DETERMINANTS OF ADOPTION OF PROVEN AGRICULTURAL TECHNOLOGIES AMONG FARMERS IN DELTA STATE

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ABSTRACT
The importance of agricultural extension education in increased agricultural productivity lies in the fact that it facilitates the adoption of production innovation designed to improved agricultural production. The study ascertained the determinants of proven agricultural technologies adoption among farmers in Delta State, Nigeria. data were collected from 180 farmers with the aid of a well-structured questionnaire and was analyzed using frequency counts, mean and percentage, while hypothesis was tested using multiple regression. Results showed that a higher proportion (33.88%) (49.61%) and (23.9%) completed secondary school and have farms of between 1 and 2 hectares, and adopted ADP improved cassava varieties, respectively. Farmers age, farm size, and access to credit facility had significant relation with adoption of improved technologies by farmers. The study concludes that farmers in Delta State had a high adoption rate of proven agricultural technologies and were influenced by age access to credit and farm size of the respondent.
Keywords: Determinants, Adoption, Technologies, Farmers, Agriculture

Introduction

Agriculture has been described as the bedrock and backbone of the Nigeria economy. It is the source of food and other raw materials needed by people and industries.

Onwumere, (1983) observed that a country that is self-sufficient in food production enjoys a reasonable measure of power status to a certain degree in the global arena, this is because a country that provides enough food for domestic consumption and excess for export enjoys economic advantage and utilize food effectively as a powerful weapon of foreign policy.

Just like the United States of America, Britain and other world power who control the global political economy using food to police and some developing nations of the world.

According to Britain Nationals farmers Union (1984), agriculture in Britain faired by 16% in the last 10 years. Can be above be said of Nigeria situation? Because Nigerian economy is predominantly that of small holders growing characteristically 2 or 3 hectares of crops in the south and 8 or 10 in the north, (Johnson *et al.*, 1969).

Agricultural productivity in Nigeria is said to be low with domestic food supply inadequate to supply domestic needs resulting to food import, which further worsens our food import bills. Onemolease and Okoedo-Okojie (2005). Adewuyi and Okumdewa (2001) report that the food import bill rose from ₦801,967 in 1986 to ₦47.307.6 million in 1996 in just a decade.

Onuoha (1985) reports that development in Agricultural sector were not as positive as in other areas of the economy. The overall output remained virtually stagnant during 1973 to 1983 period within a decade, Nigeria became a major food importer (US$2.7) billion of import in 1983. As domestic terms of trade moved against agriculture, food imported counted for more than 20% of the total of Nigeria's imports.

It was observed that agriculture in Nigeria is characterized by the use of primitive implements, small-sized farms, labour intensive and open to vagaries of climatic and other natural disasters as well as pest and diseases. Our traditional system of land rotation and shifting cultivation with long period of fallow can no longer provide enough food for our domestic need talk less of surplus for export.

However, over the years, increased attention has been given to agriculture and rural development in Nigeria. The operation feed the nation of 1976 (O.F.N), agricultural development programme of 1975 (A.D.P) and Green Revolution of 1980 (GRP) reflect this attention, even recently the

Government has come up with the new programmes types root and tuber expansion programme

2001 (R.T.E.P), and special programme for food security 2002 S.P.F. in conjunction with the ADPs in all the states.

The poor trend of agricultural production happened because an effective agricultural extension machinery was not put in place, the introduction of the A.D.P. training and visit (T&V) system of extension concept brought about by Benor and Baxter (1984) with a full aim of:

- re-organizing and revitalizing the agricultural extension system vis-à-vis increased food production.

- developing a well-articulated and reliable network of input distribution system couple with farm service centres.
- enhancing accessibility of farm areas through the provision of feeder roads, provision of water for drinking and other irrigation work.
- providing farmers with each ancillary service as tractor hire, land clearing and farm management advice.

With about 90 percent of activities in food and agro-industrial raw materials in the hands of peasant farmers using hand tool technology, unimproved seedlings, information backwardness, high level of illiteracy, inconstancy in government policies that are associated with risk and eventualities, it is not surprising that an average Nigerian today is faced with serious food shortages or that our agro-industries, are starved or needed raw materials that rising food importation bills remain a huge drain on our foreign exchange earnings (C.B.N., 1985).

Despite the introduction of new methods of farming, improved hybrids, seeds/seedling which are characterized by early maturity and high yield, improved farm mechanization services, there still seems to be a short fall in food production in the study area. Based on the imminent low level of production among farmers in the area and upon the existence of the ADP in the country and Delta in particular.

Anyanwu, (2000) report that for a developing nation like Nigeria, agriculture and rural transformation are requisite foundation for socio-economic progress.

Hence the adoption f proven farm technologies by farmers with access to ADP services in Delta State have become an issue for research.

