

Determinants of Adoption of Recommended Cassava Production Practices on Yield and Income among Farmers in Bwari and Kuje Area Council Abuja, Nigeria.

ABSTRACT

The study was to determine the effect of adoption of recommended cassava production practices on yield and income among farmers. The specific objectives were to examine the effects of adoption of the recommended practices on the yield and income of farmers and identify the constraints faced by farmers in adoption of the recommended practices. The study used a multi-stage sampling procedure to select 120 registered cassava farmers. Frequencies, percentages, means, and z – test were employed for data analyses. Result of the Z-test revealed that the mean yield of cassava before and after adoption were 3,832t/ha and 6,387t/ha with a differential of 67%. The mean income of farmers before and after adoption was ₦464, 642.00 and ₦714, 833.00 and the differential mean was 54%. The identified major constraints for low and non-adoption of some of the recommended cassava production practices were limited scale and uneven distribution of farmland, insufficient funds and complex nature of technologies to farmers. It was recommended that technology developers should develop technologies that are simple, cost effective and easily adoptable by farmers. On the other hand, promoters of technology adoption should intensify efforts targeted at improving service delivery and promoting the adoption of recommended cassava production practices by the farmers especially the technologies that record low levels of adoption.

Key words: Determinant, effect, adoption, recommended cassava production practices, yield.

1. INTRODUCTION

Nigeria is one of the world largest producers of cassava, with about 37 million tons of cassava cultivated on 2.5 hectares of land, with a national average yield of 14.8 metric tons per hectare [1]. However, a total output production of 38.17 million metric tons was reported to be harvested from 4.118 hectares of land with average yield of 9.271 tons per hectares [2]. Nigeria's production account for 19% of the world output and 34% of Africa's output [3]. Research in Nigeria by International Institute of Tropical Agriculture (IITA) and National Root Crops Research Institute (NRCRI) over the years have made cassava a priority for extensive research and have developed different varieties that are resistance to major disease. These varieties give sustained yield of over 50% higher yield when compared to local varieties [4]. The

persistent problem of food shortage in Nigeria has led to increasing agricultural productivity, which involves the use of improved high yielding crop varieties, have been popularised among farmers through extension services of ADPs. The multiplication, distribution and adoption of TMS varieties by farmers have led to tremendous yields increase over the years. For example, between 1994 and 1998, yield increased from 31 million tons to 34 million tons [5] while 39 million tons was reported in 2003 [6].

The economy is basically agrarian, with majority of the people living in squalor and very poor standard of living. Most of the farmers are subsistence small holders, farming 1.2 hectares of farmland under a traditional system characterized by low technology and production efficiency. Besides, they are also faced by problems of natural resource inputs, especially land, water, labour and management. The poverty among farm families goes beyond material deprivation to include insecurity, vulnerability, and exposure to risks, shocks and stress. This poor condition of the rural communities had continued to deteriorate since independence due to severed neglect emanating from poor and inconsistent policies formulation and implementation by successive governments in Nigeria [7].

Effect is a change or changed state occurring as a direct result of action by somebody or something else. The introduction of technologies to a social system is designed to achieve certain outcome. Whether this is achieved or not would depend on changes that are noticed among the target group (FN Adun, University of Ibadan, Nigeria. Unpublished). Studies by [8], revealed that improved farm equipment enables farmers to increase the land area under cultivation and achieve higher income. Similarly, [9] reported that adoption of improved farm equipment for crop production resulted in an increase in total production by improving yields, expanding the agricultural land area, increasing land use intensities and changing the nature of crop enterprises.

[10] stated that income is likely to increase, especially if production expands as a result of increases in yield per hectare and the adoption of cultural practices, which sustain soil fertility over time.

A number of constraints to the adoption of recommended cassava production practices have been identified by many researchers. [11], reported that untimely weed control and wrong application herbicides affect the growth and development of cassava tubers. [12] revealed that 95 percent of the respondents indicated high labour cost as a major constraint to cassava production. [13], found that a large potential exist for the adoption of improved cassava varieties if farmers can obtain more cassava stems suitable for planting. [14], opined that the factor limiting improved cassava production are uneven supply of suitable planting materials and other farm inputs such as fertilizer, herbicides, pesticides and processing facilities.

