Assessment of Extension Delivery Methods to Farmers in Apa Local Government Area of Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author PGK designed the study, performed the statistical analysis and wrote the literature review of the manuscript. Authors AAA and YK managed the analyses of the study. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Information plays a very important role in agriculture in particular and life in general. Agriculture has become information-intensive; information is required for livestock and crop production. It empowers farmers to respond to market incentives, risks, and competition. Farmers access information from a variety of sources. These sources can be divided into formal and informal information networks. The study assessed extension delivery methods to farmers in Apa Local Government Area of Benue State, Nigeria. Stratified, purposive and simple random sampling techniques were used in selecting 125 respondents through survey. Primary data were collected

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using a structured questionnaire. Data collected were analyzed using descriptive statistics. The findings revealed that males were 74.2%, the respondents 49% were between 26 and 35 years, 61.7% were married, 52% had farm size of 6 hectares and above. About 34% earned an estimated annual income of between ₦100,000.0 and ₦500,000.0, 83.3% acquired land through inheritance and 47.5% obtained information from extension services using radio. About 50% of identified characteristics of the effectiveness of extension delivery methods used were helped solve problems and 86% of constraints to the effectiveness of extension delivery methods used were poor infrastructure. It is recommended that government and non-governmental organizations should provide infrastructure, organize adult education for farmers and organize training to update knowledge of extension workers.

1. INTRODUCTION

Agricultural information has become a factor of production as without it the basic things that are required by farmers, input dealers, processors, agriculture policymakers among others cannot function properly. Agriculture information changes with time due to increased awareness of farmers of their needs. Farmers face new challenges everyday as a result of lack of recent information on how to solve problems of market uncertainty, climatic variability and new technology among others [1]. For example, a farmer producing rice on his field for generations now faces new problems of weather, soil moisture, temperature, biological factors and soil quality [2].

An extension method is defined as a specific procedure used by extension workers to achieve changes of farmers' skills, behaviour, attitudes and knowledge. There are different methods by which extension services reach farmers [3]. It is clear that the most common extension methods included farmers' group meetings, farm/home visits, training and farmer-to-farmer extension, method demonstration and result demonstration just to mention few [4].

Changes in environment and intensive agricultural practices have resulted in coming up of new types of pests, diseases and weeds that can significantly affect crop production and human health, thus, yield and profitability of the crop [5,6]. It is difficult for a farmer to obtain information on the remedy of these emerging challenges from conventional sources of information, to improve or maintain their yield. Farmers need to address these challenges with relevant information about techniques or methods that are related to their local environmental condition [2].

Information has vast and multidimensional role in agriculture. It makes farmers more confident to attend to different categories of issues; competition, market incentives and risk more effectively. Agricultural extension is very important in dissemination of information on different aspects including technology transfer. With the aid of extension services, farmers access information from a variety of sources. These can be categorized into formal and informal information sources. The informal sources constitute face-to-face interactions with friends, other farmers, relatives and extension agents among others. On the other hand, formal sources refer to information that is created specifically for farmers through media such as radio, social media, television, telecentres and print media [2].Farmers use a combination of informal and formal sources for accessing information at the same, for different information.

Studies have shown that most farmers have access to a variety of traditional information sources (radio, television, newspapers, friends, other farmers, traders, relatives and input dealers, (agricultural extension services)), which they regularly access for agricultural information [7]. These traditional sources have been important tools for many years now. They disseminate technical and scientific agricultural knowledge to farmers and also help improve adoption of technologies. Nigeria suffers from low agricultural productivity due to a number of factors such as inadequate extension personnel, poor market linkages, lack of clientele involvement in agricultural extension planning process, poor dissemination of agricultural information, poor government support and weak linkage between research and extension. Other issues affecting efficiency of extension system include poor administrative and institutional structure, inadequate farm inputs, untimely provision of extension services and poor

organizational structure among others. The role of extension is to empower farmers and aid them to identify and analyze their agricultural problems so that they are able to make correct and sound decisions [8]. This warranted the significance of understanding the feelings of the farmers served so that they can be successfully involved in extension programme planning and promote their ability to adopt the technologies delivered [9].

