

Determinants and Uses of Farm Income from the Cassava Enterprise in Ondo State, Nigeria

T. E. Mafimisebi

*Department of Agricultural Economics and Extension, The Federal University of Technology,
Akure, Nigeria
E-mail: temafis@yahoo.com*

KEYWORDS Farmers. Credit. Cassava. Income Determinants. Income Uses

ABSTRACT The on-going campaign for increased production of cassava rests on peasant farmers for its success. One obstacle is the unavailability of credit for farm expansion and the need for farmers to prudently utilize income from the farm firm. The study therefore examines the determinants and uses of income generated from cassava cultivation. Descriptive statistics, budgetary analysis and multiple regression models were the tools utilized for data analysis. Empirical results show that cassava cultivation is profitable in the study area with gross revenue (GR), gross margin (GM) and net farm income (NFI) per hectare of ₦95,700.00, ₦90,133.74 and ₦88,319.18 respectively. NFI was determined by size of cassava farm, quantity of hired labour used, amount of capital invested on farm and the variety of cassava cultivated. These factors were significant at either 5% or 1% level and positively influenced income. Income generated was put to a variety of uses with family food consumption, children's school needs and purchase and maintenance of household assets accounting for about 40.0%, 28.2% and 7.7% respectively. Only 13.2% of income, considered insufficient for a reasonable farm expansion bid, was re-invested into the cassava enterprise. It is recommended that a special credit window be opened for cassava farmers if the desired boost in cassava production is to be achieved and sustained.

INTRODUCTION

The agricultural sector remains a dominant sector in the Nigerian economy in terms of its being a source of food and income to a large segment of the society (World Bank, 1993a). Agriculture is the main source of raw materials for several local industries. Therefore, productivity gains in agriculture are a *sine-qua-non* for self-sustaining economic development (Mafimisebi et al., 2004). Most arable farmers, who are the backbone of the Nigerian economy, are peasants and are poorly endowed in terms of resources (Akinwumi, 1999). Yet, they account for up to 95.0% or more of food produced for consumption in the country (Olayide, 1980; World Bank, 1993a and Olaitan, 2000). The inadequate use of improved inputs consequent upon the low resource endowment of the peasant farmers, has made Nigerian agriculture to remain at the rudimentary and traditional level. A fundamental requirement for correcting this problem is injection of investible funds into peasant agriculture. This is necessary because the needed funds cannot be provided by the resource-poor farmers owing to low productivity and widening demand-supply gap for loanable funds especially in the rural landscapes which is home to majority of the peasants (Olayemi, 1999; Akinrinola and Mafimisebi, forthcoming).

As a response to the problem of poor resource endowment, peasant farmers tend towards cultivation of crops that require very little investment during their gestation periods. A popular example of such crop is cassava, which has become a very important crop in Nigerian agriculture. Cassava was first introduced into Central Africa during the last part of the 16th century, into West Africa in the early 18th century and into East Africa in the early 19th century (Jones, 1959). Though relatively new in African agriculture, it has become very popular because of its ease of cultivation and adaptability to a wide variety of soils even the marginal ones (Hahn, 1994). Owing to the role of cassava in the African feeding pattern, it is often referred to as the "hunger crop" (World Bank, 1993b). All of Nigeria's production of the crop is hitherto consumed locally but the recent discovery of its potential as a foreign exchange earner, has led to strident calls to increase its cultivation.

The resource-poor peasant farmers are responsible for the expected boost in cassava production so that there can be enough for both domestic consumption and exportation to generate foreign exchange. Even though the responsibility of increased production of cassava placed at the door-step of the peasant farmers is to go along with increased soft loans from

institutional sources, not many farmers have been able to access the loans for some reasons. The most important of these reasons is the fact that the volume of credit available is limited relative to the number of loan seekers in the various sub-sectors of agriculture. Another incentive is that government, through the Accelerated Poverty Alleviation Agency (APAA), in Ondo State for example, offers to buy all cassava produced by farmers who find it cumbersome to go through the necessary arrangements for exportation of cassava produced by them. Since the Ondo State Government started the campaign for the promotion of cassava production in 2003, the APAA has not been able to meet the volume of cassava it targets to purchase from farmers. This compels it to look for sellers in the neighbouring states of Ekiti and Osun. The limitation of the flow of both formal and informal credit to farmers has been a major factor in this low response of farmers to the cassava production "revolution".

