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# EFFECT OF SELECTED CAPACITY BUILDING ACTIVITIES ON PRODUCTIVITY AND FOOD SECURITY OF CASSAVA FARMERS IN IMO STATE, NIGERIA

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## ABSTRACT

*The study examined the effect of capacity-building activities on the productivity and food security of cassava contact farmers in Imo State, Nigeria. The specific objectives were to; describe the socio-economic characteristics of farmers; identity capacity-building technologies extended; determine the effect of capacity-building activities on their productivity and determine the effect of capacity-building activities and other variables on the food security status of farmers. A multistage random sampling technique was employed. Data were collected from 96 farmers using a semi-structured questionnaire. The result revealed that the use of improved varieties, optimum plant population, line planting, fertilizer application, correct spacing, planting depth, timely weeding, routine watering, application of insecticides, timely planting, and tillage practices were perceived by the farmers as being available while result on z-test showed that mean productivity before and after the adoption was 1.80tons/ha and 4.04 tons/ha respectively. The OLS result showed that the coefficients of capacity-building activities, farm size, planting materials, use of fertilizers, and other agrochemicals were positive and highly significant at 1%. This implies that a 1% increase in capacity-building activities will bring about an increase in the food security status of the farmers. Based on the findings, it is recommended that agricultural extension policies and measures which improved the food security status of cassava farmers should be advocated.*

**Keywords:** Capacity Building Activities, Food Security, Productivity, Cassava Farms

## INTRODUCTION

The ultimate aim of extension service is to increase farmers' productivity and income. Extension can contribute to the reduction of the productivity differential by increasing the speed of technology transfer and by increasing farmers' knowledge and assisting farmers in improving farm management practices (Omobolanle, 2008). Over the years several agricultural extension approaches have evolved and one of such approaches is the Training and Visit (T & V) system. T&V system is one adopted innovation in Nigeria's agricultural extension that aims at overcoming some limitations that characterize the conventional extension approach. The system was propounded by Daniel Benor and Baxter and was first developed in the early 1970s. The system was designed to facilitate regular training of extension workers in order to enable them deliver recommended technologies on crops especially cassava. The major extension approach being adopted in Nigeria in general, and in Imo State in particular is Agricultural Development Project (ADP) which operates through T & V with its main objective: to disseminate low cost, labour saving, technical and improved technological information to small-scale farmers in order to upgrade their knowledge and skills for increased productivity and food security. Part of the technologies transferred to farmers in Imo State in the crop sub-sector using T & V are cassava-based technologies. Capacity building is a process of improving the ability of individual or group with a view to empower them with new knowledge or add to their existing knowledge. UNESCO (2010) described capacity building as individual, organization or system ability to perform some functions more appropriately, effectively, efficiently and sustain such ability. The idea behind capacity building program is to give what is lacking or what is causing a set-back in achieving a task or goal so that the task or goal will be achieved. Unamma (2003) and Nwaneri *et al*.,(2017) posited that farmer decision to adopt innovations are determined by age, farm size, extension contact, level of formal education and farm income. Many improved cassava farming technology packages have been developed and disseminated to the farmers in the area but their levels of adoption and socio-economic factors for adopting these packages by cassava farmers remained elusive. Hence the broad objective of this study was to examine the effect of T&V based capacity building activities on productivity and food security of cassava contact farmers in Imo State, Nigeria. The specific objectives of the study were to; (i) describe socio-economic characteristics of cassava farmers in Imo State; (ii) identify T&V based capacity building technologies extended (iii) determine effect of T&V based capacity-building activities on their productivity and (iv) determine the

effect of T&V based capacity-building activities and other variables on food security status of farmers.

## MATERIALS AND METHODS

### Study Area Description

The study was conducted in Imo State of Nigeria. The State is part of the East Central State, and part of South Eastern Nigeria. The State is bounded in the East, West, South and North by Abia, Delta, Rivers and Anambra and Enugu States respectively. Imo State lies within Latitudes $4^0$ $45^1$ and $7^0$ $15^1$ North of the Equator and Longitudes $6^0$ $50^1$ and $7^0$ $25^1$ East of the Greenwich meridian (Wikipedia, 2017). It has an annual rainfall of 1,500mm to 2,200mm and temperature through the year ranges between 21°C to 29°C (mean temperature is $25^0$C) with relative humidity ranging from 75% to 90% (Wikipedia, 2017). The population of the state stood at 3,927,563 (Males: 1,976,471 and Females: 1,951,092) (NPC,2006). The State has a land area of 5,530km$^2$ most of which are fertile and arable (Wikipedia, 2017). The state is made up of twenty seven LGAs which are subsumed into three agricultural zones namely Owerri, Orlu and Okigwe. The three agricultural zones of the State are broken down into blocks. Each block is further broken down into circles. The choice of Imo State is based on the fact that the State is a major cassava producing state in the country; over 80% of the populations are engaged in agriculture growing different types of food and cash crops including rice, yam, cassava, sweet potato and oil palm, as well as keeping ruminants and non-ruminants (Obasi *et al*., 2015).

