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Full Length Research Paper

Sustainability of agricultural technologies in Southwest, Nigeria: The case of cassava farmers

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Sustainability of agricultural technologies requires an understanding of farmers socio-economic and farm characteristics, as well as the choice of technologies adopted by the farming households. The objective of this study is to investigate the farmers' socio- economic, adoption level, socio- cultural and environmental characteristics as well as the contribution to the sustained use index of these and some other independent variables. A multistage random sampling was used to collect primary data from the respondents, and the data collected were analyzed with spearman correlation methods. The results revealed that, there were significant positive correlations between age and sustained use index (r =0.16), organizational membership and extension contact (r = 0.21), factors affecting adoption of cassava technologies (r = 0.09) while a negative significant correlation exists between factors affecting adoption of cassava technology and extension contact (r = - 0.15). In conclusion, sustainable use of technology requires understanding better the socio-economic constraints of farmers as well as policy implications to encourage the sustained use of adopted technologies.

Key words: Sustainability, technology, cassava, farmer.

INTRODUCTION

Nigeria being an agrarian country, the production of foods and other raw materials are necessary ingredients for the take-off of all other sectors of the nation's economy. As a primary production sector, agriculture has to be modernized in order to achieve the much-needed increase in the productivity of the sector.

Agricultural development was described as the shift from traditional method of production to the use of modern techniques (Swanson and Claar, 1984). This has been effected in Nigeria as a two-way strategy at various times. First as the transformation type, which is the creation of capital-intensive projects, and secondly the improvement approach, which is the diffusion of high pay-off agricultural inputs and improved practices, derived from research institutes by extension agents and input supply organizations to small-scale farmers. This accounts for the establishment of many research institutes as the third component of the agricultural production macro-system (Havelock, 1972).

The trend of the contributions of agriculture in Nigeria, alone in the primary sector (agriculture) to Gross Domestic Product (GDP) is reflected in raising the contribution of agriculture from 38.8% in 1995 to 41.08 in 2000 while mining sub sector of primary sector contributed 12.95 in 1995 and reduced to 11.06 in 2000 (Table 1). The secondary sector's contribution to output was below 10% throughout the period under review (NISER, 2000; Ogunsumi, 2004).

Similarly, the percentage age growth rates of real GDP by sectors are contained in Table 2. The implication is that the Nigerian economy is still characterized by primary sector dominance. Agriculture alone contributed 3.66% in 1995, about 4% in 1996 and increased to 5.2% in 1999, while the secondary sector had a deficit of 3.52% in 1995. In all, the primary sector contributed over half (52.14%) of the real GDP from where agriculture alone contributed 41.08%. This implies that the leading sector in terms of growth is the agricultural segment of the primary sector, followed by the tertiary sector throughout the period. However, mining sub-sector of the primary sector registered large negative rates in 1998 through 2000 (Table 2).

Agricultural technology and sustainable agriculture

Sustainable Agriculture is a way of farming that can be carried out for generations to come. This long-term

Table 1. Distribution of real GDP by Sectoral Groups (1995 - 2000).

Sectoral Groups	1995	1996	1997	1998	1999	2000
Primary sector (Agric)	38.75	39.09	39.40	40.07	40.99	41.08
Primary sector (Mining)	12.93	13.35	13.14	12.25	11.06	11.06
Total primary sector	51.67	52.35	52.54	52.32	52.05	52.14
Secondary sector	9.23	9.02	8.89	8.55	8.60	8.70
Tertiary sector	39.10	38.62	38.57	39.13	39.35	39.16
Total value added	100.00	100.00	100.00	100.00	100.00	100.00

Source: CBN, Several issues In NISER, 2000 cited in Ogunsumi, 2004.

Table 2. Growth rates of real GDP by Sectoral Groups (1995 - 2000).

