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Factors Influencing the Adoption of Sasakawa Global 2000Maize Production Technologies among Smallholder Farmers in Kaduna State

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Abstract

The study assessed the adoption of Sasakawa Global 2000 maize production practices among smallholder maize farmers in Kaduna State. Data for the study were obtained by the use of structured questionnaire. A multistage sampling technique was used to select the respondents from the four ADP zones of the State. In the first stage, four cells were selected randomly from the four ADPs zones. Subsequently, twenty maize farmers were randomly selected from each of the four cells given eighty (80) respondents. Descriptive statistics and logit regression analysis were used to analyze the data. The result showed that many (50.0%) of the sampled farmers were between the ages of 31-50years and 58.7% are literate. It, also, revealed that majority (98%) of the respondents had increased yield, eighty three per cent (83%) indicated the use of less fertilizer, while seventy one per cent (71%) reported having improved level of living. The result further shows that age, education, household size, extension contact, farm yield, and access to credit were the factors influencing the adoption of SG 2000 maize production practices at 1% and 5% level of significance. The study recommends that extension workers should assist farmers to form co-operatives associations and where they are in existence, efforts should be made to strengthen them for easy access to credit, farm inputs and markets for their agricultural products.

Key words: Adoption, Extension, and Sasakawa Global 2000.

Introduction

About 30.7 million hectares (76 million acres), or 33% of Nigeria land area, are under cultivation [Nigeria Forum, 2007]. Nigerian diverse climate, from the tropical areas of the coast to the arid zone of the north, makes it possible to produce virtually all agricultural products that can be grown in the tropical and subtropical areas of the world. Large-scale agriculture, however, is not common. Despite an abundant water supply, a favourable climate and wide areas of arable land, productivity is restricted owing to inefficient techniques of cultivation (Nigeria Forum, 2007).

In order to boost agricultural production in the past, Nigerian governments and non-governmental organizations had initiated agricultural programmes such as National Accelerated Food Production Programme (1972), Operation Feed the Nation (OFN) 1977, Agricultural Credit Guarantee Scheme Fund (ACGSF) 1978, Green revolution (1979), Agricultural Development Authority (NALDA) 1991, Sasakawa Global 2000, International Fund for Agricultural Development Community Based Agriculture and Rural Development Project (IFAD-CBARDP) and a host of other non-governmental programmes. These programmes, which involved mostly subsidized funding and input supplies treated the goals of agricultural development and poverty alleviation in *Pari-Passu*, with the understanding that the success of any poverty alleviation programme would have to be measured by their impact on improving agricultural incomes (Tule, 2003; Akanji 2005).

Ganpat and Seepersad (1996) opined that for a successful adoption of new technology, farmers must not only know about it, but must be able to follow the recommendations given. This implies that the farmer must have the knowledge before putting the recommendations into practice. It is a well-known fact that not all farmers adopt technologies at the same rate due to differences in behaviour to the technologies (van den Ban and Hawkins, 1996). Technology, according to Yates (1995), can be transferred primarily through authoritarian imposition and through voluntary adoption or emulation. Adoption by voluntary methods depends solely on the effectiveness of demonstration, which may be very rapid or slow.

Gowing (2002) asserted that the inabilities of past programmes to yield the required results have attributed to poor targeting and inappropriate innovations. This, according to him, could be attributed to the fact that most development facilitators engaged by the development organizations are not equipped with the requisite skills to facilitate all inclusive bottom-up grassroots projects.
Maize (Zea mays, L.) is one of the main cereal crops of West Africa, and the most important cereal food crops in Nigeria. Maize is produced in all agro-ecological zones of Nigeria. The total estimated land devoted for maize production in Nigeria is about 5, 995, 420 ha.(NAERLS, 2012) It comes after wheat and rice in terms of world importance and is becoming the miracle seed for Nigeria's agricultural and economic development. It is an important cereal being cultivated in the rainforest and the derived savannas zones of Nigeria (Tijani and Oshotimehin, 2007). It is a very important worldwide crop used for both food and industrial purposes such as raw materials for many agro industries. Falaki (2000) asserted that the major tool for demonstration of

improved agricultural production methods is the management training plots (MTP), which is the farmers' plot of 0.25 – 0.50 ha in which the farmer is trained to implement the technological package. The management training plots serve as the classroom for both the farmers and the extension staff. The improved agronomical practices applied in the management training plots (MTPs) stem from experimental findings from the National Agricultural Extension Research Institutes (NAERLS). Broadly, the SG 2000 used a technological package of agronomic practices which include 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 and other agronomic practices for improving the seedbed. In Nigeria, farmer's access to and use of research findings remains limited. As such, there exists a discrepancy between what research findings show to be feasible and what the farmers know and use to increase crop production in Nigeria. It has therefore becomes imperative to assess the adoption of improve recommended Sasakawa maize production practices among small holder maize farmers in Kaduna State in view to making appropriate policy recommendations that will promote agricultural development in Kaduna State and Nigeria.

