Analysis of cassava production in Odukpani Local Government Area, Cross River State, Nigeria

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Abstract
The study was on analysis of cassava production in Odukpani L.G.A of Cross River State. Multistage random sampling technique was used to select a sample size of 120 respondents for the study using a validated structured to obtain questionnaire to obtain information. Data analysis was carried out using descriptive statistics inferential statistics. Findings revealed that farmers' age, number of extension visit, farm size, household size and labour, were the significant factors that affected cassava production in the area. This showed that, there is a significant effect of farmer's socio-economic on output of study area. Findings also revealed that the level of cassava production in the area was moderate due to adoption of improved cassava technologies in cassava farming.Government policies should target at the economically active age group farmers and also encourage land expansion for cassava cultivation.

Keywords: Cassava, production

Introduction

Background of the study

Manihot esculenta commonly called cassava is a woody shrub native to South America of the spurge family, *Euphorbiaceae*. Although a perennial plant, cassava is extensively cultivated as an annual crop in tropical and subtropical regions for it edible starchy tuberous roots, a major source of carbohydrate. (Agricultural research service, United States, 2014).

Cassava is the basis of a multitude of products, including foods, flour, animal feeds, alcohol, starches for sizing paper and textiles, sweeteners, prepared foods and bio-degradable products. The products are derived from a number of forms of cassava, ranging from fresh leaves and roots to modified cassava starch. The degree of processing and the technical requirements tend to increase from the fresh form to the modified starch form.

However, Nigeria is said to be the largest producer of cassava in the world, the country is not an active participant in the international market on cassava when compared with others countries with lesser production output (Elemo 2013), Agbachom, Odok and Idiong (2018), which is due to the fact that cultivation of cassava is done by rural small holders of farm.

Furthermore, most Nigeria cassava is produced across the country's southern and central regions. Almost one-third of the overall national output of cassava tones from the Niger-Delta are where its inhabitants depend on cassava as a primary source of food and income (Angba, Iton 2020).

Cross River State dominate cassava production in the South-South region of the country (FAO, 2017). The cassava production system in Odukpani and elsewhere in Nigeria is characterized by smallholders and is subsistent in practice primarily grown for the traditional food.

However, the main challenges have been the fact that rural small holders mostly do production using low-level production techniques, having insufficiently established marketing networks and inadequate infrastructure needed for an effective production and marketing system (Akerele, Idowu, Onyebanjo, Ologbon and Oluwasanga, 2018)

Statement of the problem

Nigeria from records 57, 134, 478MMT, is leading producer of cassava (FAO, 2017) in the world (FAO, 2017). Then cassava which is processed into garri is supposed to be the cheapest, but reverse is the case. The production system in Odukpani is characterized by small scale farmers, their production is primary subsistent. The production of cassava is hampered by pests, diseases, low yield and weed interference. Some of the pests that affect cassava include cassava green mite, cassava mealy bug and the variegated grasshopper. Disease includes cassava mosaic, cassava bacterial blight, cassava anthracnose and the root rot. These together with poor cultural practice combine to cause yield losses that may be as high as 50%.

However, availability of improved varieties of planting materials has not been consistent because up to 40% of the farmers do not have access to improved planting stock. Cassava production depends on supply of quantity stem cuttings. The multiplication rate of planting materials is low compared to grain crops, which are propagated by the true seed. In addition, cassava stem cuttings are bulky and highly perishable as they dry up within few days.

Production of cassava in Cross River State is in the hands of peasant farmers who are using unimproved farming techniques. Large losses may occur during storage, as a result of insect and rodent damage. However, due to the rapid increase in the population of the country the demand for cassava is increasing more than the supply. Other challenges of cassava production in Nigeria include: high input cost (cost of credit, agrochemicals) decaying infrastructures, high interest rate and low public sector investment in agriculture.

Several studies have been carried out by different authors related to this study. They include: Angba, Iton (2020) conducted an econometric investigation on examined analysis of cassava production in Akpabuyo L.G.A: An Econometric investigation using farm-level data. Daud, Amao, Ganiyu and Adeniyi (2015) carried out an examined Economic analysis of cassava production in Saki-west L.G.A Oyo State. Itam, Ajah, Agbachom (2014) studied on Analysis of

determinants of cassava production and profitability in Akpabuyo L.G.A Cross River State Nigeria, but they did not examine the economic analysis of cassava production in Odukpani L.G.A Cross River State. Agbachom and Amalu (2016) work on poverty issues and its determinants among cassava-based farming households in AkpabuyoLocal Government Area, Cross River State.

