

## **Impact of Extension Services on Cassava Farming in Benue State, Nigeria**

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### **Abstract**

*The study assessed the impact of access to extension services on cassava farming in Benue State, Nigeria. Data were collected from 180 randomly sampled cassava farmers from nine local government areas in Benue State using a structured questionnaire. Data collected were analysed using descriptive statistics and inferential statistics. The study showed that only 47.78% of the farmers had access to extension services. The study showed that there was a significant relationship between farmers' access to extension services and profitability of farming. Farmers who had access to extension services had higher profits. Access to extension services had significant impact on the profitability of cassava farming in the study area. The study recommended that extension agents should put more effort in reaching cassava farmers that have not had contact with them so as to pass useful information to them in order to increase their profitability. Cassava farmers should be encouraged by extension agents to subscribe to the various cassava farmers group. Cassava farmers should be mobilized to establish cooperative society in order to enjoy government provision of capital under poverty alleviation programmes. Adequate mobility should be provided for the extension agents for effective coverage of the areas of information need.*

**Key words:** impact, access to extension services, profitability, cassava farming, Benue State

### **1. Introduction**

The term extension was derived from the practice of British Universities of having one educational programme within the premises of the university and another away from the university buildings. The programme conducted outside the university was described as "extension education". The expression connoted an extension of knowledge from the university to places and people far beyond. The term "Extension Education" was first introduced in 1873 by Cambridge University in England to describe a particular system dedicated to the dissemination of knowledge to rural people where they lived and worked. Within a short time, the idea had spread to other parts of Britain, Europe and North America and Africa (Kelsey and Heame, 1966).

Agricultural extension has three main facets: (i) As a discipline it deals with the behaviour of people: It is educational in content and purposive in approach. Whether the content consists of agriculture, medicine, education, engineering etc, extension is always dependent on a firm knowledge and expertise; (ii) As a process, agricultural extension seeks to influence the behaviour of rural through education and information exchange; (iii) As a service, agricultural extension makes the government ministry, the university or voluntary agency as useful as possible of the people who support it through taxes and donations.

Agricultural Extension is defined by Ekpere, (1990) as the discipline which seeks to develop professional competencies essential to the operation of a system of services which assist rural people through educational programmes of improved farming methods and techniques, increased production efficiency and income, level of living and achievement of a more fulfilling rural life.

The extension agents carried out the responsibilities of educating and disseminating useful and timely agricultural information to the farmers. Williams (1978) reported that the conduct of agricultural extension work in Nigeria shows that one of the primary responsibilities is to help farmers make efficient use of available resources to meet the nation's food needs. The goal of agricultural extension services in Nigeria is to facilitate farmers acceptance while the ultimate goal of agricultural extension is to improve standard of living through the transfer of improved farming practices to the rural people.

Information is an indispensable factor in agricultural practices and it is the basis of extension service delivery. It is defined by Adereti et al. (2006) as data that have been put into a meaningful and useful context which is communicated to recipient who uses it to make decision. Adereti et al. (2006) stated that the quality of information rests solidly on three pillars which are accuracy, timeliness and relevance. Accuracy implies that information is free from bias; timeliness means that recipients can get information when they need it, while relevance implies whether the piece of information specifically answers the user's question. An individual consciously or unconsciously engages in information search in order to find appropriate information which can fill the information gap there by regaining physiological and psychological balance.

Information needed by fish farmers include information on pond construction, stocking, pond management, fish breeding, credit, fish harvesting, feed formulation, group formation and marketing outlets etc. However, Agricultural extension agents carry out this particular responsibility by using various strategies to encourage farmers to adopt agricultural innovations. These strategies include establishment of farm institutes, extension work station, experimental farms, visits to farms and various types of farm settlement schemes. Each strategy has met with some amount of success but the rate of farmers' acceptance and use of Agricultural innovations is still low.

The importance of cassava in human nutrition as a major source of food fibre cannot be over emphasized as it touches the lives of a large percentage of the population of the world. As population increases, the demand for food fibre and cassava products increases, especially with its comparative cost advantage over cereals as source of energy. This calls for improved cassava farming technologies and other information needed for improved production level. Access to adequate information is very essential to increased agricultural productivity (Mgbada, 2006). Therefore this study is aimed at assessing the impact of access to extension services on cassava farming in Benue State, Nigeria.

