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PERCEIVED EFFECT OF TECHNOLOGY ATTRIBUTES ON FARMERS' ENGAGEMENT IN SASAKAWA GLOBAL 2000 AFRICAN AGRONOMY INITIATIVE CASSAVA-MAIZE INTERCROP IN ABIA STATE, NIGERIA

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ABSTRACT

The study assessed engagement of farmers in Sasakawa Global 2000 African Agronomy Initiative cassava-maize intercrop in Abia State, Nigeria. Multistage random sampling procedure was used to select 60 cassava farmers for the study. Data were collected with a structured questionnaire and analyzed using both descriptive and inferential statistics (Probit regression analysis). Result showed that farmers had favourable perception ($\bar{x} = 2.8$) on Sasakawa cassava-maize intercrop technology attributes and high engagement ($\bar{x} = 2.3$) in the technologies. Farmers were constrained by high cost of technology ($\bar{x} = 2.2$) and negative perception of farmers about past related programmes ($\bar{x} = 2.2$). Probit regression result showed that coefficients for early maturity (-0.5076**), high yielding (0.0977***), disease and pest tolerance (-0.0611**), relative advantage (0.0628**) influenced farmers' engagement in Sasakawa cassava-maize intercrop initiative in the study area. The study concluded that cassava-maize intercrop attributes encouraged farmers to engage in the technology. Policies aimed at promoting and intensifying breeding programmes on high yielding, early maturing, pest and disease tolerant varieties of cassava and maize were advocated for ease of engagement of farmers in the project.

Keywords: Perceived; attributes; Sasakawa; cassava-maize intercrop

INTRODUCTION

Resource poor farmers are conscious of their needs and constraints associated with their farming environments in their efforts to realize their goals of production. Therefore, they weigh the expected benefits of any recommendation from extension against these variables to determine their sustainability or otherwise before adoption and engagement as only recommendations that give the highest promise of meeting such needs are adopted (Olorunfemi *et al*., 2020; Montoeli, 2022; Oladele, 2019). The low rate of adoption and engagement of extension packages of recommendations by farmers in Nigeria has been partly attributed to the neglect of the farmers' areas of need, cumulative experiences, technology attributes, knowledge and advances made by local farmers in consonance with their environment (Omotesho *et al*., 2019; Agbarevo and Meregini, 2019). The overall function of extension delivery is to disseminate appropriate agricultural production technologies to target

farmers through demonstrations in order to improve their living standards. The cassava-maize intercrop technology (innovation) extended must be technically feasible, economically affordable, reliable, culturally and socially acceptable to the target farmers (Nwaobiala *et al.*, 2019). According to Olarinde *et al*. (2020), Kulyakwave *et al*. (2021), researchers have over the years paid little attention to analyzing how the properties or attributes of the innovations affect their engagement, acceptance or rate of adoption and engagement. According to Abdulmumini *et al*. (2022), these attributes include relative advantage, compatibility with existing values, complexity or relative ease of application, potentiality and divisibility, visibility or observability of results.

Studies of Oladele (2021), Sasakawa African Association (2020) showed that Sasakawa Global 2000 intervention established in 2017 is carried out basically for its agronomic adoption of cassava-maize intercop (appropriate planting date, good quality improved seed, proper row-to-row and plant-to-plant spacing resulting in a correct plant population per unit area, appropriate seed planting depth, timely application and method of fertilizer application at the correct rate)), hence the perceived effects of the technology attributes are yet to be ascertained in the study area. In order to fill the research gap, this study was necessitated to assess the engagement of *Sasakawa* cassava-maize intercrop technologies among small holder maize farmers in Abia State, Nigeria. Specifically, the study; assessed farmers' perception on Sasakawa cassava-maize technology attributes, ascertained level of engagement of farmers in Sasakawa cassava-maize technology and examined constraints to engagement of farmers in Sasakawa technology in the study area.

The hypothesis tested states that factors such as early maturity, high yield, canopy formation, soil adaptability, drought tolerance, disease and pest tolerance, relative advantage, compatibility, trial ability, complexity and affordability do not influence engagement in cassava-maize intercrop technologies of Sasakawa Global 2000 African Agronomy Initiative among farmers in the study area.

MATERIALS AND METHODS

The Study Area

The study was conducted in Abia State. The State was created on 27th August, 1991, out of the old Imo State. The State is situated in the South – Eastern part of Nigeria and predominantly populated by the Igbo tribe. Abia State lies between longitudes $7^{0}23^{'}$ and $8^{0}2^{'}$ east of the equator and latitudes $4^{0}47^{'}$ and $6^{0}12^{'}$ north of the Greenwich Meridian. The State is located east of Imo State and shares common boundaries with Anambra, Enugu and Ebonyi States on the north-west, north and north-east, respectively. On the east and south-east, it is bounded by Cross River and Akwa Ibom States and by Rivers State to the south. It occupies a land mass of 5833.11km^{2} (ABSPC, 2006). According to the Federal Republic of Nigeria, the projected population growth of Abia State at 2.6% from 2006 population figure is 10,3157 people (NPC, 2020).

