Global Journal of Agricultural Research
Vol.8, No.1, pp.1-18, March 2020
Published by ECRTD-UK
Print ISSN: ISSN 2053-5805(Print), Online ISSN: ISSN 2053-5813(Online)

ANALYSIS OF CASSAVA PRODUCTION IN AKPABUYO LOCAL GOVERNMENT AREA: AN ECONOMETRIC INVESTIGATION USING FARM-LEVEL DATA

[1]Angba, C. W. and [2]Iton, O. V.
[1]Department of Agricultural Economics, University of Calabar, Calabar, Nigeria. [2]Department of Science Education, University of Calabar, Nigeria.
Corresponding email: cynthia.whiteley@yahoo.com

ABSTRACT: *The study analyzed the economics of cassava production in Akpabuyo LGA of Cross River State. Multistage random sampling technique was used to select a sample size of 75 respondents for the study using a validated structured questionnaire. Data analysis was carried out using descriptive statistics, budgetary method and regression analysis. Findings revealed that farm size, labour, the quantity of fertilizer, and gender were the significant factors affecting cassava production in the study area. The coefficients of elasticity showed that a 10% increase in capital, labour, number of bundles and quantity of fertilizer would lead to 0.06, 0.84, 0.03 and 0.85% increase respectively in cassava production while that of farm size will lead to -0.64% decline in cassava production. Total Cost (TC) per hectare of N35,990.4 was incurred in cassava production and a net farm income (NFI) of N39,957.6 was earned and return on naira invested was N2.11. Unfavourable government policies, sparse marketing outlets, inadequate capital, high cost of inputs, insufficient farmland, high cost of transportation and lack of extension services were the severe constraint faced by cassava farmers in the study area. Extension agents should be mobilized and sent to the study area to educate the farmers on the innovation practices available for cassava farming to encourage its production.*
KEYWORDS: cassava, production, profitability ,constraint

INTRODUCTION

Background of the study

Agriculture employs about two-third of Nigeria's total labour force, contributed 42.2% of Gross Domestic Products (GDP) and provides 88% of non-oil earnings (Yakubu and Akanegbu, 2015). The contribution to agricultural GDP is in the following proportion; crops (85%), livestock (19%), fisheries (4%) and forestry (1%). Also, more than 90% of the agricultural output is accounted for by small-scale farmers with less than two (2) hectares under cropping (World Bank, 2005). Among the crops that contribute to 85 per cent of Nigeria's GDP, cassava (Manihot spp.) is recognized together with yams, rice, maize, sorghum, and millet as the main staple food crops in Nigeria (NEEDS, 2004). Cassava has a high poverty-reduction potential for Nigeria due to its low production cost (FAO 2005).

Cassava (*Manihot spp*) is the fourth most important crop for farmers in tropics after rice, wheat, and sugarcane, consumed by up to a billion people globally (FAOSTAT, 2010). Cassava is originally a crop of Brazil in South America; however, the introduction of cassava to the Southern parts of Nigeria was in the sixteenth century (Adeniji *et al.*, 2005). The two significant types of

cassava usually cultivated in West Africa are the sweet cassava (*Manihot palmata*) and the Sitter cassava (*Manihot utilisima*). Cassava is suitable for the making of fufu, gari, flour, tapioca, animal feed, ethanol, starch, gum, and glucose. Its roots are eaten as food, fed to stock, or used in the manufacture of starch (Eguono, 2015). The leaves are sources of vitamins, minerals, and proteins. Cassava is cultivated all through the year, which makes it more desirable compared to periodic crops like yam, beans or peas. It exhibits an extraordinary capacity to adapt to climate change, with a tolerance to low soil fertility, resistance to drought conditions, pests' diseases, and suitability to store its roots for long periods underground even they mature.

Cassava is one of the world's most significant food crops. In 2013, it recorded a year global output of about 276 million metric tons (MT). The leading producers worldwide in the year 2013 were Nigeria, Thailand, Indonesia, Brazil and the Democratic Republic of Congo which accounted for 19%, 11%, 9%, 8%, and 6% of the overall respectively. Moreover, demand for the crop globally has been increasing expressively between 2004 and 2013 due to its recognition as a food security crop for rising populations in developing markets, and the increasing call for technologically processed produce from cassava. Cassava crop generates a source of living for most rural people. Practically, almost all the cassava (90%) cultivated in Africa are staple food for consumption. It provides calories for 500 million people and constitutes 37% of the population's dietary energy requirements (Asante-Pok, 2013).

Cassava is a staple food of an average household, particularly for a poor rural family in Nigeria. Cassava or its derivatives form part of daily diet both for poor and non-poor households. Therefore, this makes it an essential factor in food security, poverty alleviation and employment generation, among others. International Fund for Agricultural Development (2004) disclosed that on a per capita basis in Nigeria, North Central is the highest producer, producing at 0.72 tonnes per person in 2002, followed by South East (0.56), South-South (0.47), South-West (0.34), North-West (0.10) and North-East (0.01). Also, the national per capita production of cassava is 0.32 tonne per person (Igberi and Awoke, 2013).

