ADOPTION OF AGRICULTURAL EXTENSION AGENTS' INNOVATIVE PACKAGES BY CASSAVA FARMERS IN OVIA SOUTH-WEST LOCAL GOVERNMENT AREA, EDO STATE, NIGERIA

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Abstract: The study examined the Adoption of Agricultural Extension Agents innovative packages by cassava farmers in Ovia South-West Local Government Area of Edo State, Nigeria. Primary data were elicited through well structured interview schedule administered to 100 farmers. The secondary data were obtained from the official records of Agricultural Development Programme extension agents in the State, libraries and internet. Descriptive and inferential statistics were used to analyse data. They include the use of mean, frequency, standard deviation and percentages. Findings revealed that the main information sources on improved cassava in the area were: radio, television, friends, relatives, extension agents, and Global System for Mobile Communication (GSM). phone in that order. Regression result show factors such as farming experience (2%), extension (2.5%), mass media exposure (8.1%) and group number (2.8%) were found significantly influence adoption a technology package. Result shows that the mean score for level of production increase from 2.8 tonnes/ha before adoption to 5.16 tonnes/ha after adoption of improved cultivar of cassava while the means level of farmers increase from ₦13.875.41 before adoption N16, 412, 92 tonnes/Ha after adoption. Based on the findings of the study it was recommended that those factors and innovative attributes that contributed to adoption should be capture in future planning of agriculture project in the state, particularly in the study area, in view of identified constraints in which 98% of the farmers expensed dissatisfaction with lack of access to inorganic fertilizers and 90% of the farmers complained lack of tractors for hiring, among others, Government should intervene by establishing agro-service centres at strategic location that are adequately stocked with inputs to be sold to the farmer at subsidized rates, so as fast-track commercial agriculture in the study area.

Keywords: Adoption, Agricultural Extension Agents, innovative packages, cassava farmers

Introduction

Cassava (*Manihot excultenta, Grantz)* is one of the most widely cultivated crops in Nigeria. It is generally cultivated on small-holdings in association with crops such as maize, groundnut, cowpea, vegetables and cocoyam depending on the agro-ecological zone. It relies on residual soil nutrients when intercropped with maize which has been fertilized or as following crop in rotation with legumes (Chukwuji, 2008). Cassava crop is grown in 24 States out of the 36 States in Nigeria including the Federal Capital Territory (FCT). It does not only serve as a food crop but more also as a major source of income for rural households. Nigeria is been known to be the largest producer of cassava in the world with an annual production of over 34 million tonnes of tuberous roots (FAO, 2009).

According to Tonukari (2004), cassava ranks very high among crops that convert the greatest amount of solar energy into soluble carbohydrates per unit of area. Among the starchy staples, cassava gives a carbohydrate requirement which is about 40% higher than rice and 25% more than maize. It is the cheapest source of calories for both human nutrition and animal feeding. Akinnagbe *et al.* (2010) reported that there is a low level of information dissemination between research institutes and cassava farmers about improved high yielding varieties thereby leaving a greater percentage of cassava farmers to continue to rely on low-yielding varieties for cultivation.

As a way out of the problem, Ugwu (2008) posited that agricultural extension plays a pivotal role in ensuring the awareness and subsequent adoption of the contemporary methods of cassava production. According to Davies (2009), agricultural extension and advisory services play an important role in agricultural development and can contribute to improving the welfare of farmers and other people living in rural areas. Extension services can be organized and delivered in a variety of forms, but their ultimate aim is to increase farmers' productivity and income (Bamgbose *et el.*, 2008).

Ayanwuyi *et al*, (2010) also reported that extension service is an important link between the research centres and the farm families which help to convince farmers through the use of educational methods to accept scientific findings (new innovations) and technological developments that are relevant in improving their methods of agricultural practices. Based on the aforementioned, this study is motivated to determine the adoption of Agricultural Extention Agent Innovation Package by cassava farmers in Ovia South-West LGA of Edo State.

