

# Effectiveness of Agricultural Extension Methods Used in the Adoption of Rice Production Technologies by Farmers in Fufore Local Government Area of Adamawa State, Nigeria

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## Abstract

The study determined the effectiveness of agricultural extension methods used in the adoption of recommended rice production technologies by farmers in Fufore Local Government Area of Adamawa State, Nigeria. The specific objectives were; to describe the socio-economic characteristics of the respondents, identify the available extension methods used, examine the effectiveness of extension methods used for recommended rice production technologies and to identify the major problems associated with various extension methods used by extension agents on rice production technologies adoption by rice farmers in the study area. Data were collected from one hundred and fifty (150) rice farmers in four villages of the two selected districts through a well structured and unstructured questionnaires. Both descriptive and inferential statistics were used for data analysis. The study revealed that majority of the respondents 80(26.7%) are within the age of 30-49 years, 110(73.3%) are married. Majority of the respondents 59(39.3%) have access to one form of educational background or the other with their farm sizes between 1- 4 hectares respectively, having their major source of farm information from radio programmes. The results revealed that marital status and educational level of the respondents were statistically significant at 1% and 5% level respectively, while correlation result ( $r=0.456$ ) shows a significant relationship between recommended technologies adopted and extension methods used by farmers at 1% level. The major problems encountered by farmers were; irregular visits by extension agents, lateness of information flows, lack of adequate trained extension agents, their localities outside network coverage among others. The study recommends among others the establishment of community radio station in the study area, the need to employ and train more extension agents and to revive agricultural extension services in the study area to meet its primary objectives.

**Keywords:** Extension methods, Adoption, Agriculture, Technologies, Modernization, Rice

## INTRODUCTION

Food crop production is important for the survival of every nation of the world. Nigeria as a country has been engaged in

the production of many types of food crops that support and sustain the livelihoods of its citizens. Example of such crop is rice, commonly shifting from ceremonial food crops to staple in many families and has recently become a household popular food in Nigeria.

It was observed that most rice crops produced in the country come from the efforts of small-scale resource-poor farmers who depend largely on traditional farming systems for their agricultural inputs (Ani, 2003). Recurrent food crises have occurred in the country; this could be attributed to high rate of human population growth above the required food production level and had led to erratic amount of food crops imported from year to year. As a means to reduce the importation of rice, Nigerian rice Farmer should be encouraged through extension services. Similar observations were made by the International Policy Research Institute (IPRI) in favour of farmer's technology adoption through extension agents for efficient rice production.

The process of increasing the efficiency of agricultural production through agricultural modernization depends mainly on the extent to which extension agent persuade farmers to incorporate rice technology into their farming operations (Ani and Kwaghe, 1997). In order to use rice production technology, farmers must first become aware of the existence of such practices, develop interest, evaluate, try and become convinced before adoption. Agricultural extension method therefore, could be means of getting farmers abreast with modern rice technology. Adereti and Ajayi (2005) indicated that the concern of extension education as an educational process is to help rice farmers make a decent living by mastering the best way to handle rice farms in order to improve their productivity. This is because extension should assist rice farmers to determine their rice production problems, help them to find desirable solutions and to encourage them to use available rice production technology.

Rice is a very important crop in Nigeria today that significantly requires extension methods to improve and increase its production. It is cultivated in virtually all agro-ecological zones because of its ability to thrive well in rainfall between 508 and 1524mm and in mean annual temperature between 17°C and 34°C (Oserneobo, 1993). Given those environmental requirements, it is certain that rice production could be grown in almost every part of the country.