The problem limiting the production of cassava in the FCT is the use of traditional methods by farmers. Traditional method in this study refers to the farmers' ways of cultivating cassava such as; close or wide spacing, shallow planting depth, and the continuous use of local varieties such as; "Nwanye" and "Dan Warri" which reduced the yield potentials. The recommended cassava production practices (RCPPs) is package aimed at improvement on cassava yield. (O Osuagwu, University of Nigeria, Nsukka, Nigeria. Unpublished), stated that cassava yield can be increased by adoption of recommended practices or by expanding the land area under cassava cultivation. The process of increasing cassava yield through modernization is depended on the extent to which farmers become aware of the existence of such recommended practices, develop interest, evaluate them, try them and become convinced of their relevance. It is only then that it can be expected that the farmers would adopt completely all the components of the recommended production practices. The study made use of eight recommended production practices. These

were: recommended planting material: healthy stem cutting with 4 – 5 nodes, recommended planting time: April and June, then August or September, recommended method of planting: planting on ridges at an angle, recommended planting depth (5cm – 10cm), recommended plant spacing: (1m x 1m) for sole cropping, recommended fertilizer rate: (NPK 15:15:15, 4 – 8 bags per hectare) and weeding: (herbicide application), Pre-emergence herbicide: Alachlor (Lasso) at 300ml/ CP15 knapsack pump, Selective post – emergence herbicide: Round-up at 4-5 liters per hectare, Harvesting: (cassava lifters).

Several studies [GAA Okoosi, Obafemi Awolowo University, Ile-Ife, Nigeria. Unpublished, 12, 7] revealed that farmers in the study area have access to different improved cassava production practices and cassava hybrid cultivars thus: TMS 30572, TMS 4 (2) 1425, TMS 99/2132, TMS 98/0581, NR 8032, MS6. The Federal government through the Cassava Multiplication Programme (CMP), the Root and Tuber Expansion Programme (R-TEP) and the Abuja Agricultural Development Project (ADP) have all made a lot of commitment in promoting the adoption of these recommended cassava production practices. However, in spite of all the efforts, the farmers in the study area are still practicing the traditional cassava production methods [15]. Consequently, the production of cassava in the study area in terms of its yield (1.2 million tons) is relatively low [16]. Therefore, the objective of this study is to evaluate the determinants militating against the adoption of recommended cassava production practices on yield and income among farmers in Bwari and Kuje area council Abuja, Nigeria.

2. METHODOLOGY

The study was conducted in Abuja, the Federal Capital Territory (FCT). Abuja was created and carved out in 1976 from the Kaduna, Niger, Kwara and Plateau States. The FCT is centrally located, lying within the latitude 8⁰25'N and 9⁰20'N. and longitude 6⁰ 45'E and 7⁰ 39'E. Abuja

has a boundary with Kaduna State to north and Kogi State to the south. It is also bounded to the east and west by Nassarawa and Niger States respectively. What is referred to as Local Government Area in states are “designated Area Councils in Abuja”. There are six Area Councils in Abuja namely: Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area Councils. Abuja covers an area of 8,000 square kilometres with a total population of 1,899,622 in 2012. National Population Census Result [17](NPC, 2006) The people are predominantly peasant producers cultivating crops such as yam, cassava, maize, sorghum, rice, groundnut, beans and vegetables. They embark on small, medium and large-scale livestock production as well as marketing their products. The people live mostly in organised settlements, towns and cities [18].

