Effectiveness of Extension Delivery Techniques for Rice Production Technologies Among Farmers in Gbako Local Government Area of Niger State, Nigeria

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Abstract: The study was conducted to evaluate effectiveness of extension delivery techniques in dissemination of rice production technologies in Gbako Local Government Area of Niger state. A probability sampling method involving random sampling of 150 respondents was used, and data were collected with aid of structured questionnaire. The study employed both descriptive and inferential statistics for analysis of the data. The results of a 3-point graphic rating scale (Likert ratio) indicated that method-cum-result demonstration, farmers' participation in On-Farm Adaptive Research (OFAR) trials, Management Training Plot (MTP) and use of contact farmers were the very effective extension delivery methods. The results of a paired t- test for mean comparison revealed a highly significant (P≤0.01) difference between the mean output (kg/ha.) before and after the dissemination of rice production technologies at 95% confidence interval. The study therefore concluded that extension delivery methods were effective and sources of information were utilized, which culminated in the increased yield of farmers; hence participatory extension delivery approach should be emphasized in policy formulation and program planning for intervention and technology transfer.

Keywords: Effectiveness, extension delivery, rice production technologies.

1. INTRODUCTION

Most often than not, farmers are stereotyped as conservative and fatalistic or blamed for poor adoption of technically improved Agricultural practices. The lapses could be from lack of professional knowledge to apply appropriate extension delivery methods. There are possible means of evaluating extension service delivery, which include measurement of the learning situations provided and techniques used in the dissemination process. Of course, if appropriate extension teaching methods and learning situation are provided, it follows that knowledge or relatively permanent and positive change in behaviour of the end-user would take place [1]. Extension service delivery in words of Oguremi and Olatunji [2] is the process by which extension providers bring extension services inform of technical advice, introduction and application of new ideas or methods and all other innovation from the research institutes to the farmer. Extension delivery methods are an organized techniques and appropriate tools for communicating, teaching and informing the intended users on innovative ideas and practices. In the light of this, different techniques are applicable depending on the farmers' condition and the nature of technology in question. A proper understanding of these techniques and their applicability is of great importance.

Extension service delivery techniques are the supposedly most powerful tools in the hands of extension practitioners in teaching and communicating new technologies. It bears that while appropriate delivery mechanism is applied, a response to new ideas or technical services is achieved [3]. Extension methods like demonstration plots, seed multiplication program, adopted village concept and field days (Green and Brown), On-farm Adaptive Research (OFAR) trials, Management Training Plot(MTP), technology exhibition among others are some of the major delivery methods for introducing improved agricultural technologies to increase production in particular and uplift socio-economic status of rural masses[4]. These methods are extension tools for effecting desirable changes in the behavior of rural masses, transmit knowledge and skills, and provide opportunities in which useful interaction take place between extension workers and farmers [5].

The National Cereals Research Institute (NCRI), Badeggi is one of the research institutes in Nigeria that has a national mandate for conducting researches on genetic improvement, production, processing and utilization of all its mandate crops, and dissemination of same to end-users. In the institute, the dissemination pathways include the use of on-farm Adaptive Research (OFAR) trials, Management Training Plots (MTPs), demonstration plots, Adopted villages, extension bulletins, and mass media among others. Over the years, the NCRI Badeggi has successfully disseminated technologies through these techniques,

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especially rice production technologies. More so, Private Sector Driven Extension Program (PSDEP) in Niger state had employed several extension delivery techniques in dissemination of improved production practices for rice crop. These included demonstration plots, community seed multiplication program, Farmers Field School (FFS), Farmer Business School (FBS) and farmers' group meeting.