## MATERIALS AND METHODS

### Study Area

The study was conducted in Fufore Local Government Area. Fufore Local Government area is located in the eastern part of Adamawa State, it lies between latitude 8° 45' and 9° 43' North and longitude 12° 05' and 13° 12' east of the green wish meridian. It is bounded by Song and Girei local Government to the North, Ganye Local Government to the South, Mayo-Belwa Local Government Area to the west and to the east with Maiha and Cameroon Republic (AD ADP 1999). The Local Government has an estimated land mass of 562 km<sup>2</sup>, with an estimated population of 209,459 National Population Commission, Abuja (2006). It has an average annual rainfall of 988.92 mm/annum, majority of the inhabitants engaged in crop farming activities, few inhabitants are civil servant, traders and cattle rearers. Major crop cultivated in the area includes, maize, Guinea corn, groundnuts, rice, Bambara nuts, potatoes cocoyam use among others.

### Sources of Data Collection

Data for this study were obtained from primary source. The primary data were collected with the aid of both structured and unstructured questionnaires and interview schedules, which was administered by the researcher to the farmers. Data were collected on the socio-economic characteristics of the farmers, as well as on the various extension methods available to them and their major sources of information. Data were also collected on the level of adoption of extension methods in practice by the farmers.

### Sampling Techniques and Sampling Size

A multi stage sampling technique was employed for the selection of the respondents in the study area. The first stage was the purposive selection of AD-ADP zone three which is located in the southern part of the state due to its prominence in rice production in the state. The second stage was the random selection of one of the major rice producing local governments (Fufore). The third stage was the purposive selection of the major rice producing villages in the local government. Two districts of Fufore local government noted for rice production were purposively selected namely; Gurin and Ribadu local government respectively. The final stage was the selection of two villages from each selected districts and from each of the villages, rice farmers were selected proportionate to the population of rice farmers in the village area. A total of one hundred and sixty (160) farmers were selected and administered both structured and

unstructured questionnaires. However, only one hundred and fifty (150) questionnaires were retrieved and used for the analysis. The distribution of sample in the four selected villages is presented in Table 1.

**Table 1.** Distribution of Sample in the 4 Selected Villages of the Study Area

L.G.A	District	Ward	Villages	Number of Respondents
1. Fufore	Gurin	Gurin	1. Chikito	35
			2. Muninga	41
	Ribadu	Ribadu	1. Dasin- Hausa	44
			2. Bodere	40
<b>Total</b>				<b>160</b>

Source: Field Survey, 2015.

## Analysis of Data

The analytical tools that were used in the study include; descriptive statistics, regression and correlation analysis. Descriptive statistics used include frequency counts and percentages. This was used to describe the socio-economics of farmers and the problems associated with the use of various extension methods.

Simple Linear Regression analysis was used to determine the relationship between socio-economic characteristics of the farmers and the use of agricultural extension methods for rice production. The explicit form of the linear regression model is expressed as;

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6)$$

Y = Extension teaching methods used in assessing the Number of teaching methods adopted

X<sub>1</sub> = Age of the respondents (years)

X<sub>2</sub> = Marital status (married and unmarried)

X<sub>3</sub> = Educational level (years of formal education)

X<sub>4</sub> = Family size (number)

X<sub>5</sub> = Farm Size (ha)

X<sub>6</sub> = Farming experience (years)

The X<sub>1</sub> to X<sub>6</sub> represented the variables to influence dependent variable (Y) which was stated as agricultural extension methods for rice production technologies adopted by farmers. Pearson Correlation was also used to determine the relationship between the technologies adopted and the extension methods used in assessment of extension methods used by rice farmers. The form of correlation model is expressed as:

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[(N \sum X^2) - (\sum X)^2] [(N \sum Y^2) - (\sum Y)^2]}}$$

Where Y = Recommended rice production technologies Adopted by Farmers.

X = Extension methods used by rice farmers.

N = Number of farmers interviewed

$\sum XY$  = The sum of rice technology adopted and extension methods used.

