

DETERMINANTS OF CASSAVA COMMERCIALIZATION FOR EXPORT DEVELOPMENT AMONG FARMERS IN ABIA STATE

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ABSTRACT

This study examined empirically the determinants of participation in cassava commercialization among small holder farmers and trend of cassava export in Nigeria from 2001-2016. The data obtained were analysed using Probit model and the exponential trend equation which was fitted to cassava export value from 2001 - 2016. The results showed that total land size, age of the farmer, and household size were variables that are statistically significant at 1%, 10% and 5% respectively with causal impact on the ability of a households' willingness to participate in cassava commercialization. The coefficient of the trend variable for cassava export was 0.04 and significantly different from zero at 5% level. Based on the findings of the study, it was recommended that concerted effort is required in other to reverse the slow process of growth on cassava exportation by encouraging younger farmers to see agriculture as a business.

Keywords: Cassava, Commercialization and Export

Introduction

The nation's agricultural sector strategy aims, *inter alia*, to integrate the majority of subsistence farmers into the commercial agricultural economy which include export markets and local markets. Commodity production and trade have significant bearing on sustainable livelihoods of the poor, as well as on the exports and growth of a number of commodity-dependent developing countries (Developing Countries in International Trade, 2005; Carletto, Kirk, Winters and Davis 2010). In Nigeria, as in most developing countries, agriculture is an important part in the livelihoods of rural people. In recent years, producers in general and especially small farmers have faced considerable difficulties in practice and agricultural services. Nigeria is the highest cassava producer in the world, producing a third more than Brazil and almost double the production capacity of Thailand and Indonesia. (FAO, 2004) Although the world leader in cassava production, Nigeria is not an active participant in cassava trade in the international markets because most of her cassava is targeted at the domestic food market. In Nigeria cassava is mainly used as staple food and its production methods are primarily subsistence in nature and therefore, it is unable to support industrial level demands.

However, despite the concerted efforts being made by the Federal Government of Nigeria to harness the vast economic, nutritional, industrial and export potentials of cassava in Nigeria in other to ensure national food security, boost rural livelihood and foreign exchange earnings (Ekwe and Nwachukwu, 2004), level of commercialization of cassava is still untapped because production is not oriented towards commercial use; instead, farmers produce and process cassava as a subsistence crop. The need for Nigeria to have a well-developed cassava industry driven by value addition to export cassava products besides satisfying her domestic market cannot be over emphasized. The Nigeria cassava is of high quality which will compete favourably in the international market. (Cassava Master Plan 2006). At the launch of presidential Initiative on cassava (PIC) production for export in 2001, it was observed that global attention by buyers was on Nigeria with several purchase orders received but seventeen years after the inauguration of the Presidential Committee on the promotion of cassava export with an annual target of \$ 5 billion, Nigeria, the world's largest producer of the crop, is yet to tap opportunities which countries with less endowment are reaping in foreign exchange earnings. The issues that concern the increasing agricultural commercialization and exports are prevalent among policy makers, but farmer's motivation and willingness to boost production of exportable crop like

cassava remain highly unknown. Therefore, this study provides an empirical contribution to the on-going debate about increasing export potentials by exploring the willingness of farmers to increase the production of cassava given the external policy shock. Considering the importance of agricultural commercialization for export and its impact on agricultural productivity, rural poverty reduction, and food and nutrition security, it is important to understand the factors affecting the extent of commercialization and export trend of cassava in Nigeria. Hence, this study is aimed at analysing the determinants of commercialization for export among farmers in Abia state, Nigeria.

Conceptual Framework

Farmers' decisions can be modelled through a random utility framework, which implies that farmers decide to engage in value addition meant for exportable cassava to participate in export markets when the expected benefits outweighs the expected costs.

Farmers' utility is thereby modelled as a function of a vector of exogenous variables as follows:

$$Y = (bX_i) + u_i \quad (1)$$

With Y being the part of the utility function that can be observed, u_i being the unobserved utility and u_i being an error term representing the unobserved part of the utility. The vector X_i includes farm and household characteristics and b is a vector of parameters to be estimated. The farmer will choose to commercialize or participate in export market if the utility U_{ip} from participation is higher than the utility U_{iNP} derived from non-participation.

Thus the probability of a farmers' willingness to participate in processing cassava for export is given by $P(u_i < bX_i)$ and the willingness to participate in and the model can be written as follows:

$$P(p_i = 1) = P(u_i < bX_i) = bX_i + U_i \quad (2)$$

Where $p_i = 1$ if $U_{ip} > U_{iNP}$ and $P_i = 0$ if $U_{ip} < U_{iNP}$

Moreover, there are macro and micro level factors that have been identified in previous studies as relevant for farmer decision or willingness to participate (or not) in certain market, which can be categorized into three groups.

- (i) Farm head characteristics (i.e. human capital)
- (ii) farm characteristics and (iii) institutional and infrastructure related factors (e.g. supply chain and policies).