Almost one-third of the overall national output of cassava emanates from the Niger Delta area where its inhabitants depend on cassava as a primary source of food and income. The cassava production system in Akpabuyo and elsewhere in Nigeria is characterized by smallholders that cultivate not more than 2 hectares of cassava (average of 0.5 ha) and is subsistent in practice, primarily grown for the traditional food market. Any excess cassava is either processed on the farm or sold to local processors. The average production figures per hectare in Nigeria were 10.5 MT/ha in the early 1970s, 11.5 million MT/ha in the 1980s, 10.5 million MT/ha by the end of 1980s, and 11.5 million MT/ha in the 1990s and up to 17.3 million MT/ha in 2004 (Igberi and Awoke, 2013, Ashaye *et al.*, 2018). According to FAO estimates, Nigeria generally produces about 50 million MT annually from a cultivated area of about 3.7 million ha.

Even though Nigeria is the largest producer of cassava in the world, the country is not an active participant in the international market on cassava when compared with Brazil, Indonesia, and Thailand with lesser production output. Thailand and Indonesia are leaders of world trade on cassava today (Agom *et al.*, 2012). Moreover, 90 per cent of the total cassava produced in Nigeria

is for consumption, while only as low as 10 per cent is for industrial products. It was because of these reasons that the Nigerian presidential initiative on cassava production and export in 2002 called for increased production to meet both local and export markets (Omotayo and Oladejo, 2016). Governmental and non-governmental organizations have made several efforts to encourage increased cassava production in Nigeria.

However, the main challenges have been the fact that rural smallholders mostly do production using low-level production techniques, having insufficiently established marketing networks and inadequate infrastructure needed for an effective production and marketing system (Oyegbami *et al.,* 2010). This study, therefore, was conducted to collect data on the current status of cassava production in Akpabuyo LGA of Cross River State as well as assess the current challenges of production to proffer solutions to enhance productivity.

Statement of the problem

Cassava production in the world is highest in Nigeria, but the production system in Akpabuyo and elsewhere in Nigeria is characterized by small-scale farmers that cultivate less than 2 hectares of cassava, and their production is primarily subsistent, grown for the traditional food market. Some constraints to cassava production exist in Akpabuyo, and some of them are pest related. These include cassava green mite, cassava mealybug and the variegated grasshopper. The disease-related ones are cassava mosaic disease, cassava bacterial blight, cassava anthracnose, and the root rot. According to the International Institute of Tropical Agriculture (IITA) (2017), these constraints, together with poor cultural practices, combine to cause yield losses that may be as high as 50% in Africa. Asante-Pok (2013) suggested that improved cassava varieties that are disease and pest resistant, low cyanide content, drought-resistant, early maturing and high yielding are crucial in production. However, the availability of these improved varieties of planting stock has not been consistent because up to 40% of the farmers do not have access to enhanced planting stock (IITA, 2017). Hence this study intends to identify factors and constraints that affect the productivity and the profitability of cassava in Akpabuyo LGA and proffer recommendations and policy implications to boost productivity and profit of the farmers in the area.

Research questions

The study attempts to provide answers to the following question:

(i) What are the socio-economic characteristics of cassava farmers in Akpabuyo LGA?
(ii) What are the factors affecting cassava production in Akpabuyo LGA?
(iii) What is the level of profitability of cassava farmers in Akpabuyo LGA?
(iv) What are the constraints faced by the farmers in their production activities in the study area?

THEORETICAL FRAMEWORK/LITERATURE

Two theories inform this study; they are the theory of production and cost theory.

Theory of production

From a theoretical perspective, the theory of production explains the transformation process of physical inputs (e.g. labour and capital) into outputs. In other words, the production function mirrors the level of technical efficiency in the production process by showing the ratio of observed production to the maximum level of output that a producer can produce, using given input (Agom *et al.,* 2012).

Importantly in economics, the production transformation expresses itself mathematically using the production function. Hence, this leads to the production function presented in the next sub-section.

Production function

The production function is the mathematical expression, which indicates the maximum output that a producer can produce, given available physical input (Agom *et al.,* 2012).
The mathematical expression of the crop production function is:

$$Q_t = f(m_t, z_t, x_t)$$

Where Q_t denotes agricultural productivity or yields per hectare of a specific crop, m_t represents farmers' characteristics, z_t represents climatic variables, x_t represents endogenous variables and the sub-index *t*, represents the time or the year observed. More so, this approach relies on the fact that farmers attempt to maximize their profit and thus, they choose the number of inputs (X) that allow them to achieve this goal given the explanatory variables. Also, to estimate the production function, the Cobb–Douglas production function is used.

Theory of cost

Cost refers to the values of the inputs used in production. Ibrahim, Ayinde, and Arowolo (2014) defined the cost of producing any goods or services as the value of the resource used in producing them in their best alternative since there are other alternative means of attaining these production goals. Production naturally is aimed at either maximizing output, maximizing profit, maximizing utility; minimizing cost or a combination of or all these. Importantly, there exists a close relationship between production and cost. According to Ojiako *et al.,* (2018), the cost of production at a given time is dependent on the prices of the factor inputs, the quantity of output produced and the production period.