## RESULTS AND DISCUSSION

The socio- economic characteristics of the respondents is shown in table 2. The table shows that majority (26.7%) of the respondents were within the age of 30-49 years of age. This indicates that, majority of the respondents were within their productive age with the mean age of 40.8 years. Only about 20% of the respondents were below the age of 30 years, 17.3% were between the ages of 50-59 years, while 9.3% were above 60 years of age. This implies that rice farmers in the study area had the desired energy for rice production activities. Table 2 revealed that, Majority (73.3%) of the respondents were male and 26.7% were female. This indicates that more men were involved in rice crop production in the study area than their female counterparts. This shows that male farmers are stronger and more active and have the potential to work for long hours. Table 2 Present the marital status of the respondents. The table indicates that majority (73.3%) of the respondents were married, while 16.7% were single, 8.0% were widows and 2.0% were divorced. This

result implies that married people were mostly involved in rice production. This finding was in agreement with Munlland (2008) which revealed that married men were the most engaged in arable crop production to meet their family basic needs. This finding also agreed with Ratanachai (2006) who discovered that, majority of farmers in Adamawa State were married. The study as recorded in Table 3 revealed that 16.7% of the respondents did not attend formal education but claimed farming as their primary occupation. Lack of education might affect the farmers' level of technology adoption of new farming techniques such as the use of agrochemicals in the right proportion and the use of recommended hybrid seed variety .About 10% of the respondents had primary education, 20.0% of the respondents had senior secondary school certificate, 39.3% of the respondents had National Certificate in Education/Diploma, While 14.0% of the respondents had Bachelor's degree/Higher National Diploma. This high formal education among the respondents could be expected to influence farmer's attitude toward the adoption of new technology transfer to them. Table 2 revealed that, 20.0% of the respondents had 1-4 people per household, 42.7% of the respondents had 5-8 people with mean household size of 8.2. 18.7% of the respondents had 9-12 people, while 12.0% of the respondents had.

**Table 2. Socio-Economic Characteristics of the Respondents**

Table	Frequency	Percentages	Mean
<b>Age</b>			
<30	30	20.0	40.8
30-49	40	26.7	
40-49	40	24.7	
50-50	26	17.3	
60 and above	14	9.3	
<b>Sex</b>			
Male	110	73.3	
Female	40	26.7	
<b>Marital Status</b>			
Single	25	16.7	
Married	110	73.3	
Widowed	12	8.0	
Divorce	3		
<b>Educational Qualification</b>			
No formal education	25	16.7	
Primary education	15	10.0	
Secondary education	30	20.0	
NCE/ Dploma	59	39.3	
BSC/ HND	21	14.0	
<b>Household Size</b>			
1-4	30	20.0	8.2
5-8	64	42.7	
9-12	28	18.7	
13-16	18	12.0	
17 and above	10	6.6	
<b>Farm Size (ha)</b>			
1-2	52	34.7	36
3-4	52	34.7	
5-6	31	20.6	
7 and above	15	10.0	
<b>Farming Experience</b>			
1-10	35	23.3	19.4
11-20	55	36.7	
21-30	31	20.7	
31-40	24	16.0	
41 and above	5	3.3	
<b>Land Acquisition</b>			
Inheritance	96	60.4	
Rent	34	22.7	
Purchase	11	7.3	
Gift	9	6.0	
<b>Seed Variiety Used</b>			
Improved Variety	97	64.7	
Local Variety	53	35.3	

Source: Field Survey, 2015

13-16 people and 6.6% of the respondents had more than 17 persons per household. This result shows that most of the rice farmers in the study area had household sizes of various degrees, and household size could be used to determine the family farm labour. Table 2 revealed that majority (34.7%) of the respondents had cultivated the farm land ranging from 1-4 hectares with mean value of 3.6 hectares of farm land. 20.6% of the respondents had farm size of 5-6 while only 10% of the total respondents interviewed had their farm size more than 6 hectares. This is in conformity with the findings of Ephraim (2009) and Kadafa (2012) who pointed out that majority of farmers in Hong Local Government area of Adamawa State Nigeria, had farm sizes of 0.5-5 hectares and less than 2 hectares respectively. This shows that rice production in the study area was practiced under subsistence level.

