

EFFECT OF AGRICULTURAL EXTENSION DELIVERY METHODS ON ARABLE CROP FARMERS' CROPPING SYSTEMS IN KADUNA STATE, NIGERIA

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Abstract

This study analysed effect of agricultural extension delivery methods on arable crop farmers' cropping systems in Kaduna State, Nigeria. Purposive and multi-stage random sampling procedure was used to select 120 arable crop farmers across the state. Data were collected with a structured questionnaire and analysed using descriptive and correlation coefficient analysis. The result indicated that 57.50% of farmers were males, with mean ages of 56.20 years, mean farming experience of 39.3 years and mean farm size of 1.86 hectares. Extension delivery methods used by the agencies were demonstrations (88.4%), adopted village (81.5%), on-farm adaptive research (75%) and group (70%). The effective extension delivery agencies in the study were; National Agricultural Extension and Research Liaison Services (\bar{X} =2.8), World Bank project (\bar{X} =2.6) and Faith Based Organisations (\bar{X} =2.5). The most common cropping systems practiced by farmers in the study area were sole maize (97%), sole millet (87.50%), sole cowpea (85.40%) and sole groundnut (72.40 %). Result also shows that farmers had favourable attitude (\bar{X} =2.2) towards agricultural extension delivery methods used by the agencies, with an attitudinal index of 73.33%. The correlation coefficient analysis showed a significant relationship ($P<0.01$) between agricultural extension delivery methods and cropping systems of farmers in the study area. The study recommends training and retraining of extension workers, provision of mobility and adequate funding of extension agencies for effective agricultural technology delivery in the study area.

Key words: analysis, extension, methods, farmers, cropping systems

INTRODUCTION

The success of extension service delivery depends on the expertise and technical know-how of the extension personnel, which could be achieved by providing adequate and relevant information. The extension services therefore are used to serve as a vehicle for conveying and educating farmers on the new agricultural policies and practices. Perhaps, for this to be optimally realised, well trained and articulated extension workers are needed to extending extension messages to wide range of farmers who live significantly in the rural areas [18]. [1] added that for these farmers to improve their farming practices towards adopting new technologies or improved farming practices; certainly they require to be trained in order to use different extension methods. [10] noted that agricultural technology has remained a viable tool for improving the productivity of the agricultural

sector in Nigeria. [7] emphasized the need for agricultural extension services which plays significant role in promoting the adoption of new technologies and innovations through communication with farmers and educating them so as to improve their attitude, knowledge and skills need to be funded.

Extension methods are effective means of communication meant to transmit knowledge and skills and, that target farmers may easily see, hear, and learn the things conveyed by extension worker [8]. There are various extension teaching methods used as tools by the extension worker to effect desirable changes in the behaviour of farmers, arrange the best learning situations and provide opportunities in which useful communication and interaction takes place between extension workers and farmers. Such teaching methods/pathways include group training, demonstration plot, adopted villages, On-Farm Adaptive Research and mass media [11].

Extension methods like demonstration plots, seed multiplication programme and field days and among others are some of the major weapons for introducing the findings of modern research in agricultural practices to increase agricultural production in particular and improve welfare of target farmers [2]. There is a growing recognition that farmers and rural community members have demands for information and appropriate farming methods that are not being achieved. Farmers need to be aware about increase in their productivity and income through several channels such as extension agents, individual farmer to farmers contact, print media (Newspaper, magazines, newsletters, leaflets, posters, electronic media and among others) have to be widely used in disseminating information to farmers [4]. Intercropping is the practice of growing more than two crops on the same piece of land such that the period of overlapping is long enough to include the vegetative stage. In Nigeria, as in many other countries, mixed cropping often involves the intercropping of a cereal with legume. The cereals being the main crop while, legumes are regarded as a cash crop [14]. In particular intercropping cereal with legume may produce yield advantage over the component sole crops [5]. [9] further suggested that there is need for strategic investment, research and development together with local, national and international cooperation to improve agriculture development.

Unfortunately, when planning research projects, policy makers give little or no consideration to information dissemination as a crucial aspect of research project implementation forgetting the fact that, there is the need to accelerate the pace of dissemination of the research findings to farmers. The most inherent problem confronting extension delivery in Nigeria is illiteracy levels of farmers, poorly motivated in terms of remuneration and provision of transport facilities to visit the farmers, inadequate funding of extension delivery institutions and low ratio of extension agents to farmers' [3]. This scenario has drastically affected the application and dissemination of various extension methods in the country [17].