The specific objectives of the study were to:

i. describe the socio-economic characteristics of the smallholder maize farmers in the study area;
ii. determine the socio-economic factors influencing adoption of SG. 2000 technologies and;
iii. examine the social and economic benefits farmers derived by adopting the technology

Research Methodology

The study assessed the adoption of Sasakawa Global 2000 maize production technologies among smallholder Maize farmers in Kaduna State. Data for the study were obtained by the use of structured questionnaire. A multistage sampling technique was used to select the respondents from the four ADP zones of the state. In the first stage, four cells were selected randomly from the four ADPs zones. Subsequently, twenty maize farmers were randomly selected from each of the four cells given eighty (80) respondents. Data were analyzed using descriptive statistics such as frequency distribution, Percentages and ranking to achieve objective 1 and 2 while logit regression analysis was used to achieve objective 3.

Table 1: Sample Size

KADP Zones	Cells	Number of Farmers
Lere	Yarkasuwa	20
Maigana	Wanka	20
Birnin Gwari	Kuyelo	20
Samaru	Zangon Kataf	20
Total		**80**

Source: Field survey, 2013

The logit regression model is specified as

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{----------} b_{11}x_{11} + U$

Where

Y = Adoption of Sasakawa Global 2000 technologies

X_1 = Age (in years)

X_2 = Educational Level (years)

X_3 = Sex (Male = 1; Female = 0)

X_4 = Farming Experience (in years)

X_5 = Number Ext. Contact (no. of Visit)

X_6 = Household size (number of persons)

X_7 = Membership of cooperative (number)

X_8 = Farm Yield (Kg/ha)

X_9 = Amount of credit used (₦)

X_{10} = Income (₦)

X_{11} = Quantity of fertilizer used (Kg)

a = Constant

$b_I – b_{II}$ = Regression Co-efficient

U = Error term.

Result and Discussion

Socio-economic Characteristics of Respondents

It was observed in Table 2 that many (50%) of the farmers were between the ages of 31 – 40. while 17.5% were between the ages 51-60 years old. The mean age of the respondents was 37 years. This indicated that most of the respondents were of middle age; the above findings are consistent with the results of previous study by Simorgan & Arokoyo (2001) which stated that youths generally detested farming as a profession. The result also indicated that 36.3% of the respondents had primary education, with only 4 representing (5.0%) with Tertiary education. The implication of this result is that most of the respondents fell within the lower level of formal education. This certainly has an effect on the adoption of new technologies by the farmers. Agbamu *et al.* (1996) and Njoku (1991) in a separate studies found that formal education has a positive influence on adoption of innovation. The study further reveals that most (38.8%) of the respondents had between 0.5 and 1.0 hectares, and 23 representing (28.8%) had between 1.1 – 1.5hectares of farmland with only (8.7%) having more than 2 hectares of farmland. The average farm size was 1.3 hectares, this results implies that majority of the respondent had 1.3 hectares of farmland. Size of farmland is expected to aid the adoption of new technologies by farmers because farmers that lack enough farmland cannot sacrifice their land for trials of a new technology. The result shows that 16.2% of the respondents had a household size 1-5 with 11.3% having a household size of 16-20. The average household size of the respondents was 11 members in a household. Household size is expected to play a vital role in the adoption of improved technologies among farmers. The result further shows that some (40%) of the respondents had 11 – 15years of farming experience, with only 17 representing 21.25% having over 15 years of farming experience. However, the result reveals that majority (72%) of the respondent did not belong to any cooperative association with only 22 representing 27.25% of the respondents belong to cooperative association.

Table 2: Socio-economic characteristics of sampled farmers

Variables	Number of Respondents	Percentage (n = 80)	Mean (M)
Age in year			
21 – 30	18	22.5	
31 – 40	40	50.0	37
41 – 50	08	10.0	
51 – 60	14	17.5	
Level of Education			
Primary	29	36.3	
Secondary	14	17.5	
Qur'anic	33	41.2	
Tertiary	04	5.0	
Farm Size in (ha)			
0.5 – 1.0	31	38.8	
1.1 – 1.5	23	28.8	
1.6 – 2.0	19	23.7	1.3
2.1 – 2.5	07	8.7	
Household Size			
1 – 5	13	16.2	
6 – 10	41	51.2	
11 – 15	17	21.3	
16 – 20	09	11.3	
Years of Farming experience			
1-5	10	12.5	
6-10	21	26.25	
11-15	32	40.00	11