None of these researchers worked on analysis of cassava production in Odukpani L.G.A which this study seeks to address.

Research questions

The study attempts to provide answers to the following question:

(i) What are the demographic characteristics of Cassava farmers?

(ii) What factors affect production of Cassava?

Methodology

Study Area

The study area is located in Cross River State. The study was conducted in Odukpani local government in Cross Rivers State. Odukpani L.G.A lies between latitude $5^0$4'52.46"N and longitude $8^0$20'59.7"E and has an elevation approximately 413ft. The L.G.A has approximately a population of 257,800 persons, settlements in Odukpani include AkpapOkoyong, Eki, EniongAbatin, Ito, IdereUkwoIbom, Creek town, Inuakpa, Okoyong, Okurikang .The major occupation of the people in the study area are mainly farming and fishing activities.

Sampling Procedure and Sample Size

The multistage sampling technique was appropriate to use in this study area. The multistage sampling technique was employed in this study. The first stage was purposive selection of Odukpani as the major farming area in the Calabar agricultural zone. In the second stage, four (4) villages (New Netim, EniongAbatim, Creek TownI, and UsangOdot) were randomly selected from number of existing villages. Then, thirty (30) farmers were randomly selected from each of the four villages, making a total of one hundred and twenty (120) farmers, based on the number of registered farmers.

iTo analyse data, the use of descriptive and inferential statistics 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:

$Y = f(X_1, X_2, X_3, X_4, \ldots X_{11}, e)$

Where:

Y = Output of cassava (Kg)

X_1 = Farm size in Hectares

X_2= member of association (participation)

X_3 = Labour in Man-days/ha

X_4 = cassava cuttings (number of bundles)

X_5 = Age in years

X_6 = Farming experience in years

X_7 = household size (number of persons per household)

X_8 = Extension visit (number of visit)

X_9 = Income (N)/ha

X_{10} = access to credit (n/hect)

X_{11} = Education (number of years)

e =error term

Four (4) functional forms namely linear, semi-log, exponential and double-log were fitted to data generated using ordinary least square (OLS) technique under the assumption that data fulfilled the assumption of the multiple regression models. The explicit forms of this model are as follows:

Linear function

$Y = \beta0 + \beta1X_1 + \beta2X_2 + \beta3X_3 + \beta4X_4 + \beta_5 X_5 + \beta_C X_C + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta n X_n + ei$……(7)

Semi Log function

$Y = \beta0 + \beta1 LnX_1 + \beta2LnX_2 + \beta3LnX_3 + \beta4LnX_4 + \beta5LnX_5 + \beta n X_n + ei$……..(8)

Double Log function

$LnY = \beta0 + \beta1 LnX_1 + \beta2LnX_2 + \beta3LnX_3 + \beta4LnX_4 + \beta n X_n + ei$……(9)

Exponential function

$LnY= \beta0 + \beta1X_1^2 + \beta2X_2^2 + \beta3X_3^2 + \beta4X_4^2 + \beta5 X_5^2 + \beta6X_6^2 + \beta n X_n^2 + ei$ ……(10)

Economic, statistical and econometric criteria were employed to choose the lead equation based on coefficient of determination (R^2), significant levels of the parameters, and signs of the estimated coefficients that conform to the a priori expectations.

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.

From the results, most of the respondents were female, accounting for 57.5 % of the total respondents, while 42.5 % were males. This indicated 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 that male might be engaged in other occupation aside farming. This is in agreement with Angba and Itan (2020), who also noted that the female population was more involved in cassava production compared to their male counterparts.

Majority of the respondents were less than 30 years (32.5 %). The approximated mean age distribution of the respondents was 38 years. The mean age of the respondents indicates that respondents were young and active age. Akerele et al. (2018) also obtained similar result and concluded that respondents with this age range could easily engage in field crop production to cater for their needs and that of their families.

Also, 56.7 % of the respondents were married, 27.5 % were single, 12.5 % were widowed, while 3.3 % were divorced. This result shows that cassava production was dominated by married couples suggesting the chances of getting family labour in abundance for use in their production activities. Majority of the respondents (45.8%) attended primary school education, while 29.2% attended secondary school. This shows that, the level of education was relatively low. The low level of literacy will have an effect on cassava production in terms of accessing information on modern technologies in cassava farming. Itam*et al.,* (2014) reported that education is an important factor in the recognition and utilization of investment opportunities.