Sectoral Groups	1995	1996	1997	1998	1999	2000
Primary sector (Agric)	3.66	4.08	4.20	4.04	5.17	5.17
Primary sector (Mining)	2.51	6.82	1.51	-4.60	-7.21	-7.21
Total primary sector	3.37	4.76	3.51	1.88	2.27	2.27
Secondary sector	-3.52	1.08	1.63	-1.60	3.49	3.49
Tertiary sector	1.96	2.15	3.01	3.80	3.42	3.65
Total value added	2.14	3.40	3.15	2.31	2.82	4.05

Source: CBN, Several issues In NISER, 2000, cited in Ogunsumi, 2004.

approach to agriculture combines efficient production with the wise stewardship of the earth's resources (Renkov, 2000). It is hoped that, over time, sustainable agriculture will do the following:

1. Meet human needs with a safe, high-quality, and affordable supply of food and fiber.
2. Protect the natural resource base and prevent the degradation of air, soil and water quality.
3. Use nonrenewable resources efficiently.
4. Use natural biological cycles and controls.
5. Assure the economic survival of farming and the well-being of farmers, their families and communities.
6. Creation of institutional incentives and funding that focus public and private research, education, and technology development on integrating agricultural productivity and profitability with environmental stewardship (Rewald, 2001).

Karanyo (2002) affirmed that new technology in all areas has improved agricultural production, thus its sustainability. Today's Agriculture is using best management practices (BMP's), by targeting many of its applications, not broadcasting as was done in the past. New disease resistant hybrids, biological pest control, reduced pesticide use, cultural practices that reduce the incidence of pests and diseases, and better placement and reduced amounts of fertilizers are all being employed. Insect specific chemicals and biological insect controls are now being utilized, instead of broad-spectrum pesticides that actually reduce the number of sprays needed along with costs (Munyi, 2000).

Nigerian agriculture needs sustainability so that Nigerians can rely on a safe domestic supply of food rather than relying on foreign imports which could affect our security if cut off and not be able to guarantee its safety. However, it is possible that agriculture will somehow overcome these issues and prevail if major crops that are into the farming systems are considered (Norman et al., 1976). That is why it is imperative to include three major crops namely maize, cassava and soybean in this study. Technologies have been developed to improve the lots of farmers in Nigeria; these technologies were transferred through the ADPs and reports show adoption or adaptation of the technologies (Aloa and Williams, 1972; Ladipo, 1977; Arnon, 1989; Degrande and Duguma, 2000).

Statement of the problem

An agricultural technology system is a complex set of functions and linkages. To increase agricultural productivity and farm household income while maintaining the resource base and addressing equity concerns, requires an interactive technology system whereby farmers, researchers, extensionists, non governmental organisations and other agencies work together in a co-ordinated manner with adequate feedback (Swanson, 1995). The trend of Agricultural Development Programmes

(ADPs) going commercial to extend its existence due to the dwindling funding opportunity affecting the availability of the required inputs. Also with the recent economic situation of galloping inflation, starvation and food scarcity, there has been consistent rapid increase in the prices of many agricultural inputs. This has an adverse effect on the technology development, dissemination, adoption and of course, sustained use of the technology.

Farming practices change continually, farmers build in their own experience and they manage their crops. There are changes in natural conditions, resource availability and opportunities to which farmers have to respond. Farmers learn about new technologies from various organisations, programmes and projects dedicated to research, extension or rural development (Biggs, 1985). These bodies develop and promote new varieties, inputs and management practices. It is essential that such institutions should follow-up the results of their efforts and understand how the technologies they promote result into the complex pattern of agricultural changes in which all farmers participate.

Sustained use of technology sometimes may not be as a result of income generation as stated by Abang et al. (1994) and FACU (1994), but rather due to other reasons that have not been documented. It is therefore important to analyse the sustained use of agricultural technologies on farmers' productivity in Southwest Nigeria and find out the contribution of technology use on yield, farmers' income and socio-cultural situations.