For this study, multi-stage sampling technique was used to select the study area and sample size.. Two Area Councils (Bwari and Kuje) were purposively selected in the first stage. In the second stage, two out of the ten districts (Kuduru and Igu) were randomly selected from Bwari using a table of random number technique. Three districts (Rubuchi, Gwagwalada and Gudunkarya) were also selected from the fifteenth district of Kuje giving a total of five districts. This selection was based on the intensity and concentration of farming activities particularly cassava production in the study area, in the third stage, assigned value number of random selection method was employed to select two villages from Kuduru district (Gutau and Kuduru), three villages from Igu (Igu, Panunike and Tokolo), two villages from Rubochi (Rubochi and Kujekwa), two villages from Gwargwada (Gwargwada and Gidan Bawa) and one village from Gudunkarya. In the fourth stage, the list of farm villages and households from ward councilors revealed that a total number of registered farmers in these five districts were one thousand, two hundred (1200). This formed the sample frame for the study. In the fifth stage, one hundred and twenty (120) of

the respondents that is, 10% of this population was randomly taken because the farmers in the study area were homogeneous in their mode of operations

A well-structured questionnaire was use to collect information from the farmers. Information was collected on the socio-economic, institutional and technological characteristics of the respondents. Interview method, informal observation and pictorial information were also gathered more appropriately as means to elicit adequate information on the study area.

Descriptive statistics was used to analyze the general constraints faced by farmers on adoption of recommended cassava production practices and Z-statistic was used to examine the effect of adoption of recommended cassava production practices on income and yield of the respondents. The z-test model was used to compare the differences in yield and income of the farmers before and after adoption of recommended practices. This was used to achieve objective five of the study.

$$z = \frac{|\bar{X} - \mu|}{S\bar{X}} \text{-----}(1)$$

Where Z = calculated Z value

$\bar{X}$ = Mean of the sample

$S\bar{X}$ = Standard error of the mean

$$S = \sqrt{\frac{\sum(x_1 - \bar{x})^2}{n-1}} \text{-----}(2)$$

Where: x_1 = individual observation

$\bar{x}$ = mean of the distribution

n = sample size.

3. RESULT AND DISCUSSION

3.1. Effect of adoption of recommended cassava production practices on yield and income

154 . The results of the z-analysis showed the effect of adoption on the output and income of the
 155 respondents before and after the adoption of recommended cassava practices – RCPPs – is given
 156 on Table 1. The average yield was estimated to be 3,832.4 t/ha before the adoption of
 157 recommended cassava practices and 6,387.33 t/ha after the adoption; giving a differential
 158 percentage of 67%. The minimum yield before and after the adoption of recommended cassava
 159 practices were 1,800 and 3,000 t/ha respectively. The maximum yield before and after the
 160 adoption of recommended practices were 9,330 and 15,550 t/ha respectively. The z- calculated
 161 was 21.25 above the z-critical of 1.96 at 1% level of probability. This implies that there was
 162 significant difference between the yield of cassava farmers before and after the adoption of
 163 recommended cassava production practices. The results revealed that the yield of farmers after
 164 adoption of the cassava recommended practices was higher than the yield before adoption. The
 165 result further showed that, the average income was ~~N~~464, 641.67 before the adoption of
 166 recommended cassava practices and ~~N~~714, 833.00 after the adoption of recommended cassava
 167 practices. The minimum **income** before and after the adoption of cassava recommended practices
 168 were ~~N~~260, 000.00 and ~~N~~400, 000.00 respectively. The maximum income before and after the
 169 adoption of recommended practices were ~~N~~1, 222,000.00 and ~~N~~1,880,000.00 and the differential
 170 mean percentage was 54%. The z- calculated was 5.38 and this was significant at 1% level of
 171 probability. These findings revealed that the income of farmers after adoption of the cassava
 172 recommended practices was higher than the income before adoption.

173 The result was consistent with the report of [9], who reported that adoption of improved farm
 174 practices resulted in an increase in total production by improving yields and income. The mean
 175 percentages for both yield and income were higher and this implied that the adoption of cassava
 176 recommended practices had significant influence on the yield and income of the cassava farmers.

Table 1 Effect of the adoption of improved cassava recommended practices on output and income in Nigerian Naira (₦).