Amaza (2000) pointed out that farmers experience enhances efficiency in resource use. The more farmers experience, the more efficient the utilization of input were expected to be. Table 2 revealed that majority (36.7%) of the respondents had farming experience ranging between 11-20 years with mean value of 19.4 years. 23.3% of the respondents had their farming experience between 1-10 years while 20.7% of the respondents had farming experience between 21-30 years and 16% of the respondents had 31-40 years of farming experience but only 3.3% of them had more than 40 years of farming experience. This result implies that most of the respondents were experienced in rice farming operation and this experience could be an advantage for rice technology adoption as it could assist farmers to increase rice productivity through the use of recommended rice technology transfer to them by extension agents through various methods. Table 2 shows that the majority (64%) of the respondents inherited their farmland, 22.7% acquire theirs through rent, 7.3% purchase their farmland while only 6% of the respondents got their land as gift from friends and relatives. This result agrees with the findings of Alimi (2000) which revealed that most of the food crops produces acquire their pieces of farm land through inheritance, in most part of Nigeria. The table also revealed that 64.7% of the respondents used improved seed variety, while 35.3% of the respondents used Local seed variety. This shows that farmers are now becoming aware of the usefulness of improved seed variety.

From Table 3, the findings revealed that 64.7% of the respondents obtained their rice seed from the local market. However 15.3% of the respondents acquired their rice seed from Adamawa Agricultural Development Programme (AD-ADP) and another 15.3% of them used the seed they stored from their previous seasons harvest, while only 4% of the respondents obtained their seed from extension agents. This implies that AD ADP could not meet the farmers demand for hybrid seed hence they decided to seek from the open markets which may not provide farmers with certified seed varieties needed for optimum yield.

**Table 3.** Respondents Sources of Seed, Access to Extension Service, Frequency of Farm Visit and Farm Information

<b>Table</b>	<b>Frequency</b>	<b>Percentages</b>
<b>Source of Seed</b>		
Extension Agents	6	4.0
AD ADP	23	15.3
Local Market	97	64.7
Last Season Harvest	24	16.4
<b>Access to Extension Services</b>		
Yes	99	66.0
No	51	34.0
<b>Frequency of Farm Visit</b>		
Very often	13	8.7
Often	23	15.3
Less often	114	76.0
<b>Source of Farm Information</b>		
Extension Agent	35	23.3
Television Programme	12	8.0
Radio Programme	87	58.0
News Paper	38	25.3
Posters and Bulletins	38	25.3
Neighbour Friends and Relatives	45	30.0
Telephone	24	16.0

Source: Field Survey, 2015.

\* = Multiple Responses

Majority of the respondents (66%) as shown in Table 3 have access to extension service while 34% of the respondents had no access to extension services, hence their contact to extension workers could be technically efficient and their productivity could also be increased. Table 3 shows the extent to which extension agents visit farmers in their

communities. About 9% of the respondents indicate that extension agents paid them regular visit. However, 15% of the respondents admitted that the extension agents visited them often, while the majority (76%) of the respondents indicates that extension agents had less contact with them.

Respondents in table 3 shows that radio had greater percentage (58%) as means of acquiring farm information, this is because it could be more affordable, portable and can even be heard anywhere. This agrees with the observation made by Ogunbameru (2001) who stated that radio plays an important role in all the five stages of adoption process. Further more, the respondents, (8%) revealed television as their sources of information, they disclosed that television is not affordable to them and electricity is never stable. This makes it difficult or impossible for the study area to use television as their sources of farm information. FAO (1999), report indicates that television is prestigious and persuasive, but not available in most rural area. Programme production for agriculture may be difficult to localize unless there are local television stations which are rare in developing countries, Nigeria inclusive.