Also, majority of the respondents (67.5%) had household size that were less than 5 persons per household. This moderate household size could have a positive support in the farm. The approximated mean household size was 5 persons per household. The relatively low household size can be attributed to the fact that most of the respondents were still young and in active age below 30 years. Daud*et al.* (2015) also reported similar result and conclude that farmers adopted family planning. The result also showed that most of the respondents had farm size (49.2%) that were less than 3 hectares. The approximated average farm size was 4 hectares with standard deviation of 1.81. This result shows that respondents were planting in a relatively large farm size and cultivation is also for commercial purpose.

In terms of membership to association, majority of the respondents (56.7%) did not belong to any association, 43.3% were members of an association. The high proportion of respondents who did not belong to an association may not be able to access credit easily. This is due to the fact that memberships to association significantly enhance farmers' awareness of new innovations and chances of getting quick access to credit.

The result further showed that the frequency of visit of the extension agent to the respondents was low, with 60.8 % of respondents having contact with the extension agent while 39.2 did not have contact with extension agent. By implication, high frequency of contact can promotes farmers' access to credit and knowledge on the new innovations used to improve cassava output

The result also shows that the respondents (32.5%) had farming experience ranging from 6-10 years, 27.5% of the respondents had less than 5 years' experience, while only 22.5% had above 15 years of farming experience. The approximated average farming experience was 12 years. This implies that the respondents have been engaged in cassava production for a long period. By implication, farmers with high farming experience will gain more knowledge and technological ideas on how to tackle farm production problems.

The result showed that the average annual income was ₦153,925, with majority 65.8% of the cassava farmers earning more than ₦100,000, while only 8.3 % earn less than ₦50,000.The result further revealed that majority (45.8%) of the respondents' sources of capital was through personal saving, 19.2% sourced it from family and friends, 11.7% from banks, while only 23.3% was from co-operative.

Farmers level of cassava output

The result showing farmers' level of cassava output is presented Table 2. The result revealed that the highest level of cassava output (55.8%) was between 101 and 500 kg/hect. furthermore, the minimum and maximum output of cassava was 75 kg and 1,222 kg, with an average cassava output of 444.629 kg/hectare. The finding shows that the level of cassava production in the area was moderate. This may be due to non adoption of improved cassava technologies in cassava farming.

Effects of socio-economic variables on cassava produced in Odukpani LGA

The result of the multiple regression analysis for the factors affecting cassava production in the study area is presented in Table 3. The four functional forms that were estimated, the double log form was chosen as the lead equation due to the number of significant variables (6), low standard error (0.754), highest value of R^2 and sign of the significant coefficient conforming to *a priori* expectation. Thus, double log would be used for interpretation and discussion of findings.

The coefficient of multiple determination (R^2) obtained was 0.236, implying that about 23.6% of the variability in farmers output of cassava is explained by the explanatory variables included in the model. The F-value of the regression result is 3.031 and it is significant at 1% level of significance. This implies that the data are good fit for the model. The results showed farmers' age, number of bundles, extension visit, farm size, household size and labour, were the significant factors that affect cassava production in the area.

Effect of farmer's age on cassava output

The coefficient of farmer's age (1.163) was positive and significant at 1 %. This implies that 10 % increase in farmers' age will increase cassava output by 11.63 kg. The finding is in line with that of Itam *et al.* (2014) and Dicta *et al.* (2013) who obtained a positive and significant effect between farmers' age and cassava output.

Effect of number of bundles on cassava output

The coefficient of cassava bundle (0.414) was positive and significant at 5%. This implies that the more the cassava bundle used for production, the more the cassava output. The finding is in line with that of Itam*et al.* (2014) who obtained a positive and significant effect between cassava cuttings and cassava output.

Effect of household number on cassava output

Results further showed that the coefficient of household size (-0.349) is negative and significant at 10 %. This implies that less number

of persons per household would leads to a greater quantity of output of cassava. This is due to the fact that the farmers will have more family labour to work on his farm. Daud*et al. (*2013) also obtained a negative and not significant effect between household size and cassava production.

Effect of farm size on cassava output

The coefficient of farm size (0.314) was positive and significant at 10%. This implies than an increase in area of land used for cassava cultivation, will increase the output of cassava. The result is in line with that of Daud*et al.* (2013) who obtained a positive and significant effect between farm size and cassava output.

Effect of extension visit on cassava output

The coefficient of extension visit (0.294) was positive and consistent with *a priori* expectation, implying that farmers' output will increase as number of extension visit increases.