An extension method can also be defined as a specific process use by extension workers to achieve predetermined changes of farmers' knowledge, skills, attitudes and behaviours [10]. For extension educators, it is very important to identify and examine the usefulness of each delivery method; researchers and educators have examined the feelings of farmers and other clientele towards delivery of agricultural information using different methods and suggest that various methods are used depending on knowledge and information needs of farmers, availability of new and emerging technologies.

There are many extension delivery methods used in reaching farmers by extension workers, some of them includes training and visit system (T&V) which is the regular training of extension staff and regular (once in a fortnight) field visits to contact farmers, farmer field school is an adult education, participatory, group-based approach for training of farmers, project method concentrates efforts on a specific project within a specified period, often with outside resources. Radio involves the process by which messages are sent through electrical waves, it is also about the activity of disseminating agricultural information for farmers to listen to the programmes being broadcast, social media is the use of electronic device with specialized apps for creation of farmers' groups for sharing of agricultural information. Agricultural education is the teaching of agriculture as a subject in the school curriculum, method demonstration entails how a task involving a particular procedure is performed, individual contact is the method involving extension officer and an individual farmer, inter-personal communication method, agricultural shows/exhibition/fairs are orderly displays of agricultural produce and products, research inventions like tools, equipment, farm machines, improved varieties of crops, improved breeds of animals etc. The exhibitions or fairs are used both for advertisement and educational purposes with a view to creating awareness and interest on the part of those who are seen them.

According to Muhammed [11], effectiveness of extension delivery methods is largely determined by the wise choice and skills of the extension workers involved. Thus, extension workers need to use diverse extension methods to effectively communicate to farmers.

2. METHODOLOGY

Benue State lies between longitude $6^0 35'$ E and $8^0 10'$ E of the Greenwich Meridian and latitude $6^0 30'$ N and $8^°10'$ N of the equator at an elevation of 97m above sea level in Southern Guinea Savannah agroecological zone. The State has 23 local government areas (LGAs) 423 council wards and three agricultural zones with administrative headquarters at Makurdi [12]. The State covers landmass of 32,518 Km^2 and an estimated population of 5,454,521 people [13]. The State lies in the North-Central region of Nigeria and share boundaries with five other States: Nassarawa to the North, Taraba to the East, Cross-River to the south, Enugu to the Southeast and Kogi to the West. The State also shares a common boundary with the Republic of Cameroon in the south-east (Benue State Agricultural and Rural Development Authority) [14].

Apa is one of the 23 Local Government Areas in Benue State. The Local Government Area (LGA) was created in August 1991. It is bounded in the North by Agatu LGA, in the East by Gwer-West LGA, in the South by Otukpo LGA, in the West by Olamaboro LGA of Kogi State. The original inhabitants of the LGA are predominantly Idoma and a few Igala and other people. The mineral resources found in the LGA are numerous and are awaiting exploitation, they include crude oil deposits at Okwiji and salt at Iga-Okpaya. Other mineral resources are kaolin, limestone, gypsum, anhydride and natural gas. The LGA with its headquarter at Ugbokpo has eleven (10) council wards which include Auke, Ugbokpo, Oba, Ojantele/Akpete, Igoro, Edikwu I, Edikwu II, Oiji, Ikobi, Iga and Ofoke. The LGA has a population of about 100,000 people with a population density of about 200,300 persons per sq. Km [15]. Two different seasons are observed in the area, the rainy and dry seasons. The rainy season starts from April to November while the dry season which begins from November to February. The environment is good for cultivation of different crops like yam, maize, sorghum, rice, soybeans, millet, beniseed, cowpea, groundnut, bambara nut, citrus, mangoes, cashew, pineapple, guava, pepper and cassava [15]. A

survey design was adopted for this study. The population of the study consisted of all the rural farmers in the LGA. Due to the enormity of the population, five (5) out of eleven (10) council wards were selected purposively because of high intensity of farmers population, they included Iga, Edikwu I, Oiji, Oba and Ugbokpo. In each of the council wards selected, 25 (farmers) respondents were selected randomly, thus given a total of 125 respondents. Data for the study were collected through primary source using structured questionnaire, data collected were analyzed using descriptive statistics. Objectives i socio-economic characteristics of the respondents, ii extension delivery method mostly accepted by the respondents, and iii characteristics of effectiveness of extension delivery methods were analyzed by frequencies and percentages and objective iv constraints to effective extension delivery methods was analyzed by mean scores.