Despite the accepted evidence of the contribution of improved technologies to agricultural productivity, there exist some problems including lack of quality extension service delivery. The situation is worsened by poor access to basic agricultural production facilities; in ability of the farmers to optimize the adoption of the recommended management practices. Poor participation of farmers in research-extension-farmer linkage (REFILS) operational activities in Nigeria has been linked to monotone of top-down approach in contrast to participatory approach to mainstream the resource-poor farmers into overall farming systems and research-extension activities [6]. There is difficulty in knowing which of the appropriate delivery method to be used in a particular farmers' condition, and how resources and technology can help overcome farmers' production problems. Moreover, poor extension delivery methods, and inadequate knowledge of the suitable method to apply in a teaching/learning situation is eminently affecting the rate of technology acceptance and diffusion. Empirical information concerning the effectiveness of the delivery methods used in dissemination of the improved practices for rice production to the farmers in the study area is scanty. Consequently, it is the objective of this study to ask some pertinent questions: what are the socio-economic and demographic characteristics of the rice farmers? What is the farmers' perception of effectiveness of extension delivery mechanism, that is, how effective extension methods are in dissemination of improved production practices? What are the farmers' view points of the sources of information utilized?

2. OBJECTIVES

The broad objective was to examine extension delivery methods in dissemination of improved production practices among rice farmers in Gbako local government area of Niger state.

The study specifically sought to:

1. Describe socio-economic characteristic of rice farmers in the study area.
2. Determine the effectiveness of extension delivery methods used in dissemination of rice production technologies to the farmers in the study area.
3. Determine the level of sources of information utilized by rice farmers in the study area.

3. HYPOTHESIS

Ho: There is no significant difference between mean output (yield /kg/ha.) before and after the dissemination of rice production technologies to the rice farmers.

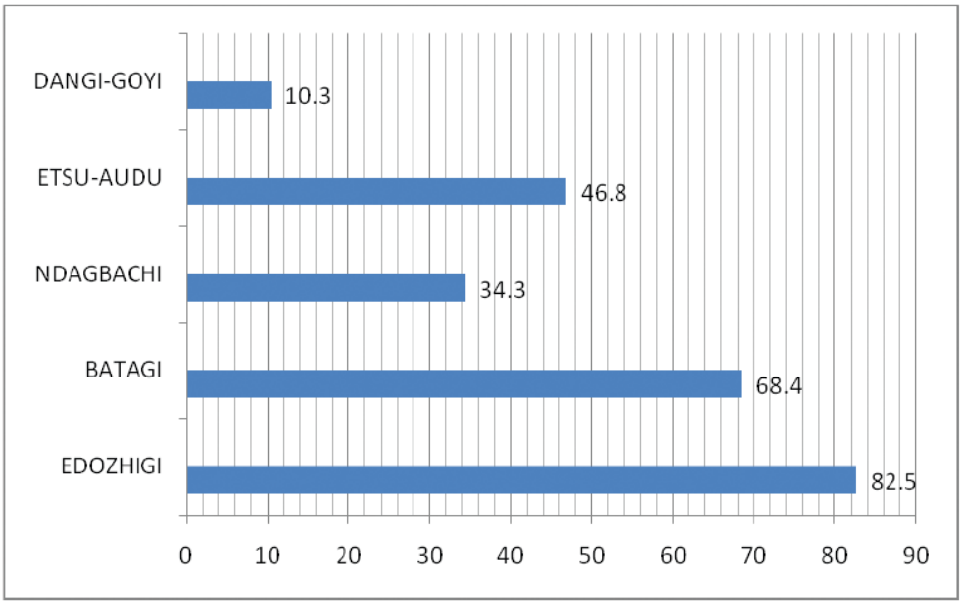

Figure 1: Showing paddy output ('000 tons) of the selected study areas. Niger state IFAD coordinating office, 2015.

4. MATERIAL AND METHODS

4.1. The Study Area

Gbako Local Government Area is located in Guinea Savannah vegetation zone of Nigeria. In the area, rice is cultivated mostly under rain-fed conditions. The area receives annual rainfall of between 1000-1500mm, which occurs from mid-April to November [7].

Average monthly temperature ranges from 23°C to 29°C. The area falls within Latitude 80-100N and Longitudes 30 - 80 East with estimated population of 127,466 people [8]. Soils are predominantly light and well drained, while Fadama and depressions are accessible to many families. Crop and livestock farming is the major occupation of the people. The summary of rice production output in the selected villages during the year 2015 cropping season is depicted in the figure **1** below.