To achieve the above, this study will ask the following questions:

1. What has been adoption behaviour of the farmers with respect to cassava technologies?
2. What are the reasons for sustained or abandoned use of recommended technologies?
3. What are the effects of sustained use of technologies on farmers' income and standard of living?
4. Are there differences in the outputs of farmers with sustained use of certain technologies and those that abandoned use of such technologies?

Objectives of the study

The general objective of the study is to determine sustained use of cassava technologies among farmers in Southwest Nigeria.
The specific objectives are to:

1. Examine the demographic characteristics of the farmers,
2. Determine the past and present adoption patterns of the farmers in the study areas,
3. Assess the effect of the technologies on the farmers' income in the study area,
4. Compare farmers that sustained the use of these technologies with those that abandoned them against:

i). Attitude towards improved technology.
ii). Output.
iii). Income.

MATERIALS AND METHODS

The multi- stage sampling procedure was used to randomly select three states namely Oyo, Osun and Ondo where adoption (full or partial) of cassava recommended technologies had been reported (IAR and T, 2000).

The second stage of the sampling procedure consists of purposive selection of two zones of Agricultural Development Programme (ADP) per state; however, only one zone was eventually considered fit for Ondo State for logistic reasons. This represents about 60 and 50% of the zones in the States respectively. The zones are Saki and Ibadan/Ibarapa in Oyo State, Iwo and Ife/Ijesha in Osun State and Akure in Ondo state.

Stage three consists of random selection of two blocks from the lists of blocks per zone, where adoption of the technologies in question had taken place. The blocks selected were Saki, Igboho, Ido and Akinyele in Oyo State; Iwo, Ejigbo, Ijebu jesha and Atakumosa in Osun State; Ishua and Ibule in Ondo State.

Stage four comprised of four cells selected randomly representing 50% of the selected blocks.

Lastly, stage five was the purposive selection of three farm households who have sustained use of the technologies and three farm households that abandoned the technologies from the list of farmers that had adopted the technologies earlier. This was derived from a preliminary survey that was carried out with the assistance of Extension staff of the Agricultural Development Programme (ADPs). This helped in identifying the farmers that had adopted selected technologies within a stipulated period of time. The time frame chosen was between 1990 and 1995, this period recorded high adoption rates in the crop technologies according to ADPs' reports.

Data collection and instrument for data collection

The use of primary and secondary data was employed for this study. Secondary data were the information obtained from literature, project reports, official documents, publications, consultation and library materials among others. Primary data were collected through the use of a structured and validated questionnaires consisting of both open and closed-ended questions to elicit information from the target respondents. Trained enumerators who have the knowledge of the dialect of the clientele were used to assist in the collection of information required.

The data were first collected in 2004 and were validated in 2006. The Dependent variable of the study is sustained use index; it was measured as not sustained/ abandoned the use of adopted technology and still using/sustained the use of previously adopted agricultural technologies within a stipulated period of time. Scores were assigned as follows:

Abandoned use/Not sustained = 1
Still using/Sustained use = 2

Sustained use index was then developed from the list of cassava technologies with maximum score of 18. The data analysis was carried out using Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies, percentage ages, means, standard deviation and ranges were used.

Pearson Product Moment Correlation (PPMC) was used to test relationships between age, income, and farm size, level of awareness and attitude on one hand and sustained use of cassava technologies on the other.

Table 3. Distribution of respondents according age.

Variables	N =133 Sustained users		N =75 Abandoned users		N = 208 All respondents	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
Age group						
≤20 years	1	0.75	-	-	1	0.48
21-30	1	0.75	3	4.00	4	1.92
31- 40	16	12.03	10	13.38	26	12.50
41-50	62	46.62	39	52.00	101	48.56
51-60	43	32.33	20	26.67	63	30.29
61-70	9	6.77	3	4.00	12	5.77
Above 70	1	0.75	-	-	1	0.48
Mean	49.71		47.07		49.00	
Range	30 - 77yrs		20 - 65yrs		20 - 77yrs	
Standard Deviation	8.28		8.72		8.76	

Source: Ogunsumi, 2004.