Effect of total labour on cassava output

The coefficients of labour (0.0906) was positive and statistically significant at 5%. The result obtained was in line with *a priori* and thus suggests that a 10% increase in labour will increase cassava output by 0.91kg. This study was in line with that of Itam*et al*. (2014), Dicta *et al. (*2013) and Daud *et al.* (2013). Specifically, Itam *et al.* (2014) obtained a positive and significant effect of value of cassava cutting, labour, age and farming experience on cassava output; 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. The result further suggests that these variables (member of association, credit access, education, farming experience and income) were not important factors affecting cassava production in the study area.

Summary

This study evaluates the economics of cassava production in Odukpani L.G.A of cross river state. The specific objectives of this study were to: analyse the socio-economic variables on output and estimate the total output of cassava produced in the study area. A multistage sampling technique was adopted in selecting 120 respondents using structured questionnaire. Data obtained were analyzed using both descriptive and inferential statistic. The results on socio-economic characteristics showed that majority (57.5%) of the respondents were female, aged less than 30 years, married (56.7%) and literate. The result of household size distribution showed that majority (67.5%) of the respondents had less than 5 persons per households, 49.2 % had farm size that were less than 3 hectares. Also, majority (58%) of the respondents had contact with extension agent and had farming experience that were less than 5 years. Further results showed that, majority (45.8%) of the respondent's source for capital from personal savings. Furthermore,

43.3% of the respondents were member of association while 56.7% did not belong to any association. Most farmers (65.8%) earn more than ₦100,000. The result of the farmer's level of cassava output showed that the highest level of cassava output (55.8%) was between 101 and 500 kg, with a minimum and maximum output of cassava of 75 kg and 1222 kg. The average cassava output was 444.63 kg.

Conclusion

The findings of the study showed that personal saving were mostly used by farmers in cassava production in Odukpani LGA and that majority of the cassava farmers had contact with extension agent which lead to an increase in the farmer's level of output in the area. The factors that influences farmers output of cassava were farmers' age, number of bundles, extension visit, farm size, household size and labour; these imply that an attempt to increase the farmers output of cassava in the study area should take cognizance of these factors. The measures of performance indicate that cassava production in the study area is viable and profitable enterprise. The foregoing therefore suggested that cassava production in the study area is a profitable venture that needs to be developed and built upon in Nigeria quest to be food secure and alleviate rural poverty.

Recommendation

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

1. Based on the findings, young and energetic farmers should be encouraged to join cassava farming.
2. Experienced farmers should be encouraged in the Cassava farming business.
3. Household size, extension visits, farm size and hire labour should be considered as significant factors in cassava production.

References

Agbachom, E. E. & Amalu, E. M. (2016). Poverty issues and its determinants among cassava-based farming households in Akpabuyo Local Government Area, Cross River State, Nigeria. *Global Journal of Pure and Applied Sciences,* 22, 7-19.

Agbachom, E. E., Ettah, O. I. & John, B. (2018). Impact of Fadama III project on output of cassava in Calabar in Calabar agricultural zone of Cross River State, Nigeria. *Journal of Agriculture, Forestry and Environment,* 3, 136-141.

Agricultural research service (ARS 2014), United States department of agriculture (USDA) *Germplasm Resources Information Network 2014.*

Akerele, E. O, Idowu, A. O. Oyebayo, O., Olagbon, O. A.C. & Oluwasanyo, O.P. (2018). Economic Analysis of cassava production in Ogun state, Nigeria. Department of Agricultural economics and farm management, collage of Agricultural sciences, Olabisi Onabanjo University, Yewa campus, Ayetoro, Ogun State, Nigeria.

Angba, C.W & Iton, O.V (2020). Analysis of cassava production in Akpabuyo local government area: an econometric investigation using farm level data. Department of Agricultural Economics, University of Calabar, Calabar, Nigeria. Department of Science Education, University Of Calabar, Nigeria.

Cross River State Nigeria-population statistics, charts, map and location (2018) *www. citypopulation.de (2018).*

Daud, S. A., Amao O., Ganiyu, M. O., & Adenyi B. A. (2015). Economic Analysis of cassava production in Saki-west local government area of Oyo State. department of agricultural technology, school of plant sciences, department of agricultural economics, faculty of agricultural science, LadokeAkintola University of Technology, Oyo State, Nigeria.

Daud, S.A., Amao O., Ganiyu, M.O. & 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.

Elemo, G.N. (2013). The prospects and challenges of cassava presented at the NISER research services. Premier hotel, Ibadan, Oyo state, Nigeria.