The broad objective of the study is to assess the impact of access to extension services on cassava farming in Benue State, Nigeria. The specific objectives are to:

- i. analyse socio-economic characteristic of cassava farmers in Benue State;
- ii. identify information disseminated to cassava farmers by the extension agents;
- iii. assess cassava farmers' perception of extension agents in the area of information dissemination;
- iv. determine cassava farmers' profitability in relation to access to extension services;
- v. analyse the relationship between cassava farmers' profit and number of extension contact; and
- vi. analyze the impact of access to extension services on the profitability of cassava farming.

The following null hypotheses were stated and tested:

- i. there is no significant relationship between cassava farmers' profit and number of extension contact; and
- ii. there is no significant difference between the profit of cassava farmers before and after the access to extension services.

## **2. Methodology**

### **2.1 The Study Area**

Benue State is one of the 36 states of Nigeria located in the North-Central part of Nigeria. The State has 23 Local Government Areas, and its Headquarters is Makurdi. Located between Longitudes  $6^{\circ} 35' E$  and  $10^{\circ} E$  and between Latitudes  $6^{\circ} 30' N$  and  $8^{\circ} 10' N$ . The State has abundant land estimated to be 5.09 million hectares. This represents 5.4 percent of the national land mass. Arable land in the State is estimated to be 3.8 million hectares (BENKAD, 1998). This State is predominantly rural with an estimated 75 percent of the population engaged in rain-fed subsistence agriculture.

The state is made up of 413,159 farm families (BNARDA, 1998) and a population of 4,219,244 people (NPC, 2007). These farm families are mainly rural. Farming is the major occupation of Benue State indigenes. Popularly known as the “Food Basket” of the Nation, the State has a lot of land resources. For example cereal crops like rice, sorghum and millet are produced in abundance. Roots and tubers produced include yams, cassava, cocoyam and sweet potato. Oil seed crops include pigeon pea, soybeans and groundnuts, while tree crops include citrus, mango, oil palm, guava, cashew, cocoa and *Avengia spp.*

## 2.2 Sampling Technique

Benue State is divided into three agricultural zones namely, Zone A, Zone B and Zone C. Using a combination of purposive and random sampling techniques, a total of nine Local Government Areas were selected for the study. Purposive sampling technique was employed to select the areas with high concentration of cassava production in Benue State.

From each of the nine selected Local Government Areas in Benue State, one community that typifies the State in terms of cassava production was drawn employing a randomized sampling design. Finally, from each community, 20 households were drawn for the study through a randomized sampling design. A total of 180 cassava farmers were selected for the study using the randomized sampling design. This sample size consists of both male and female farmers.

## 2.3 Data Collection

Data were collected from both primary and secondary sources. Primary data for the study were generated through the use of a structured questionnaire, copies of which were administered to the 180 cassava farmers selected for the study in the study area. This sample was randomly drawn from the nine Local Government Areas (Logo, Katsina-ala, Ukum, Gboko, Tarka, Buruku, Otukpo, Okpokwu and Ohimini) that were selected for the study.

## 2.4 Method of Data Analysis

Data collected were analysed using both description statistics and inferential statistics. Description statistics such as frequency distribution and percentage were used to analyse specific objectives i, ii, iii and iv. Inferential statistics such as correlation analysis was used analyse specific objective v while t-test analysis was used to analyse specific objective vi. Hypothesis i and ii were tested using Pearson correlation and t-test analysis respectively.

## 2.5 Model Specification

### 2.5.1 Gross margin analysis

According to Adegeye and Dittoh (1982), Gross Margin is a good measure of profitability.

$$GM = GI - TVC$$

GM = Gross Margin

GI = Gross income

TVC = Total Variable Cost

### 2.5.2 Correlation analysis

Pearson's correlation coefficient when applied to a sample is commonly represented by the letter  $r$  and may be referred to as the *sample correlation coefficient* or the *sample Pearson correlation coefficient*. We can obtain a formula for  $r$  by substituting estimates of the covariances and variances based on a sample into the formula above. That formula for  $r$  is:

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

An equivalent expression gives the correlation coefficient as the mean of the products of the standard scores.

