PROFITABILITY OF CASSAVA PRODUCTION IN KOGI STATE, NIGERIA

Audu, S.I.
Department of Agricultural Economics and Extension,
Faculty of Agriculture, KogiStateUniversity,
Anyigba, Kog State, Nigeria.

Abstract

Profit is a very important factor in farm business management because it plays crucial role in resource allocation. The study was on profitability of cassava production in KogiState in 2011. Primary data for the study were collected from 360 cassava farmers who were randomly selected from three agricultural zones in the State. A well structured questionnaire was used for the interview. Information collected from the farmers was on their farm size, inputs used on the farm and their cost and the revenue realized. The data were analysed with the use of gross margin and profit function. Results indicated that cassava production was profitable. The revenue recorded per hectare was ₦183,242.00 while variable and fixed costs were ₦67,616.00 and ₦2,522.00 respectively. The gross margin and the net margin per hectare were ₦115,626.00 and ₦113,104.00 respectively. Linear functional form was chosen as the lead equation in the profit function analysis. Labour, fertilizer, herbicide, cassava stem, transportation and depreciation of farm tools which were included in the model had negative coefficients and were all significant at 1 per cent level of risk. They jointly explained about 99 per cent variation in the profit made by the farmers. Recommendations made for more profit in cassava production include; encouraging youths to stay in rural areas to provide labour; making fertilizer and herbicide available at cheap prices and providing good transport system for farmers and farm produce among others.

Key words: Cassava, Production, Gross margin, Profit, KogiState

Introduction

Cassava is one of the major root crops grown in Nigeria. The production of it is concentrated in the hands of numerous small scale farmers found mostly in the southern and central regions (FAO, 2004). It is a crop of the humid and sub- humid areas and so its cultivation is not significant in the semi-arid zone of Nigeria (Amans *et al*., 2004). In the semi-arid zone, the mean yield of cassava is below 10 tones per hectare as compared to yields of more than 20 tones per hectare that is obtainable in more humid areas (APMEU, 1997). Cassava is a basic crop for many households in Nigeria because of its' starchy roots which are valued as food and industrial raw materials. The roots are processed into several food and industrial products. One of such products obtained from the processed roots is flour. The flour is important food stuff in many homes in Nigeria. It is mixed with maize flour and steamed to make a thick paste which is eaten with soup or stew (Uguru, 1996). More- over, the flour is increasingly being used with wheat flour in bakery and fast food industries. The roots are also processed into *garri*, *lafun* and *akpu* (Nwakor *et al.*, 2007). The roots of the sweet varieties are eaten raw, roasted or boiled. The peels and flesh are used as animal feed (Aduku, 2004). Cassava tubers are made into chips and pellets which are also used in feeding animals. Cassava starch is used as binding agent in production of papers and textiles. The leaves are consumed as vegetable which provides protein, minerals and some vitamins (Bokanga, 1994). Famine is rare where cassava is widely grown since it provides a stable base to the food production system and has the potential to bridge the food gap (Nweke et al., 1992).

Profit is the difference between total cost and total revenue (Upton, 2005). In other words, it is the excess of revenue over cost and so it is a residual income which can be positive or negative. It is the reward for decision making and the risk bearing function of the entrepreneurs (farmers). Thus, profit and the profit motives play a growing role in the efficient allocation of scarce resources (Hirschey, 2006). Profit can be estimated via gross margin. Gross margin is obtained by taking total variable cost from total revenue (Upton, 2005). The actual farm profit is the net margin which is the gross margin minus total fixed cost. (Olorunsanya and Akinyemi, 2004). Gross margin is a good planning tool because it can be used to rank enterprises for

profitability. The existence of profits determine the type and quantity of goods and services that are produced and sold as well as the demand for various factors of production (McGuigan*et al.*, 2005). A good profit is an indication of the success of decisions made by the entrepreneurs. It is also available for business expansion. It is as a result of the crucial roles that profit play in agricultural production that the study was carried out. The specific objectives of the study were to estimate the profitability of cassava production and determine the factors that affect profit in cassava production.

Materials and Method

The study was carried out in KogiState of Nigeria between June and November, 2011. The State is located between latitude $6^0$30'N, and $8^0$50'N and Longitude $5^0$51'E and 8^0.00'E (KOSEEDS, 2004). The State has a total population of3,278,487 people based on the 2006 population census which is made up of 1,691,737 males and 1,586,750 females (KOSEEDS,2004).

A multistage random sampling was used to select the respondents for the study. In stage one, three agricultural zones out of the four agricultural zones were purposively selected for the study because cassava production was dominant there. In stage two, two Local Government Areas were selected from each of the selected agricultural zone. In stage three, four communities were selected from each Local Government Area making eight settlements from each agricultural zone. In stage four, a sample of 15 cassava farmers were selected from each community. The sample was made up of 120 cassava farmers from each agricultural zone and a total of 360 cassava farmers for the State.