Since some of these extension delivery methods are known to be effective it is not certain whether they have impacted positively on the cropping systems of arable crop farmers in the state. Hence, this study was designed to analyse the effect of agricultural extension delivery methods on arable crop farmers' cropping systems in Kaduna state, Nigeria.

Specific objectives were to:

- (i) describe the socio – economic characteristics of farmers in the study area
- (ii) identify different extension delivery methods used by the agencies
- (iii) assess effectiveness of agencies in extension delivery in the study area
- (iv) identify different types of cropping systems prevalent in the study area and;
- (v) ascertain farmers' attitude towards the extension delivery methods in the study area

Hypothesis:

H₀₁: There is no significant relationship between extension delivery methods and farmers' cropping systems in the study area.

MATERIALS AND METHODS

The study was conducted in Kaduna state Nigeria. The state lies between Latitude 9⁰ 03¹ and 11⁰ 32¹ North of the Equator and Longitudes 6⁰ 05¹ and 8⁰ 38¹ North of the Greenwich Meridian. The state shares common boundaries with Abuja in the South –East and six other states namely; Katsina, Kano, Zamfara in the North, Nasarawa and Plateau in the North – East and Niger in the North – West respectively. Kaduna state has rainfall ranging between 942 mm and 1,000 mm per annum, Relative humidity of 56.64% and mean annual temperature of between 35⁰C - 37⁰C. The state is made up of twenty three Local Government Areas (LGAs) which is subsumed into four Agricultural zones namely; Samaru, Lere, Birnin – Gwari and Maigana zones. Most of the people in the state, especially rural dwellers are engaged mainly in subsistence farming. The major crops grown include; maize, groundnut, rice, soybean, millet, water melon and okra. Purposive and multi-stage random sampling procedures were used in the study. Purposively

two agricultural zones namely; Samaru and Lere were selected because of intensity in arable crop production prevalent in the area. A multistage random sampling technique was adopted in the selection of blocks, circles and arable crop farmers. First five blocks each were randomly selected from each of the two zones to give a total of ten (10) blocks. From the selected blocks, three (3) circles each were randomly selected to give a total of thirty (30) circles. Finally five (4) arable crop farmers were randomly selected from the selected circles that gave a total of one hundred and twenty (120) farmers.

Data from the study were analysed using frequency distribution, percentages, graphs and mean scores. Effectiveness of agricultural extension delivery methods was realised by using a 3-point Likert type scale namely; very effective =3, effective = 2 and not effective = 1. The bench mark was obtained thus; $3+2+1 = 6$ divided by 3 to give 2.0. Any mean score of 2.0 and above is effective, otherwise non effective. The attitude of farmers towards agricultural extension delivery methods used by extension agencies was captured by getting responses on 10 attitudinal statements using a 4 - point type Likert scale namely; Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1). The bench mark was obtained thus; $4+3+2+1 = 10$ divided by 4 to give 2.5. Based on the obtained mean score decision rule, any mean score of 2.5 and above implied favourable attitude and otherwise unfavourable. The Attitudinal Index was obtained by dividing the grand mean attitudinal score by 4 (i.e. the 4 – point Likert type scale).

RESULTS AND DISCUSSIONS

The socio-economic characteristics of respondents are shown in Table 1. The result revealed that a high proportion (67.5%) of the respondents were males, while 42.5% were females, as against 35.00% that acquired primary education. This implies that males dominated farming activities in the study area. This result is in contrast with [15] that women are found to dominate farming activities thereby producing the bulk of food in Nigeria, but can make decisions on farming activities

based on years of farming. The result also indicates that 62.00% of the respondents were married with mean ages of 56.2 years. The age of the farmers suggests that they were not in their productive ages, thereby having adverse implication on agricultural production. The result is in tandem with [13], who obtained a similar result among arable crop farmers in Abia state, Nigeria. The mean household size for the farmers was 6.3 persons, farming experience of 39.8 years while they cultivated on mean farm size of 1.86 hectares. Household size in turn provides cheap labour for agriculture and other remunerative activities.