Objectives of the Study

- Describe the Socio-economic Characteristics of farmers affecting adoption of improved cassava technological package in the study area
- Identify the main source of information on improved cassava technological packages of used by farmers in the study area
- Determine the awareness of improved cassava technological packages by farmers in the study area
- Determine the effects of adoption of the improved cassava technology packages on farmers production level and income in the study area
- Ascertain constraints to adoption of improved cassava technological packages by farmers in the study area.

Materials and Methods

Area of study

The study was carried out in Ovia-South-West LGA which is one of the eighteen local government areas in Edo State, Nigeria. Edo State lies within the geographical coordinates of Longitudes 05°04' East and 06° 431 East and Latitudes 05° 44^1 North and 07^034^1 North of the Greenwich Meridian.

Sampling method

A multi-stage sampling technic was employed in the selection of cassava farmers for the study.

Stage 1: Stage 1was the purposive sampling of Ovia South-West Local Government Area from the eighteen local government areas in Edo state because of their mass involvement in agricultural activities.

Stage 2. Involved the purposive sampling of four communities (Iguobazuwa, Siluko, Usen and Udo) out of six major communities in the study area. They were sampled because their involvement of cassava production.

Stage 3: The third stage was the random sampling of 25 cassava farmers from each of the sampled communities; giving a total of one hundred (100) cassava farmers for the study.

Data source

The data used in this study were primary and secondary data. The primary data were collected through the use of well-structured questionnaire from which relevant information were elicited from the respondents. The secondary data were obtained from both published and unpublished materials from the university library and the internet.

Data analysis technique

The analytic instruments used in the study included: Descriptive statistics such as frequency distribution, percentage, mean and multiple regression model statistics as well as to test the hypotheses of the study. Descriptive statistics such as means, standard deviations, percentages, frequency distributions and rank ordering were used to achieve objectives: i, ii and v. Inferential statistics such as regression analysis were used to achieve objectives iii and iv; and z-test to test the hypotheses of the study.

Measurement of dependent variable (adoption)

In this study, measurement of adoption behaviour of the farmers toward the technology packages which were the continuous use of a synthesis of technologies/practices, namely:-

(1) Improved cassava cuttings; (2) Ploughing; (3) Harrowing; (4) Flats; (5) Ridging;

(6) Mounds; (7) Planting cassava cuttings horizontally; (8) Planting cassava cuttings vertically; (9) Planting cassava cuttings slanting; (10) Crop population for cassava: 10,000 plants/ha; (11)15,000 plant stands/ha; and (12) 20,000 plant stands/ha; (13) Weed control with herbicides; (14) Manual weed control; (15) Inorganic fertilizer for cassava; (16) Harvesting cassava 10 months after planting (MAP); (17) 11 Months After Planting and (18) 12 Months After Planting.

The foregoing constituted the dependent or response variables of interest which were measured by using the total number of technologies/practices adopted by each respondent. The adoption score for each respondent was measured by the sum of the practices the farmers were adopting. Equal weight of a point was assigned to each technology/practice adopted by a respondent giving a maximum of twenty eight (28) points and a minimum of zero.

Measurement of independent variables

i. **Household size (x_1)**: was based on the number of people in a household. This variable was included to prove or reject the notion that the larger the family size the more favourably disposed will be the members to adopt improved cassava technology packages.

ii. **Farm size (x_2)**: was given as total area of the farm in hectares operated by the respondents and included in the model to confirm or reject the assumption that the larger the size of the farm the more feasible it is to adopt the technology packages.

iii. **Farming experience (x_3)**: measured by the number of years of farming given by the respondents, which was included to prove or disprove that the more experienced farmers are the more willing to adopt an innovation.

iv. **Group affiliation (x_4)**: measured by the number of organizations the respondent belonged to and was incorporated to show whether the higher the number of social groups farmers belong to, the higher the awareness of the technology packages. Rogers and Shoemaker (2011) reported that satisfactory and collective innovative decisions can be positive if there is a high degree of participation by members.