However, this study will focus on identifying only micro-level factors determining market participation of farm households. The dependent variable is then market participation. This can be modelled as follows

$$Y = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \dots + \alpha_k X_{ki} + u$$

$= \alpha X + u$ of this study

Where Y represents market participation
 X represents the factors that determine market participation
 α_0 and α_{1-k} estimable parameters
 u is the error term

Therefore the need to use probit regression model to identify the factors that determine the decision of smallholder cassava farmers to commercialize cassava production both for domestic and export market. Household were considered participants if they sold cassava worth any value above zero and non-participants if otherwise. The fact that the dependent variable is a dichotomous one justifies the use of probit model. According, the dependent variable assumes only two values 1, if the household commercialise by participating in output market and 0 if it does not. The probit model is given by:

$$P(Y = 1/X) = F(X\alpha) = \frac{1}{\sqrt{2\pi}} \int_0^{\frac{XB}{\sigma}} e^{-\frac{x^2}{2}} dx$$

Where: $X = (x_{1i}, x_{2i}, \dots, x_{ki})$
 $\alpha = (\alpha_0, \alpha_1, \dots, \alpha_k)$

Methodology

A total of 120 farm households were chosen from the three agricultural zones of Abia State. A multi-stage stratified random sampling technique was adopted in selecting respondents. First, all the 17 LGAs were listed to form a separate sampling frame from the three zones. Two Local Government Areas (LGAs) were purposively selected from each of the zones making a total of 6 LGA's, from the state. Secondly, from each of the 6 LGAs, four farming communities were purposively selected. At the third stage, in each of the 24 communities/villages, a list of farm households was compiled with the assistance of village heads and resident ADP extension agents. From each village, 5 households were randomly selected for the study. Households were visited bi-monthly over a six-month period.

Empirical Data Estimation Method

The exponential trend equation was fitted to cassava export value from 2001-2016 following Onyenweaku and Okoye (2005). The equation was specified as follows:

$$Y_t = e^{\beta_0 + \beta_1 t_1 + u_t} \quad (3)$$

By taking the natural logarithm of both sides, the linear form of the equation will be:

$$\log y_t = \beta_0 + \beta_1 t_1 + u_t \quad (4)$$

t = time trend variable

B_0 = intercept of the trend equation

B_1 = trend coefficient

u_t = error term

From equation 2 the compound growth rate was computed as follows:

$$\gamma = (e^{\beta_1} - 1) \times 100 \quad (5)$$

Where

γ = compound growth rate.

e = Euler's exponential constant (2.71828)

The second objective was analysed using probit regression model to find out what factors influence smallholder cassava farmer to participate or not. In probit regression model, the dependent variable was binary; that implies it assumes only two values: 1 if the household is a market participant and 0 if not. Households were considered participants if they sold crops worth any value above zero and non-participants if otherwise.

The multiple regression models are specified as follows:

$$Y_1 = f(X_1, X_2, X_3, X_4, X_5, \dots, X_{12}) + \varepsilon \quad (6)$$

Where

Y = Commercialization (dummy variable);

1=Participating, 0=not participating)

X_1 = Quantity Produced (Kg)

X_2 = Farm size (hectares)

X_3 = Household size (No)

X_4 = Gender (male=1; female= 0

X_5 = Education (years)

X_6 = Age (years)

X_7 = Dist from the Farm to market (KM)

X_8 = Dist from the house to market Nearness to market (km)

X_9 = Membership of cooperative (yes=1; No= 0)

X_{10} = Alte Src of income (Yes=1, No=0)

X_{11} = Monthly Income (Naira)

X_{12} = Farm experience (years)

ε_i = Error term

Household commercialization index (HCI) was also estimated. Commercialization index (defined as the value of household crop sales as proportion of the value of crop expressed in percentage terms) is presented thus;

Agricultural HCI= value of crop sold /total value of crop produced $\times 100/1, \dots$ (7)

The index measures the ratio of the gross value of crop sales by household i in the year j to the gross value of all crops produced by the same household i in the same year j expressed as percentage. The index measures the extent to which household crop production is oriented toward the market. A value of zero would signify a totally subsistence oriented household and the closer the index to 100, the higher the degree of commercialization. This index has been used in the past by Govereh et al (1999) and Strasberg et al (1999).

Results and Discussion

Analysis of Trend of Cassava Export Value in Nigeria from 2001 -2016

Analysis of trend of cassava export value was done using estimated regression coefficient of the time trend variables presented in table 1. The export trend of cassava exhibited a positive trend within the period under study. The coefficient of the trend variable for cassava export was 0.04 and significantly different from zero at 5% level. The coefficient being 0.04 implies that there has been a 4% increase in cassava exportation within the period of study.

The Growth Rate of Cassava Export Value in Nigeria from 2001-2016

The compound growth rate for export value of cassava is presented in Table 2. The cassava export value grew at a compound growth rate of 4.08 % per annum. This implies a relatively slow process of growth in cassava exportation during the period of study compared to the optimal level required.