Based on a sample of paired data  $(X_i, Y_i)$ , the sample Pearson correlation coefficient is

$$r = \frac{1}{n-1} \sum_{i=1}^n \left( \frac{X_i - \bar{X}}{s_X} \right) \left( \frac{Y_i - \bar{Y}}{s_Y} \right)$$

Where

$$\frac{X_i - \bar{X}}{s_X}, \bar{X}, \text{ and } s_X$$

are the standard score, sample mean, and sample standard deviation, respectively.

### 2.5.3 The t-test

The impact of access to extension services on profitability of cassava farming was determined using the t-test statistic formula. The  $t$  statistic to test whether the means are different can be calculated as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1X_2} \cdot \sqrt{\frac{2}{n}}}$$

where

$$S_{X_1X_2} = \sqrt{\frac{1}{2}(S_{X_1}^2 + S_{X_2}^2)}$$

Here  $S_{X_1X_2}$  is the grand standard deviation (or pooled standard deviation), 1 = group one, 2 = group two. The denominator of  $t$  is the standard error of the difference between two means.

For significance testing, the degree of freedom for this test is  $2n - 2$  where  $n$  is the number of participants in each group.

## 3. Results and Discussion

### 3.1 Socio-economic Characteristic of Cassava Farmers in Benue State

Table 1 shows that majority (57.78%) of the cassava farmers were between the age range of 30 and less than 50 years. This is because cassava farming requires adequate attention and a lot of sense of responsibility. The young people in the rural communities are mostly, pursuing tertiary education between the age of 20 and 30 years and pay much attention to their studies and have little or no time for other serious activities, people above the age of 50 were few in cassava farming because they lack adequate strength and vigor required in the management of cassava farms. Majority (83.3%) of the respondents had one form of secondary education or the other, while 11.1% and 4.4% had tertiary and primary education respectively. Just 1.1% had no formal education. This means that cassava farming is dominated by the educated class with secondary education. This is so because cassava farming requires a lot of technical and scientific knowledge. The information on the innovations of cassava farming is somehow complex and this need some high level of education to practice and the more educated an individual is, the easier it will be for him or her to decode and process information.

Male (62.22%) dominates in cassava farming. The male dominancy in this source of livelihood implies the laborious nature of cassava farming operations right from tillage to management which their female counterparts cannot easily undertake. On the marital status, 78.89% were married. This suggests that there may be high demand for food and additional income as the family size increases. Few percentages (15.56%) of the respondents were single and this indicates that they are youth and they still have strength to work on the farm without hiring labour. Those that are widowed were 20% and 2.22% were divorced.

As for cassava farming experience, 62.2% of the respondents had been involved in cassava farming for less than 5 years and 2.22% for above 15 years. This connotes that cassava farming diffused very slowly among the farmers in the study area but involvement of farmers in cassava farming in the last 5 years had greatly increased. Majority (58.89%) of the cassava farmers did not belong to any social group while 27.8% subscribed to co-operative societies. Those engaged in monthly contribution constituted 8.89% of the respondents, while 4.44% of them held membership of Cassava Farmers Association. Those that did not belong to any social group are many because majority of the farmers in the study area lack knowledge on the benefits of those social groups.

Those that are members of co-operative societies did so mainly to have access to credit, input and aids from government and extension services. Those engaged in monthly contribution did so to enhance their savings and those that belong to Cassava Farmers Association did so to have easy access to extension services, market and credit facilities.