Table 1. Selected socio-economic characteristics of respondents in the study area (n = 120)

Variables	Frequency	Percentage	Mean
Gender			
Male	69	57.5	
Female	51	42.5	
Age (years)			
20 – 30	6	5.00	
31 – 40	15	12.50	
41 – 50	42	35.00	56.2 years
51 – 60	47	39.17	
61 – 70	10	8.33	
Marital Status			
Single	11	9.17	
Married	78	65.00	
Divorced	2	1.67	
Widowed	13	10.83	
Separated	2	1.67	
Household Size			
1 – 3	7	5.83	
4 – 6	33	27.50	6.3 persons
7 – 9	65	54.17	
10 – 12	15	12.50	
Education (years)			
No Formal Education	28	23.33	
Education			
Primary Education	42	35.00	
Secondary Education	38	31.67	
Tertiary Education	12	10.00	
Farming Experience (years)			
1 – 10	8	6.67	
11 – 20	9	7.50	
21-30	92	76.67	39.8 years
31- 40	11	9.16	
Farm Size (ha)			
0.1 - 0.5	12	10.00	
0.6 - 1.0	38	31.67	1.86 hectares
1.1 – 1.5	58	48.33	
1.6 – 2.0	12	10.00	

Source: Field Survey 2017

Extension Methods

Data on Fig. 2 reveal that Demonstrations (88.4%), Adopted Village Approach (81.5%), On -Farm Adaptive Research (75%) and Group Methods (70%) were the most effective

methods of technology transfer adopted by extension delivery agencies in disseminating improved agricultural production technologies to farmers in the state. Demonstrations such as Small Plot Adaptive Techniques (SPATs) and Management Training Plots (MTPs) are identified as the common techniques used by extension agencies in extension delivery in the country [12]. This result suggests that since individual methods have many setbacks, extension outfits in the country adopted other methods identified to be group-oriented in order to extend agricultural information to target farmers. [16] is of the view that there is a gap between yields which farmers can obtain through the current use of these extension strategies on improved technologies 6.5 times when compared to traditional sources. This gap could be covered through technology transfer which is the sole responsibility of extension institutions in Nigeria [6].

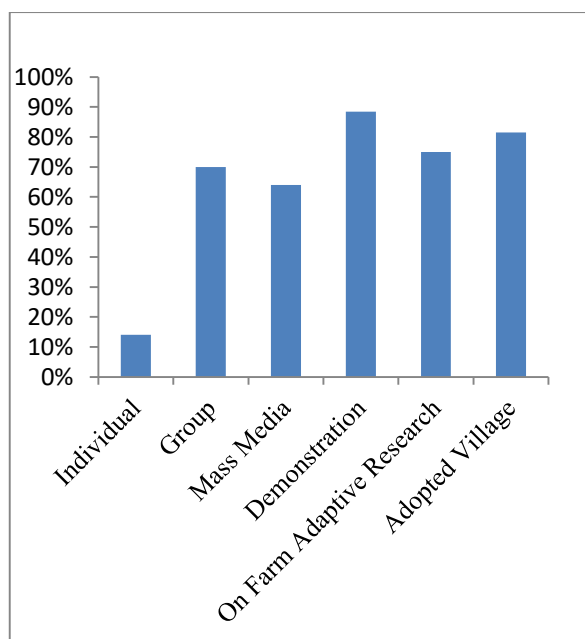


Fig. 1. Showing Extension Delivery Methods

Effectiveness of Agricultural Extension Agencies

Data on Table 2 shows that National Agricultural Extension and Research Liaison Services (NAERLS) ($\bar{X} = 2.8$), World Bank Projects (FADAMA and IFAD) ($\bar{X} = 2.6$) and Faith Based Organisations (FBOs) ($\bar{X} = 2.5$) were institutions that were very effective in extension delivery in the state.

The effectiveness mean scores for these agencies was 2.3 indicating that they were effective.

This result is in consistent with [12] and [3] that donor sponsored agricultural agencies and institutes play significant and complementary roles in extension delivery in Nigeria.