Sampling Procedure and Data Collection

Multistage random sampling procedure was employed in the study. First, three (3) out of four (4) Local Government Areas (LGAs) that participated in the progarmme were selected for the study namely, Umuahia North, Isiala Ngwa North and Isuikwuato. The lists of co–

operators from these selected participating LGAs were obtained from the Abia State Agricultural Development Programme (ADP) Umuahia. From the selected LGAs, two (2) out of four (4) cooperative societies were randomly selected from the participating LGAs to give six (6) cooperative societies. Furthermore, ten (10) co-operators (farmers) each were randomly selected from the selected cooperative societies to give a sample size of 60 co-operators (farmers). Percentage, mean scores, multiple and Probit regression analyses were used to test the study hypothesis.

Farmers' perception of cassava-maize intercrop technologies of Sasakawa Global 2000 African Agronomy Initiative attributes was measured and rated on a 4-point Likert rating scale of; Strongly Agree=4, Agree= 4, Disagree= 2, Strongly Disagree = 1. Based on the fourteen (14) perception item statements respondents mean scores were computed for each perception statement by adding the weights of 4+3+2+1 = 10/4=2.5. Mean score greater than or equals 2.5 implied favourable and otherwise unfavourable perception of the technology attributes.

To ascertain the levels of engagement of farmers in Sasakawa technology attributes, 3 –point rating scale was used to derive the mean scores. The rating scores were assigned as follows: always =3, occasionally =2, and never =1. The benchmark was obtained thus: 3+2+1=6 divided by 3 to give 2.0. The following categorizations were used: Any mean score between; 1.00-1-49 = low engagement; 1.50-1.99 = moderate engagement and 2.0 and above = high engagement.

Data Analysis

Model Specification

The Hypothesis was tested using Probit regression model implicitly stated thus:

Y1* = Bx1+E
Y1* = 0 if Y1* = 0
Y1 = 1 if Y1* = 0
Y1 = 1 if Y1* = 0

Where:

$$Y = \beta_o + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7 + \beta_8 + \beta_9 + \beta_{10} + e_i \quad \text{..... (1)}$$

Y= Probability of farmers engaging in Sasakawa cassava-maize intercrop technologies ranges from 0 – 1.

β_o = A vector of estimated parameter
β_1 = early maturity (yes = 1, no =0)
β_2 = high yielding (yes = 1, no =0)
β_3 = canopy formation (yes = 1, no =0)
β_4 = soil adaptability (yes = 1, no =0)
β_5 = drought tolerance (yes = 1, no =0)
β_6 = disease and pest tolerance (yes = 1, no =0)
β_7 = relative advantage (yes = 1, no =0)

β_8 = trial ability (yes = 1, no =0)
β_9 = complexity (yes = 1, no =0)
β_{10} = affordability (yes = 1, no =0)
e_i= error term

RESULTS AND DISCUSSION

Farmers' Perception of Cassava–Maize Intercrop Attributes of Sassakawa Global 2000 African Agronomy Initiative Attributes

The result in Table 1 shows that the farmers had favourable perception ($\bar{x} = 2.8$) of cassava-maize technology attributes.

This result corroborated the findings of Nwaobiala (2018), Nwaobiala and Issac (2017) as they found that intercropping of cassava with other component crops such as *egusi* and *teleferia* provides additional income to the farmers, thereby guarantying food security in Abia and Imo States of Nigeria.

Levels of Engagement of Farmers in Sasakawa Cassava-Maize Intercrop Technologies

Result in Figure 1 shows that the farmers had high engagement ($\bar{x} = 2.3$) of all the project technologies in the study area.