### **3.2 Information Disseminated to Cassava Farmers by the Extension Agents**

Table 2 above shows the distribution of the information disseminated by the extension agents to the farmers. Majority of those that had access to extension services had information on marketing (44.4%), pests and diseases (42.22%), improved technologies (42.22%), chemical usage (41.11%) and agronomic practices (40%) routinely by the farmers. So the farmers were eager to get information on these operations. About 38.89% had information on processing and storage, 36.67% had information on weeds and soil conservation, 35.56% had information on cassava stalk varieties, 33.33% had information on group formation and 32.22% had information on agricultural credit. This is because most of these operations were carried out by outside consultants, so the farmers pay little attentions to them. Farm management had the least with 27.8%. This implies that the farmers in the study areas lack appropriate information on farm management and this is the reason why they have low output since they have inadequate capacity to manage their farming operations much better. So, the extension workers should try and pay more attention to this. All this information will make the cassava farmers to improve on their farming operation which will lead to high profitability.

### **3.3 Cassava Farmers' Perception of Extension Agents in the Area of Information Dissemination**

Table 3 shows the farmers perception score of the Extension Agents. The study showed that 45.56%, 44.44%, 43.33%, 43.33%, 43.33%, 42.22%, 41.11%, 41.11% and 40% respectively of the farmers reported that the Extension Agents had ability to demonstrate, were flexible, were reliable, had ability to communicate, ability to read, commitment to extension work, subject-matter expertise, had ability to proffer solution to problems and humble. Furthermore, 36.7% of the farmers revealed that extension agents had the ability to demonstrate. Those that did not respond are those that had no access to extension services.

### **3.4 Access to Extension Services**

Table 4 shows the distribution of farmers based on access to extension services in the study area. Majority of the farmers in five Local Government Areas (Buruku, Okpokwu, Gboko, Otukpo and Katsina-ala) had access to extension services because the farmers are located closer to the Agricultural Development Office in these Local Government Areas. The low number of respondents in the other areas is because extension offices are located far from the locations of the farmers. So extension officers do not usually visit these farmers because they are far from them, and the extension officers may lack adequate mobility to reach these farmers.

Table 5 shows the distribution of the farmers generally based on access to extension services. The result revealed that 52.22% of the respondents had no access to extension services and 47.78% of the respondents had access to extension services. The impact of the extension agents has not been really felt in the study area and this is because of the nonchalant attitudes of the governments toward financing the extension services which leads to their poor performances. Low performance of the extension agents in some areas leads to low productivity and profitability in the study area.

### **3.5 Profitability Analysis**

Table 6 shows the profitability of farmers in each local government area. The result revealed that local government F, I, E, A and G had high profit of N200857.5, N180950, N162850, N159450 and N159450 while local government B, C, D and H had lower profit of N147662.5, N143710, N144755 and N146137.5 respectively. This indicate that local governments F, I, E, A and G have higher profits than local government B, C, D and H because the number of farmers that has access to extension services in local government F, I, E, A and G is higher. The information received from these extension agents made the farmers to improve on their production method thereby increasing their profit.

### **3.6 Relationship between Access to Extension Services and Profitability of Cassava Farming**

Table 7 revealed that there is a relationship between access to extension services and profitability of farmers, suggesting that the more the farmers had access to extension services on cassava farming operations, the higher the farmers profit will be. The result shows that local government F, I, E, A and G had high profit of N200857.5, N180950, N162850, N159450 and N159450 because the number of respondents that had access to extension services in each of these local government were high while in local government B, C, D and H with low profit of N147662.5, N143710, N144755 and N146137.5 fewer respondents had access to extension services. This implies that those that had access to extension services had higher profit than those that had no access to extension services.

The result in Table 8 shows that at 1% level of significance, the hypothesis that there is no significant relationship between household profit (Gross Margin) and extension contact among the respondents is rejected. This suggests that there is a significant positive relationship between household profit (Gross Margin) and extension contact among the cassava farmers in the study area. This implies that profitability of cassava farming in the study area increases as the number of extension contact with the extension agents increases and vice versa.

### **3.7 Impact of Access to Extension Services on Profitability of Cassava Farming**

The result of the t-test in Table 9 rejects the null hypothesis that there is no significance difference between the profit of the respondents before and after their access to extension services. This suggests that access to extension services has significant impact on the profitability of cassava farming in the study area.

