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Community Adoption on Cassava Technology Packages in Elele Alimini Enuoha Local Government Area of Rivers State, Nigeria.

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Abstract: *The study examined community adoption on cassava technology packages in the Elele-Alimini, Emuoha Local Government Area of Rivers State. Structured questionnaire was used to elicit information from the respondents, multistage random sampling techniques was used to select 60 cassava farmers. Data obtained were subjected to descriptive statistics. The major specific objectives were to identify socio-economic characteristics of cassava farmers, identify the main sources of information on improved cassava technology package used by farmers, assess the levels of adoption of cassava technology packages by farmers and ascertain the constraints to adoption of cassava packages by farmers. Results indicate that improved cassava cultivars (x=3.5), seed bed preparation (x-3.8), weed control (x=3.3) fertilizer application (x=3.8), planting method and spacing (x=4.1) were the cassava technology packages adopted by farmers. Constraints to adoption of cassava technology packages amongst the cassava farmers were the non-availability of fertilizers which ranked 1st, non-availability of tractors for hiring (2nd), non-assistance of children with farm work (3rd), shortage of improved cassava cuttings (4th) amongst others. It was therefore recommended that as landholding per farm household in the area was found to be largely 4.13 ha, government can move in to help the farmers with tractors and implements to enable them plough, harrow and ridge their fields. Policies aimed at encouraging subsidy of farm inputs, availability and effective distribution of inorganic fertilizers and improved cultivars were also advocated for increased cassava production.*

Keywords: *Community, Adoption, Cassava, Technologies Packages.*

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I. Introduction

The production of food and fiber to satisfy the world population in critical to the socio-economic well-being of all societies. Unless agricultural produce and products are plentiful and relatively inexpensive, in both urban and rural communities, the life chances of human populations are significantly reduced. In the United States of America as well as other developed nations of the world, the productivity of agricultural sector has been consistently high for decades (Camboni and Napier, 1993). As a major source of economic buoyancy, those countries have over the years placed high values on agriculture by making generous budgetary provisions to the sectors, particularly in the areas of research and extension activities. Consequently, several studies on adoption-diffusion of innovations aimed at boosting farm productivity have been conducted which have largely translated into their present self-sufficiency in food production.

Some of the studies according to Rogers (1962) included: congruence versus profitability in the diffusion of hybrid sorghum (Brandner and Straus, 1959); The adoption of two farm practices in a Central lowa Community (Beal and Rogers, 1960); Adoption of new ideas and practices (Lionberger, 1960) Farm practice attributes and adoption (Fliegal and Kilvin, 1961); Diffusion of innovation (Rogers, 1962); and farmer practices and problems in Northern Veracruz (Harrington, 1979).

Almost all farmers have a goal of increasing income. Also small farmers have a security goal of meeting subsistence requirements of their preferred foods. Despite that, as much as they may wish to adopt new technologies, they equally want to avoid taking risks that might jeopardize their subsistence or source of income.

World Bank (1999) reported Nigeria's annual agricultural growth rate at 2.9% Juxtaposed against its current annual population growth of 3%, it casts a dark shadow over its capability to produce enough food for its growing population, which outstrips food production. This accounts for the current food crisis facing the nation coupled with a negative impact on the economy and low level of production and investment in the sector.

On their own part, Nigeria agricultural scientists rose up to the challenge by embarking on appropriate research efforts that resulted in the introduction of new technologies that are fat transforming and modernizing the Nigerian agricultural landscape. Similarly, adoption-diffusion scientist executed studies in their effort to

identify problems associated with adoption of rejection of innovation (e.g. National Agricultural Extension Research and Liaison Services- NAERLS, 2000).

Adekoya and Ajayi, 2000; Atala, 1986) and others. However, in an attempt to solve the problem of agricultural extension under the Ministries of Agriculture, the Agricultural Development Projects (ADPs), based on the Training and Visit (T and V) extension management system that integrates extension workers' training, farm visits, and ensures a two-way communication between research and farmers, and an effective inputs distribution system was introduced in the 1980s but perceived to have been largely ineffective due partly to slow implementation (Olayide *et al*., 1980; Madukwe, 1989 and Eziakor, 1990).