v. **Extension contact (x_5)**: showed the number of visits/year made by the extension agents to the farmer and vice versa. This was equally included to establish or reject the impression that frequency of visits to the farmers by the extension agent or vice versa would influence farmers' awareness of the innovations. Score: 'Yes' 1 'No' 0. No of visits were measured as follows:- Once: lpt; 2 times : 2pts; 3 times : 3pts; 4 times: 4pts.

vi. **Mass media exposure (x_6) a** two-way questions (i.e. 'Yes' or 'No') were asked to elicit information on the extent of the respondents' utilization of mass media sources of information on improved cassava technology packages in the area (e.g. radio, television and agricultural publications). This variable was incorporated into the study to affirm or debunk Voh's (2009) hypothesis that mass media channels of communication are important in conveying information and creating awareness or changing cognition. A positive response 'Yes' was scored (1) point while a negative response 'No' was scored zero (0).

Innovation attributes

Relative Advantage: The variable was included so as to establish whether or not respondents would assert the superiority of the technology packages over existing practices. 'Yes' was scored one (1) point and 'No' was scored zero (0).

Compatibility: Is the degree to which an innovation is consistent with existing values or past experiences of the people. 'Yes' response earns one(1) point while 'No' earns nothing or zero(0).

Complexity: Is the extent to which the innovation is not complex (i.e. not complicated). 'Yes' response earns one (1) point while 'No' gets zero (0).

Trialability: Is the degree to which an innovation can be tested on a limited scale. 'Yes' gets one (1) point while 'No' receives zero.

Observability: Is the extent to which results of adoption are clearly visible. 'Yes' response scores one (1) point while 'No' receives zero point.

Availability: Establishes whether all the components of the innovation packages are accessible within the area or not. 'Yes" response earns one (1) point while 'No' receives nothing or zero (0).

Regression Model

The form of the regression model used is specified as:

$$Y = F(X_1, X_3, X_4, X_5, X_6, X_7, U)$$

The explicit form of the functional forms is specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots + \beta_7 X_7 + e \quad \text{(Linear)}$$

Where: Y = output of cassava in kilogram (proxy for adoption of improved cassava technology package); X_1 = Household size; X_2 = Farm size (in hectares); X_3 = Farming experience (in years); X_4 = Group membership; X_5 = extension contact; X_6 = Mass media exposure; X_7 = Relative advantage; X_8 = Compatibility; X_9 Complexity; X_{10} = Trialability; X_{11} = Observability; $X_{12=}$ Availability; U = error term

Adoption Constraints to the Farmers: A 3-point Likert-type scale was employed in analyzing the adoption constraints encountered by the respondents.

To determine the seriousness and hence rank of the constraints, a mean score >2 serious, <2 Not serious.

Age: age was measured in years using 4 categories vis-à-vis:<30, 30-40, 41-50, above 50.

Gender: There are 2 categories, which are male and female.

Household size: this refers to the family size and there are four categories; 1-5, 6-10, 11-15, above 16.

Hypotheses' testing

z-test statistic was employed in testing hypotheses of the study:

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1}{n_1} - \frac{S_2}{n_2}}}$$

Where: z = Calculated z-test value; X_1= Mean value of production in tonnes after adoption income in Naira and after adoption in score value; X_2 = Mean value of production in tonnes before adoption income in Naira before adoption in score value; S_1 = Standard deviation of Mean value of production in tonnes after adoption income in Naira and after adoption in score value; S_2 = Standard deviation of Mean value of production in tonnes before adoption income in Naira before adoption in score value; n_1= Sample size of respondents after adoption; n_2= Sample size of respondents before adoption

The calculated absolute value was compared with critical value, and if the calculated value was greater than the critical (table) value, the null hypothesis was rejected, if otherwise, the null hypothesis was accepted.