Variable	Before	After	Difference	Differential % (2011)
Output (t/ha)				
Mean	3832.4	6387.33	2554.93	67%
Maximum	9330	15550	6220	
Minimum	1800	3000	1200	
Standard deviation	180.31	300.51	120.2	
z- calculated	21.25***			
z- critical	1.96			
Income (Naira)				
Mean	464,641.67	714,833.33	250191.66	54%
Maximum	1,222,000.00	1,880,000.00	658000	
Minimum	260,000.00	400,000.00	140000	
Standard Deviation	199,622	307,111.9	107489.9	10,748,900.00
z- calculated	5.38***			
z- critical	1.96			

*** P<0.01

Table 2 showed that there was no increase in the amount of money spent on Cookers; after adoption of recommended production practices - RCPPs. The result indicated that there was an increased in the amount of money spent on grinding machines, livestock, televisions, radios and telephones. The amount of money spent on motorcycles, cars, sprayers, houses, cushion chairs and generators after adoption of the RCPPs doubled the amount spent on items above. However, the money spent on the purchase of bicycles decreased after adoption. This implied that the farmers had extra money with which they could buy motorcycles for their comfort. Indeed, respondents were able to purchase most household property after the adoption of the recommended practices improved their yields viz. incomes greatly – a clear indication of the change in the respondents' level of living. This is in conformity with the reported observation of (A Isah, Ahmadu Bello University, Zaria, Nigeria. Unpublished), that money generated from adoption of recommended rice practices was use to purchase more household properties by the respondent.

Table 2: Distribution of money spent on household properties by respondent before and after adoption of RCPPs; in Nigerian Naira (₦).

Household Properties	Average amount spent before adoption	Average amount spent after adoption	Difference	Differential %
Bicycles	3,166.67	2,375.00	-791.67	-33.33
Motor cycles	7,500.00	23,333.33	15,833.33	211.11
Cars	8,750.00	24,500.00	15,750.00	180.00
Grinding machines	2,500.00	4,950.00	2,450.00	98.00
Livestock	7,950.00	14,400.00	6,450.00	81.13
Sprayers	800.00	2,933.33	2,133.33	266.66
Houses	11,666.67	45,500.00	33,833.33	290.00
Cushion chairs	1,500.00	4,216.67	2,716.67	181.11
Cookers	500.00	500.00	0	0
Televisions	3,800.00	5,366.67	1,566.67	41.22
Radios	1,470.00	7,908.33	6,792.67	85.87
Generators	825.00	2,933.33	2,108.33	255.55
Telephone sets	2,650.00	3,266.67	616.67	23.27
Total	₦ 52,399.17	₦ 135,745.00	₦ 83,345.83	

3.2. Constraints to Adoption of Recommended Cassava Production Practices by Farmers

The major constraints faced by farmers in the adoption of recommended cassava production practices are presented in Table 3. Scarcity of farmlands is shown by majority (77.50%) of the respondents ranked as the first constraint; followed by insufficient extension agents with 27.50% and the least were problems of pests and diseases and poor information network with 6.67% of the respondents.

Table 3: General constraints faced by farmers on adoption of recommended cassava production practices

Constraints	Frequency	Percentage	Ranking
Limited scale and uneven distribution	93	77.50	1
Insufficient extension agents	33	27.50	2
Insufficient capital	19	15.83	3
High cost of farm inputs and affordability	10	8.33	4
Lack of access roads	9	7.50	5

230	Processing, storage and marketing problems	9	7.50	6
231	Problems of root/tuber pests and diseases	8	6.67	7
232	Poor information network	8	6.67	8

233

234

235 4. CONCLUSION AND RECOMMENDATION(S)

236 The result of this study has revealed that Cassava farmers encountered scarcity of farmland and
 237 this suggests their inability to expand the current level of cassava production. Also, inadequate
 238 funds were also noted as a limiting factor on adoption of recommended cassava production
 239 practices among the farmers. However, the study noted that the adoption of recommended
 240 cassava production practices (RCPPs) increased the yield and income of the farmers. This is
 241 reflected in the ability of the farmer to meet up with the family needs and consequently, an
 242 improvement in their standard of living. In spite of the fact that the aadoption of RCPPs had
 243 positive and significant effects on yield and income of farmers, there was low level of adoption
 244 of the technologies; attributable to the high cost of these technologies.