4.2. Sampling Technique and Data Collection Method

The basic information for the analysis was obtained from primary data collected with the aid of a structured questionnaire. Five out of Eight prominent rice producing communities were randomly selected. The five communities were Edozhigi, Batagi, Ndagbachi, Etsu-Audu and Dangi – Goyi. Thirty (30) rice growers were randomly selected from each of the five selected communities. A total of 150 randomly selected rice growers constituted the sample size for the study.

The questionnaire was pre-tested by the group of 4 experts in three of the five sampled communities and was found valid and reliable in generating qualitative and quantitative information. The survey was conducted from the month of May to July, 2016.

4.3. Analytical Techniques

The study employed both descriptive and inferential statistics in analysis of the data. Descriptive statistic (Frequency count and percentage) was used to analyze objective I, while Objective II was analyzed using a 3-point graphic rating scale (Likert ratio) to evaluate view points on effectiveness of the extension service delivery methods. To each of the extension delivery method, numerical scores were assigned thus: not effective = 1, effective = 2 and very effective = 3. The mean ($\bar{X}$) was obtained using a 3-point graphic rating scale, which was modified thus: >2.50 = very effective, 2.0 – 2.50 = effective, <2.00 = not effective. A mean of 2.00 was used as cut-off point in determining effectiveness of each of the extension methods. Thus, a 3-point rating scale of 1; 2 and 3 added up to 6, which gave 2 as mean, when divided by 3. Data collected were also analyzed to achieve objective III. This was done by computing the mean and standard deviation to determine the farmers' level of utilization of sources from which information was obtained. Thus: <2.00 = low (rarely utilized), 2.00 – 2.50 = average (sometimes utilized) and > 2.50 = high (always utilized).

A–3 point graphic rating scale is represented by the formula:

$$\bar{X} = \frac{\sum fx}{N},$$

Where $\bar{X}$ = mean score

Σ = Summation sign

fx = Frequency and,

N = number of responses

The mean score of respondents was computed as follows;

$\frac{3+2+1}{3} = \frac{6}{3} = 2$, Therefore, 2 is the weighed mean of the rating statement.

A paired student's t-test for mean comparison of the two subjects was used to test the null hypothesis of the study. The formula is given as:

Student's T = test model: $t = \frac{\bar{d}}{sd/\left(\sqrt{n}\right)}$

$\bar{d} = \frac{\sum d}{n}$ where $\bar{d}$ = X_1–X_2 and X_1–X_2 are paired observation from before and after the dissemination of the rice production technologies to the farmers.

$S_d = \sqrt{\frac{\sum (d-d)^2}{n-1}}$ the standard deviation of the differences ($\bar{d}$); n = number of pairs of values, before and after the dissemination of the rice production technologies.

5. RESULTS AND DISCUSSION

Results in Table **1** show that average proportion (52%) of respondents fall between the age of 31 and

Table 1: Distribution of Respondent According to Socio-Economic and Demographic Characteristics (n=150)

Characteristics	Frequency	Percentage
Age (years)		
15 – 30	28	18.7
31 – 45	78	52.0
46 – 60	32	21.3
>60	12	8.0
Marital status		
Married	108	72.0
Single	42	28.0
widow	0	0.0
Household size (number)		
1-10	88	58.7
11-20	40	26.6
>20	22	14.7
Farm experience (years)		
<10	4	2.7
10-15	98	20.0
16-20	30	65.3
>20	18	12.0
Farm size (ha.)		
<1	23	15.3
1 – 2.0	31	20.7
2.1 – 3.0	78	52.0
>3.1	18	12.0

45 years. The finding implies that good numbers of the rice farmers are still in their productive and economically active age; therefore would be more receptive to technology package. This agrees with Egbe and Eze [1] who remarked that young people are likely to accept and serve as better agents of innovation transfer; and is economically active age. The results further indicate that many (65.3%) of respondents had between 16 - 20 years of farming experience. This implies that the respondents are experience based rice producers and would be more likely to be receptive of innovative ideas. This is in line with Tiamiyu [9] who lamented that farmers who have more years of rice production experience are more likely to be innovators and technically skilful to demonstrate new technology with or without minimum assistance from extension agent. In addition, 58.7% of the respondents had 1-10 people in the household who constituted labor force for farm operations. The finding suggests that lack of labor availability is not a constraint in rice production to more than average proportion of the farmers in the study area.