The t-test analysis on the impact of access to extension services on profitability of cassava farming gave a t-calculated value of 36.29. The average annual profit of the farmers before access to extension services was 523.89 Naira and 2885.51 Naira after access to extension services. At 1% level of significance, t-value at 358 degrees of freedom is 1.65 (one-tail test) and 1.97 (two-tail test). From the p-value, both for the one-tail test and the two-tail test, it is therefore inferred that at this level of significance access to extension services had increased the profitability of cassava farming among cassava farmers in the studied area. This is based on the ground that the t-calculated (36.29) is greater than the t-tabulated (1.97).

### **3.8 Constraints to Information Accessibility**

The constraints to cassava farmer's access to information are presented in Table 10. These include: inadequate extension contact (86.67%), ineffective communication (79.44%), long distance from information source (76.11%), distance from other farmers (71.11%) and lack of capital (62.78%). The farmers find it difficult to comprehend information they get through the extension agent because the communication is ineffective. Noise is one of the hindrances when such information is disseminated among the target groups. The distance of some farmer to the others makes it difficult for them to have easy access to information. Similarly, the distance of information source makes it difficult for them to have easy access to information. Also extension contact is poor because the ratio of extension agents to farmer is far from adequate. All these hinder the cassava farmers from getting easy access to information.

## **4. Conclusion and Recommendations**

The study showed that not up to half (47.78%) of the farmers had access to extension services while 52.22% had no access to extension services. The study also showed that some local government areas felt the impact of extension agents more than the others. This is because the extension agents lack adequate mobility to reach some of the farmers that are far from their locations. The study showed that there is a significant relationship between farmers access to extension services and farmers profitability. Those that have access to extension services have higher profit than those that do not. Access to extension services had significant impact on the profitability of cassava farming in the study area.

Extension agents should put more effort in reaching cassava farmers that have not had contact with them so as to pass useful information to them in order to increase their profitability. They should also encourage all cassava farmers to subscribe to the various cassava farmers group. This will make information and credit facilities easily accessible to them. Cassava farmers should be mobilized to establish cooperative society in order to enjoy government provision of capital under poverty alleviation programmes. Adequate mobility should be provided for the extension agents for effective coverage of the areas of information need. They should be updated on any new technology for quick dissemination. Farmers too should also be eager to receive the extension agents and should always search for their help.

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**Table 1: Socio-economic Characteristics of the Respondents**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age (years)</b>		
20 < 30	18	10
30 < 40	104	57.78
40 < 50	52	28.89
≥ 50	6	3.33
<b>Total</b>	180	100
<b>Level of Education</b>		
Primary education	8	4.44
Secondary education	150	83.33
Tertiary education	20	11.11
No formal education	2	1.11
<b>Total</b>	180	100
<b>Gender</b>		
Male	112	62.22
Female	68	37.78
<b>Total</b>	180	100
<b>Marital status</b>		
Single	28	15.56
Married	142	78.89
Divorced	4	2.22
Widowed	36	20
<b>Total</b>	180	100
<b>Farming experience</b>		
< 5	112	62.22
5 < 10	48	26.67
10 < 15	16	8.89
≥15	4	2.22
<b>Total</b>	180	100
<b>Membership of social group</b>		
Co-operative society	50	27.78
Cassava farmers association	8	4.44
Monthly or daily contribution	16	8.89
None	106	58.89
<b>Total</b>	180	100

Source: Field Survey, 2012

**Table 2: Farmers Distribution by the Information Received From Extension Agents**

<b>Information</b>	<b>*Frequency</b>	<b>*Percentage</b>
Cassava stalk varieties	64	35.56
Agronomic practices	72	40
Pest and diseases	76	42.22
Weeds and soil conservation	66	36.67
Processing and storage	70	38.89
Marketing information	80	44.44
Agricultural credit	58	32.22
Group formation	60	33.33
Farm management practices	50	27.78
Improved technologies	76	42.22
Chemical usage	74	41.11

Source: Field Survey, 2012

\*Multiple Responses



**Table 3: Distribution of Farmers by Perception of the Extension Agents**

Attributes of Extension Agents	*Frequency	*Percentage
Ability to motivate	82	45.56
Subject-matter expertise	74	41.11
Ability to lead	78	43.33
Commitment to extension work	76	42.22
Humility	72	40.00
Reliability	78	43.33
Ability to demonstrate	66	36.67
Ability to proffer solution to problems	74	41.11
Flexibility	80	44.44
Ability to Communicate	78	43.33