A well structured questionnaire was used to collect the primary data that were used for the study. Information collected was on the quantity and cost of variable and fixed inputs such as family labour, hired labour, fertilizers, herbicides, cassava stems, transportation, tractor services, hoes, cutlasses, wheelbarrows, sacks and the output of cassava root tubers and revenue generated from the sale of the root tubers and the stems.

The first objective of estimating the profit in cassava production was achieved by preparing enterprise budget for one hectare of cassava. To prepare the budget, all the inputs used in cassava production by the farmers

and their value were obtained. Cost of labour, fertilizers, herbicides, cassava stems, transportation (variable cost) and depreciation of farm tools (fixed cost) were assembled. The total cost of each of these cost items was divided by the total number of hectares to get the cost per hectare. Revenue obtained from the sale of cassava root tubers and stems were summed up to get the total revenue and this was divided by the number of hectares to obtain the revenue per hectare. The gross margin was arrived at by taking the total variable cost from the total revenue. The net margin or farm profit was obtained by taking the depreciation of farm tools or fixed cost from the gross margin. The models of the gross margin and the net margin used were:

GM = TR – TVC---------1

NM = GM – TFC (depreciation or fixed cost) ----------2

Where:

GM = Gross Margin, TR = Total Revenue, TVC = Total Variable Cost, NM = Net Margin and TFC = Total Fixed Cost or depreciation.

Profit function analysis was used to determine the factors that influenced profit in cassava production. Linear, semi-log and double-log functional forms were used to estimate the profit function. The explicit forms of the linear, semi-log and double-log profit function models used were:

Linear

$\prod^* = b_0 + P_y + b_1p_1 + b_2p_2 + b_3p_3 + b_4p_4 + b_5p_5 + b_6p_6 + e$----------3

Semi-log

$\prod^* = Lnb_0 + LnP_y + b_1Lnp_1 + b_2Lnp_2 + b_3Lnp_3 + b_4Lnp_4 + b_5Lnp_5 + b_6Lnp_6 + Lne$-----4

Double-log (Cobb-Douglas)

$Ln \prod^* = Lnb_0 + LnP_y + b_1Lnp_1 + b_2Lnp_2 + b_3Lnp_3 + b_4Lnp_4 + b_5Lnp_5 + b_6Lnp_6 + Lne$--5

Where: $\prod^*$ = amount of maximum profit of the i^{th} farmer; P_y = total revenue made by the i^{th} farmer; P_1 = cost of labour (naira); P_2 = depreciation of farm tools (naira); P_3 = cost of fertilizers (naira); P_4 = cost of herbicides (naira); P_5 = cost of cassava stems (naira); P_6 = cost of transportation (naira); b_0 = constant; $b_1 – b_6$ = estimated coefficients; Ln = natural logarithm and e = error term.

After the estimation, the linear function was selected as the lead equation because it has the highest coefficient of multiple determination (R^2) and F-ratio and all the coefficients of the explanatory variables were significant.

Results and Discussion

The estimated revenue, cost and profit are shown in Table 1. The returns or revenues obtained from cassava production were made up of money realized from the sales of cassava root tubers and stems. The total revenue generated from one hectare of cassava farm was ₦ 183,242.00 which was made up of ₦ 180,590.00 from root tubers and ₦ 2,652.00 from stems. The cost of production was made up of variable and fixed costs. The variable costs were made up of cost of labour, fertilizers, herbicides, cassava stems and transportation. Fixed cost was made up of depreciation of farm tools like hoes and cutlasses. The cost of labour was ₦ 38,031.00 or 54.2 percent of the total cost of production. This percentage is slightly lower than those of Anozie and Okoronkwo (2009) who found that the cost of labour occupied 61 per cent of the total cost of production in their study in Imo State, Nigeria. Labour is very important in cassava production because it makes other inputs to function properly.

Table 1: Cost and returns of one hectare of sole cassava production in KogiState

	Revenue and Cost Items	**Value (₦)**
A.	**Revenue**	
	Cassava roots	180,590.00
	Cassava stems	2,652.00
	Total revenue	183,242.00
B.	**Variable costs**	
	Labour	38,031.00
	Fertilizers	11,135.00
	Herbicides	2,407.00
	Cassava stems	10,000.00
	Transportation	6,043.00
	Total variable cost	67,616.00
C.	**Fixed cost**	

	Depreciation of farm tools	2,522.00
D.	**Total cost or total investment**	70,138.00
E.	Gross margin (**A-B**)	115,626.00
	Net return (**E-C**) or (**A-D**)	113,104.00
	Proceed per unit of investment	2.61

Source: *Field Survey Data, 2011.*

The cost of fertilizers, herbicides, cassava stems and transportation were ₦ 11,135.00; ₦ 2,407.00; ₦ 10,000.00 and ₦ 6,043.00 respectively (or 15.9; 3.4; 14.3 and 8.6 percent of the total cost of production respectively). The total variable cost was ₦ 67,616.00 (or 96.4 percent) of the total cost of production. The gross margin was ₦ 115,626.00. The fixed cost of production was ₦ 2,522.00 (or 3.6 percent) of the total cost of production. The net return or farm profit was ₦ 113,104.00 per hectare. The return per unit of investment was ₦ 2.61. This implies that for every naira invested in cassava production, the farmer made a profit of ₦ 1.61. This is a good return even though it depends on the price of cassava products.