The broad objectives of this study was therefore to ascertain the determinants of proven agricultural technologies adoption in Delta State, Nigeria. The specific objectives were to:

i. examine the socio-economic characteristics of farmers in Delta State ii.ascertain technologies by farmers in the study area iii.determine the effect of the socio-economic characteristics of farmers on their level of adoption of proven agricultural technologies

Methodology

The study was conducted in Delta State, Nigeria. the state situated in the south-south geopolitical zone of Nigeria with a population of 4,098.291 (males: 2,674,396; female: 2,024,085) (National Population Census, NPC, 2006). Major crops grown in Delta State are cassava, cocoyam, oil palm and potato.

Well-structured questionnaire was use to solicit response from 180 farmers across the state use a multi state sampling techniques. Frequency counts mean and percentage were use in Data analysis. A null hypothesis stated for the study showed: there is no significant relationship between farmers' socio-economic characteristics and their level of adoption of proven technologies and was tested using the multiple regression analysis.

Results and Discussion

1. Socio-Economic Characteristics of Respondents

Result shows that greater percentage of respondents are school certificate holders which constitute 33.88%, 23.88% were secondary school drop outs, 13.33% did not complete primary education, 12.77% where highly educated, while 7.22% had no education at all.

The age distribution table shows that the age bracket of 41-50 years constitute 29% depicting that farming is gradually moving from the hands of the aged ones, 27.77% are in the bracket of 51-60 years while the remaining percentage are distributed within other age brackets. This implies that farming is gradually moving away from the aged to the younger generation, this will bring a boast to agriculture especially in the study area.

The table below shows that 6.11% of the respondents had farm land between 5 hectares and above, while the range of 1.2 hectare constituted the highest percentage of the respondents which is 41.69%. the reason of the respondents not having large farm size could be because of the increase in population and complex land tenure system which entails owing land in fragments by individual house hold as their share from their late parents, and this will affect food production and reduce fit to adoption.

The table shows, that 31.11% are within the income range of N180,000 to N210,000, 29.44% were within the range of N30,000 to N170,000 while the rest are 39.45% are distributed among the remaining income range. This shows that farmers in the study area are increasing their income because of high rate of adoption.

The table shows that 90.55% of the farmers had no access to credit facility, while 9.44% only had access to credit, as such most of the farmers could not purchase some farm inputs. This implies that finance is the life blood of agribusiness.

The table shows that 37.22% are into trading as a major source of income, 30.56% get theirs through osusu 12.78% through cooperative societies 10% through relatives while 9.44% were through friends. Most farmers in the study area gets their income from informal financial market, because they had no access to loan, reason no collateral.

Table 1: Socioeconomics characteristics of respondents

Socio-economics characteristics	Frequency	Percentage (%)
Educational level No schooling	13	7.22
Primary school not completed	23	13.33
Primary school completed	16	8.88
Secondary school not completed	43	23.88
Secondary school completed	61	33.88
Highest education specify MSC, BSc. HND, NCE, OND	23	12.77
Age 21-30	6	3.33
31-40	22	12.55
41-50	53	29.44
51-60	50	27.77
61-70	12	6.66
Farm size		
Less than 1	71	39.44
1-2	75	41.69
2-3	23	12.78
5 and above	11	6.11
Income range per annum		
50,000-80,000	14	7.77
90,000-120,000	26	14.43
130,000-170,000	53	29.44
180,000-210,000	56	31.11
220,000 and above	31	17.20
Access to credit		
Yes	17	9.44
No	163	90.55
Other source of income		
Friends	17	9.44
Trading	67	37.22
Relatives	18	10
Loan from banks	-	-
Cooperative society	23	12.78
Osusu	55	30.56

Source: Field Survey, 2023

2. Level of adoption of extension services recommendation

Table 2 below revealed that the most farmers adopted extension service recommendation with regard to enhanced production by farmers in the study area includes, improved cassava varieties (32.8%), yam/maize/melon/cassava intercropping (26.1%), use of fertilizer (23.8%), mixed cropping arrangement (21.7%), dry season vegetable (21.7%), rabitary technology (13.9), poultry production (12.2%), upland rice production (11.79%), yam minisette (15.6%). This implies that most farmers in the study area are aware of the above mentioned extension service recommendations. It should be observed that the above technologies were not properly diffused, never the less the same farmers still adopted. The less adopted extension service recommendations in the study area include, tractorixation (2.2%), agro forestry practice (8.9%), upland production (11.7%) and cassava processing of cassava into flour (10%). Most farmers in the study area are aware of these extension recommendation to enhanced agricultural production, but tried them for adoption and found the

practices and yield less impressive hence, rejection of these recommended extension technologies.