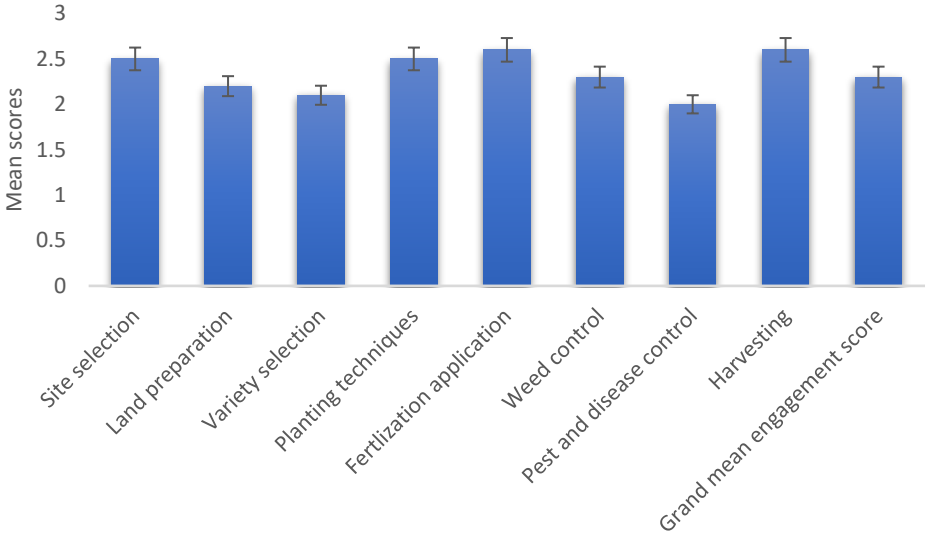

Figure 1: Levels of farmers' engagement in Sasakawa cassava-maize technologies

This result is in tandem with the findings of Ikuerowo and Tehinloju (2021), and Olorunfemi (2018) as they affirmed that adoption of innovation disseminated to farmers through agricultural promoted programmes had shown to improve the farming practices of farmer which is geared towards improving their livelihoods and ensuring food security.

Table 1: Distribution of respondents according to perception of cassava-maize intercrop attributes of Sasakawa Global 2000 technologies

Perception Statements	SA	A	DA	SD	Total	Mean	Decision
The technology disseminated are adaptable to my farm environment	25(100)	30(90)	4(8)	1(1)	199	3.3	Favourable
The technologies could be practiced in the field with less supervision	16(64)	24(72)	15(30)	5(5)	171	2.9	Favourable
The technologies do not have any cultural barriers	21(84)	30(90)	8(16)	1(1)	191	3.2	Favourable
The rate of assimilation during training sessions was easy to understand (not complex)	13(52)	30(90)	14(28)	3(3)	173	2.9	Favourable
The technology packages are cheap to practice	7(28)	32(96)	14(28)	7(7)	159	2.7	Favourable
The project disseminated technologies are desirable	19(76)	27(81)	12(24)	2(2)	183	3.0	Favourable
The technology packages are cost effective to practice	8(32)	37(111)	11(22)	4(4)	169	2.8	Favourable
The technology when put in use is highly profitable	9(36)	36(108)	8(16)	7(7)	167	2.8	Favourable
The technology could easily be re-evaluated to make adjustments where necessary	15(60)	21(63)	12(24)	11(11)	158	2.6	Favourable
The technology attributes sustain and tolerates drought conditions	9(36)	25(75)	13(26)	13(13)	150	2.5	Favourable
The technology transferred are environmentally friendly	9(36)	31(93)	10(20)	10(10)	159	2.7	Favourable
The attribute of the technology reduces incidence of disease and pest infestations	11(44)	28(84)	11(22)	10(10)	160	2.7	Favourable
The technology encourages crop mixtures without affecting other component crops	11(44)	16(48)	16(32)	17(17)	141	2.3	Favourable
Grand Total			39.2				
Grand Mean			2.8				

Constraints to Engagement of Farmers in Sasakawa Cassava-Maize Technologies

The result in Table 2 shows constraints to engagement of cassava-maize intercrop technologies of Sasakawa Global 2000 African Agronomy Initiative Technologies among farmers in the study area.

Table 2: Mean distribution of respondents according to constraints to farmers' engagement in Sasakawa cassava-maize intercrop of Technologies

Constraints	Severe	Mild	None	Total	Mean	Decision
High cost of technology	23(69)	28(56)	9(9)	134	2.2	HC
Crop mixture not compatible	8(24)	10(20)	42(42)	88	1.4	NC
Inadequate extension contacts	10(30)	23(46)	2 (27)	103	1.7	MC
Poor yield due to intercrop	9(27)	37(74)	14(14)	115	1.9	MC
Negative perception of farmers about past related programs	18(54)	30(60)	12(12)	126	2.1	HC
Late arrival of farm inputs	7(21)	28(56)	25(25)	102	1.7	MC
Bureaucratic bottle necks in administration	11(33)	30(60)	20(20)	113	1.8	MC
Inadequate training and re-training of farmers	13(39)	20(40)	27(27)	106	1.7	MC
Non-access customary right to land	19(57)	19(38)	22(22)	117	1.9	MC
Total					16.4	
Grand mean					1.82	
Moderate						

HC = High constraint, NC = No constraint, MC = Moderate constraint

Farmers were constrained by high cost of technology ($\bar{x} = 2.2$) were high constraints facing farmers as against negative perception of farmers about past related programmes ($\bar{x} = 2.1$). Again, they averred that poor yield due to intercrop and access to customary right to land with mean ratings of 1,9 respectively, bureaucratic bottlenecks in administration ($\bar{x} = 1.8$), late arrival of farm inputs and inadequate training and retraining of farmers with mean values of 1.7 were moderate constraints to engagement in Sasakawa cassava-maize intercrop technologies. The mean constraints to engagement in these technologies was 1.5, indicating that they were moderate.