Mathematically, it is as follows;

$$C = f(X, T, P, K)$$

Where; C = Total cost
X = Quantity of output
T = Technology
P = Prices of the factor input
K = Fixed factors

Also, the cost of production that accrues to a business or firm consists of both explicit and implicit costs. Explicit cost is the cost made by a resource or resources used in production, such as payments for raw materials, firm's payroll or payment for a firm's overhead cost. Conversely, the implicit cost is self-owned. It has to do with the firm's self-employed resources (Ibrahim, Ayinde,

and Arowolo, 2014). There are two types of costs associated with production; Fixed cost (FC) and variable cost (VC). Fixed cost are costs that do not change as production is increased or decreased, e.g. rent, interest on loans, insurance, depreciation. The payment is in advance of production. They exist even if the output is zero. Variable cost, on the other hand, is a cost that varies with the level of output, e.g. direct labour, raw materials and components, packaging costs, heating and lighting (Ojiako *et al.,* 2018).

Cassava production in Nigeria

Cassava production in Nigeria is by far the largest in the world; a third more than the production in Brazil and almost double Indonesia and Thailand. From the estimates in 2010, Nigeria's output of cassava reached 37.5 million tonnes (FAOSTAT, 2010). The nation ranks as the world's largest producer of cassava consistently since 2005 (FAOSTAT, 2012). However, Nigeria is not among the top 10 exporters of cassava worldwide and exported just about 0.55 million tonnes of its fresh and dried cassava in 2011 (Asante-Pok, 2013).

Cassava production by state in Nigeria showed that over 90 per cent of cassava cultivation is carried out by smallholder farmers. Moreover, cassava production is widespread across all regions of the country, although the highest producing states are Benue, Kogi, and Taraba producing 3,788, 2,988 and 2,730 tonnes of cassava respectively per year (NBS, 2012).

Cost and Returns of cassava production

In crop production, cost and returns are essential factors that dominate the decision-making process of farmers. The farmers producing cassava incur cost of different inputs. According to Afreen and Haque (2014), the firm making the most significant profit is the one whose cost of productive inputs are lowest. This indicates that it will have an incentive to expand production and, if necessary, can afford to pay more factors of production. Returns not only suggest that consumers want more of a good, but they are also the inducement to firms to produce this good. Enimu, Edet and Ofem (2016) opine that profit level has an influence on the size of the operation concerning the cost of the inputs of the business. Ojiako *et al.,* (2018), states that family labour can reduce the operating costs in small-scale farms, but that for proper cost allocation, determining the opportunity cost of family labour is important. Afreen and Haque (2014), asserted that factors like labour, land and other inputs such as fertilizer, and improved variety (besides cost consideration), determine the size of the farm holdings.

Constraints faced by cassava farmers

Constraints in cassava production comprise an extensive range of technical, institutional, and socio-economic factors. Such factors are pests and diseases, agronomic challenges, land destruction, unavailability of planting materials, lack of access to markets, constrained processing options and inefficient/ ineffective extension delivery systems. Several diseases and insect pests inundate cassava; pests and conditions such as the ACMD, CBB, the mealybug (which are substantially under control), green spider mite and the large grain borer, which raids dry chips of cassava in storage (FAO 2005). White ants (termites) terminate stems before they sprout after planting. There are recommendations of several chemical control methods; nonetheless, the necessity for the safe application and high costs limits their usage amongst various small-scale

farmers who cultivate cassava in mixtures. Additionally, the menace of rodents is a consistent incidence in the field.

Kuye (2015) carried out a study to analyze and compare the constraints to cassava production among cassava farmer loan beneficiaries and cassava farmer loan non-beneficiaries in South-south Nigeria. The result revealed that the significant barriers limiting cassava production among cassava farmer loan beneficiaries and cassava farmer loan non-beneficiaries were scarcity and high cost of fertilizer (87.97%) and (77.46%), high cost of agrochemicals (87.55%) and (77.05%), unavailability of research results to cassava farmers at the appropriate time (79.25%) and inadequate extension services (77.59%). The least problems were drought (43.98%), soil water pollution (36.93%) and stream/river pollution (35.68%). The conclusion was that increasing cassava farmers' access to the loan would enhance their productivity through improved well-being and living standard. Itam, Ajah and Agbachom (2014) also highlighted the problems encountered by cassava farmers to include high cost of inputs and lack of implements. Sangoyomi and Ayandiji (2013) opine that the most crucial cassava production constraints are a shortage of suitable planting materials, lack of standard marketing boards, pests and diseases. The study further indicated the need to improve on the supply of healthy and high yielding varieties, the formation of marketing boards and cassava flour processing centers to enhance production.

METHODOLOGY

Study Area

Akpabuyo LGA is in the Calabar Agricultural zone in Cross River State, with its headquarters at Ikot Nkanda. It is also within the vegetative belt of southern Nigeria and shores of the Atlantic seashore with Bakassi to the East and the Republic of Cameron to the West. The location of Akpabuyo LGA is between latitude 405"N and 504"S and longitude 8025" W and 8032"East of the equator. It has a population of over 271,325 people (NPC, 2006). There are twenty-eight (28) villages in Akpabuyo, and the primary economic activities are farming and fishing. Therefore, it is known as the food basket of Cross River State (Itam, Ajah and Agbachom, 2014). The most important crops grown are cassava, cocoyam, kola nut, oil palm, maize, etc. Other economic activities include palm wine tapping, processing of wild palm fruits, tailoring, welding, trading, and processing of cassava into garri and fufu for sale.