245 Hence, it was recommended that the appropriate technologies should be made available to the
 246 farmers; at the right time and at affordable prices by the agencies involved. Furthermore, since
 247 the major constraint on adoption of recommended cassava production practices was limited scale
 248 and uneven distribution of farmlands, it is recommended that appropriate adaptive and adoptive
 249 technologies that would suit the fragmented nature of farmland should be developed by research
 250 institutes for use by the farmers.

251

252 REFERENCES:

253 [1] Olumide, O. T. (2003). Strategies for Sustainable Development Of cassava Based Industries
 254 in Osun State. Accessed 25 July 2010. Available;
 255 www.osunstate.gov.ng/Summit/PROSE/

- [2] Food and Agriculture Organization. 2007. Accessed 7 August 2007. Available: www.fao.org/faostat/fao.org/faostat/access
- [3] Agwu AE, Anyaeche CL. Adoption of Improved Cassava Varieties in Six Rural Communities in Anambra State, Nigeria. *Journal of Biotechnology*; 2007. 6(2): 89-98.
- [4] Yahaya MK. Communication and Social Change: Lessons from Cassava technology transfer In Nigeria *Journal of Agricultural Extension*: 2007; (10): 178.
- [5] Central Bank of Nigeria - CBN. Statistical Bulletin and Statement of Accounts, Central Bank of Nigeria (CBN), Abuja. 1999.
- [6] Central Bank of Nigeria - CBN. Annual Report and Statement of Accounts, Central Bank of Nigeria (CBN), Abuja. 2003.
- [7] Okozie C. Women And Commercialisation of Agriculture: Implication for Household Food security. Paper presented at the 18th annual conference of Farm Management Association of Nigeria (FAMAAN). Held at University of Calabar, November 24th – 8th, 2003; 5 – 7.
- [8] Philip DOA, Abalu GOI, Aganga AA, Aduku AO. Animal Traction Technology in Northern Nigeria: A Survey of Constraints and a Model of Prospects. In: Starkey PH, Ndiam F, editors. Animal Traction for Agricultural Development. *Proceeding of the Third Workshop of the West African Animal Traction Network*; Saly, Senegal, July 7 – 12 1990; 370 – 374.
- [9] Anazodo UGN. Agricultural Mechanization as A Catalyst For Rural Development. *Journal of Agricultural Mechanization in Asia, Africa and Latin America*. 1986; 17(3): 47-50.
- [10] Berry SS. Socio-economic Aspect of Cassava Cultivation and use in Africa: Implication for the Development of Appropriate Technology. *India Journal of Extension Education* xviii: 1993; 30-36
- [11] Moody K. Weed Control in cassava. Proceedings of the third Nigerian weed science group meeting, IAR, Samaru Zaria. 1973; 13-22.
- [12] Saito KA. Raising Productivity of Women farmers in Sub-Saharan Africa. World Bank Discussion Papers. Africa Technical Development Series 230. The World Bank, Washington DC, USA; 1994.
- [13] Akiroda MO, Gebremeskei T, Oyinola AE. Impact of IITA cassava Varieties In Oyo State, Nigeria, 1975–1985. 1989; *Tropical Agriculture* 66(2): 113-120.
- [14] Anuebuwa FO, Eluagu EU. “Cassava Mealybug/Green Spidermite Infestation and The Demand For Food Grains In Nigeria. A Case study of Anambra State”. In *NAFPP National Cassava Workshop*. 6th Umudike, Nigeria. *Proceedings National Root Crops Research Institute*, National Cassava Centre: 1982; 123-133.

- 302 [15] Kuta FA. Dynamics of technology adoption in rural-based cassava production enterprise in
 303 North-central, Nigeria. *International journal of Agricultural Economics and Rural*
 304 *Development*: 2009; 4(2): 17-22.
 305
- 306 [16] Bwari Area Council Annual Report - BAC, Federal Capital Territory. Agricultural
 307 Department Annual Report. 2004.
 308
- 309 [17] National Population Commission. National Population Commission (NPC) Production
 310 Year Book, 2006 Census Result. 2007.
 311
- 312 [18] Agricultural Extension Service Division (AESD), Federal Capital Territory (FCT),
 313 Agricultural Department Annual Report. 2004.
 314
 315
 316
 317
 318