Cassava (Manihot esulenta) is grown for use as food in many African countries including Nigeria. It is a high yielding and drought resistant crop and with improved pest management practices, its high yielding capacity could be sustained, (Cock, 1985 in Oyegbami *et al*, 2010). In Nigeria, cassava plays a principal role in the food economy Agwu *et al*, 2007.

Consequently, Nigeria is the largest cassava producing country in the world with an annual estimate of 39 million tones (Central Bank of Nigeria, 2003). Nigeria's production accounts for 19% of the world output and 34% of Africa's output (Okoro et al., 2005). According to Nweke et al (2002) eight percent of Nigerians in the rural areas eat a cassava meal at least once a week and majority eats cassava at least once a day; hence it play a major role in the country's food security. As a crop whose by products have a wide array of uses, cassava is the most important food crop for Nigeria by production quantity next to yam, which is most important food crop by value (FAOSTAT, 2013). Nigeria is the world's largest producer of cassava with other top producers being Indonesia, Thailand, the Democratic Republic of Congo and Angola. It has been estimated that in 2010 Nigeria's production of cassava reached 37.5 million tones. FAOSTAT, (2012).

In Nigeria, there are two main categories of cassava produced; *Manihot Palmata and Manihot aipi,* or bitter and sweet cassava respectively (Nwabueze, 2011). Cassava production in 2010 has reached about 37.5 million tones while yield and area values reached 12 tonnes per hectare and 3.13 million hectares respectively FAOSTAT, (2012). The country has consistently been ranked as the world's largest producer of cassava since 2005 (FAOSTAT, 2012). Cassava is also seen to have a high poverty-reduction potential for Nigeria due to its low production cost (Nweke 2004. FAO 2005). Egesi et al (2006), argue that cassava has been transformed from a reserve commodity for support in times of famine into a rural staple, and subsequently a cash crop. In Nigeria, typically farmers either marker their fresh produce to middlemen who then process the crop or farmers also directly process the fresh tubers.

Diverse motives abound why farmers adopt or reject agricultural innovations. It is assumed that farmers make adoption decision based upon utility consideration comparing various technologies that are available. Framers will adopt a technology if its widely utility exceeds the utility of other (Louis, 1999). People however resist change or reject innovations if when the reason for the change is unclear, when the communication about the change has not been sufficient and when it threatens to modify established patterns of working relationships between people. Many improved cassava technology packages have been developed and disseminated to farmers in the study area without considering the constraints to their adoption. There is a dearth of information hence; the study seeks to answer the following questions.

i. What are the socio-economic characteristics of cassava farmers in the study area?
ii. What are the main sources of information on improved cassava technology packages use by farmers in the study area?
iii. What are the levels of adoption of cassava technology packages of farmers in the study area?
iv. What are the constraints to adoption of the improved cassava technology packages by farmers in the study area?

II. Methodology

This study area is Elele-Alimini town in Emuoha Local Government Area (LGA) of Rivers State. It occupies an area of 11,077 square kilometers with a population of 5,184,400 people by projection to 2011 (National Population Census, 2007) created in 1967 with the split of the Eastern Region of Nigeria. Rivers State is one of the 36 states in the Nigerian federation and is located in south-south geopolitical zone of Nigeria. It is bounded on the south by the Atlantic Ocean to the Northern by Imo. Abia and Anambra States, to the East by Akwa Ibom State and to the West by Bayelsa and Delta States.

The inland part of the state consists of the tropical rain forest; towards the cost of typical Nigeria-Delta environment features many mangrove swamps. The people of Elele-Alimini are predominantly agrarian and their major crops include yam, cassava, maize, palm oil, cocoyam, assorted vegetables, livestock and fisheries. The texture of its alluvial soil ranges from sand to loamy. Its surface layer is humus-rich and general poorly drained. Estimated extension agent/farm household ratio is 1:1,500 compared to national ratio of 1:750 (Ekong, 1995).