Results and Discussion

Distribution of respondents according to socio-economic characteristics

Sex of respondents

Table 1 indicates that 63 respondents representing 63% were males while 37 respondents representing 37% were females. This implies that there were more male respondents than females respondents. This finding is in line with that of Yesuf and Kohlin (2008) who opined that the reason for more male respondents over the female respondents in agricultural and agro-related studies would not be unconnected with the fact that most of such studies are done in the rural areas where the farmers are found and in most African rural settings, it is a tradition that is usually adhered to because of the fact that women do not always present themselves for interview schedule as it is perceived that it is a role reserved for the head of the household who is usually a male.

Table 1: Sex of respondents

Marital status	No of respondents
Male	63
Female	37
Total	**100**

Source: Field study, 2017

Table 2: Age of respondents

Age of respondents	No of respondents
Less than 30years old	13
30-40years old	37
41-50 years old	42
Above 50 years old	8
Total	**100**

Source: Field study, 2017; Mean age = 46years

Age of respondents

Table 2 indicates that majority of the farmer respondents which constituted 42 respondents representing 42% fall within the age bracket of 41 to 50 years old. This is in agreement with the finding of Williams (2009) in his study stated that youth involvement in agricultural production has great influence on the Nigeria's economy. The author highlighted that farming age usually fall in betwee the ages 40 years and above; this suggest an exclusion of youths and young adolescents in agricultural production.

Marital status of respondents

Table 3 shows that 18% of the respondents were single and 56% were married while others (Divorced/Separated/ Widowed) represent 26% of the respondents. The implication is that majority of the respondents (farmers) are married which supports the finding of Bamgbose *et al.* (2008) who found that married farming household constituted the majority of practicing farmers. who described families that will assist in production as a sign of maturity that create awareness for ownership mentality of the rural farming, this tend to make them get married on time than urban folks so as to own larger portion of farmland.

Table 3: Marital Status of respondents

Marital status	No of respondents
Single	18
Married	56
Divorced/Separated/Widowed	26
Total	**100**

Source: Field survey, 2017

Table 4: Educational level of respondents

Education	No of Respondents
Primary School Certificate	18
WASC/SSCE	56
OND	26
HND/B.Sc	0
Total	**100**

Source: Field survey, 2017

Educational level of respondents

Table 4 shows that 18% of the respondents had primary school leaving certificate and 56% had the senior secondary school certificate while 26% of the respondents had ordinary national diploma certificates. This implies that majority of the respondents were senior secondary school leavers.

Farming experience of respondents

Table 5 below shows that respondents who had 1-7 years farming experience were 13% and 8-4 years farming experience accounted for 52% of the respondents; this was followed by 15-21 years' experience representing 21% of the respondents while 22 years and above constituted 14%. The mean of farming experience was 14 years. This finding implies that the farmers in the area were highly experienced. The variable was found to be highly significant on regression coefficient results at p<.01.with findings of Bello (2010) who in their separate studies established positive association between farming experience and adoption.

Table 5: Farming experience of respondents

Option	No of Respondents
1-7	13
8-14	52
15-21	21
22-28	6
29-35	7
>35	1
Total	**100**

Source: Field survey, 2017; **Mean = 14 years**

Table 6: Distribution of respondents according to their mean income levels before and after adoption=100

Income Level				
Before Adoption		**Percentage (%)**	**After Adoption**	
₦ /Ha	**No. of Respondents**		**₦/Ha**	**No of Respondents**
<₦ 10,00	22	22	<₦10,000	6
₦10,001 – N15,000	38	38	₦10,001- N15,000	13
₦15,001 – 20,000	21	21	₦15,001- ₦20,000	41
₦20,001 – ₦25,000	12	21	₦20,001- ₦25,000	20
₦25,001 – ₦25,000	7	7	₦25,001 –₦30,000	17
₦30,001	0	0	₦30,001	3
Mean= ₦13,875.41/ha			**Mean- ₦16,412.92/ha**	