Measurement of Variables

Age in years (continuous: 1, 2, 3, etc.)

Sex (dummy: female = 0, male =1)

Marital status (dummy: married 1, otherwise 0)

Household size (continuous: 1, 2, 3, etc.)

Educational level (number of years spent in formal education: continuous: 1, 2, 3, etc.)

Farm size (Number of hectares cultivated by a farmer: continuous: 1, 2, 3, etc.)

Farming experience in years (continuous: 1, 2, 3, etc.)

Estimated annual income in Naira (₦) (continuous)

Method of land acquisition (indicating the method the farmland was acquired; inheritance, communal, purchase etc.)

2.1 Likert Scale

Data on constraints to effective extension delivery methods used in the study area were collected using a three-point Likert-type scale as follows: 1 = not serious; 2 = serious; and 3 = very serious. The scores were added up to 6 and divided by 3 to obtain a mean score of 2.0. A mean score equal to or greater than 2.0 was regarded as being high.

3. RESULTS AND DISCUSSION

Results in Table 1 shows that majority (74.2%) were male while 25.8% of the respondents were female. This is an indication that males were more involved in farming than female in the study area. The involvement of males in farming than females could be associated with the drudgery of farming activities, since females are the weaker sex some of them may not like to be involved in farming more so that small scale farming makes of use manual labour in carrying out almost all farm activities. The result further depicts that a reasonable (49%) proportion of the respondents were age between 26 and 35 years. This category of age group (26-35 years) is people that are very active and can carry out manual farm operations. This means farmers in the study area were young and energetic people. The implication is that young people were involved in farming in the study area and the older people would be able to teach the younger generations much about farming, the knowledge of farm activities could be transmitted from one generation to another.

Results in Table 1 indicates that majority (61.7%) were married, single 24.2%, and widowed/widower 14.2%. This means married people were more involved in farming than others. Married people have more responsibilities than others; therefore get involved in activities that can earn income to be able to take care of their families. This finding confirms [16] that most farmers in Federal Capital Territory, Abuja were married. Married people are more responsible than single people. The implication is that married people were more involved in farming in the study area. Marriage confers responsibility on people. Result of household size shows that those between 7 and 9 persons constitute 42.5%, 10 and above constitute 28.8%, 4-6 constitute 22.9% and 1-3 persons in a family constitute 6.8% with an average of 10 persons. A reasonable (42.5%) proportion of the respondents had household size of between 7 and 9 persons. Household size of between 7 and 9 is moderate. Most farmers in Nigeria are used to very large household size and this is because members of the family assist in carrying out farming activities. In places where labour to carry out farm activities may be very scare or not available, members of the family are the only source of farm labour. This contradicts the finding of [16] that household size of most farmers was between 6 and 10 people. Most farmers are interested in having a large

household size because members of the household serve as a source of labour in carrying out farming operations.

Result in Table 1 of farm size in hectares (ha) depicts that majority (52%) of the respondents had 6 and above 52%, followed by 3-5 (33%) and less than 2 (15%).This means farmers in the study area had large farm size. In Nigeria, land owned by a father is usually shared among the children after the death of the father; this has led to fragmentation of farmland with people having very small portions that discourage mechanizing farm operations. This finding is in tandem with that of [17] that fragmentation of farmland in Benue State, Nigeria has discouraged use of agricultural machines for carrying out farm operations.