### Use of available extension methods

Table 4 indicates the level of availability of various extension methods, under individual, group and mass methods. The table revealed that 53.3% and 60% of the respondents had access to farm and home visits and results demonstration respectively, while 5.3% and 7.3% of them had access to office calls and personal letter, 13.3% of the respondents had access to telephone call available to them. This indicates that telephone and office call may not be effective methods of passing farm information on rice production in the study area; this could be due to the fact that they are scarcely available. The low level of availability of extension methods could be attributed to the rural nature of the selected villages of the study area. Under the group method, general meeting had 62% respondents followed by method demonstration 30%, exhibition 25.3%, group discussion 16%, while tour and field days 6.0% respondents. Findings revealed that method demonstration and general meeting were available to respondents since extension agents visit them once in a while, and meeting were conducted to demonstrate different aspects of rice production mostly improves varieties. Group discussion were organized with farmers on timely planting, weeding, seed dressing, seed rate, weeding, harvesting techniques and processing. Less concerned was given to tour and field days due to inadequate funding by government to motivate extension staff to go round their areas of coverage.

Mass media methods show from the table that majority of the respondents (66%) had radio set available to them, while printed materials and television had 13.3% and 6% respectively. Only 33.3% of them had newspaper available to them as a means of getting farm information. The availability of radio is on the high since agricultural programme are disseminated via it, while television set were scarcely available to the respondents hence information on rice channelled through it may not get wide coverage. The findings on the table shows that little awareness, little knowledge and little learning will take place on programmes that are disseminated through television and hence little or no adoption on rice technology.

**Table 4.** Distribution of Respondents Based on the Used of Available Extension Methods

Table	Frequency	Percentages
<b>Individual Extension Methods</b>		
Farm and Home Visit	80	53.3
Office call	8	5.3
Personal Letter and Correspondence	11	7.3
Result Demonstration	90	60.0
<b>Group Extension Methods</b>		
General Meetings	93	62.0
Group Discussion	24	16.0
Exhibition	38	25.3
Conducting Tour and Field Day	9	6.0
Method Demonstration	54	30.0
<b>Mass Media Methods</b>		
News Paper	50	33.3
Radio	99	66.0
Television	10	6.7
Bulletins Leaflets and Pamphlets	20	1.3

Source: Field Survey, 2015

\*Multiple Respondents

## Effectiveness of Extension Methods Used For Recommended Rice Technologies Adopted

The correlation results revealed that, there is a significant relationship between recommended technologies adopted and extension methods used by rice farmers. The result of the correlation test ( $r=0.456$ ) shows that correlation is significant at 1% level. This means that increase in extension teaching methods will lead to increase in efficiency by farmers.

**Table 5.** Analysis of Relationship between Socio-Economic Characteristics and the Use of Technologies

Variables	Coefficient	Std. error	t-value	P-value	Decision
Age ( $X_1$ )	0.092	0.061	0.698	0.487	NS
Marital Status ( $X_2$ )	-0.178	-0.336	-2.064**	0.041	S
Education level( $X_3$ )	0.405	0.261	5.284***	0.000	S
Household size( $X_4$ )	0.100	0.093	0.647	0.519	NS
Farm size( $X_5$ )	0.036	0.031	0.252	0.801	NS
Farming experience( $X_6$ )	-0.164	-0.124	-1.213	0.227	NS
Constant		1.290	3.589	0.001	

Source: Field Survey, 2015.

\*\*significant at 5%, NS = not significant

\*\*\* Significant at 1%, S = Significant

### Major Problems Associated with Face-to-face (Individual), Mass Media and Print Media Method

Table 6 shows that majority of the respondents (41.3%) disclosed that irregular visits by agricultural extension agents constitutes their major problem. This phenomenon has been identified as a major problem; majority of the respondents indicates that they still rely on the extension agents as their main source of farm information. If government had motivated these extension workers, they would have done their work as expected which could have lead to high rate of adoption by rice producers in the study area. 17.3% of the respondents pointed out their major problems as lack of competence of trained extension agents. These respondents could be educated for some extent hence they were able to discover the inadequacy of knowledge on the part of the extension workers. Only 18.7% of them indicated that messages of farm information reached them lately, while 22.7% of the respondents disclosed that the message are irrelevant to their existing farm practical since such massage on farm information always come late.