Table 2. Effectiveness of Agencies in Extension Delivery in the Study Area

Extension Agencies	Effectiveness
National Agricultural Extension and Research Liaison Services (NAERLS)	2.8*
Agricultural Development Programmes (ADPs)	2.4
Faith Based Organisations (FBOs)	2.5*
World Bank Projects (FADAMA and IFAD)	2.6*
Institutions (Colleges of Agriculture and University Faculties of Agriculture)	1.3
Mean Score	2.3

Source: Field Survey Data, 2017 *Effective

Types of Cropping Systems

Result in fig 3 indicate that majority (97%) of the farmers plant sole maize, sole millet (87.50%), sole cowpea (85.40%) and sole groundnut (72.40%) as types of framing system practiced in the study area. Furthermore, they intercropped maize/groundnut (71.40%), maize/cowpea (70.30%) and maize/soya bean (63.80%).

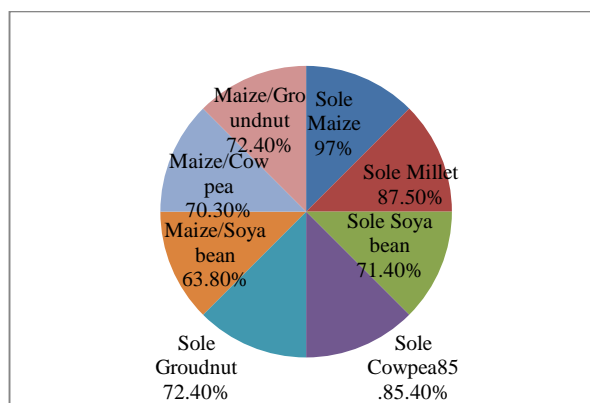


Fig.2..Showing Types of Cropping Systems

This result is in contrast with [19] that intercropping is the growing of two or more crops simultaneously on the same piece of land aimed at maximizing the use of natural

resources, which is a popular cropping system among small scale farmers in the tropics.

Table 3. Attitude of Farmers towards different Extension Methods used by Agencies in Extension Delivery in the Study Area

Attitudinal Statements	Mean Scores
Extension methods taught did not improve crop yield	1.8
Extension workers have sufficient information on the different extension delivery methods	2.3*
Materials used in technology transfer were adequate	2.1*
Extension workers were friendly to target audience	2.2*
The training sessions were very conducive	2.0*
Time allotted for any training session were enough to handle any subject matter taught	2.1*
Methods used are problem solving oriented	2.5*
The training session was interactive and participatory	2.4*
The extension agency follow – up farmers’ farming activities	2.1*
Farmers have confidence in the Subject Matter Specialists	2.4*
Grand Mean	2.2
Attitudinal Index	0.7333%

Source: Field Survey Data, 2017

*Favourable Attitude

Attitude of Farmers

Table 3 reveals that among the attitudinal statements of the respondents disagreed on non - improvement of extension methods on farmers’ yield ($\bar{X} = 1.8$) as against others. The total mean score was ($\bar{X} = 2.2$) indicating that the farmers had favourable attitude towards different extension methods employed by extension agencies in technology dissemination. Also, the farmers had 73.33% attitudinal index responses of these extension delivery methods.

Correlation Coefficient Analysis

Data in Table 4 shows the relationship between extension methods and farmers’ cropping systems. The result reveals a correlation coefficient (r^2) of 0.9213, which was significant at 1% level of probability. This indicates a positive relationship. The implication of the result is that any increase in

extension methods will lead to an increase in farmers’ cropping systems in the study area.

Table 4. Relationship between Extension Delivery Methods and Farmers’ Cropping Systems

Variables	Correlation Coefficient (r^2)
Extension Methods	0.9213***
Cropping Systems	0.0045

Source: Field Survey Data, 2017

*significant at $P < 0.01$ of probability

CONCLUSIONS

The study has revealed that extension delivery agencies in the study area effectively used extension methods in disseminating agricultural technologies to farmers. Farmers also had favourable attitude of these extension methods in improving their cropping systems. There was a significant relationship between the different extension delivery methods and farmers cropping systems in the study area.

The study therefore recommends training and retraining of extension workers in order to be abreast with the latest techniques and approach to extension delivery. There is also need to provide mobility (motorcycles) to extension workers to ensure wide coverage of service areas. Adequate funding of extension agencies is very crucial for effective agricultural technology delivery in the study area.

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