Sampling Procedure and Sample Size

The multistage sampling technique was appropriate to use in this study area. The first stage required a purposive selection of Akpabuyo as the main farming area in the Calabar agricultural zone. In the second stage, there was a random selection of five (5) villages from twenty-eight (28) villages. After that, there was a selection of fifteen farmers from each of the five communities, making a total of seventy-five farmers.

Analytical technique

To analyse data, the use of descriptive statistics, budgetary method and regression analysis sufficed.

Model specification

Ordinary least square regression was used to ascertain factors influencing the production of cassava in the study area. The implicit model is as follows:

$Y = f(X_1, X_2, X_3, X_4, \ldots X_9, U)$

Where Y = Cassava output (Kg)

F = functional form

X_1 = Farm size in hectares

X_2 = Capital (in Naira)

X_3 = Labour in man-days

X_4 = Cassava cuttings (number of bundles)

X_5 = Age in years

X_6 = Years of farming experience in years

X_7 = Household size

X_8 = Fertilizer (Kg)

X_9 = Gender (Dummy; 1=male, 0=female)

U =error term

Four functional forms namely linear, semi-log, exponential and double log were fitted to the data generated from the field using ordinary least square technique under the notion that data fulfilled the assumption of the multiple regression models. The explicit forms of these models are as follows:

Linear function

$Y=b_0+b_1 X_1+ b_2X_2 +\ldots b_9X_9 + U_i$

Semi-log function

$Y=b_0+b1\ LnX1+ b2LnX2 + \ldots b9LnX9 + U_i$

Double log function

$L_nY = b_0+b1\ LnX1+ b2LnX2 + \ldots b9LnX9 + U_i$

Exponential function

$Y = aX_1^{b1}+ X_2^{b2} + \ldots X_7^{b7}e^u$

$\text{Log } Y = a+b1X1 + b2\ X2 + \ldots\ b9X9+ U$

Furthermore, to choose the lead equation, statistical and econometric selection criteria came to play which was based on the coefficient of determination (R^2), the significant level of the parameters and signs of the estimated coefficient that conform to the *a priori* expectations.

RESULTS AND DISCUSSION

Socio-economic characteristic of respondents

The presentation of the cassava farmers' socioeconomic characteristics is in Table 1 below. Accordingly, most of the respondents were females comprising 69.3%, whereas 30.7% were males. This result indicates the high participation of females in cassava production in the study area compared to their male counterparts. The high involvement of women may be due to the fact the male might be engaged in other occupations aside farming. This finding is in agreement with

Abang and Agom (2004), who also noted that the female population was more involved in cassava production. The marital status of the respondents showed that 70.7% of the farmers were married, indicating that married couples dominate cassava production industry, thereby suggesting the chances of getting family labour in abundance for use in their production activities (Enimu, Edet, and Ofem, 2016). Results also revealed that about 37.3% of the respondents were between the ages of 30-49 years, with an average of 47 years and a standard deviation of 9.81. This outcome implies that most of them were in their active, productive age; as such, they could easily be engaged in field crop production to cater for their needs and that of their families (Enimu, Igiri and Oduma, 2015). In terms of educational level, most of the respondents had one form of education or another with most of them (55.2%) having primary education, 33.3% had secondary education, and only 6% with no formal education. This result implies that the respondents in the area were functionally literate.

However, more than half of the respondent (53.6%) had a household size ranging between 8-10 persons with a mean household size of 9 persons. Similarly, the mean farm size was 2, with a standard deviation of 1.007. Majority of the respondents (74.7%) had farm sizes ranging between 1-2 hectares while 6.7% had above 3 hectares. This finding suggests that most of the cassava farmers in the study area are subsistence farmers. Distribution of respondents based on farming experience revealed that 49.3% of the farmers had been into farming between 5-10 years. The average farming experience was about 8.6 years. The average annual income was N122487, with 48% of the cassava farmers having between N50,000 and N100,000, while only 5.3% had above N200,000.
The result of the study further showed that a high proportion of the farmers (82.7%) did not belong to any association, and also, the majority (69.3%) of them had no access to capital.

Table 1: Socio-economic characteristic of the respondents (N=75)

Variable	Frequency	Percentage
Sex		
Male	23	30.7
Female	52	69.3
Age		
<25	1	1.3
25-35	11	14.7
36-45	19	25.3
46-55	28	37.3
>55	16	21.3
Mean	46.76 (9.81)	
Marital status		
Single	1	1.3
Married	53	70.7
Divorced	4	5.3
Widowed	17	22.7
Education		

No formal education	6	8
Primary	44	58.7
Secondary	25	33.3
Farm size		
1-2	56	74.7
2.1-3	14	18.7
>3	5	6.7
Mean	2.01 (1.01)	
Household size		
1-4	2	2.7
5-7	16	21.3
8-10	40	53.3
>11	17	22.7
Mean	8.93 (2.28)	
Farming experience		
<5	14	18.7
5-10	37	49.3
11-15	22	29.3
16-20	2	2.7
Mean	8.60 (4.82)	
Annual Income		
<50000	5	6.7
50000-100000	36	48
101000-150000	21	28
151000-200000	9	12
>200000	4	5.3
Mean	122487 (80451.2)	
Membership association		
Yes	13	17.3
No	62	82.7
Access to credit		
Yes	23	30.7
No	52	69.3

Source: Computed from field data, 2019. Values in parenthesis = standard deviation.