Table 4. Distribution of respondents by their main and secondary occupation.

Occupation	Primary						Secondary					
	Sustained		Abandoned		All respondents		Sustained		Abandoned		All respondents	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Crop farming	115	86.47	65	86.67	180	86.54	10	7.52	8	10.67	18	8.65
Livestock farming	2	1.50	2	2.67	4	1.92	15	11.28	7	9.33	22	10.58
Trading	5	3.76	-	-	5	2.40	43	32.23	30	40.00	73	35.10
Hunting	2	1.50	-	-	2	0.96	30	22.56	19	25.33	49	23.56
Civil service	6	4.51	6	8.00	12	5.77	-	-	-	-	-	-
Gathering and selling non-timber forest products	1	0.75	2	2.67	3	1.42	18	13.53	6	8.00	24	11.54
Graft	-	-	-	-	-	-	2	1.50	2	2.67	4	1.92
No indication	2	1.50			2	0.96	15	11.28	3	4.00	18	8.65

Source: Ogunsumi, 2004.

RESULTS

Socio- economic characteristics of respondents

The selected socio-economic characteristics of the respondents in this study were age, sex, marital status, level of education, religious affiliation, family size, gender of household head and organisational membership.

Mean age of respondents was 49 years ranging from 20 - 77 years (Table 3). The modal age group was 41 - 50 years. Almost half of the respondents (48.56%) fell within the age bracket of 41 - 50 years. Those of 51 - 60 years make up only 30.29% of the respondents while those above 60 - 70 years were 5.77%, and only 0.48% were above 70 years (Table 3). In addition, some 12.50% were within 31 - 40 years age bracket, 1.92% was within 21 - 30 years of age and only 0.48% were a maximum of age 20 years old. A total of 14.90% of respondents fell below the modal age group, while a total of 36.54% rose above it. A large proportion of 78.85% were within the 41 - 60 age range (Table 3). Respondents got engaged in various types of occupation both primary and secondary.

Primary occupation

Majority of the farmers (86.54%) were crop farmers while 1.92% were livestock farmers (Table 4). Other primary occupations engaged by the respondents include trading (2.40%), hunting (0.96%), civil service (5.77%), gathering and selling of non-timber forest products (1.42%) and 0.96% did not indicate their specific primary occupation.

A total of 87.46% of respondents were farmers while 12.54% got engaged in other activities as their main occupation.

Secondary occupation

The respondents that had crop farming as their secondary occupation were 8.65%. Similarly 8.65% of the respondents did not indicate their secondary occupation when they were asked. Only 10.58% of the respondents had livestock farming as secondary occupation. However, a large proportion (35.10%) had trading as secondary occupation while 23.56% were hunters by their secondary occupation and 11.54% engaged in gathering of non-timber forest product. The rest 1.92% engaged in crafts work as secondary occupation (Table 4).

Household membership by Sex

Only 1.44% of the respondents had no male member in the household, 44.23% had only one male member in each of the households (Table 5). About 29.00% had 2 male members each and 12.98% had 3 male members in each of the households each. The respondents with 3 and 4 male members were 7.21% and 4.32%, respectively. Mean of the male members among the respondents' households was 1.95 males with a range of 0 - 6 persons while the modal male number was one (Table 5).

Similarly, the female members in the households of the respondents followed the same trend. Only 1.44% of the respondents had no female member in their households while 25.48% had only one female member. About 36.00% had 2 female members in the household while 15.38% had 3 female members in their household set up. The respondents with 4 females in the household were 12.50% while 4.81% had 5 female members in the household and the remaining 0.96% had 9 female members in the household. Mean of the female member in the household set up was 2.52 females among the respondents with a range of 0 - 9 and the modal being 2 females (Table 5.).