The alternative then is for farmers to look inwards by being more prudent with managing the income earned from the farm business. One way of doing this is to make sure that they generate close to, if not optimum returns, from their cassava farms and utilize the income in such a way that it leaves enough to plough back into their farm operations against the next farming season. By doing this, they will not always be on the look out for the often unavailable or available-but-inadequate agricultural credit from either formal or informal sources or both.

The general objective of this study is to examine the factors determining the magnitude of income generated from cassava farms and the application (uses) of the income. The specific objectives are to (i) describe the socio-economic characteristics of cassava farmers (ii) compute the level of profit generated from cassava farms and (iii) examine the uses to which income from cassava farms is put.

METHODOLOGY

Study Area and Sampling Technique: The study was carried out in three (3) Local Government Areas (LGAs) of Ondo State. A multi-stage sampling technique was used in the selection of respondents. In the first stage, three (3) LGAs were selected on basis of having the highest production figures for cassava in each of the three senatorial districts in the state. The LGAs

were Okitipupa, Akoko Northwest, and Ifedore. In the next stage, three farming communities were randomly selected in each of the LGAs using a list got from Ondo State ADP. This gives a total of nine (9) communities. Twenty (20) farmers were purposively selected on basis of having sole cassava plots. The purposive sampling of farmers having sole cassava was made possible by snowball method. In this method, the farmer that has just being interviewed was asked to identify one or two other farmers that had sole cassava plot(s) in the last planting season and the enumerators proceeded to interview the identified farmers.

Data and Data Collection Instrument:

Primary data was the major data used in the study. Data were collected by means of a well-designed questionnaire, which was pre-tested to increase its reliability. Owing to the low literacy rate of farmers, trained enumerators, who understood the local dialects, were used to administer the questionnaire on farmers. In all, 180 farmers were interviewed but only 146 completed the interview. Field data collection was carried between October and November, 2005.

Techniques of Data Analysis: Descriptive statistics such as frequency, percentages and tables were used to describe the socio-economic characteristics of farmers. The budgetary technique was employed in computing the income accruing to farmers from sole cassava production. The arithmetical relations used in capturing profit made are presented below in a step-wise fashion: Total Cost (TC) = Total Fixed Cost (TFC) + Total Variable Cost (TVC).....(1)
Gross Revenue (GR) = Total Farm Output (TFO) x Unit Price (UP).....(2)
Gross Margin (GM) = GR – TVC (3)
Net Farm Income (NFI) = GM – TFC.....(4)

Multiple regression analysis was used to isolate factors determining the magnitude of income generated from cassava production. The implicit form of the regression model is presented as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, m).....(5)$$

Where;

Y = net farm income (₦)

X₁ = farm size (ha)

X₂ = household size

X₃ = quantity of hired labour (in man days)

X₄ = farmers experience in sole cassava production (years).

X₅ = amount spent on other inputs (₦)

X_6 = number of farm and non-farm enterprises managed by the farmer

X_7 = variety of cassava cultivated, dummy; improved = 1, 0 otherwise.

m = random error

Four functional forms of regression model were fitted to the data collected and the best fit was selected based on established criteria. The *a priori* expectation was that b_1, b_2, b_3, b_4, b_5 , and b_7 were each greater than zero i.e. they should be positive while b_6 should be less than zero, i.e. it should be negative.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Farmers