Table 2: Percentage distribution of extension service recommendation by farmers in the study area

	Unaware		Awareness		Interest		Evaluation		Trial		Adoption	
Technologies	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Yam minisett	36	20	31	17.2	25	13.9	21	11.7	15	8.3	28	15.6
Fertilizer usage	7	3.9	42	23.3	22	12.2	23	12.8	38	21.1	43	23.8
Upland rice production	33	18.3	28	14.4	26	14.4	18	10	12	11.7	21	14.4
Yam/maize/cassava/melon intercropping	4	2.2	28	15.6	28	15.6	28	15.6	15	8.3	47	26.1
Calibration and application of herbicides	8	4.1	63	35	22	12.2	18	10	17	9.4	18	10
Poultry technology	6	3.3	53	28.9	33	18.3	26	14.4	20	11.1	22	12.2
Mixed and multiple cropping arrangement	6	3.3	63	35	20	11.1	26	14.4	20	11.1	39	21.7
Tractorization	18	10	21	11.7	22	12.2	16	8.9	18	10	4	2.2
Dry season vegetable farming	8	4.4	32	17.8	29	16.1	28	15.6	27	15	39	21.7
Agro forestry practice	26	14.4	23	12.8	20	11.1	21	11.7	20	11.1	16	8.9
Rabbitary technology	15	8.3	63	35	20	11.1	18	10	10	5.6	33	18.3
ADP improved cassava varieties	2	1.1	32	17.8	43	23.9	30	16.7	14	7.8	59	32.8
Artificial brooding of local chicks	3	1.7	68	37.8	16	8.9	28	15.6	20	11.1	29	16.1
Processing of cassava into floor	15	8.3	38	21.1	40	22.2	32	17.8	16	8.9	18	10
Floor production	3	1.7	43	23.9	45	25	28	15.6	25	13.9	25	13.9

The coefficient of multiple regression R^2 was found to be 14.44% and significant at 5% level. The value of R^2 shows that the included socio-economic variables explained only 14.41% of the total variations in the dependent variable (i.e adoption level of farmers). This is rather low and seems to show that the variable used may be the only responsible factors for farmers adoption of the recommended ADP programmes in the study area.

Based on the analysis of Table 3, only three (3) independent variables namely the farmers age, farm size, and access to credit facility were significant at 5% level. The farmers age (x1) however showed a deviation from the a priori expectation. It was expected that the coefficient of farmers age (X_1) be negatively signed to depict that the older the farmer, the lower the tendency of the farmer to adopt new technologies from the ADP. Thus, older farmers may be more experienced to adopt new technologies. Since most of the farming activities are left in the hands of relatively old people, adoption process will be left in their hands. However, since the effect of age (X_1) is significant, it confirms with the works of Agbamu (1993) and Rado (1996) which noted that the age of the farmers has a significant effect on their adoption level. The coefficient of X_3 (farm size) confirms with the a priori expectations that it is positively signed and significant at 5% level. Hence, an increase in the farmers farm size should encourage increased adoption of ADP technologies.

Access to credit facility (X_7) was positively signed as expected. This implies that access to credit facility by farmers encourages adoption of improved technologies. Non-availability of credit inputs when and were needed are known to militate against the adoption of improved technology. Farmers may have sufficient access to extension services and may be willing to adopt an improved practice after being aware of its benefits, but unable to do so because of the inability of coming up with necessary funds.

Furthermore, educational level, farm income, frequency of extension visits and availability of non-

farm income sources were found to be non-significant at 1%, 5% and 10% level. However, all these variables confirmed with the a priori expectations.

Table 3: Multiple Regression Result of the Relationship Between Adoption Level and Farmers socio-economic characteristics

Variable	Coefficient	Standard error	statistics	Sig. T.
Farmers age (X_1)	0.000236	7.23E-05	3.263459	0.0013
Educational level (X_2)	0.000274	0.000189	1.449519	0.1490
Farm size (X_3)	0.001264	0.000653	1.936758	0.0544
Farm income (X_4)	3.62E-09	8.99E-09	0.403180	0.6873
Frequency of extension visit (X_5)				
Availability of non-farm income sources (X_6)	0.001889	0.001397	1.352370	0.1780
Access to credit facility (X_7)	0.001174	0.000493	2.379309	0.0184
Constraint C	0.003376	0.004511	0.748279	0.4553

R^2=0.1441 or 14.41% *Significant at P<0.5
R^2= Adjusted = 0.109
S= Error= 0.017
F=Statistics =4.114
Prob (f-statistics) 0.000334
DW=1.61159
Source: Calculated from field data, 2006

Based on the a priori expectations, the linear functional form was considered to be of best fit. The linear regression equation is given as:

$Ad=0.0034+0.00024x_1+0.00027x_2+0.00126x_3+0.0000000036x_4$
(0.7483) (3.2635) (1.4495) (1.9368)
$+0.00093x_5+0.00189x_6+0.00117x_7$
(0.8779) (1.352370) (2.379309)
NB: Figures in brackets are the t-values

Conclusion

This study concludes that farmers in Delta State had high adoption rate of some proven technologies and was influence by their age, access to credit facility and farm size.

Recommendations

This study recommends thus:

1. The technologies that are not yet highly or not adopted by farmers (e.g dry season vegetable farming, calibration and application of herbicides) should by intensified for a complete high adoption by farmers in Delta State, Nigeria.
2. Private sectors, NGOs, churches and philanthropists should be encouraged by government to contribute to agriculture as part of their social responsibilities to the study.

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