The selection of the area was based on a reconnaissance survey and was principally due to easy accessibility. A decision was taken in consultation with RISADEP as it has a wider coverage of the area.

III. Sampling Procedure And Sample Size

A multistage random sampling procedure was adopted in the selection of villages and cassava farmers. First, six villages were randomly selected from the nine villages that make up Elele-Alimini town. From the selected villages (i.e Omeke, Omeneta, Omuse, Omuohia Omukpurike and Mgbuanyim) ten cassava farmers, consisting about 20% of the population of cassava farmers in the area (obtained from RISADEP Extension Agents).Primary data were employed in the study using an interview schedule with each farm household as the unit of analysis. These were supported by secondary data sources from extension agents in the area, RISADEP, Institute of Agricultural Research (IAR), as well as International Institute for Tropical Agriculture (IITA).Technical center for Agricultural and Rural Cooperation (CTA) and internet. Data from the study were analyzed using the following analytical tools:

(a) Descriptive statistics such as frequency counts, percentage, mean scores, and rank ordering were used to analyze the data.
(b) The adoption of recommended cassava technology packages by cassava farmers were determined using adoption score analysis. It will be achieve using a 7-point liker scale.

1.	Unaware	0
2.	Aware	1
3.	Interest	2
4.	Evaluation	3
5.	Trial	4
6.	Accept	5
7.	Reject	6

Farmers with adoption score of 3.0 and above were regarded as having average score of technology, that is, they are at evaluation stage, while farmers with adoption score of less than 3.0 were either at unaware, aware and interest stages.

The mean adoption score is determined thus:

$$\overline{x_s} = \frac{\Sigma fn}{nr}$$

Where $\overline{x_s}$ mean score

Σ	=	summation
F	=	frequency
n	=	liker nominal value
nr	=	number of respondents
$\overline{x_s}$	=	$\frac{0+1+2+3+4+5+6}{7} = \frac{21}{7} = 3$

IV. Results And Discussion

Socio-economic characteristics of the cassava farmers

Results in Table 1 shows the socio-economic characteristics of cassava farmers in the study. The table contained information on gender, age, marital, household size, educational level, farming experience, contact with extension agents, group affiliation and mass media exposure of respondents from the table gender. Majority (62.6%) of the cassava farmers numbering 38 were females while the rest consisting about 37.4% attracting 22 respondents were found to be male. Males also participated in the farming. Also 82% of the cassava farmers in the study area were married with only 8.7% was found to be unmarried. However, the remaining 9.60 percent accounted for 6 respondents who are either widow(er)s and divorced respectively. The contribution of marital status on agricultural production can be explained in terms of the supply of agricultural family labour. Family labour would be more where the household head is married and visa-versa. Household Size of the farmers reveals that about 59% have a family size range between 11 and 15 people, while the remaining 19.13,13.04 and 8.7% constituting 12, 8 and 5 respectively have family size of between 1 and 5,6 and 10 and above 16 persons respectively**.** Educational status of the farmers reveals that a majority of the respondents representing about 67.8% lack formal education, and these set of farmers hardly accept new innovation as asserted by Ajala (1992). Okoro (1991) stated that there exist a positive relationship between education and adoption of new innovation. Also 25%, numbering 15 respondents had at least primary or secondary school education, while the remaining 7% attracting 4 respondents accounted for those with tertiary education. The implication of this is that there is every likelihood that adoption of new innovations by the farmers in the study area would not be very effective likely because education is one of the important factors that determine the ability of farmers to