Majority (71.0%) of the respondents, as shown in Table 1, were females. This lends credence to the assertion that the African farmer is a woman. It also confirms report from previous researchers that cassava production, processing and the marketing of its various products in Africa are dominated by females (IFAD, 1994; Mafimisebi, 2007). Also, a higher proportion (58.9%) of the sample farmers fell in the active age bracket of 30-50 years with the average age being 44 years. Most (64.9%) of the farmers were married. A high proportion (46.6%) of the farmers had only secondary education while another 29.5% had no formal education. The average household size was six (6) with household size class intervals of 3-6 and 7-10 having 37.0% a piece. Cultivation of other crops (47.9%) and petty—trading (36.3%) were the major other supplementary economic ventures engaged in by respondents. The other crops cultivated by respondents practising arable farming were maize, yam, vegetables, rice, potatoes, pineapples and banana/plantains.

Sole Cassava Farm Size

Majority (80.2%) of the farmers had farm sizes of less than 3.0 hectares while the balance

Table 1: Socio-economic characteristics of Cassava farmers

Variables and Categories	Number of Respondents
Sex	
Male	42 (28.8)
Female	104 (71.2)
Age (Years)	$X = 44$ years
<30	36 (24.7)
30 – 40	53 (36.3)
41 – 50	33 (22.6)
51 – 60	21 (14.4)
>60	03 (2.0)
Marital Status	
Single	42 (28.9)
Married	95 (64.9)
Divorced	09 (6.2)
Educational Status	
No formal education	43 (29.5)
Primary education	68 (46.6)
Secondary education	35 (24.0)
Household Size	$X = 6$
<3 persons	35 (23.7)
3 – 6 persons	54 (37.1)
7 – 10 persons	54 (37.1)
11 and above	03 (2.1)
Supplementary Occupation	
Artisanship	15 (10.3)
Livestock Rearing	08 (5.5)
Trading	53 (36.3)
Cultivation of other crops	70 (47.9)

Source: Survey data, 2005.

Note: 146 = 100%

The values in parentheses are percentages.

cultivated above 3.0 hectares (Table 2). All the sample farmers had a total farm size of 242.51 hectares giving an average farm size of 1.66 hectares per farmer. This shows that farm sizes are small in the study area probably because of the low level of mechanization of traditional agriculture or owing to land tenure problems.

For the peasants to be able to meet the target volume of production canvassed by the Nigerian Government, farm sizes for sole cassava have to be considerably expanded beyond the present level.

Cost Implications and Returns to Cassava Farming

The result of the budgetary model used to

Table 2: Distribution of farmers by size of sole Cassava plots

Farm Size (ha)	Number of Farmers	Total Hectarage	Average Farm Size (ha)
< 1.00	42 (28.8)	39.26	0.93
1.00 – 2.99	75 (51.4)	104.00	1.39
3.00 – 3.99	25 (17.1)	81.50	3.26
4.00 – 4.99	04 (2.7)	17.75	4.44
Total	146 (100.0)	242.51	1.66

Source: Survey data, 2005.

Table 3: Results of budgetary analysis per hectare of sole Cassava.

No. Item	Cost (₦)
1 Total Variable Cost (TVC)	1,786,512.20
2 Average Variable Cost (AVC) per hectare	7366.76
3 Total Fixed Cost (TFC)	43998.01
4 Average Fixed Cost (AFC) per hectare	1814.06
5 Gross Revenue (GR)	23,644,725.00
6 Gross Revenue per hectare	97,500.00
7 Gross Margin (GM) (item 5 – item 1)	21,858,213.00
8 Gross Margin per hectare	90,133.24
9 Net Farm Income (NFI) (item 7 – item 3)	21,418,285.00
10 Net Farm Income per hectare	88,319.18

Source: Survey data, 2005.

determine the level of profit earned from cassava farming in the study area is shown in Table 3. The AVC per hectare was ₦7,366.76 while the corresponding value for the AFC was ₦1,814.06. Thus, the ATC per hectare was ₦9,180.87. Compared with yam and maize which had ATC of ₦46,106.61 and ₦18,244.48 (Babalola, 2004), the level of ATC for cassava is small and more affordable by resource-poor farmers. Variable costs, which include cost of land clearing, ridging (in some places), planting materials, weeding and harvesting accounted for 80.24% of TC while FC took the balance. The GR, GM and NFI per hectare were ₦97,500.00, ₦90,133.24 and ₦88,319.18 respectively. This indicates that sole cassava is profitable in the study area. Also, this level of profit is considered high enough for the farmers to operate without having to depend on credit from any source if this income is judiciously allocated in such a way that a considerable proportion is re-invested.