Factors affecting cassava production in Akpabuyo LGA

Table 2 presents the result of the multiple regression analysis for the factors affecting cassava production in the study area. Among the four functional forms that were estimated, the choice of exponential form came up as the lead equation due to a high R^2 (40%), the number of significant variables (4), low standard error (0.1061), and significant F statistics values(2.6950), which was significant at 1%.

Table 2: Factors affecting cassava output in the study area

Variable	Linear	Semi-log	Double log	Exponential (+)
Constant	115.7387 (14.8375)***	-37.2489 (88.4130)	3.4426 (0.6818)***	4.7474 (0.1166)***
Farm size	-2.7498 (0.9869)***	-6.3372 (2.7763)**	-0.0497 (0.0214)**	-0.0215 (0.0078)***
Capital	0.0001 (0.0008)	1.3972 (6.0386)	0.0088 (0.0466)	6.75E-07 (6.40E-06)
Labour	0.0011 (0.0005)**	9.2769 (5.4082)*	0.0688 (0.0417)	8.17E-06 (4.01E-06)***
No. of bundles	0.3599 (0.3601)	2.3205 (3.8496)	0.0247 (0.0297)	0.0003 (0.0028)
Age	-0.0939 (0.2141)	-3.2697 (9.8785)	-0.0274 (0.0762)	-0.0009 (0.0017)
Farming experience	0.5076 (0.3940	4.1217 (3.2313)	0.0295 0.0249)	0.6637 (0.0031)
Household size	-1.1809 (0.7654)	-9.0207 (6.2622)	-0.0806 (0.0483)	-0.6103 (0.0060)
Fertilizer	0.0007 (0.0004)*	9.2312 (4.0921)**	0.0910 (0.0316)***	6.85E-06 (3.39E-06)*
Gender	2.2746 (3.8567)	2.1645 (3.9486)	0.0210 (0.0305)	0.0240 (0.0302)**
R-squared	0.25	0.24	0.29	0.40
Adj R-squared	0.15	0.14	0.20	0.17
F cal	2.4320**	2.3667**	3.6022***	2.6950***
S.E	13.5135	13.5594	0.1046	0.1061

Source: Computed from field survey result, 2019

Note: Values in parenthesis are standard errors, represents significant at 10%, 5% and 1%.(+) = Lead equation.

The results showed farm size, labour, the quantity of fertilizer, and gender were the significant factors that affect cassava production in the area. The coefficient of farm size (-0.0215) was negative and statistically significant at 1%. The result was not consistent with apriori expectation. This result implies that if these factors are increased above its present levels, cassava production will decrease significantly and this might be due to soil erosion and soil fertility problem. The coefficients of labour(8.17E-06), quantity of fertilizer(6.85E-06) were all positive and statistically significant at 1% and 10%. The result obtained was in line with a priori and thus suggests that an increase in labour, quantity of fertilizer will increase cassava production. The variable gender also had a positive and significant effect on cassava output. Although it's a priori expectation was indeterminate. This suggests that cassava production is not affected by gender. This study is in line with that of Itam, Ajah and Abachom (2014), Dicta *et al.* (2013) and Daud *et al.*, (2013). Specifically, Itam, Ajah and Abachom (2014) obtained a positive and significant effect of the value of cassava cutting, labour, age and farming experience on cassava production; Dicta *et al.*, (2013) concluded that farm size, farming experience, and age are the significant factors affecting cassava production, while Daud *et al*., (2013), also obtained a significant and positive effect between farm size, gender and farming experience.

On the other hand, capital (6.75E-07), the number of bundles (0.0003) and farming experience (0.0037) all had a positive effect on cassava production. Their effect was not statistically significant but consistent with *a priori* expectation. The coefficient of age (-0.0009) was negative and in line with *a priori* expectation, while that household size(-0.0103) was also negative and not significant, implying an inverse relationship with cassava production. This result suggests that these variables (capital, number of bundles, age and household size) are not important factors affecting the production of cassava in the study area. Daud *et al.*, (2013) also obtained a negative and not significant effect between household size and cassava production.
The estimated R-squared shows that the independent variables explain 40 per cent of variations in the total output of cassava, and the remaining 60 per cent is due to random error (U) in the model.

The elasticity of Cassava Production and Returns to Scale
The estimated coefficients for the specified function are explained as the elasticities of the explanatory variables. The elasticity of production for the exponential function was obtained by multiplying the estimated coefficients of each variable by the mean value of the variables ($E_p = \hat{\beta}_1 \bar{x}$). The analysis shows that a 10% increase in capital, labour, number of bundles, and quantity of fertilizer will lead to a 0.06, 0.84, 0.03 and 0.85% increase respectively in cassava production while that of farm size will lead to -0.64% decline in cassava production (Table 3). The value of the returns to scale (RTS=0.1146) shows that the farmers were producing at the decreasing positive return region. This result implies that increasing the units of inputs will lead to less than a proportionate increase in cassava production towards the frontier (Udoh, 2012).