Results in Table 1 of farming experience show that from 8 years and above farm experience constitute majority (81%), followed by 4-7 (13%) and 1-3 years (7%). The mean farming experience was 23.5 years. This means that the farmers have relatively few years of farming experience. Experience is generally very important especially in farming; the more experience a farmer is the better it is with him/her. Experienced farmers have experimented on different aspects of farm practices over the years and have accumulated knowledge on many farm practices more than inexperienced ones. Some of the experienced farmers know where and when to start looking for farm inputs like fertilizer, improved seeds and improved breeds of animals among others.

Results in Table 1 reveal that a reasonable (33.9%) of the respondents earned between ₦100,000 and ₦500,000, followed by at least ₦100,000.025 (4%) and ₦501,000 and above (6.8%) of estimated annual income in Naira with a mean of ₦175,380.33. This means that farmers in the study area were small scale. Small scale farmers do not farm as a business, they produce mainly for consumption with the hope of selling only the surplus and their lack of access to credit facilities, farm inputs just to mention few have made them to use crude implement for production which limits their scale of production.

Results of land acquisition shows that majority (83.3%) of respondents acquired their lands through inheritance followed by hired 15.5% and communal land 8%. In Nigeria, in most places land is acquired by inheritance. This method of land acquisition encourages land fragmentation and discourages farm mechanization. The finding is similar to that of [18] that most land use for farming in the rural areas by farmers is acquired by inheritance. Most farmers are indigenes of such areas who inherited land from their fathers.

Results in Table 2 depicts that radio (47.5%), participatory technology development (26.7%), newspapers (25.8%), group meeting (24.2%), tour (23.3%), individuals (22.5%), social media (22.5%), field days (22.5%), formal training day (20.0%), farmer field school (20.0%), demonstration (12.5%), exhibition (12.5%), farm walks (6.7%) and fairs (6.7%) were the extension delivery methods used in that order. This is an indication that radio was one of the methods mostly used by extension agents in delivering information to farmers. Radio is one of the methods used by most extension agents in dissemination of information to farmers in the rural area. A transistor radio is relatively cheap, portable, its cost of maintenance is low, can be listened to while working in the farm and requires a very simple energy for it to be powered among others. It is also one of the oldest means of communication which has a large listenership good for dissemination of agricultural information to both urban and rural people. The affordability and portability of radio has also encourage wide spread ownership by different category of listeners. This confirms finding of [18] that radio is one of the best means of disseminating agricultural information to farmers most especially in the rural areas because of its good signal reception and affordability in most rural areas in Nigeria.

Results in Table 3 represent the effectiveness of extension delivery methods, help to solve problems (50%), sufficient information provided (36.7%), information provided in a simple way (36.7%), based on farmers needs (33.3%), repeated till understanding (29.2%), delivered on time (26.7%) and meanings are very clear (6.7%) were characteristics of effectiveness of extension delivery methods as perceived by respondents in descending order. One of the major reasons for extension is to advice/teach farmers how to solve their problems and if there is any extension delivery method that performs the function of solving farmers' problems it is an indication that such method of extension delivery is effective. Extension delivery method which helps solve farmers' problems should be use by extension services to reach farmers as this can reduce a number of problems the farmers are facing.

Table 1. Socio-economic characteristics of the respondents

Socio-economic Characteristics	Frequency	Percentage	Mean score
Sex			
Male	89	74.2	
Female	31	25.8	
Age(year)			
26 – 35	59	49.0	
36 – 45	34	28.8	44.2667
15-25	17	14.2	
Above 45	10	8.0	
Marital status			
Married	74	61.7	
Single	29	24.2	
Widow/widower	17	14.2	
Household size			
7 - 9	51	42.5	
10 and above	34	28.8	10
4 to 6	27	22.9	
1 -3	8	6.8	
Educational Level			
Secondary school	60	50.0	
Non-formal education	25	20.8	
Tertiary education	19	15.8	
Primary school	16	13.3	
Farm Size			
Above 6	62	52.0	
3 - 5	40	33.0	7.2667
≤ 2 hectares	18	15.0	
Farming experience (years)			
Above 8	96	81.0	
4 - 7	16	13.0	23.533
≤ 3	8	7.0	
Annual income (Naira)			
100,000 to 300,000	42	35.0	
301,000 to 500,000	40	33.3	175,380.3333
501,000 and above	30	25.0	
less than 100,000	8	6.7	
Method of land acquisition			
Inheritance	100	83.3	
Hired	19	15.8	
Communal land	1	8.0	