Source: Field Survey, 2012

\*Multiple Responses

**Table 4: Distribution of Farmers by Local Government Areas based on Access to Extension Services**

LGA	Access	No Access	Total
Gboko (A)	13	7	20
Tarka (B)	8	12	20
Ukum (C)	6	14	20
Logo (D)	5	15	20
Katsina-ala (E)	12	8	20
Buruku (F)	14	6	20
Otukpo (G)	13	7	20
Ohimini (H)	7	13	20
Okpokwu (I)	14	6	20
<b>Total</b>	92	88	180

Source: Field Survey, 2012

**Table 5: Distribution of Farmers based on Access to Extension Services**

Distribution	Frequency	Percentage
Access to Extension Services	86	47.78
No Access to Extension Services	94	52.22
<b>Total</b>	180	100

Source: Field Survey, 2012

**Table 6: Gross Margin Analysis for an Average Cassava Farmer in Benue State**

LGA	A	B	C	D	E	F	G	H	I
	(₦)	(₦)	(₦)	(₦)	(₦)	(₦)	(₦)	(₦)	(₦)
<b>Items</b>									
<b>Variable Costs</b>									
Planting material	2800	2200	2000	2000	3200	5000	3600	2400	4000
Tillage	6400	5600	5200	4800	6800	8000	7200	6000	7600
Planting	4200	3600	3200	2800	4600	6000	5000	3800	5600
Harvesting	8000	7200	6600	6000	8600	10000	9000	7600	9400
Garri Processing	5400	4600	4200	4000	4000	7000	6000	5000	6300
Transportation	10000	8800	8000	7000	9800	12000	10000	9000	11000
<b>Total</b>	36800	32000	29200	26600	37000	48000	40800	33800	43900
<b>Income</b>									
Garri Yield (kg)	3925	3593.25	3458.2	3427.1	3997	4977.15	4005	3598.75	4497
Market price of Garri (₦/kg)	50	50	50	50	50	50	50	50	50
Gross Income	196250	179662.5	172910	171355	199850	248857.5	200250	179937.5	224850
Gross margin	159450	147662.5	143710	144755	162850	200857.5	159450	146137.5	180950
Rate of return	5.33	5.61	5.92	6.44	5.40	5.18	4.91	5.32	5.12

Source: Field Survey, 2012

**Table 7: Analysis of Relationship between Farmer's Access to Extension Services and Profitability**

LGA	Access	No Access	Gross Margin/Profit
Gboko (A)	13	7	159450
Tarka (B)	8	12	147662.5
Ukum (C)	6	14	143710
Logo (D)	5	15	144755
Katsina-ala (E)	12	8	162850
Buruku (F)	14	6	200857.5
Otukpo (G)	13	7	159450
Ohimini (H)	7	13	146137.5
Okpokwu (I)	14	6	180950

Source: Field Survey, 2012

**Table 8: Test of No Significant Relationship between Profit and Extension Contact**

	Profit	Extension contact
Profit	1	0.753**
Extension contact	0.753**	1

Source: Field Survey, 2012

\*\*Correlation coefficient (r) is significant at 1% level (2-tailed).

**Table 9: Test of No Significance Difference between the Profit of Cassava Farmers before and after their Access to Extension Services**

Mean Profit before	523.89
Mean Profit after	2885.51
Hypothesized mean	0
Degree of freedom	358
T-stat	36.29
P-value (one-tail)	2.5586E-122
T-critical (one-tail)	1.65
P-value (two-tail)	5.1172E-122
T-critical (two-tail)	1.97

Source: Field Survey, 2012

**Table 10: Distribution of Respondents by Constraints to Accessing Agricultural Information**

Problem	*Frequency	*Percentage
Inadequate extension contact	156	86.67
Ineffective communication	143	79.44
Distance from other farmers	128	71.11
Lack of capital	113	62.78
Long distance from information source	137	76.11

Source: Field Survey, 2011

\*Multiple Responses