Food and agriculture organization of the United Nation statistics (2017). Rome. United Nations Economic and Social Council, *FAO.org*

Itam, K. O., Ajah, E. A. & Agbachom, E. E., (2014). Analysis of determinants of cassava production and profitability on Akpabuyo Local Government Area of Cross River State, Nigeria. Department of Agricultural Economics and Extension, University of Calabar, Calabar, Nigeria. *International Business Research, 7(12), 128, 201.*

Table 1: Socio- economic characteristics of respondents

Variable		Frequency	Percentage (%)	Min.	Max	Mean
Gender	Male	51	42.5			
	Female	69	57.5			
	Total	**120**	**100**			
Age	≤30	39	32.5	27	61	38.17
	31-40	35	29.2			
	41-50	35	29.2			
	51-60	9	7.5			
	>60	2	1.7			
	Total	**120**	**100**			
Marital status	Single	33	27.5			
	Married	68	56.7			
	Divorced	4	3.3			
	Widowed	15	12.5			
	Total	**120**	**100**	4	16	11.65
Experience	≤5	33	27.5			
	6-10	39	32.5			
	11-15	21	17.5			
	>15	27	22.5			
	Total	**120**	**100**			
Education	No formal	18	15			
	Primary education	55	45.8			
	Secondary education	35	29.2			
	Tertiary education	12	10			
	Total	**120**	**100**			
Household size	≤5 persons	81	67.5	4	11	4.99
	6-10 person	37	30.8			
	> 10 persons	2	1.7			
	Total	**120**	**100**			
Farm size	≤3	59	49.2	1	10	3.85
	4-7	56	46.7			
	>7	5	4.2			
	Total	**120**	**100**			
Sources of capital	Personal saving	55	45.8			
	Banks	14	11.7			
	Co-operative	28	23.3			
	Family and friends	23	19.2			
	Total	**120**	**100**			
Member of association	Yes	52	43.3			
	No	68	56.7			
	Total	**120**	**100**			
Extension visit	Yes	73	60.8			
	No	47	39.2			
	Total	**120**	**100**			
Income	<20,000	1	0.8			
	20,001-50,000	9	7.5			
	50,001-100,000	31	25.8			
	>100,001	79	65.8			
	Total	**120**	**100**			

Table 2: Farmers level of cassava output

Output/ha	Frequency	Percentage (%)	Min.	Max.	Mean
≤100	2	1.7	99	1001	
101-500	67	55.8			
501-1000	42	35.0			
>1000	9	7.5			
Minimum	75				
Maximum	1222				
Mean	444.629				
Standard deviation	320.12				

Source: Field survey, (2021)

Table 3: Multiple Regression result of influence of socio-economic factors on farmers output of cassava

Variables	Linear	Semilog	+Double log	Exponential
C	288.015 (212.275)	-528.085 (799.93)	1.984 (1.985)	4.901 (0.544)***
Age	9.899 (3.505)***	419.176 (129.65)**	1.163 (0.331)***	0.028 (0.0089)***
Association	-57.551 (57.845)	-77.768 (58.790)	-0.069 (0.150)	-0.023 (0.148)
Bundles	2.473 (2.002)	126.211 (78.80)	0.414 (0.201)**	0.008 (0.0051)
Credit	-42.299 (56.32)	-22.980 (55.26)	-0.079 (0.141)	-0.120 (0.144)
Education	-5.302 (3.605)	-24.960 (33.085)	-0.055 (0.0846)	-0.011 (0.015)
Experience	-6.109 (3.605)*	-28.633 (39.548)	-0.091 (0.101)	-0.019 (0.0092)**
Extension visit	96.402 (58.59)	97.644 (59.33)	0.294 (0.152)*	0.286 (0.15)*
Farm size	-19.383 (16.42)	-154.934 (66.851)**	0.314 (0.171)*	0.028 (0.042)
Household size	-35.444 (16.87)**	-139.896 (81.823)*	-0.349 (0.209)*	-0.090 (0.043)**
Income	4.38E-04 (3.51E-04)	-69.525 (49.036)	-0.145 (0.125)	-8.17E-07 (9.00E-07)
Hired labour	0.012 (0.005)**	38.245 (16.56)**	0.0906 (0.0423)**	2.34E-05 (1.32E-05)*
R^2	0.228	0.230	0.236	0.231
Adj R^2	0.149	0.152	0.158	0.153
Fcal	2.90***	2.94***	3.031	2.95***
S.E	0.149	294.78	0.754	0.756

Note: Values in parenthesis are standard errors, *, **, *** represents significant at 10%, 5% and 1%. **(+)** = Lead equation.
Source: Computed from field survey result, 2021