### Sample size and data analysis

The population of this study is the cassava contact farmers in Imo State domiciled in agricultural zones of Owerri, Okigwe, Orlu. Multistage random sampling technique was adopted in selection of agricultural zones, extension blocks, circles and cassava farmers. The first stage involved the selection of two (2) agricultural zones in the state. The selected zones were Owerri and Okigwe. In the second stage, two (2) blocks were selected by random process from each of the chosen zones which gave a total of four (4) blocks. The selected blocks were Aboh Mbaise and Ikeduru blocks in Owerri zone, Okigwe and Obowo blocks in Okigwe zone. From the selected blocks, two (2) circles each were randomly selected that gave a total of eight (8) circles. The selected circles were Nguru and Aboh in Aboh Mbaise block, Ogwa and Amatta in Ikeduru block, Osuama Ibeme Okigwe Urban and Ihube in Okigwe block, Umulogho and Ikenanzizi in Obowo block. Finally, twelve (12) cassava contact farmers were randomly selected from each of the chosen circles. This gave a total of ninety six (96) cassava farmers. Data were collected

before and after intervention from these cassava farmers. A semi-structured questionnaire was used in soliciting information from the farmers. Objectives i and ii were analyzed using descriptive statistics such as frequency distribution, percentages and mean scores. Objective iii was analyzed using Multiple regression model.

**RESULTS AND DISCUSSION**

The socio-economic characteristics of the cassava farmers is shown in Table 1. Result revealed that males constituted a large proportion (62.5%) of the farmers in Imo state. The dominance of male farmers is probably because the males own most of the farm assets including farm lands and therefore had an edge over the females. This findings is in line with Nwaneri *et al*.,(2019). The table further revealed that the mean age of cassava farmers was 48.8 years. These cassava farmers were relatively middle aged and experienced enough to record high productivities and output levels, and consequently food secure (Nwaneri *et al*.,2019). The table also showed that a fairly good proportion (44.8%) of the cassava farmers had tertiary education. Education enlightens one and makes him/her more responsive to new technologies, and this fact probably accounts for the high percentage of farmers with tertiary education involved as ADP contact farmers. This is in line with Nwaneri *et al*. (2019) assertion that educated farmers are expected to be more receptive to improved farming, while farmers with low level of education or without education are less receptive to improved techniques. The table also revealed mean years of their farming experience as 13years in the area. Agbamu and Ohorhoro (2007) and Nwaneri *et al*., 2019 observed that the number years a farmer spent in the farm business may give an indication of the practical knowledge he had acquired. The mean farm size of the cassava farmers was 1.96 hectares. Ezeh, (2006) and Nwaneri, (2015) reported that increased farm size significantly resulted to increased farm output.

**Table 1: Characteristics of Cassava Farmers in Imo State, South-east, Nigeria (N= 96)**

| Characteristics | Frequency | Percentage |
|---|---|---|
| Females | 36 | 37.5 |
| Males | 60 | 62.5 |
| **Age (years)** | | |
| ≤ - 40 | 18 | 18.8 |
| 41 -50 | 43 | 44.8 |
| 51 -60 | 24 | 25.0 |
| 61 -70 | 6 | 6.2 |
| 71 -80 | 5 | 5.2 |
| **Mean** | **48.8 years** | |
| **Level of Education** | | |
| No formal education | 4 | 4.2 |
| Primary school | 31 | 32.3 |
| Secondary school | 18 | 18.7 |
| Tertiary school | 43 | 44.8 |
| **Farming Experience (years)** | | |
| 1 – 5 | 6 | 6.3 |
| 6 – 10 | 10 | 10.4 |
| 11 - 15 | 65 | 67.7 |
| 16 – 20 | 4 | 4.2 |
| 21 – 25 | 8 | 8.3 |
| 26 - 30 | 3 | 3.1 |
| **Mean** | **13.07yrs** | |
| **Farm size (Ha)** | | |
| 0.1-1.0 | 22 | 23.0 |
| 1.1-2.0 | 61 | 63.5 |
| 2.1-3.0 | 6 | 6.3 |
| 3.1-4.0 | 1 | 1.0 |
| 4.1-5.0 | 5 | 5.2 |
| 5.1-6.0 | 1 | 1.0 |
| **Mean** | **1.96ha** | |

**Source:** *Field Survey,2019*

The distribution of cassava farmers according to capacity building packages extended to them is shown in Table 2. The table revealed an overwhelming (100%) indication of the extension of improved varieties, optimum plant population, line planting, fertilizer application, correct spacing, planting depth, timely weeding, routine watering, application of insecticides, timely planting and tillage practices were the packages extended to farmers in the study area. While application of rodenticides and herbicides were indicated as not being available in the state due to their low percentages (5.2% and 3.1% respectively in Imo state). It is one thing for an innovation to be available and a different thing for the technology to be utilized (Nwachukwu and Onuegbu, 2005).