Table 3: Elasticity of cassava production and returns to scale

Variable	Elasticity
Farm size	-0.0639
Capital	0.0063
Labour	0.0841
Number of bundles	0.0034
Quantity of fertilizer	0.0847
RTS	0.1146

Source: Field data, 2019

Cost and return of cassava production in Akpabuyo LGA

The summary of annual costs and returns from cassava enterprises to entrepreneurs in Akpabuyo LGA, Cross River State is presented in Table 4. The profitability of cassava production enterprise was examined using cost and return analysis. Results show that the total variable cost (TVC) was higher than the total fixed cost (TFC) per hectare associated with cassava production in the study area. The result further showed that the total variable cost was N30,296 accounting for 84.18% of the total cost of cassava production. The total fixed cost component of cassava production stood at N5,694.4 accounting for 15.82 % of the total cost (TC) of cassava production. However, a total cost (TC) per hectare of N35, 990.4 was incurred in cassava production and a net farm income (NFI) of N39, 957.6 was earned. This result confirms that cassava production in the study area was profitable. These findings agreed with that of Dicta *et al.* (2013) who reported a net farm income of N 49,272 per hectare of cassava production in Ika South and Ika North East Local Government Areas of Delta State. The profitability Index (PI) (i.e return on naira invested) was N2.11, suggesting that for every naira earned as revenue, N2.11 is returned to cassava farmer as net income. This is an indication that the production of cassava is profitable in the study area.

On the contrary, a study by Ojiako *et al.,* (2018) on the topic "Profitability of Cassava Production: Comparing the Actual and Potential Returns on Investment Among Smallholders in Southern Nigeria" indicated N27,7400 as the gross revenue, although they further discovered that this figure could be higher by over 114% to N596000 if farmers adopted the package of practices recommended. The gross margin was calculated to be N150536 but could be increased by about 120% to N330536 following farmers adoption of improved practices. The preceding therefore suggests that cassava production in the study area is a profitable venture that needs to be developed and built upon in Nigeria's quest to be food secured and to alleviate rural poverty.

Table 4: The average cost and returns per year of cassava production in the study area

Variable Items	Cost (N)	% of total Cost	% of labour Cost
Variable cost			
Cassava cutting	5,693.33	15.82	
Labour	12,238.0	34.0	
Bush clearing	4,664.0		12.95
Tillage/Ridges making	3,466.67		9.63
Plantin	1,100.0		3.06
Weeding	1,336.93		3.71
Harvesting	I,670.4		4.64
Fertilizer	12,364.67	34.36	
Total variable cost	**30,296**	**84.18**	
Fixed costs			
Land renting	4,734.67		
Depreciation on fixed items (hoes and cutlasses)	959.73		
Total fixed cost	**5,694.4**	**15.82**	
Total cost	**35,990.4**		
Revenue N			
Average yield of cassava (kg)/yr	126.58		
Average price per kg	600.0		
Total Revenue	**75,948.0**		
Gross Margin /yr	**45,652.0**		
Net Farm Income	**39,957.6**		
Return on Naira investment	**2.11**		

Source: Field data 2019

Constraints faced by cassava farmers in the study area

Table 5 shows the constraints faced by cassava farmers in order of their severity, militating against efficient cassava production. The weighted mean value of 2.00 was used as the critical value for comparing the order of severity. From the table, it was evident that unfavourable government policies, sparse marketing outlets, inadequate capital, high cost of input, insufficient farmland, high cost of transportation and lack of extension services were the severe constraint faced by cassava farmers during its production in the study area. The result obtained is consistent with that of Kuye (2015), who identified the high cost of inputs and inadequate extension service as the constraints faced during cassava production. Besides, Itam, Ajah and Agbachom (2014), conducted a similar study and obtained the same result. Sangoyooni and Ayandiyi (2013) identified a lack of standard marketing as one of the constraints faced by cassava farmers. The area in which the constraint was not serious includes; poor yield, Poor soil fertility, lack of improved

variety, excessive rainfall and pests and diseases attack. Similarly, Ashaye *et al.,* (2018) reported that inadequate capital, high-interest rate, inadequate transportation facilities, insufficient access to farmland and poor access to extension services were the significant barriers farmers encountered in cassava production in Kwara State, Nigeria.

Table 5: Constraints faced by cassava farmers

Constraints	Very serious	Serious	Not serious	Cum	Mean	Rank
High cost of transportation	45(135)	12(24)	18	117	2.36**	6th
High cost of inputs	46(138)	22(44)	7	189	2.52**	4th
Lack of extension services	37(111)	19(38)	19	168	2.24**	7th
Inadequate farmland	46(138)	15(30)	14	182	2.43**	5th
Poor soil fertility	11(33)	7(14)	57	104	1.39	9th
Pest and diseases attack	3(9)	14(28)	58	95	1.27	11th
Poor marketing outlets	60(180)	12(24)	3	207	2.76**	2nd
Unfavourable government policies	64(192)	7(14)	4	210	2.80**	1st
Excess rainfall	8(24)	7(14)	60	98	1.31	10th
Lack of improved variety	4(12)	15(30)	56	98	1.31	10th
Inadequate capital	51(153)	21(42)	3	198	2.64**	3rd
Poor yields	16(48)	18(36)	41	125	1.67	8th

Source: field survey data, 2019. weirgted mean, 2.00, ($X \geq 2.00$ = A serious constraint, $X < 2.00$ = not a serious constraint), **= constraints, cum = cumulative frequency.

