of Tropical Agriculture (IITA) Ibadan, yields have gone up to 30 – 40 tonnes per hectare (Nwosu, 2005). Cassava ranks among the highest most important food crop world wide and the highest food crop produced in the developing countries. It serves as food, provides employment and provides raw materials. Cassava can be eaten as fufu, garri, tapioca. It can be eaten raw, roasted or fried, boiled, and in many other forms. The leaves serve as source of protein for both human beings and livestock (Ravindran and Kenkpen, 2006).

Due to the importance of cassava, a lot of improved varieties have been developed by research institutes for the farmers to adopt in order to boost yield. These varieties have high yielding capacity per unit area of land are tolerant to major prevalent diseases like Cassava Mosaic virus Disease (CMD). Cassava Bacteria Blight and cassava pest like cassava mealy bug (*pheacoccus manihotts).*

They also have low cyanide content, high starch, hish garri index and are early maturing (ADP, 2001). Most of these varieties have been transferred to the farmers, but it was observed that many of them have not yet adopted them. For instance, production technologies in root and tuber crops were disseminated by National Root Crops Research Institute (NRCRI) Umudike to farmers in Abia State and other states in the South-East agro ecological zone of Nigeria through ADP and other extension methods (Asumugha and Akinpelu, 2005). TME 419, TMS 96/0002, NR 8082 etc were developed and transferred to the farmers through the ADP and Extension Service Programme of the NRCRI Umudike.

These varieties have the following qualities: Yield =35 - 45t/ha, Starch = 15 – 22%, Dry matter = 30 - 42%, good branching habit and high flour yield. TME is a collaborative work between IITA and NRCRI while NR 8082 was specifically developed by NRCRI Umudike. This study intends to ascertain the rate of adoption of these varieties among the farmers. The work will help to identify those factors that determined the adoption and non-adoption of these varieties by the farmers.

This study therefore intends to find who has adopted these recommended cassava varieties and factors determining the adoption of these varieties.

1.3 OBJECTIVES OF THE STUDY

The general objective of the study was to investigate the determinants of adoption of recommended cassava varieties. (TME 419, and NR 8082,) by farmers in Abia State.

Specific Objectives were to –
1. determine the socio-economic characteristics of the respondents;
2. determine the level of awareness and adoption of these recommended cassava varieties;
3. ascertain the sources of information about the technology; and
4. to identify and analyze the determinants of adoption of improved cassava varieties.

Research Methodology

The study was conducted in Abia State in 2009; five out of seventeen LGAs in Abia State were purposely selected for the study because these areas are known for cassava farming. They are Isuikwuato, Umunneochi, Umuahia South, Bende and Ukwa East, covering the three agricultural zones of Abia State. Two communities were randomly selected from each of the LGAs and 15 registered cassava farmers were randomly selected in each of these communities making it a total of 30 farmers randomly selected in each of the LGAs. An interview schedule and a well structured questionnaire were used to elicit information from 150 respondents selected.

Data were analyzed by means of descriptive statistics like frequency tables, percentages, means and probit model analysis.

The probit model is specified in the implicit form as follows:

Where Y $=$ $F(X_1, X_2, X_3, \ldots X_{14}, + Y)$

Where Y $=$ $F(X_1, X_2, X_3, \ldots X_{14} + U)$

Y: Adoption Index (Stages of adoption by Respondents (Adoption = 1, non = 0)

X_1: Age of farmers (in years).

X_2: Sex (Male = 1, Female = 0)

X_3: Marital status (Married – 1, Not married - 0)

X_4: Household size (No of people feeding from the same pot)

X_5:   Educational status (in years)
X_6:   Level of income (per annum)
X_7:   Farming experience (in years)
X_8:   Membership of a co-operative or farm association (membership = 1 Non = 0)
X_9:   Total farm size (in hectares)
X_{10}:   Contact with Extension staff (in months)
X_{11}:   Complexity of technology (Complex 1, non 0).
X_{12}:   Profitability (Profitable, non 0)
X_{13}:   Adaptability (Adapable 1, non 0)
X_{14}:   Compatiblity (Compatible 1, non 0)
U: Error term