Number of children in the household varied from 0 - 35 children with a mean of 4.49 and modal group of 3 and 4 children. Only 3.85% of respondents did not have any child in the family. Those ages considered as children were any individuals with age less than 18 years. About 10.00% had only one child while 16.83% had two children. Those with three and four children in the households were 17.79% each. Only 1.44% had five children and about 11.00% had six children while 13.90% had nine and above children members of household (Table 5).

Adoption and sustained use of cassava technologies

The years of first trial (adoption) and years of last use of cassava technologies were considered. It was discovered that farmers did not adopt the whole improved cassava package of technologies. The commonly adopted components from the package are the following: (i) The choice of improved cassava varieties (ii) Planting date (iii) plant population (iv) Fertilizer application and (v) Weed control measure while the respondents did not adopt the remaining components that include the following pest and diseases control and harvesting time.

Table 6 shows that 70.19% of the respondents first used at least one of the cassava technologies 11 - 15 years ago. That group was followed by 17.80% of the respondents who used the technology 16 - 20 years ago. The remaining 12% of respondents had used at least one of the cassava technologies in the past 6 - 10 years.

The period of last use of cassava technology was also considered. Similarly, 63.94% of the respondents were still using the technology. These respondents were the sustained users of cassava technology while the rest 36.04% were the abandoned users. However, they stopped the use of the technology at varying times. Those respondents that stopped using the technology since 1 - 5 years were 14.9%. About 17% stopped the use since 6 - 10 years while 3.8% stopped 11 - 15 years ago (Table 6).

Mean output from cassava of respondents was 32.74 tons ranging from 20 - 200 tons (Table 7). A large number of respondents (92.86%) had output of 25 tons and below from cassava production in 2000/2001 season, 2.86% were in the output group of 25.1 - 50 tons while only 1.43% had 50.1 - 100 tons and the rest 2.86% had above 100 tons.

Pattern of sustainability of cassava technology in the study area

Table 8 shows that, all the respondents (100%) were aware of a set from cassava technologies and used it before, while Table 9 reveals that 63.94% were still using and 36.04% had stopped the use.

Sources of information on improved technologies identified among the respondents include friends or other farmers, mass media (radio), research institute and extension agents. The results show that majority (91.35%) of the farmers got information from friends/farmers while 39.42% got from research institutes (these include the farmers whose farm, on- farm research were carried out at one time or the other). Only 42.79% received information from extension agents (Table 10).

The study revealed that there were significant positive correlations between age and adoption pattern ($r = 0.16$), age and soybean adoption level ($r = 0.15$), age and cassava adoption level ($r = 0.14$), organizational membership and extension contact ($r = 0.21$), factors affecting sustained use of maize and cassava technologies ($r = 0.09$) while a negative significant correlation exists between factors affecting sustained use of maize technology and extension contact ($r = -0.15$).

Table 5. Distribution of household membership by sex.