Above 15	17	21.25
Membership of Co-operative		
Yes	22	27.5
No	58	72.5

Source: Field survey, 2013

The result of logit regression analysis in Table 3 shows that age of the respondent had a negative coefficient (-.404) and significant at 1 percent level of Probability. This implies that age is inversely related to adoption of Sasakawa Global 2000 technologies but with significant influence. This is in agreement with the findings of Maurice (2004) and Yusuf (2009) that age can influence the adoption of improved agricultural practices, which can in turn, influences an increase in high level of maize production. Education was found to had a positive coefficient (.652) and significant at 1 percent level of probability. This implies that the higher the educational level of the respondents the higher the adoption of Sasakawa Global 2000 Maize Production technologies. This confirms the findings of Okunmadewa (2002) who reported that education has positive and significant impact on farmers' efficiency in production. Farmer's literacy level usually influences the decision-making and adoption of innovation by farmers, which may bring about increase productivity.

Household size was found to have a positive coefficient (.073) and significant at 5% level of probability. This indicated that household size was an important factor in the adoption of Sasakawa, Global 2000 Maize Production technology. This could be attributed to the fact that SG 2000 method of planting one seed per hole and the fertilizer application methods which entails making of a hole of about 3-5cm deep in between the plant stands and the subsequent covering of the hole requires a great deal of labour. Hence, household that have a sizable number of members that are within the productive age would find it easy to carry out such task.

Extension contact was found to have a positive coefficient (.092) at 1% level of probability and positively contributed to adoption of SG 2000 maize production technology. This implies that the higher the number or frequency of visits of extension agent to the farmers, the higher the level of adoption of recommended practices.

Farm yield was found to have a positive coefficient at (.165) and significant at 1% level of Probability. This shows that the higher the yield obtained by a farmer as a result of practicing the technology, the more likely they adopt it.

Credit access was found to have a negative Coefficient (-.165) and was significant at 1% level of Probability. This implies that farmers that got access to credit are more likely to adopt the SG.2000 recommended practices although credit access here was inversely related to the adoption of the SG. 2000 maize production technologies. This could be attributed to the misused of the credit facilities by the farmers. However, other variables such as sex, farming experience, membership of cooperatives, income and

the quantity of fertilizer used were not significant. The result, also, shows the contribution of each independent variable to the adoption of SG.2000 recommended practices with an R^2 value of 76%. This implies that the variables explain about 76% of the variability in adoption of SG.2000 maize production technologies.

Table 3: Logit regression on factors influencing adoption of Sasakawa Global 2000 Maize Production Technologies

Variables	Coefficient	Standard Error	T. val.	Lev. of Sig
Age	**-.**405*	.083	-4.868	.0000
Education	.652*	.062	10.433	.0000
Sex	.025	.055	.456	.6499
Farming experience	-.006	.038	-.177	8602
Extension contact	. 092*	.049	4.36	.0000
Household size	.074**	.041	1.774	.0799
Membership of cooperative	.034	.058	.585	.5600
Farm Yield	.165*	.058	2.817	.0061
Credit Access	-.166*	.067	2.459	.0161
Income	.020	.033	.582	.5623
Quantity of fertilizer used	.101D-04	.000	.098	.9220

***Significant at 1% Level of Probability**
****Significant at 5% Level of Probability**

Table 4 shows the distribution of the respondents according to the benefits derived as a result of adopting the SG.2000 maize production technology. Increased yield was ranked 1st with (98%) with increased income ranked 2nd with (91%) and the use of less fertilizer ranked 3rd with (82%). This implies that farmers that adopted the technologies benefitted a lot.

Table 4: Distribution of farmers according to benefits derived from participation

Benefits derived from participation	Frequency*	Percentage	Rank
Increased yield	78	98	1st
More Income	73	91	2nd
Use of less fertilizer	66	83	3rd
Improved living condition	57	71	4th
Increased awareness	42	53	5th
Total responses	**316**		

***Multiple responses allowed**

Conclusion and Recommendation

Findings from the study reveals that age, education, extension contact, household size, farm yield and credit access were the factors that influenced the adoption of Sasakawa Global 2000 technologies among the smallholder maize farmers in the study area at 1% and 5% level of significance. However, membership of cooperatives, sex and farming experience were not significant at either 1% or 5% level of significance. The study further reveals increased yield, increased income, use of less fertilizer, improved living condition and increased awareness as the benefits derived by the farmers as a result of adopting the technology. In conclusion, SG.2000 program has been successful in improving the farmers' income and living standard in the study area. Therefore, the study recommends that extension workers should assist farmers to form co-operatives association and where they are in existence, efforts should be made to strengthen them for easy access to credit, farm inputs and markets for their agricultural products.

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