RESULTS AND DISCUSSION

Table 1 reveals that majority (86.1%) were within the age range of 40 – 60 years and above. This shows that cassava farmers in Abia State were more of elderly people rather than youths who are between 20 – 40 years, and still very active. This agrees with Pur et al, 2007 and Nwakor et al, 2008 that the level of youths involvement in agriculture has reduced due to schooling and part-time farming. Also majority (54.7% of the cassava farmers in the study area were female which also agrees with the finding of Ironkwe and Asumugha (2007). This implies that women should be given equal right in land ownership in Abia state since they were the active farmers. Majority (70.7%) were married people. About 81.3%) were educated at their varying levels, and this has positive influence on adoption. Majority (57.3%) of the respondents were part-time farmers. Full time farmers are expected to have high adoption rate than part-time farmers. About (70%) of the respondents had above 21 – 30 years farming experience which is expected to have positive influrnce on adoption. Majority of the respondents (89.3%) farmed less than 5 acres of land. The farmers were more of part-time and it affect their production. This agrees with Mba (2007) in Enugu State. Mixed cropping is the major farming system in the study area.

Tables 2 shows that majority of the farmers were aware of NR8082 (96.7%) and TME 419 (80.0) varieties. The high level of awareness of these varieties could be attributed to the location of National Root Crops Research Institute (NRCRI) in Abia State. It is the duty of this Institute to develop, transfer and train the farmers on how to use the technology. This agreed with the finding of Okonade (2005) and Apata et al. 2008 who discovered a high level of awareness of this technology in Oyo and Delta States Nigeria. Coming to adoption stages, of TME 419 only 30% have fully adopted the technology. Twenty five percent were still on awareness stage while 4% and 4% were on the interest and evaluation stages. The mean adoption score here is ($X = 3.62$). In NR 8082, about 57.3% of the respondents have fully adopted this technology. The mean adoption score here is $X = 4.70$. This implies that the adoption of NR 8082 was higher among the adopters.

Table 1: Socio-economic Characteristics of Respondents

Variables	No of Respondents	Percentages
Age		
20 or less	03	2.0
21 – 30	07	4.6
32 – 40	11	7.3
41 – 50	49	32.7
50 – 60	55	16.7
Above 60	25	100
Sex		
Male	68	45.3
Female	82	54.7
		100
Marital Status		
Single	44	29.3
Married	106	70.7
		100
Educational Status		
No School	28	18.7
Primary	29	19.3
Secondary	58	38.7
Tertiary	35	23/3
		100
Farm Involvement		
Full Time	64	42.7
Part Time	86	53.3
		100
Farming Experience		
1 – 10	13	8.7
11 – 20	31	20.7
21 – 30	45	30.0
Above 30	61	40.0
		100
Farm Size		
0 - 1 acre	44	29.3
2 - 3 acre	49	32.7
4 - 5 acre	41	27.3
6 - 7 acre	6	4.0
8 acre & above	10	6.7
		100
Farming System		
Mono cropping	03	2.0
Mixed Cropping	78	52.0
Mixed farming	33	22.0
All of the above	36	24.0
None of the above	-	-
		100

Source: Field Survey, 2009.

Table 3 shows that 34.0% and 30.0% of respondents got information about these improved varieties from ADP/Extension workers and fellow farmers respectively. About 11.4% heard about it from research institutes. This shows that extension workers in Abia State were doing their work effectively which leads to a positive influence in the adoption level of this technology. Source of information is expected to have positive influence on Adoption of improved varieties. This agrees with Nwachukwu and Uchechi (2008) who observed a positive relationship between source of information and adoption of improved cassava varieties.

Table 2: Distribution of Respondents according to Awareness and Adoption of Improved Cassava Varieties.

Awareness stage				
TME 419		**%**	**NR 8082**	**%**
Unaware	30	20.0	5	3.3
Aware	120	80.0	145	96.7
Total	150	100	150	100
Stages of Adoption				
TME 419		**%**	**NR 8082**	**%**
Unaware	30	20	05	3.5
Aware	34	25.3	24	10.0
Interest	6	4.0	14	9.3
Evaluation	6	4.0	5	3.3
Trial	25	16.7	15	10.0
Adoption	45	30.0	86	57.3
Discontinued adoption	00	00	01	0.7
Total adoption score		**543**	**706**	
Mean adoption score		**3.62**	**4.70**	

Source: Field Survey, 2009.

Table 3: Distribution of Respondents According to Source of Information of Improved Varieties.