Relationship of Perceived Factors Influencing Engagement of Farmers in Sasakawa Cassava-Maize Intercrop Technology Attributes

Table 3 shows the Probit regression estimates of perceived factors influencing the engagement in Sasakawa Global 2000 African Agronomy Initiative cassava-maize intercrop technology attributes among farmers in the study area. Result showed a Chi^2 value was highly significant at 1.0% level of probability indicating goodness of fit of the probit regression line.

Table 3: Probit regression estimates of factors influencing the farmers' engagement in cassava-maize intercrop of Sasakawa Global 2000 African Agronomy Initiative

Variables	Parameters	Coefficient	SE	t-value
Constant	β_0	1.0114	0.0769	13.15***
Early maturity	β_1	-0.5076	0.0209	-2.42**
High yielding	β_2	0.0977	0.0319	3.05***
Canopy formation	β_3	-0.0426	0.0399	-1.07
Soil adaptability	β_4	0.0077	0.0385	0.20
Drought tolerance	β_5	-0.0349	0.0379	-0.92
Disease and pest tolerance	β_6	-0.0611	0.3009	-2.53**
Relative advantage	β_7	0.0628	0.0371	2.50**
Trial ability	β_8	0.0009	0.0128	0.07
Complexity	β_9	0.0213	0.0352	0.60
Affordability	β_{10}	0.0006	0.0422	0.01
Probability Chi^2 ($\varkappa^2$)	13.24			
Pseudo Chi^2 ($\varkappa^2$)	0.4212			
Log likelihood	36.5343			

***p≤ 0.01, ** p≤ 0.05 and ** p≤ 0.10 + = lead equation

Result shows that the coefficient for early maturing (-0.5076) was negatively signed and significant at 5.0% level of probability. This implied that any decrease in maturing period of either of the crops (cassava or maize) will lead to increase in probability engagement in cassava-maize intercrop among farmers in the State. This is expected and simply indicated that famers under this programme were able to engagement in Sasakawa cassava- maize intercrop technology attributes due to the early maturing period probably due to the maize crop. Nwachukwu and Nwaobiala (2020) noted that the longer maturity period would lead to decreased adoption as farmers' perception of early maturity was an important variety attribute that motivated the adoption. Coefficient for high yielding (0.0977) was highly significant and positively related with the adoption of cassava-maize intercrop among farmers that participated in Sasakawa Global 2000 African Agronomy Initiative at 1.0% level of probability. This indicates that increase in yield will lead to increase in adoption of cassava-maize intercrop technology in the study area. Similarly, high yields have been reported as a motivational factor for improved varieties adoption following (Nwaobiala and Anyanwu, 2017). The coefficient for disease and pest tolerance (-0.0611) had a negative sign and significant at 5.0% level of probability. This implies that decrease in disease and pest attack will lead to probability of engagement in Sasakawa cassava-maize technology attributes among farmers in the study area. This is expected as pests and diseases have been known to attack crops virtually at every stage of crop development; at pre-germination, budding, flowering, harvest and in post-harvest/storage thereby leaving the crop with no "breathing space, following (Tokula, 2019).

Furthermore, the coefficient for relative advantage (0.0628) was positive at 5% level of probability and significantly related with engagement in Sasakawa cassava-maize intercrop attributes in the study area. This indicates that farmers under this programme have a relative advantage in planting cassava-maize intercrop compared to other crop mixture possibly because traditionally, cassava-maize intercrop has been done in mixtures and even the commercialization has not changed this practice much. More so, Nwaobiala *et al*., (2019)

found that innovations are more likely to be engaged in a technology if they have a high relative advantage and are readily tried on farmers' field.

CONCLUSION

The study concluded that Sasakawa cassava-maize intercrop attributes influenced farmers' engagement in the technology despite high cost of technology and negative perception of farmers about past related programmes. The study therefore recommended that effort should be geared towards intensification of breeding programmes on high yielding, early maturing, pest and disease tolerant varieties of cassava and maize for ease of engagement in the project.

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