### Major Problem with the use of Radio/Television as Extension Methods

Table 6 indicates that 14% of the respondents complained that they did not understand the language used in the radio and television programmes. They stressed out that language used in such programmes were too ambiguous for them to comprehend for the purpose of adoption. 10% of the respondents complained of poor network coverage. They further explain that television signals are poorly received in some of their locality. They maintained that if television network coverage will be made available to their localities, it will assist their adoption process. Majority of the respondents (48%) enjoy radio/television programmes but they complained that the time allocated to farm programmes in either television or radio has been remarkably too small for their understanding. 28% of the respondents indicated that their major problem was lack of opportunity for interactive discussion session. This however, hider them from asking constructive and relevant questions concerning the technologies recommended for rice production. This in pediment is capable of marking those extension methods ineffective.

### Major Problems with the Use of Printed Media as Extension Methods

Table 6 shows that majority of the respondents (63.3%) stressed out that printed materials were not available in their localities. These respondents could be the ones with some level of educational background who could read and write. The findings revealed that most of the respondents may be interested in reading agricultural bulletins and newspapers but the material are not within their reach. Observation shows that these printed materials cannot be an effective means of passing farm information and hence ineffective for bringing about the adoption of rice technologies transferred. 30.3% of the respondents indicated their inabilities to read and write, while 6.7% of them did not even understand the written message well enough. This is in line with Ani (2007), who stated that publications, (bulletins, pamphlets, leaflets etc.) fit in and reinforce other methods of influencing farmers, to supplement news stories when new information is available. However, this method is not good enough for educating people with limited educational background.

**Table 6.** Major Problems Encountered with the use of various extension Methods

Table	Frequency	Percentages
<b>Individual Extension Methods</b>		
Irregular Visit by Extension Agents	60	41.3
Lack of Adequate Trained Extension Agents	26	17.3
Lateness of Information Flow	28	18.3
Message Content not Relevant	34	22.7
<b>Mass Media Methods</b>		
Languages Spoken not Understood	21	14.0
Locality is Outside Network Coverage	15	10.0
Limited Time Given to Agricultural Programme	72	48.0
No Opportunity for Interactive Discussion	42	28.0
<b>Printed Media Methods</b>		
Unavailable in their Localities	95	63.3
Unable to Read or Write	45	30.0
Unable to Understand the Languages	10	6.7

Source: Field Survey, 2015.

## CONCLUSION

Based on the findings of the study, majority of the respondents (73.3%) were male in their prime age, had formal education and were married (73.3%) with small family sizes of 5-8 persons. Majority of the respondents (36.7%) were experienced farmers. Radio programmes were their major sources of farm information. Based on their reason for preferring various extension methods, majority of the respondents (80%) opined that they understood message best when it is from source. While assessment on the effectiveness of the various extension methods, majority of the respondents 76% shows that radio is more effective than other extension methods. The result of the correlation test ( $r = 0.456$ ) shows that correlation is significant at 1%, which means increase in extension teaching methods will lead to increase in efficiency of farmers. Respondents also experienced several constraints such as irregular visit by extension agents, lack of adequate trained extension agents and lateness of information flow before rice farm activities. However, farmer's education could enhance innovation adoption and ability of the farmers to plan effectively.

## RECOMMENDATIONS

Based on the study, the following recommendations were made:

1. There is need for Government to establish community radio station in the rural areas, and to increase the limited time given to agricultural programmes on radio stations.
2. There should be need for training of extension agents on various aspects of extension methods by subject matter specialist.
3. More extension agents should be employed and send to rural areas to educate farmers to improve their productivity using varieties of extension methods.
4. Extension agents should visit farmers regularly visit to improve their efficiency
5. Farmers should be encouraged to use hybrid seeds variety for optimum yield
6. Federal, state Government and local Government should provide loan and farm inputs at Subsidize rate to farmers to encourage the adoption of rice technologies available to them.

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