Male number in household	N = 133		N = 75		N = 208	
	Sustained users		Abandoned users		All respondents	
	Freq	(%)	Freq	(%)	Freq	(%)
0	1	0.75	2	2.67	3	1.44
1	66	49.62	26	34.67	92	44.23
2	36	27.07	25	33.33	61	29.33
3	15	11.28	12	16.00	97	12.98
4	9	6.67	6	8.00	15	7.21
5	5	3.76	4	5.33	9	4.32
Above 5	1	0.75	-	-	1	0.48
Mean	1.88		2.08		1.95	
Range	0to 6		0 to 5		0 to 6	
Standard Deviation	1.17		1.19		1.18s	
Female number in household						
0	1	0.75	2	2.67	3	1.44
1	39	29.32	14	18.67	53	25.48
2	43	32.33	31	41.33	74	35.58
3	20	15.04	12	16.00	32	15.38
4	18	13.53	8	10.67	26	12.50
5	6	4.51	4	5.33	10	4.81
6	3	2.26	2	2.67	5	2.40
7	1	0.75	2	2.67	3	1.44
8	-	-	-	-	-	
9	2	1.15	-	-	2	
Above 9	-	-				
Mean	2.48		2.59		2.52	
Range	0 to 9		0 to 9		0 o 9	
Standard Deviation	1.58		1.68		1.61	
Children number in household						
0	8	6.02	-	-	8	3.85
1	13	9.77	7	9.33	20	9.62
2	24	18.05	11	14.67	35	16.83
3	22	16.54	15	20.00	37	17.79
4	23	17.29	14	18.67	37	17.79
5	3	2.26	-	-	3	1.44
6	9	6.77	13	17.33	22	10.58
7	3	2.26	2	2.67	5	2.40
8	6	4.51	1	1.33	7	3.37
9	2	1.50	3	4.00	5	2.40
Above 9	20	15.04	9	12.00	29	13.9
Mean	4.81		3.92		4.49	
Range	0 - 35		0 - 17		0 - 35	
Standard Deviation	4.61		3.79		4.35	

Source: Survey Data, 2006.

The study revealed that there were significant positive correlations between age and sustained use index (r = 0.16), organizational membership and extension contact (r = 0.21), factors affecting adoption of cassava technologies (r = 0.09) while a negative significant correlation exists between factors affecting adoption of cassava technology and extension contact (r = -0.15) (Table 11).

Table 6. Sustained use and adoption pattern of cassava improved technology.

Characteristic	Freq.	(%)	Freq	(%)	Freq	(%)
Improved cassava package of technologies						
Year 1st heard						
1 - 5	-	1.50	-	-	2	0.96
6 - 10	17	0.75	7	9.33	8	3.85
11 - 15	93	63.91	57	76.00	1.42	68.27
16 - 20	23	33.83	11	14.67	56	26.92
1st trial (Yrs)/Adoption level						
1-5	-	12.78	-	-	2	0.96
6 - 10	17	69.92	7	9.33	8	3.85
11 - 15	93	17.29	57	76.00	142	68.27
16 - 20	23		11	14.67	56	26.92
Sustained use index						
Still Using	133	100.00	-	-	133	63.94
1 - 5	-	-	31	41.33	31	14.90
6 - 10	-	-	36	48.00	36	17.31
11 - 15	-	-	8	10.67	8	3.80
16-20	-	-	-	-	-	-

Source: Survey Data, 2006.

Table 7. Distribution of respondents according to their adoption level of cassava technologies.

	N = 133, Sustained users		N = 75, Abandoned users		N = 208, All respondents	
	Freq.	(%)	Freq.	(%)	Freq.	(%)
Cassava technologies				-		
1. Land preparation	133	100.00	75	-	88	42.31
2. Planting time	-	-	-		-	-
3. Recommended varieties	133	100.00		-	133	64.94
4 Seed rate	133	100.00	-	-	133	64.94
5. Fertilizer application	133	100.00	-		133	64.94
6. Weed control	133	100.00		-	133	64.94
7. Diseases control	-	-	-	-	-	-
8. Harvesting time	-	-	-	-	-	-
9. Storage			-	-		
Adoption score			-			
≤5	13	9.78	75	100.00	88	42.31
6-10	120	90.23	-	-	120	57.69
>10	-	-	-	-	-	-
Mean	9.51		5		7.89	
Standard deviation	1.49		00		2.48	

DISCUSSION

Majority of respondents sustained the use of the selected technologies (maize, cassava and soybean) is an indication that the technologies were embraced by the farmers in the study area. Farmers may not adopt any technology that they know will not give an advantage over the existing practices. However, some farmers still abandoned the use of the technology in the study area. The analysis further shows the direction of each of the

Table 8. Distribution of respondents according to cassava output (tons).