Results in Table 4 indicate categories of the constraints faced by farmers; very serious ones included poor infrastructure (86.7%) and frequent changes in technology (65%). Serious ones included inadequate skills among extension workers (63.3%), poor capacity building among extension workers (55%), inadequate working facilities (55%), farmers' low level of education (60%) and inadequate extension workers 80% were types of constraints faced as perceived by respondents in descending order. Infrastructure is very important in any service delivery. For instance, if roads are not motorable throughout the year extension agents may find it difficult to visit remote areas to provide extension services. Similarly, if extension agents are inadequate in a particular location it means one extension worker would be assigned to several farmers. The ratio of extension agents-farmers is 1:4,882 farm families or more in most parts of Nigeria. This confirms the findings of FAO [19] that the low ratio of extension workers to farmers in addition to poor infrastructure, lack of conducive working conditions, the poor motivation of extension workers and lack of efficient extension policy among others has made the provision of extension services very difficult in Nigeria.

Table 2. Extension delivery methods mostly accepted by the respondents

Item	Frequency *	Percentage *
Radio	57	47.5
Participatory technology development	16	26.7
Group meeting	29	24.2
Tour	28	23.3
Individual	27	22.5
Social media	27	22.5
Field days	27	22.5
Formal training days	24	20.0
Farmer field school	24	20.0
Exhibition	23	19.2
Demonstration	15	12.5
Exhibition	23	19.2
Farm walks	8	6.7

Multiple responses

Table 3. Characteristics of effectiveness of extension delivery methods

Item	Frequency *	Percentage *
Help to solve problems	60	50.0
Sufficient information provided	44	36.7
Information provided in a simple way	44	36.7
Based on farmers needs	40	33.3
Repeated till understanding	35	29.2
Delivered on time	32	26.7
Meanings are very clear	8	6.7

Multiple responses

Table 4. Constraints to effective extension delivery methods used in the study area

Variable	Very serious	Serious	Not Serious	Mean values	Standard deviations values
Poor infrastructure	104(86.7%)	8(6.7%)	8(6.7%)	2.81	.53506
Frequent changes in technology	78(65%)	30(25.0)	8(6.7)	2.61	.61522
Inadequate skills among extension workers	32(26.7%)	76(63.3%)	12(10.0%)	2.19	.59229
Poor capacity building among extension workers	48(40.0%)	66(55.0%)	4(3.3%)	2.38	.55358
Inadequate working facilities	33(27.5%)	66(55.0%)	21(17.5%)	2.09	.68906
Farmers' low level of education	33(27.5%)	72(60.0%)	15(12.5%)	2.16	.62782
Fear of change	29(24.2%)	50(41.7%)	14(34.2%)	1.90	.77707
Inadequate extension workers	20(16.7%)	96(80.0%)	4(3.3%)	2.16	.44789
Framers' ignorance	41(34.2%)	28(23.3%)	51(42.5%)	1.90	.89296

Figures in parentheses are percentages

4. CONCLUSION AND RECOMMENDA-TIONS

The importance of agricultural information cannot be overemphasized in the life of farmers. Extension services are one of the important commodities that farmers required to improve their productivity especially now that information is considered as a factor of production. Agricultural extension workers are saddled with the responsibility of providing information on agricultural innovations to their target audience. To achieve this extension services make use of different means like radio, participatory technology development, group meetings and tours among others. The extension services are practices designed to assist farmers in solving their problems. Extension agents in providing these services faced many problems including poor infrastructure, farmers' low level of

education, poor skills and inadequate extension personnel among others. It is recommended that government and non-governmental organizations should provide infrastructure, organize adult education for farmers and organize trainings to update knowledge of extension workers.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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