The results presented in Table **2** reveal that use of field demonstration for showcasing method and result of improved production technologies was very effective. The respondents rated method-cum-result demonstration as being high and very effective over the choice of a separate method demonstration or result demonstration. This is in line with Sher [10] who stressed that successful field demonstrations are very effective in convincing people and getting practices adopted by them. Field demonstrations may be regarded as the most effective tool in the hands of the extension worker for technology transfer. It involves the three important processes of learning: seeing, hearing and doing, so it is highly convincing. Organizing field day was averagely rated, considering both the green

Table 2: Mean Rating of Farmers' View Points of Effectiveness of Extension Delivery Methods (n=150)

Extension Delivery Techniques	Very Effective (FX3)	Effective (FX2)	Not Effective (FX1)	
Field Demonstration:				
Method demonstration conducted	210	116	22	2.32*
Result demonstration conducted	294	104	-	2.65**
Method-cum-result demonstration	336	60	8	2.69**
Field Day:				
Green filed day organized	48	262	3	2.09*
Brown field days organized	141	188	9	2.25*
On Farm Training:				
On farm Adaptive Research	366	56	-	2.81**
Management Training Plot (MTP)	312	56	18	2.57**
Interpersonal contact (face-to-face)	330	60	10	2.67**
Field visit organized	66	228	14	2.05*
Home visit organized	9	56	119	1.21
Group Contact:				
Farmers' group meeting	36	256	10	2.01*
Exhibition conducted	18	40	124	1.21
Workshops organized for the farmers	12	10	141	1.08
Mass Contact:				
Farm broadcast (radio) program	24	84	100	1.39
Television programs	60	94	83	1.58
Extension guides and posters distributed	12	50	121	1.22
Farmers Led Delivery System:				
Use of contact farmers	330	56	12	2.65**

Source: survey data, 2016,

**Very effective and *Effective.

(organized at the vegetative stage of the crop) and brown (organized at the maturity stage of the crop) field day. The method was effective because it avails groups of farmers to meet together to observe the new practices, and to prove that the new practice is superior to the one currently being used. This aligns with report by RTEP [4] that field day organized at bloom phase or maturity phase was an effective extension tool for transfer of technologies, to a large extent, showcases the overall superiority of the new technology over the farmer practice. The findings further reveal that on - farm trainings including On-farm Adaptive Research (OFAR) and Management Training Plot (MTP) were rated very high as being very effective by the rice farmers. These tools are often used to convince the farmers to embrace new technologies, and to a large extent used for strengthening OFAR model in promoting bottom-top demand driven technology development. The result is in contrast with the report by Egbe and Eze [1] that farmer' training programs and research-extension-farmer linkage were not very effective in extension delivery programs of Ebonyi state, Nigeria. Against this backdrop, there is obvious weak link in the overall farming system research and extension in the agricultural extension delivery in Nigeria. Furthermore, field visit is an important interpersonal (face-to-face) meeting with farmer in hi/her field to observe and identify field problem as well as to introduce new practices that are location-specific and advices on possible dimension of solving technical problems. Farmers' group meeting was discovered as effective tool for extension delivery service having a mean value of 2.01. Also found very effective were farm broadcast and use of contact farmers.

Table 3: Mean Rating of Farmers' Source of Information Utilized (n=150)

Sources of Information	$\bar{X}$	SD	Remarks
Extension agents from ADPs	2.84	0.68	RU
Technical field workers from Research institute (NCRI)	2.78	0.71	RU
Ministry of agriculture	1.86	0.84	NU
Radio broadcast	2.35	0.79	SU
Television broadcast	1.22	0.92	NU
Fellow farmers/friends/relatives	2.80	0.69	RU
Extension bulletin/poster, hand bills etc.	1.46	0.70	NU

Source: survey data, 2016,

Legends: RU = regularly utilized,

SU = sometimes utilized,

RU = not utilized.