Output group (tons)	N = 110, Sustained users		N = 30, Abandoned users		N = 140, All respondents	
	Freq	(%)	Freq	(%)	Freq	(%)
≤ 25	105	95.45	25	83.33	130	92.86
25.1 - 50	1	0.91	3	10.00	4	2.86
50.1 - 75	-	-	-	-	-	-
75.1 - 100	2	1.82			2	1.43
Above 100	2	1.82	2	6.67	4	2.86
Mean	35		20		32.74	
Range	20 - 200		20 - 120		20 - 200	

Source: Survey Data, 2006.

Table 9. Sustainability of respondents' use of technologies.

Technologies	Aware		Used before or (Adopted)		No more using (Abandoned)		Still using (Sustained)	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Cassava technology package	208	100.00	208	100.00	75	36.06	133	63.94

Source: Survey Data, 2006.

Table 10. Sources of awareness of information on improved technologies.

Sources	N = 133, Sustained		N = 75, Abandoned		N = 208, All respondents	
	Freq.	(%)	Freq.	(%)	Freq.	(%)
Farmers/Friends	120	90.23	70	93.33	190	91.35
Mass media	133	100.00	75	100.00	208	100.00
Research institutes	61.65	82	-	-	82	39.42
Extension agents	89	66.92	-	-	89	42.79
Other sources	13	9.78	-	-	13	6.25

Source: Survey Data, 2006.

variables. All the variables had inverse relationship with sustained use with the exception of marital status, maize technology adoption, cassava technology adoption.

The pattern of age distribution found in this study deserves some comments. Though, the proportion of respondents in the age 21 - 30 years category is low, sustained users were less prominent in this age range than abandoned users (that is, 0.75% of sustained users while 4.00% were abandoned users). Similarly, the case for age group 31 - 40 years, 12.03% were sustained users as against 13.33% for abandoned users.

The proportion in the age 51 years and above being age range is higher in sustained users than abandoned users (that is 39.85% for sustained users as against 30.67% for abandoned users) is an indication that older farmers are in the business of agriculture while the young and able-bodied move away from agriculture to find more lucrative jobs. Most of them might be absentee farmers. The age distribution and the averages indicated in Table 3, have some implications on policy issues with regards to adoption of innovations and labour supply. Younger people tend to be interested in white collar jobs other than Agriculture. Older people are found mainly in the field of Agriculture, thus, the age of sustained users were higher than abandoned users, other sectors compete with Agriculture for the able – bodied man power, more so they tend to pay better remuneration and more regular too. This study also agreed with Angba's, 2000 study that able – bodied tend to migrate to cities to seek jobs or higher education impressing great danger on farm labour problems on the older age groups.

The trend is similar between sustained users and abandoned users having higher males members than female. However, the proportion in sustained users is lower than abandoned users (90.23% were males as against 93.33%). But for female members the sustained users were 9.77% which was higher than 6.67% for abandoned users, respectively. However, the more female

Table 11. Correlation matrix showing relationships among selected variables.

	AGE	ORGAMEMB	EXTCONT	FACMAIZ	FACTCASS	FACSOY	ATT	SCMTOT	STOT	CTOT	MTOT
AGE		-0.03	0.06	-0.08	0.04	-0.91	0.04	0.16**	0.15*	0.14*	0.13
ORGAMEMB	-0.30		0.21**	0.01	0.06	0.02	0.03	-0.02	-0.08	0.03	-0.01
EXTCONT	0.06	0.21**		-0.15*	-0.03	-0.02	-0.10	0.06	0.01	0.09	0.06
FACMAIZ	-0.08	0.01	-0.15*		0.09**	0.88**	0.44**	-0.11	-0.09	-0.08	-0.12
FACCASS	0.00	0.06	-0.03	0.90**		0.84**	0.34**	-0.09	-0.08	-0.08	-0.09
FACSOY	-0.9	0.02	-0.02	0.89**	0.84**		0.33**	-0.12	-0.09	-0.09	-0.13
ATT	0.04	0.03	-0.10	0.44**	0.34**	0.33		-0.09	-0.07	-0.09	-0.07
SCMTOT	0.16*	-0.02	0.06	-0.11	-0.09	-0.12	-0.09		0.88**	0.88**	0.93**
STOT	0.15*	-0.08	0.01	-0.09	-0.08	-0.09	-0.07	0.88**		0.60**	0.74**
CTOT	0.14*	0.03	0.09	-0.08	-0.08	-0.09	-0.09	0.88**	0.60**		0.74**
MTOT	0.13	-0.01	0.06	-0.12	-0.09	-0.13	-0.07	0.93**	0.74**	0.74**	1.00