Global Journal of Agricultural Research
Vol.8, No.1, pp.1-18, March 2020
Published by ECRTD-UK
Print ISSN: ISSN 2053-5805(Print), Online ISSN: ISSN 2053-5813(Online)

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study analyzes the economics of cassava production in Akpabuyo LGA , Cross River State. Specifically, it describes the socio-economic characteristics of cassava farmers in Akpabuyo LGA, determines the factors affecting cassava production in Akpabuyo LGA, estimates the cost and return of cassava production in Akpabuyo LGA and identifies constraints faced by the cassava farmers in their production activities in Akpabuyo LGA. A multi-stage sampling technique was used to select respondents, and a total of 75 respondents were sampled using validated structured questionnaires. Data obtained were analyzed using both descriptive and inferential statistics. Results from- the study showed that most of the respondents were females comprising 69.3% whereas 30.7% are males, and the majority of the respondents (37.3%) were aged between 30-49 years, with a mean age of 47years and a standard deviation of 9.81. The marital status of the respondents indicated that 70.7% of them were married. In terms of educational level, most of the respondents had one form of education or the other with majority of them (55.2%) having primary education, 33.3% had secondary education and only 6% with no formal training. However, the majority of the respondent 53.6% had household size ranging between 8-10 persons with a mean household size of 9 persons.

Similarly, the mean farm size was 2 hectares. Distribution of respondents based on farming experience revealed that majority 49.3% of them had been into farming between 5-10 years. The average farming experience was about 8.6years. The average annual income was N122,487, with majority 48% of the cassava farmers having between N50,000-N100,000, while only 5.3% had above N200,000. Farm size, labour, the quantity of fertilizer and gender were the significant factors that affect cassava production in the area.

The estimated coefficients for the specified function are explained as the elasticities of the explanatory variables. The analysis shows that a 10% increase in capital, labour, number of bundles and quantity of fertilizer will lead to a 0.06, 0.84, 0.03, and 0.85% increase respectively in cassava production while that of farm size will lead to -0.64% decline in cassava production. The value of the returns to scale (RTS=0.1146) shows that the farmers were producing at the decreasing positive return region at production stages. This implies that increasing the units of inputs will lead to less than proportionate increase in cassava production towards the frontier. The profitability of cassava production enterprise was examined using cost and return analysis. Results show that the total variable cost (TVC) was higher than the total fixed cost (TFC) per hectare associated with cassava production in the study area. The total variable cost was N30,296 accounting for 84.18% of the total cost of cassava production while the totäl fixed cost component of cassava production stood at N5,694.4 and accounted for 15.82 % of the total cost (TC) of cassava production. Total Cost (TC) per hectare of N35, 990.4 was incurred in cassava production and a net farm income (NFI) of N39, 957.6 was earned and return on naira invested was N2.11.

However, unfavourable government policies, sparse marketing outlets, inadequate capital(2.64), high cost of inputs, scarce farmland, high cost of transportation and lack of extension services were the severe constraint faced by cassava farmers during its production in the study area.

CONCLUSION

Based on the findings from the study, it can be concluded that farm size, labour, the quantity of fertilizer and gender are the significant factors affecting cassava production in the study area. Although cassava production in the study area was profitable but unfavourable government policies, sparse marketing outlets, inadequate capital, high cost of inputs, scarce farmland, high cost of transportation and lack of extension services were the severe constraint faced by cassava farmers in the study area.

Recommendations

Based on the finding of the study, the following recommendations are made:

1. Extension agents should be mobilized and sent to the study area to educate the farmers on the innovation and agricultural practices available for cassava farming in order to encourage its production.
2. Agricultural extension agencies should take note of the factors limiting cassava production in the study area such as unfavourable government policies, poor marketing outlets, inadequate capital, high cost of inputs and endeavour to step up their services in these areas of need.
3. It is also recommended that the farmers in the study area need to employ more of the productive resources such as improved varieties and also increase farm size and labour to boost their productivity.

Future research

This research focused on cassava crop. Future research can also be conducted separately on other agricultural staple food crops such as wheat, vegetables, beans, millet and sorghum to reveal the profitability these crops and constraints faced by farmers. Moreover, the field survey concentrated on one local government area in Cross River State. However, there is a need for area-specific research to present a more robust view of the cost-benefit and constraints faced by farmers in cassava production.