Table **3** shows the result of the level of utilization of various information sources. The used of extension workers from Agricultural Development Projects (ADPs) was regularly utilized ($\bar{X}$ = 2.84) by respondents as a sources of information for rice production technologies. In addition, the field staff from research institute (NCRI. Badeggi) and fellow farmers/ relatives were also regularly utilized source of information having a mean rated value of 2.78 and 2.80 respectively. With these sources being regularly utilized, it is an indication that the farmers are becoming conscious of the formal sources of information and extension services [11]. In the same vein, the used of fellow farmers and relatives gave possible indication that diffusion of agricultural innovation is still great in the study area. The ministry of agriculture and television broad cast were not utilized as source of information. This agrees with submission by Egbe and Eze [1] that television broadcast and newspapers were rated low as sources of extension services to farmers. However, radio broad cast plays important role in disseminating agricultural innovation as indicated by the results. The low or non-usage of print media such as newspapers, extension bulletins/ newsletters can be attributed to low literacy level of the rural farmers. These findings are in consonant with submission by Tologbonse [12] which reveal that television, extension publications (bulletins, newsletters, posters and hand bills) were not considered as important sources of agricultural information among the farmers in Nigeria while friends /neighbours/relations, extension agents and contact farmers were considered important in terms of availability and usage.

The result presented in Table **4** shows significant difference in farmers' output (yield kg/ha) before and after dissemination of rice production technologies. The negative sign of the mean value (-1.492) is an indication that there was mean difference in term of the rice yield realized by the farmer before and after the introduction of the new rice production technologies. As the t-value (-35.640) shows significant difference at 5 percent probability level at Degree of freedom (149) and 95% confidence interval implies that extension delivery techniques were effective. The variation in the mean output of the two paired observation said much about changes that resulted in the adoption of the new practices. It could be inferred that a paradigm shift from low to higher productivity level have been recorded by the sampled farmers. By and large, the result accounts for effectiveness of the extension services provided by research institutes and extension organizations. The result is in conformity with Suraj [13] who reported significant difference between yield (kg/ha) of sesame before and after the introduction Raw Material Research and Development (RMRD) Program in Kebbi state, Nigeria. The impact of extension delivery

Table 4: Result of Paired t-Test Showing Significant Farmer's Yield (kg/ha) Difference before and after Dissemination of Rice Production Technologies

Paired group	N	$\bar{X}$	Std Deviation	Std Error Mean	t-Value	Df	Sig(2-Tail)
Before and After the dissemination of rice production technologies	150	-2.020	0.694	0.056	-35.640	149	0.05

Source: survey data, 2016,

Decision: null hypothesis is rejected.

That is Ho = $\mu \neq \mu$.

techniques could be judge and evaluated through adoption of new technology and mean difference of the farmers' output before and after delivery service.

CONCLUSION

From the results of the study, it could be concluded that rice farmers in the study area are young and married with between 16 and 20 years of farming experience. It also means that there is existence of integration of multiple extension delivery methods/ techniques employed by the research and extension organizations for effective dissemination of improved rice production practices in the study area. These included field demonstrations, organization of field days' on-farm training programs and interpersonal contacts. Regarding the use of sources of information, the study concluded that farmers are conscious of the use of formal sources than informal. Hence the regularly used of extension agents, technical field officers, fellow farmers and relatives. For mean comparison of the two paired subjects: before and after extension delivery program, there was significant mean difference in the yield output (kg/ha) in the two paired situations. Therefore, the extension delivery techniques employed for the dissemination of the production technologies were effective.

RECOMMENDATIONS

The study is policy focused; therefore the following recommendations were made:

- There should be a sustainable linkage systems between the research and extension;
- Farm broadcast should be emphasized for farmers to be abreast of new practices and production packages;
- Bottom–top approach and demand driven technology with a view to enhance the rate of adoption among end-users should take centre stage in the planning of technology development and dissemination programs;
- Both pre-season and post-season training for formers should be conducted for farmers to be technically equipped for greater productivity.

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