Source	Respondents	Percentage
ADP/Extension Workers	51	34.0
Mass Media (Radio)	15	10.0
NRCRI, Umudike	17	11.4
Sales Agents	08	5.3
Fellow Farmers	05	30.0
Market People	06	4.0
Others (Specify)	08	5.3

Source: Field Survey, 2009.

Table 4: The Result of Probit Model Analysis on the Determinants of Adoption of Two Improved Cassava Varieties TME419 and NR8082

Variable	TME419 Coefficient	Standard error	T value	NR8082 Coefficient	Standard error	T value
Age (X_1)	-.3467234	.1610008	- 2.15**	-.435444	.1824578	-. 39**
Sex (X_2)	-.6275347	.3195593	- 1.96*	.6810573	.3301048	2.06**
Marital status (X_3)	-284545	.4388819	- 0.65	-82755974	.5924909	- 1.40
Household (X_4)	-0553817	.1776471	- 0.31	.0742263	.1769382	0.42
Education status (X_5)	.2587364	.152331	1.70*	.5418162	.181666	2.98***
Income (X_6)	-.1446044	.1679632	- 0.86	-1868641	.2085854	- 0.90
Family experience (X_7)	.7436382	.2051682	3.62***	.1544868	.1724209	0.90
Member of cooperative (X_8)	.7813431	.3140315	2.49**	.452327	.3066208	1.48
Farm size (X_9)	.1288155	.1609846	0.80	-0817202	.1513319	- 0.54
Extension contact (X_{10})	.9865689	.3223938	3.06***	-1920288	.1861979	- 1.03
Complexity of technology (X_{11})	-1.455779	.3622265	- 4.02***	-0796184	.0309869	- 2.57**
Profitability (X_{12})	-.0821131	.289798	- 0.28	-6556734	.8629816	- 0.76
Adaptability (X_{13})	1.581658	.6287413	2.52**	.2760361	.543703	5.15***
Compatibility (X_{14})	7.786045	.6356993	12.25***	.6237272	.2990147	2.09**
Constant	-669382	.8626366	- 0.78	.4853969	.9585796	0.51

Source: Strata 8A Computer Analysis printed out, 2009.

*** significant at 10% level   Statistics
** significant at 5% level   LR 79.79 and 39.44
* significant at 1%   probit>chi2 = 0.0000 and 0.0003
                          Log likehihood = 63.956394 and 53.934663
                          pseudo R^2 = 0.3842 and 0.26

Determinants of Adoption of TME 419 and NR 8082 Cassava Varieties

The result of probit model analysis in Table 4 shows an R^2 value of 0.3842 for TME 419 and R2 value of 0.2677 for NR8082 Varieties. This indicates that 38.4% of the variation in adoption of TME 419 Cassava variety was accounted for by the independent variables considered in this study. Similarly, the analysis revealed that 27% of variation in adoption of NR8082 cassava variety was accounted for by the variables examined in this study. Also, the log likelihood of -63.956594 and -53.934663 and chi-square of 0.0000 and 0.0003 indicates a good fit for the model.

Specifically, educational status, farming experience, sex, membership of co-operative society, extension contact and adaptability of the innovation and compatibility of the technology are serious determinants because they have positive and significant influence on adoption of improved cassava varieties at varying degree of significance, while the farmers age and complexity have negative and significant influence on the adoption of improved cassava varieties at five percent and ten percent levels of significance.

Extension contact has a positive and significant relationship with adoption of improved cassava varieties. The level of significant is 10% in TME419, meaning that extension contact influence adoption of this improved variety. The reason may be that the farmers were already used to NR8082 and they were eager for newly released varieties. This agrees with the research result of (Okonade et al, 2005) that 90% of small scale farmers in the rural communities derived agricultural information from extension agents.

Complexity of innovation was negative and statistically significant at 10% level of TME419 and 5% level in NR8082. The interpretation is that when the technology is complex to handle it will reduce the adoption of that technology. This agreed with Rogers (1995) that factors like compatibility, complexity, agreeability and adaptability affect adoption of innovation.

Table 5: Distribution of Respondents According to Suggested Remedies to improve Cassava Production.