Key: Age = Age of Respondents; ORGAMEMB = Respondents' membership into organization. EXTCONT = Farmers contact with extension agents; FACMAIZ = Factors affecting maize technology sustainability. FACCASS = Factors affecting cassava technology sustainability; FACSOY = Factors affecting soybean technology sustainability. ATT = Farmers' attitude towards improved technology; SCMTOT = Total adoption index for the selected technologies. STOT = Soybean adoption index; CTOT = Cassava adoption index. MTOT = Maize adoption scores;; NS. at P value>0.05; * = sig at p⊆ 0.05.

members in sustained users, is an indication of sustainability of technology being gender friendly.

Only 0.96% of sustained and abandoned users had preference for traditional religion respectively. Nonetheless, the difference in religion of sustained and abandoned users was not significant at 0.05 levels.

Sustained and abandoned users as presented in Table 4, show that the primary occupation of the two categories of farmers is similar. Sustained and abandoned users had crop farming as their main occupation by 86.47% and 86.67%, respectively (Table 4).

Sustained users were expected to be involved in farming, the expectation materialized. However, they were engaged in trading since the study did not investigate the time spent on farmwork, it may be difficult to say that abandoned users were more involved in farming because a slightly greater percentage age of them were primarily crop farmers. However, Adeyeye (1986) also found that co-operators farms used less labour than non-co-operators farms. He claimed co-operators had access to some labour saving devices for land clearing and weeding operations. This also may cloud the view that because more abandoned users were primarily farmers, they were involved in farming more than sustained users, if they were, they could have sustained the use of the technology.

From the 2 categories of farmers interviewed, larger proportion (60.58%) and (34.13%) had their household head to be males for sustained and abandoned users respectively as against a lower proportion of female headship for sustained users (1.92%) and 0.96% for abandoned users .

The indication is that, sustained users had higher output from yam cultivation, consequently higher income. The mean yam output was 85.01 tons as against 65.20 tons for the abandoned users. The mean Cassava production of the sustained users was higher 35.00 tons as against 20.00 tons from abandoned users. The increased output of sustained users shows an indication that sustainability of technology might have been responsible for the increase.

The analysis further shows the direction of each of the variables. All the variables had inverse relationship with sustained user, with the exception of marital status and cassava technology adoption.

Conclusion

Majority of the respondents adopting at least a set of the selected technologies is an indication of the importance of cassava as a crop in the study area. The farmers in the study area adopted the technologies at varying times, the level of adoption is higher among the sustained users than abandoned users. The results supported earlier findings in the studies of Adeyeye (1986) and

Ladele (1990) which also reported that the level of adoption is higher among co-operators than non-co-operators. Similarly, Angba (2000) and Ogunsumi (2005) reported that the level of adoption is higher among sustained users than abandoned users. The policy implication for the agricultural extension is that sustained farmers adopt innovation more rapidly than abandoned users.

RECOMMENDATION

Therefore, it is suggested that all agricultural development schemes and interventions in the study area should give a focus on adoption of technologies adapted to the farming systems in order to sustaining the use of the technologies. Spelling out total adoption to actualize research findings on farmers' fields. Once farmers are aware of concise efforts geared towards total adoption and sustaining adopted technologies, they would gear up and organise themselves so as to benefit from such programmes.

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