understand policies, programmes and innovations of their time. The result on Farming Experience shows that about 53% accounting for 32 respondents had farming experience of 11 years and above, while 31.3 percent constituting 19 respondents had between 1 and 5 years, also about 15.7% accounting for 9 respondents were those that fall within experience years of between 6 and 10 years. This indicates that most of the cassava farmers in the study are good knowledge of cassava farming signifying that the respondents had adequate knowledge and experience in the production of the crop and therefore their long stay in the business indicates. They usually had good returns that keep them in the venture. Farm size of the respondents show that majority constituting about 60.9% of the respondents numbering 37 had a land holding between 2 and 5 hectares with about 33.9% constituting 20, cultivates not more than 1 hectares while about 52% with number respondents cultivates 6 hectares and above. From the analysis, it indicates that majority of the cassava farmers in the study area engages more in small-scale production. The table further reveals that about 60% of the respondents constituting 36 were in full time farming business while about 31.3% numbering 19 respondents were civil servants but engage in cassava production to supplement the income furthermore, 8% representing 5 engages in other activities such as represents tailors and traders respectively. The occupational distribution of the respondents above implies that farming is the most common activity in the area. Agreeing that, the agricultural sector is the highest employer of labour and so, there is need for both the government and public private partnership to increase investment in this sector so as to develop the agricultural sector with new technology and improvements in order to boost the sector. Extension contact was measured by frequency of the farmers' meetings with extension agents. Results showed that 52.50% had 3 times visit in the preceding year while 12.50% had 2 times and 27.50% had 4 times visits. One visit received 7.5 percent. The mean of visits was 3 times/per annum. One visit/quarter is below expectation. The interviewers who are RISADEP extension agents complained of acute shortage of extension staff. If more personnel were engaged, they recommended at least one visit every other month or six visits per annum. The more frequent the extension contacts with farmers are, the more information and innovation would be disseminated. On the Mass Media Exposure of respondents results reveal that those who listen to agricultural programmer constituted 94.17% while 5.83% do not. Also, while 54.`7% watch agricultural programmes on television, 45.83% do not and 53.3% read agricultural publication, while 46.7% do not read. Furthermore, the total numbers of radio and television sets owned by respondents in the area in 2016 were 80 and 72 respectively. Thus, the findings revealed that awareness levels of the farmers about technology packages were quite high. Group Affiliation of the Respondents showed that 44.20% of the respondents belonged to 3-4 social groups, 35% belonged to 1-2 groups, while 20%80 belonged to 5 and above social groups. Results equally showed that every members of the sample belonged to at least one group. The mean of group membership was 3. The finding is in agreement with Asifat (1986) Ngwu (1989) and Onu (1991) who reported a positive association between group participation and adoption of innovations. Membership of agricultural groups and associations is accepted as a means of information dissemination exchange of ideas as well as sharing experience among farm household.

Table 1
Socio-economic Characteristics of Cassava Farmers

Variables	**Frequency**	**Percentage**	
Gender	Male	22	37.4
	Female	38	62.6
Marital Status	Married	49	81.7
	Single (unmarried)	5	8.70
	Widower/widower	2	2.60
	Divorced	4	7.00
Household size (no)	1-5	12	19.13
	6-10	8	13.04
	11-15	35	59
	Above 16	5	8.7
Educational level	No formal education	41	67.8
	Primary education	10	17.4
	Secondary education	5	7.8
	Tertiary education	4	7.0
Farming experience (yrs)	1-5	19	31.3
	6-10	9	15-7
	11 and above	32	53-.0
Farm size (ha)	2-5	37	60.9
	Farming	36	60.0
Main occupation	Civil servant	19	31.3
	Tailoring	2	2.6
	Trading	3	6.1
	Once	4	7.50

	2 times	8	12.50
Extension contact (no of times)	3 times	32	52.50
	4 times	16	27.50
	Mean = 3 times/p.a		
Mass Media Exposure			
Radio: Listen to agricultural programmes	Yes	57	94.17
	No	3	5.83
Television: Watch Agric programmes	Yes	33	54.17
	No	28	46.67
Reading agricultural publications	Yes	32	53.33
	No	28	46.67
Group Affiliation (No.)	1-2	21	35.00
	3-4	27	44.20
	5 and above	12	20.80