**Table 2: Distribution of Cassava Contact Farmers According to Capacity Building Activities Extended in Imo State, Nigeria**.

| Packages Extended | *Frequency | Percentage |
|---|---|---|
| Improved Varieties | 96 | 100.0 |
| Optimum Plant Population | 96 | 100.0 |
| Line Planting | 96 | 100.0 |
| Fertilizer Application | 96 | 100.0 |
| Correct Spacing | 96 | 100.0 |
| Planting depth | 65 | 68.4 |
| Timely Weeding | 95 | 99.0 |
| Timely Planting | 95 | 99.0 |
| Routine Watering | 96 | 100.0 |
| Application of Insecticide | 94 | 98.0 |
| Application of Rodenticide | 5 | 5.2 |
| Application of Herbicide | 3 | 3.1 |
| Tillage practice | 88 | 91.7 |

**Source:** *Field Survey,2019*

*Multiple responses recorded

**Test of Significant Difference in Productivity Before and After Adoption of Capacity Building Activities of Cassava Contact Farmers in Imo State, Nigeria.**

Determination of differences between the productivities of cassava contact farmers before and after adoption of capacity building activities is shown in Table 3. The table showed that mean productivity before adoption of capacity building activities in the area was 1.80 tons/ha, while the mean productivity after adoption was 4.04 tons/ha with differences as 2.24 tons/ha. The z- value (6.067) is significant at 1% level of significance. This implies that there was significant difference between cassava contact farmers' productivity before and after adoption of capacity building activities in Imo State. This is because the calculated z-value (6.067) was greater than the critical z-value (2.364). This result was supported by the findings of Pickles and Kogol (2005) that good extension services and farmers learning shifted the production frontier of maize upward in Kenya between 1997 and 2004.

**Table 4.13 Z-test Statistics to Determine the Significant Differences between the Productivities of Cassava Contact Farmers Before and After Intervention in Imo State, Nigeria.**

| Imo State | Mean | Standard Deviation | Z-value | Critical Z-value |
|---|---|---|---|---|
| Productivity before | 1.80 | 1.0541 | 6.067*** | 2.364 |
| Productivity after | 4.04 | 3.4613 | | |
| Difference | 2.24 | | | |

Source*: Field Survey*,2019

The OLS multiple regression estimates of the effect of capacity building activities and other variables on the food security status of cassava farmers in Imo State is shown in Table 4. The exponential functional form gave the best fit and was subsequently chosen as the lead equation. This choice was premised on it having the highest magnitude of the coefficient of multiple determination ($R^2$), number of significant variables, the conformity of the coefficients of the variables to *a priori* expectation and the significance of the F-ratio. The coefficient of multiple determination was 0.7265 which implies that 72.65% of the variations in capacity building activities and other variables were explained by the variables included in the model. The F-ratio (22.57) was statistically significant at 1% level of significance which attests to the goodness-of-fit of the model.

The coefficient of capacity building activities (0.0125375) was positively signed and highly significant at 1% level of probability. This implies that a 1% increase in capacity building activities will bring about a 0.0125 unit increase in food security status of the farmers. The results indicated that the capacity building activities had significant positive effect on food security status. This showed that the variables under capacity building activities were important factors influencing the output of the cassava thereby improving the cassava farmers' food security status.
The coefficient of farm size (0.1037434) was positively signed and highly significant at 1% level. This implies that a 1% increase in farm size will lead to a 0.1037 units increase in food security status of the cassava farmers in Imo State. The result is in agreement with a *priori* expectation. Nwaneri *et al*., (2019) asserted that the larger the farm size, the more the output hence, improved food security status will be derived from increased output. The coefficient of planting materials (1.38) was positively signed and highly significant at 1% level. This implies that a 1% increase in planting materials will bring about a 1.38 units increase in food security status of the cassava farmers in the State. This is probably because the use of improved planting materials has been found to contribute substantially to cassava output and income (Nwaneri 2018). Furthermore, use of fertilizers was positively signed and highly significant at 1% level and the coefficient implied that increase in fertilizer use by 1% resulted in 0.000018 units increase in food security status of the farmers. This is in accordance with Nwaneri, *et al*., (2019) who opined that adoption of innovations such as fertilizers increases farmers output and income hence food security. Similarly, the coefficient of other agro-chemicals (0.0000354) was positively signed and highly significant at 1% level. The result showed that when the farmers adopted other agro-chemicals, their cassava output increased by 0.000035 units which translates into household food secured. The coefficient of age (-0.0055034) was negative and significant at 10% level. This implies that a 1% increase in age will lead to a 0.0055 decrease in output of the cassava farmers in Imo State. This is in agreement with a *priori* expectation. Nwaneri (2015), in his findings on input use efficiency in farm-level cassava processing into garri in Ivo LGA, of Ebonyi State obtained a similar result.