This shows that the export potential of cassava is yet to be harnessed; this calls for a concerted effort to reverse the slow process of growth on cassava exportation

Determinants of Farmers Willingness to Participate In Cassava Export

The result from the probit regression analysis shows that the quantity of cassava produced, total land size, age of the farmer, source of livelihood and household size are variables that are statistically significant and have causal impact on the ability of a households' willingness to participate in cassava commercialization. The Chi2 value was highly significant at 1% level indicating that the variables used for estimation were good.

The probit regression in Table 3 reveals that the quantity of cassava produced has a positive effect, a significance level of 10%, on the probability of households to participate in the output market. This implies that households with high level of production tend to participate in the output market than those with

lower production level. The result also shows that total land size is another important variable having a statistically significant level of 1% and a positive influence on market participation of households. This could be due to the role of land size in boosting total production level and thus the sale of surplus produce. It is also important to know that size of land is very essential because transaction costs are largely fixed costs that can be spread across more output on large farms (Rannдела *et al* 2008). Similar results were obtained from Agwu *et al* (2012) and Martey *et al*, 2012. Moreover the age of farmer is significant at 5% and negatively signed implying that increase in age will decrease the probability of a farmer to participate in cassava marketing for export. Younger household heads are more dynamic with regards to adoption of innovations both in terms of those that enhance productivity and marketing at reduced costs. Having other sources of livelihood is significantly associated with lower rates of cassava sales. The extent of participation in cassava marketing by farmer will reduce when they have other sources of livelihood. The plausible reason to this result may be that time spent in off farm activity reduces time to produce more for sale. The result further suggests that large household are more likely to engage in commercialization since households with higher number of adults will serve as a form of family labour for increase output and sales.

Level of Commercialization among the Small Holder Cassava Farmers

In measuring household specific level of commercialization, household commercialization index (HCI), which is a ratio of the gross value of all crop sales per household per year to the gross value of all crop production was used. The result showed that majority of the various households studied had a ratio of above 50%. About 33% of the household sampled had a commercialization index of above 75%.

This implies that there is high level of commercialization of cassava in the study area. According to Govereh *et al*. (1999) and Strasberg *et al* (1999) the closer the index is to 100, the higher the degree of commercialization.

Conclusion

The estimated function of export trend for cassava suggested positive trends while a slow process of growth in cassava exportation was observed during the period of study. The study further identified quantity of cassava produced, total land size, age of the farmer, source of livelihood and household size as variables that have causal impact on the ability of a households' willingness to participate in cassava commercialization. Majority of the various

households studied had a commercialization index ratio of above 50%. The results therefore call for policies at concerted effort to reverse the slow process of growth on cassava exportation by creating enabling environment for rural households. There is also need for land re-form policies to make more land available to farmers to enhance commercialization.

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Table 1: Estimated functions of cassava export value in Nigeria from 2001-2016

Variable	Constant (b0)	B1	R ²	R ² [^]	F-value
	2.11 (18.56)***	0.04 (3.04)**	0.40	0.35	9.23**

Source: Output data from Stata

Note: Superscript **, *** denote significant levels at 5%, and 1% respectively

Table 2: Compound growth rate of cassava export in Nigeria from 2001-2016

Variable	r
Cassava export value	4.08

Source: Output data from Stata

Note: Superscript *, **, *** denote significant levels at 10%, 5%, and 1% respectively

Table 3. Probit estimates for determinants of cassava commercialization for export

Variables	Coefficients	Std .Err	T	p>t
Qty prod (X ₁)	.0005145	.0002739	1.88	0.064*
Farm size(X ₂)	7.381866	1.671248	4.42	0.000***
Household size(X ₃)	3.539392	1.543898	2.29	0.024*
Gender(X ₄)	-6.445905	7.380996	-0.87	0.385
Edu. Level(X ₅)	-1.05419	5.774544	-0.18	0.856
Age(X ₆)	-1.122192	.4077621	-2.75	0.007**
Dist firm farm to Mrt (X ₇)	-.1243098	.0923539	-1.35	0.182
Dist from house to Mrt (X ₈)	.0021359	.0015268	1.40	0.165
Memb of Coop(X ₉)	-1.001224	8.320008	-0.12	0.904
Alt Src of income(X ₁₀)	-13.96659	6.947147	-2.01	0.047*
Monthly income (X ₁₁)	.0003308	.0002947	1.12	0.265
Farm exp(X ₁₂)	.7249549	.5754465	1.26	0.211
constant	64.6501	22.75622	2.84	0.006

Log likelihood= -402.64916

LR chi2(12)=49.26

Prob> Chi2 =0.000

Pseudo R2 = 0.0576

Note ***, **, * 1%, 5%, and 10% significance level respectively

Table 4: distribution of the extent of Cassava Commercialization among the Households in Abia state

Cassava Household	Frequency	percentage
0-24.9	4	5.06
25-49.9	9	11.39
50-74.9	40	50.63
75-100	26	32.91