Source: Field Survey, 2018

Main sources of information to the farmer

As shown in Table 2, the main sources of information used by the farmers were: radio with 84.44% which ranked first, television with 73.69% ranked second, friends and relatives with 72.98% ranked third, extension services with 69.29% was fourth, while GSM phone with 25.11% was last. In the aftermath of preliminary visits to the area before this study, the imperative to expose the farmers to a variety of information sources from which they could choose their preferences became apparent. Hence, both conventional and traditional information sources were used in the study. The first ranking positions of radio was in agreement with findings from most previous studies which RISADEP fully exploited by using the radio as a powerful medium to create awareness about the recommended practices since 2004 in the study area. This impacted quite positively as rate of awareness promptly took off at 10% in the same year and rose to 28% in 2009. Yazidu plays in getting information across to farmers. Matanmi (1989) awarded 71% to radio as the most used source of information to farmers, while the food and agriculture organization (FAO) in campaign to increase rice production in Sierra Leone in 1991 discovered that by using radio broadcasts supplemented with village-based slide tape presentations increased knowledge levels by almost 60% over baseline scores. Coldevin (1991) reported that regular listeners gain information twice more than the sporadic listeners while Benor (1984) stated that radio and television can reinforce the work of extension agents by giving publicity about the (T&V) system and by providing farmers with relevant technical advice. The second choice source of information in the area being television is shown to have received a boost in ownership by farmers in the area. Therefore, with a combination of both sources augmented by extension activities and social organizations, greater impact in winning adopters of agricultural innovations in the area will be more assured.

Table 2

Distribution on main sources of information on improved cassava technology packages n = 60

Sources of information	Improved cassava cultivars	seed-bed preparation	Planting method and spacing	Crop propagation	Weed control	Fertilizer app.	Harvesting	%	RK
	Freq	Freq	Freq	Freq	Freq	Freq	Freq		
Radio	58	50	55	29	53	55	56	81.40	1st
TV	50	43	41	41	41	47	37	73.69	2nd
Friends/relatives	54	45	42	40	42	43	41	72.98	3rd
Agric Ext. agent	45	39	42	40	42	41	42	69.29	4th
Agric.Org.	43	38	35	39	40	44	42	66.55	5th
Market place	48	43	34	38	28	35	34	65.71	6th
Agric publication	21	20	34	27	39	43	40	52.86	7th
GSM phone	21	15	17	5	18	13	14	25.11	8th

Source: Field Survey, 2018

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Levels of adoption improved cassava technology packages among cassava farmers in Elele-Alimini, Emohua L.G.A of Rivers State

Results in Table 3 shows that a fairly good proportion of cassava farmers (41.7%) with a mean adoption score of 3.3 and 36.7% with mean adoption score of 3.0 indicated that improved cassava cultivated and seed preparation were accepted and adopted respectively. Also 56.7 percent and 35 percent of the farmers adopted planting methods and spacing (x=4.1) and crop population (i.e. 10,000,15 000 and 20,000 pts/na) (x=3.7) respectively. Furthermore, 25 percent and 48.3 percent of the respondents adopted weed control and fertilizer application with means of 3.3 and 4.1 respectively. Finally, a fairly proportion of the farmers (4.5%) with means of 3.8 adopted harvesting and processing technology packages since the mean adoption scores of these packages were above 3.0, it shows that the technologies were fully adopted by the cassava farmers.