Farmers suggested remedies	Respondents	Percentage %
Establishment of Demo plots	30	20
Provision of loan	60	40
Provision of input	112	74.7
Provision of expert advice	02	1.3
Creation of market	60	40.0
Agricultural subsidy/labour	97	64.7
Agric. Shows workshop/seminar	04	2.7
Employ more extension staff	08	5.3
Mechanical agriculture	58	38.7
Improved processing	12	8.0
Awareness Campaign	12	8.0
Development of variety that resist goat attack	30	20
Provision of land		33.3
Reduce cost of pre-emergence herbicides	50	6.7
Farm settlement scheme	10	
Regular supply of improved varieties	10	6.7
Total	50	33.3
	605	**403.4**

Source: Field Survey 2009.   * Multiple responses recorded.

Adaptability has a positive and significant relationship at 5% level with TME 419 and 10% level with NR8082, the implication is that any increase in this variable will lead to increase in adoption. This agrees with that factors related to determinants of adoption include adaptability and appropriateness of the technology.
Compatibility has positive and significant relationship adoption at 10% and 5% levels for the two improved varieties and therefore strong determinants of adoption, showing that the compatibility of the innovation increases the

adoption of the innovation when the technology is similar and agreed with the existing culture it will hasten the adoption of such technology. This agreed with Rogers (1995) that there are characteristics of the innovation of farmers that affect their rate of adoption such as compatibility and complexity of the technology.

Table 5 shows the suggested remedies by the farmers to improve cassava production in Abia State. Majority (74.7%) suggested provision of farm input. (64.7%) suggested agricultural labour subsidy (40.0%) and 40.0% suggested provision of loan and creation of market for cassava (38.7%) and (6.7%) suggested mechanical agriculture and provision of land. Others suggested establishment of demonstration plots, the use of agric show/seminar and release of goat resistant variety. The interpretation is that the farmers will adopt innovation more when the inputs are available and when the cost of labour become reduced. This agrees with Kanku and Mukerji (1998) who stated that labour is the primary instrument for increasing production and a critical determinant of agricultural production.

SUMMARY, CONCLUSION

This work was designed to study farmer's adoption of two improved cassava varieties developed and transferred by NRCRI Umudike by farmers in five Local Government Areas in Abia State. These varieties are (TME 419 and NR 8082).

The data collected in this study were analyzed using frequency tables, percentages, means and probit model analysis. The probit model was used to analyze the determinants of adoption of the two improved cassava varieties among farmers in five local government areas of Abia State. Results from the study showed that both socio-economic characteristics of the farmers and the characteristics of the technology attributed to the adoption of improved cassava varieties in the study area.

The result of the socio-economic characteristics of the farmers shows that majority (86.1%) were above 40 years of age which influenced adoption negatively. Majority (4.7%) were women which also has influenced on adoption Majority (81.3%) were literate and this has a positive and serious influence on adoption of improved cassava varieties. Majority were members of farmers co-operative (55.3%). About 70.6% have 21 – 30 years farming experience. The result of the awareness of these varieties showed that majority (96.7%) and (80,9%) were aware if these varieties (TME 419 and NR 8082). The source of information about this technology shows that majority (34.0%) heard about this technology from extension agents followed by farmers (30.0%) and research institute (11.4%).

The result of probit model analysis shows that ten out of fourteen variable considered were significant in adoption of improved cassava varieties studied.

The constraints in growing cassava by these farmers were lack of input, fund and high cost of labour. The provision of these amenities will help to increase cassava production and adoption of improved varieties in the study area.

RECOMMENDATIONS

Since the ADP extension agents are the major source of information of technology transfer. The government should improve the working condition of ADP staff and equip the body with necessary equipment for work.

The government should therefore encourage the youths into farming by creating awareness campaign, provision of incentives like loans and other tangible gifts/awards.

The developers of this technology (Research Institutes) should be more equipped and encouraged financially by the government for them to release more and better breeds or cultivars in order to reduce the problems of food crisis in the country.

Land inheritance problem which affect women more today should be removed and land should be equally distributed in families among the male and female in the family for increase production. Government policy should consider these farmers demand.

Farmers requested that a variety that can resist goat and attack of higher animals be released for them. Cassava breeders should take note of this demand.

Farmers also complained of lack of planting material for cassava production. Government should therefore supply the farmers with improved planting materials at subsidize rate, Government should provide other inputs such as fertilizer and agricultural chemical at affordable price to farmers for increase production.

It is recommended that Agricultural Research Institute will continue to release these varieties for farmers in Abia State, for increased food production and to reduce global food crisis in Abia State in particular and Nigeria in general.

Farmers should be encouraged into cassava production by siting of cassava market closer to the farmers in the rural communities to sell their farm product easily.

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