**Table 4.14. Ordinary Least Square Estimates of Effect of Agricultural Extension Capacity Activities and Other Variables on Food Security Status of Cassava Farmers in Imo State.**

| Variables | Linear | Exponential + | Double log | Semi log |
|---|---|---|---|---|
| Intercept | -420867.4 | 10.89917 | -1.268136 | -5357197 |
| | (-2.12)** | (29.59)*** | (-0.51) | (-3.93)*** |
| Capacity building activities | 3765.882 | 0.0125375 | 0.2518712 | 417080.7 |
| | (2.06)** | (3.70)*** | (0.67) | (2.03)** |
| Farm size | 57800.97 | 0.1037434 | 0.2359073 | 127302.3 |
| | (3.30)*** | (3.19)*** | (2.93)*** | (2.88)*** |
| Planting materials | 0.4330562 | 1.38e-06 | 0.2225013 | 73548.08 |
| | (2.35)** | (4.03)*** | (4.31)*** | (2.59)** |
| Fertilizer | 7.399251 | 0.000018 | 0.4411347 | 192386.6 |
| | (2.19)** | (2.87)*** | (3.12)*** | (2.47)** |
| Other agro-chemicals | 11.94091 | 0.0000354 | 0.6079643 | 185025.3 |
| | (2.88)*** | (4.60)*** | (4.01)*** | (2.22)** |
| Capital input | 6.794336 | 6.21e-06 | 0.0730102 | 54912.64 |
| | (2.38)** | (1.17) | (1.61)* | (2.20)** |
| Years of experience | 2209.734 | 0.0078317 | 0.084863 | 20939.52 |
| | (0.67) | (1.27) | (1.14) | (0.51) |
| Gender | 428.1263 | -0.0093247 | -0.0059871 | -3887.634 |
| | (0.01) | (-0.15) | (-0.09) | (-0.10) |
| Education | 634.8446 | 0.0003107 | -0.0132394 | -2334.592 |
| | (0.23) | (0.06) | (-0.25) | (-0.08) |
| Age | -2062.572 | -0.0055034 | -0.3302693 | -117640.5 |
| | (-1.30) | (-1.88)* | (-2.09)** | (-1.35) |
| $R^2$ | 0.6075 | 0.7265 | 0.6831 | 0.5264 |
| Adjusted $R^2$ | 0.5614 | 0.6943 | 0.6458 | 0.4707 |
| F-ratio | 13.16*** | 22.57*** | 18.32*** | 9.45*** |

Source: *Field survey data, 2017*
*** = significant at 1%
** = significant at 5%
* = significant at 10%
+ = lead equation
(…) = t- val

## CONCLUSION AND RECOMMENDATION

Capacity building activities perceived as extended included use of improved varieties, optimum plant population, line planting, fertilizer application, correct spacing, correct planting depth, timely weeding, routine watering, application of insecticides, timely planting/planting date and tillage practices. The result also that mean productivity before adoption of capacity building activities in the area was 1.80 tons/ha, while the mean productivity after adoption was 4.04 tons/ha with

differences as 2.24 tons/ha. The z- value (6.067) is significant at 1% level of significance. The ordinary least square model showed that the coefficients of capacity building activities, farm size, planting materials, use of fertilizers and other agro-chemicals were positive and highly significant at 1% levels of probability while the coefficient of age was negative and significant at 5% level in the State. Based on the findings of this study the following recommendations were made: Agricultural extension capacity building is an ingredient to achieving the sustainable millennium development goals of reducing food insecurity by half, therefore policy makers should consider targeting on promoting overall lifestyle and well-being of farmers through provisional access to improved technologies to ensure increased output and income, cassava farmers capacity-building programme have educational and economical benefits, therefore, consistent educational and economic policies/intervention activities necessary to reducing food insecurity among cassava farmers should be subsidized in every ramification.

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