Table 3
Distribution of respondents according to levels of adoption of recommended practices n = 60

Sources of information	Unaware	Aware	Interact	Evaluation	Trial	Accept	Reject	Total	Mean Adoption
Imporved cassava cultivators	5 (8.33)	2 (3.3)	4 (3.5)	57 (28.3)	20 (8.3)	125 (41.7)	25 6.7	235	3.51
Seed-bed prepartion	4 (6.7)	3 (5)	6 (5)	21 (11.7)	70 23.3)	88 36.7	42 (11.7)	230	3.8
Planting method and spcaing	2 (3.3)	4 (6.7)	8 (6.7)	21 (11.7)	52 (21.7)	105 (35)	30 83	222	4.1
Weed control	4 (6.7)	3 (5)	20 (16.7)	42 (23.3)	48 (20)	75 (25)	12 (3.3)	200	3.7
Fertilizers application	3 (5)	5 (8.3)	2 (1.7)	9 (5)	64 (26.7)	14.5 (48.3)	18 (5)	243	4.1
Harvesting and processing	3 (5)	6 (10)	10 (8.3)	9 (5)	56 (23.3)	135 (4.5)	12 (3.3)	228	3.8
Total Mean Adoption score									2.61
Mean (x)									2.7

Source: Field Survey, 2018

Decision rule =3.0 and above = adoption values in parenthesis are percentages where, TEP = Technology packages

Constraints to farmers' adoption of cassava technology packages in Elele-Alimini, Emuoha L.G.A. of Rivers State

Results as presented in Table 4 show that non-availability of inputs, especially inorganic fertilizers ranked first, with 91.67 percent of the respondents mentioning the constraints. This impacted negatively on the level of adoption recommended practices in the study years. It was closely followed by lack of access to tractor for

hiring wit 75% of the farmers assenting to this constraint. Other problems faced by the respondents are the children reluctance to assist them on the farms, which was pinpointed by 70.83 percent and lack of credit linkage attested to by 60 percent of the respondents. Lack of market for fresh roots of cassava and non-contact with extension agents mentioned by 33.33 percent and 26.67 percent of the farmers respectively constricted other challenges being encountered. Pest infestation, dearth of good and motorable weeds, distance from cassava processing facilities and inability to handle agro-chemicals constituted other problems raised by respondents, which ranked from 25.83 percent-12.50 percent.

Aggregated, the foregoing problems facing the farmers are capable of adversely affecting adoption rates of inspired cassava technology packages in the area if urgent steps are not taken to arrest them.

Table 4

Constraints associated with improved cassava technology adoption in Elele-Alimini, Emuohua L.G.A., Rivers State

S/No		Frequency	Percentage	Remarks
1.	Non-availability of fertilizers	35	91.67	
2.	Non- availability of tractors for hiring	45	75.00	
3.	Non-assistance of children with farm work	60	70.83	
4.	Shortage of improved cassava cutting	38	62.50	
5.	Insufficiency of land for production	38	62.50	
6.	Non-availability of credit to buy inputs	36	60.00	
7.	No market for fresh cassava roots	20	33.33	
8.	Lack of contact with extension staff	16	26.67	
9.	Others (incessant communal clashes in the area) pest infestation, bad road, etc)	16	26	
10.	No cassava processing facility nearby	8	12.50	

Source: Field Survey, 2018

V. Conclusion And Recommendations

Based on the findings of the study the following recommendations are made to advance adoption of improved cassava technology packages in the area. Those factors and innovation attributes that contributed to adoption should be captured in future planning of agricultural projects in Rivers state, particularly in the study are in view of identified constraints in which 91.67% of the farmers expressed dissatisfaction with lack of access to inorganic fertilizers and 75% of the farmers complained of tractor for hiring, among others, government should intervene by establishing agro-service centres at strategic locations that are adequately stocked with inputs to be sold to the farmers at subsidized rates, so as to fast-track commercial agriculture in the study area. Since landholding per farm household in the area was found to be largely 4.13ha, government can move in to help the farmers with tractors and implements to enable them plough, harrow and ridge their fields.

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

As some of the respondents (25.83%) mentioned the problem of inability to handled herbicides, government should ensure that farmers in the area are educated by extension agents on use of herbicides, after the soil and rainfall would have been examined thoroughly (CTA, 1987).

That the radio relied upon as a veritable tool for agricultural information dissemination in the area.

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