References

Adeniji, A.A., Ega, L.A., Akoroda, M.O., Adeniyi, A.A., Ugwu, B.O. and De Balogun, A., 2005. Cassava development in Nigeria. *Department of Agriculture Federal Ministry of Agriculture and Natural Resources Nigeria. FAO.* Retrieved 14 October 2017

Afreen, N., and Haque, M. S. (2014). Cost benefit analysis of cassava production in Sherpur district of Bangladesh. *Journal of the Bangladesh Agricultural University*, *12*(1), 119-126

Agom, D. I., Ohen, S. B., Itam, K. O. and Inyang, N. N. (2012). Analysis of Technical Efficiency of Smallholder Cocoa Farmers in Cross River State, Nigeria. *International Journal of Agricultural Management and Development (IJAMAD)*. 02(3): 177-185

Asante-Pok, A. (2013). "Analysis Of Incentives and Disincentives for Cassava in Nigeria" (pdf).Technical notes series, MAFAP. Rome: FAO. Retrieved 14 October 2017

Ashaye, W.O, Adeyi, A.M, Willoughby, F.A, Ola, O.A and Ayodele, O.D. (2018). Economics of improved cassava production technologies in Kwara State. Global Scientific Journal, 6 (7): 15-31

Daud, S. A., Amao O., Ganiyu, M. O., and Adeniyi, B. A. (2015). Economic analysis of cassava production in Saki-West local government area of Oyo state. Journal of Biology, Agriculture and Healthcare, 5(10): 59-64

Dicta, O.O., Toritseju, B. and Bennet, O. A. (2013). Gender roles in the productivity and profitability of cassava in Ika South and Ika North Local Government Areas of Delta State, Nigeria. World Applied Science Journal 24(12): 1610-1615

Eguono, I. (2015). A look at Cassava production in Nigeria. *International Journal of Agricultural Sciences*, *5*(5), 818-819

Eguono, I., (2015). A look at Cassava production in Nigeria. *International Journal of Agricultural Sciences*, *5*(5), 818-819

Enimu, S., Edet, G. O., and Ofem, U. I. (2016). Profitability Analysis of Cassava Production in Cross River State, Nigeria. Int. *Journal of Human Resources and Social Science*, *3*(8), 210-224

Enimu, S.; Igiri, J., and Oduma S. J. (2015). An Assessment of the Performance of community Banks in Financing Resource-Poor Farmers in Delta State, *International Research Journal of Marketing and Economics*, 2 (10): 64 – 75

Food and Agricultural Organization (FAO) (2005). Quarterly Bulletin Statistics. FAO, Rome, 2(3) 120

Food and Agricultural Organization (FAO) STAT (2010). Statistical database of the food and agricultural organization of the united nations

Food and Agricultural Organization (FAO) STAT (2012). Statistical database of the food and agricultural organization of the united nations

Ibrahim, S. B., Ayinde, I. A., & Arowolo, A. O. (2014). Climate change and technical efficiency of crop farmers in Ogun state, Nigeria. In (eds) Amos TT, Imoudu PB, Oseni JO. In *Proceedings of the Annual National Conference of the Nigerian Association of Agricultural Economists* (pp. 95-104)

Igberi, C. O., and Awoke, M. U. (2013). Cassava production and gender factor challenges affecting cassava production in Ebonyi State, Nigeria

International Fund for Agricultural Development- IFAD (2004). The Global Cassava Development Strategy: A cassava industrial revolution in Nigeria.

International Institute of Tropical Agriculture -IITA (2017). Research projects and annual report

Itam, K.O., Ajah, E.A. and Agbachom, E.E. (2014). Analysis of Determinants of Cassava Production And Profitability in Akpabuyo Local Government Area of Cross River State, Nigeria. *International BusinessResearch,* 7(12): 128-135

Kuye, O. O. (2015). Comparative analysis of constraints to cassava production by cassava farmer loan beneficiaries and loan non-beneficiaries in south-south Nigeria. *Global Journal of Agricultural Research*, *3*(3), 38-52

National Bereau of Statistics- NBS (2012). Report on survey on national agriculture sample Pp 194.

National Economic Empowerment and Development Strategy (NEEDS) (2004). National Planning Commission, Abuja, pp: 125

National Population Commission Census – NPC (2006). NPC report. *Federal Republic of Nigeria Official Bulletin, Govt. Press, Abuja.*

Ojiako, I. A., Tarawali, G., Okechukwu, R. U., Chianu, J., Ezedinma, C., & Edet, M. (2018). Profitability of cassava production: comparing the actual and potential returns on investment among smallholders in southern Nigeria.

Omotayo A. O and Oladejo A. J (2016). Profitability of Cassava-based Production Systems. J Hum Ecol, 56 (1, 2): 196-203

Oyegbami, A., Oboh, G., & Omueti, O. (2010). Cassava processors' awareness of occupational and environmental hazards associated with cassava processing in south-western Nigeria. *African Journal of Food, Agriculture, Nutrition and Development*, *10*(2)

Sangoyomi, T. E., & Ayandiji, A. (2013). Status of cassava production, distribution and utilization in Osun State, Nigeria. *International Journal of Agricultural Science and Research (IJASR)*, *3*(1), 1-5

Udoh, E. J. (2012). Agricultural Economic Glossary (1st.ed.) Uyo: Access print and Design

World Bank (2005). Getting Agriculture going in Nigeria: Framework for a National Strategy. Report No 34618-NG

Yakubu, M., & Akanegbu, B. (2015). Neglecting agriculture and its consequences to the Nigerian economy: An analytical synthesis. *European Journal of Research in Social Sciences Vol*, *3*(3): pp 18-27