Source: Field Survey, 2007

Table: 7: Distribution of Respondents according Constraints of the Adoption of Improve Cassava Technologies and Packages By Respondents (n=100)

S/N	Constraints	Level of Difficulty	
		Frequency	**Percentage**
1.	Non Availability of Fertilizers	98	98
2.	Non Availability of tractors for hiring	90	90
3.	Non Assistance of Children with Farm work	85	85
4.	Shortage of improved cassava cutting	75	75
5.	Insufficient land for production	73	73
6.	Non Availability of credit to buy farm input	72	72
7.	No Market for Fresh Cassava root	40	40
8.	Lack of contact with Extension workers	32	32
9.	Others: bad road, inability to handle herbicide, etc.	31	31
10	No Cassava processing facilities Nearby	15	15

Source: Field Survey, 2007; Multiple Responses

Table 7 show that the respondents encountred several constraints. Non-availability of inputs such as inorganic fertilizers where 91% of the respondents complained about that constraint. This impacted negatively on the level of adoption of recommended practices in the study area. The absence tractor hiring services where 70% of the farmers alluded to that constraint. Other challenges encountered by the respondents were children's reluctance to assist their parents on their farms which accounted for 70% of the respondents. Lack of credit linkage was alluded to by 60% of the respondents. Lack of market for fresh roots of cassava and non-contact with extension agents mentioned by 33 and 26% of the farmers respectively constituted other challenges being encountered. Pest infestation, lack of good and motorable roads, distance from cassava processing facilities and inability to handle agro-chemicals constituted other problems raised by respondents which ranged from 12 to 25% aggregated, the foregoing problems facing the farmers are capable of adversely affecting adoption rates of improved cassava and technology packages in the area if urgent steps are not taken to arrest them. For instance, if the farmers are not trained on the uses and abuses of agro-chemicals as well as subsidizing their costs, the level of their adherence to manual weeding which currently stands at 100%. Table 7 will not abate which portends a bleak future for modernization and transformation of agriculture in the area.

Conclusion and Recommendations

Conclusion

The study found that the main information sources of the respondents on improved cassava technology packages used the area were: radio, television, friends relatives and extension agents (in that order). Stakeholders should therefore avail themselves of the privilege of harnessing knowledge from empirical studies as their fastest means of reaching their target audiences in the study area.

Recommendations

Based on the findings of the study the following recommendations are made to advance adoption of improved technology packages in cassava production in the study area:

i. Those innovations that were appreciated and contributed to adoption should be highlighted captured and featured in future agricultural projects planning in the State; particularly in the study area; e.g. radio, television, friends, relatives and extension agents.

ii. In view of the identified constraints in which 98% of the farmers expressed dissatisfaction with lack of access to inorganic fertilizers and lack of tractors for hiring services were 90% of the farmers complained. Government and other interested stakeholders should intervene by establishing agro-services centres at strategic locations. When inputs are adequately stocked and sold to the farmers at subsidized rates; it will enhance the commercialization of agriculture in the study area.

iii. Since landholding per farm household in the area was found to be majorly low (4.l3ha), Government and other interested stakeholder can resolve to assist farmers with tractors and implements to enable them plough, harrow and ridge their fields.

iv. Given that farmers' social participation was encouraging and each respondent belonged to at least one social organization, agricultural information, credit and inputs can safely be channeled through those organizations to the farmers.

v. Since some of the respondents (31%) identified inability to handle herbicides as a constraints, government should ensure that farmers in the area are given regular training by extension agents on use of

herbicides, pesticides and other relevant agro-chemical including proper examination of the soil (soil test) and correct information rainfall.

vi. Radio could be relied upon as a veritable tool for agricultural information dissemination and high level facilitation that could lead to a great boost in agricultural productivity in the study area.

Conflict of Interest

The authors declare that there is no conflict of interest related to this work.

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