The estimated profit function used to determine factors that influenced profit in cassava production is presented in Table 2. Linear functional form emerged as the lead equation because it satisfied all the econometric, statistical and economic criteria set for the study. It had the highest coefficient of multiple determinations (R^2) and F-ratio (5,701.31). Its coefficient of multiple determinations (R^2) was 0.99 meaning that the combined effects of the variable costs and depreciation of farm tools included in the linear function explained about 99% of the variation in the profit made by the farmers. F-ratio of 5701.31 was highly significant at 1 percent level implying that the model was significant in its entirety.

Table 2: Estimated profit functions for cassava production in the State

Variables	Linear ****	Double log	Semi-log
Constant b_0	846.790 (0.40)	-2.172* (-8.81)	-2138260* (-20.71)
Total revenue P_y	0.962* (153.57)	1.768* (62.85)	290304.6* (24.64)
Cost of labour b_1	-0.967* (-34.65)	-0.470* (15.98)	-85931.95* (-6.98)
Depreciation of farm tools b_2	-0.897* (-2.69)	0.034** (-2.10)	5606.253 (0.80)
Cost of fertilizers b_3	-1.029* (-17.80)	-0.10* (-7.15)	-658.973 (-1.16)
Cost of herbicides b_4	-1.180* (-4.76)	-0.003** (-1.69)	-2105.166* (-3.22)
Cost of cassava stems b_5	-0.493* (-4.76)	-0.150* (-6.51)	-12593.88 (-1.31)
Cost of transportation b_6	-1.020* (-7.25)	-131* (6.39)	27617.75* (3.21)
R^2	0.9913	0.9507	0.7570
R^2 Adjusted	0.9911	0.9497	0.7522
F-ratio (7,352)	5701.31	963.73	155.79
No. of observations	360	360	360

* Significant at 1 percent: t-table value=2.576
** Significant at 5 percent: t-table value=1.960
*** Significant at 10 percent: t-table value=1.645
**** Lead equation
Figures in parenthesis are t-ratios
Source: *Field Survey Data, 2011*
The lead equation is as follows:

$$\prod = 846.790 + 0.962y - 0.967p_1 - 0.897p_2 - 1.029p_3 - 1.180p_4 - 0.493p_5 - 1.020p_6$$
$$(0.40)\ (153.57)\ (-34.65)\ (-2.69)\ (-17.80)\ (-4.76)\ (-4.76)\ (-7.25) \text{-----6}$$

The estimated coefficient of total revenue (0.962) was positive, while the coefficients of the variable costs were negative. Specifically, the estimated coefficients of costs of labour (-0.967), fertilizers (-1.029), herbicides (-1.180), cassava stems (-0.493), transportation (-1.020) and depreciation of farm tools (-0.897) were negative and significant at 1 percent level of risk. The negative sign on these coefficients was a prior expectation and agreed with the findings of Nwosu (2007) who obtained negative coefficients for costs of labour (-0.084), fertilizers (-0.068), seed yam (-0.091), maize seeds (-0.067), melon seeds (-0.045) and land rent (-2.48) and positive coefficients for revenues from yam (0.049), maize (0.038) and melon (0.300) in a yam based crop mixture study in Imo State, Nigeria.All the variable costs and the

depreciation of farm tools had inverse linear relationship with profit. This means that extra expenditure on any of the inputs will reduce the level of profit by that amount. Specifically, one naira spent on an extra unit of labour will reduce the level of profit by 97kobo and an extra naira spent on herbicides will reduce the level of profit by N1.18.

Conclusion and Recommendations

Cassava production was profitable because a good return was made from the investment. The major inputs for cassava production were identified as labour, fertilizer, herbicide, cassava stem, transportation and farm implements because these inputs collectively determined 99 per cent of the profit made in cassava production. The cost of labour was more than half of the total cost of producing cassava.

In the light of the findings of this study, the following recommendations are made to boost cassava production.

1 Youths should be encouraged to stay in the rural areas to provide labour for cassava production. The encouragement can be in form of provision of infrastructure such as good drinking water, electricity and schools.

2 Fertilizer, herbicide and other farm inputs should be made available at affordable prices so that farmers can use them.

3 Good transport systems should be put in place so that farmers and farm produce can be cheaply transported.

4 Improved varieties of cassava should be produced and distributed to the farmers so that they can produce more cassava.

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