Determinants of Income

The results of the regression analysis to isolate the determinants of income are shown in Table 4. The double-log form provided the best fit. Four of the explanatory variables; X_1 , X_3 , X_5 and X_7 were significant at the conventional levels of 5% and 1%. While X_1 , X_3 and X_7 were significant at 1%, X_5 was significant at 5%. The parameter estimates of each of these variables also carried signs, which conformed to *a priori* expectations. The results indicate that farm size, amount of hired labour, expense on sole cassava farm and variety of cassava cultivated, positively influenced farm income. Thus, the major determinants of income in sole cassava cultivation were these four factors. All the explanatory variables together explained about 68.0% of the variations observed in net income. The positive effect of adoption of improved varieties of cassava on yield has been earlier reported by Dipeolu *et al.* (2004) and this according to CBN (1999), was responsible for increase in production from 31 million tonnes in 1994 to 34 million tonnes in 1998.

Uses of Income from Sole Cassava

The uses to which farmers put the income generated from cassava cultivation are shown in Table 5. Majority of the farmers applied the income generated to satisfying varied needs. Three crucial needs; family food, children's school requirements and purchase and maintenance of household items, accounted for 40.0%, 28.2% and 7.7% respectively of income generated. This amounted to ₦35,124.54, ₦24,879.51 and ₦6,782.91 respectively. Only about 13.2% of the income, which amounted to ₦11,675.80, was

Table 4: Regression results of income determinants

Functional forms	Constants (b_0)	b_1	b_2	b_3	b_4	b_5	b_6	b_7	F ratio	R ²	DW
Linear	-76867.05 (0.786)	9642.11** (4.763)	-918.50 (-0.412)	2746.95** (3.042)	580.66 (0.812)	527.58 (0.789)	1009* (1.012)	889.04 (0.750)	18.42*	0.635	2.053
Semi-log	-8862.94 (0.766)	-19.51 (0.029)	329.28** (2.856)	200.40 (0.412)	400.93 (0.512)	5557.00** (4.175)	241.36 (0.461)	1241.42* (1.217)	14.00	0.605	1.841
Double-log	23914.39 (0.897)	2580.08** (3.143)	748.28 (0.617)	2276.95** (2.841)	-280.84 (-0.504)	1980.64* (1.796)	540.49 (0.679)	2538** (2.449)	24.79**	0.675	2.121
Exponential	87503.4 (0.227)	1.458E-02 (0.237)	620.41 (-0.972)	-1655.0* (1.093)	7103.22** (4.032)	20.05 (0.040)	36.83 (0.062)	47.65 (0.095)	11.9*	0.588	2.011

Source: Analysis of Survey data, 2005.

Note: *means significant at 5% while ** means significant at 1%

Values in parenthesis are t ratios

Table 5: Uses of farm income by farmers

Uses	No. of Farmers	Average Proportion of Income Used (%)	Proportion of Income (₦)
1. Family food needs	100	39.77	35,124.54
2. Children's school fees	78	28.17	24,879.51
3. Medical expenses	36	5.31	4,689.75
4. Plough back into farm work	82	13.22	11,675.80
5. Purchase and maintenance of household assets	49	7.68	6,782.91
6. Contributions / Savings	45	5.85	5,166.67
Total		100.0	88,319.18

Source: Analysis of Survey data, 2005.

ploughed back into sole cassava cultivation. This level of plough-back can be considered too low for the quantum of boost required in cassava production in Nigeria. This low amount of money re-invested in the cassava farms probably partly explains why farm sizes remain low for sole cassava compared with conventional cash crops. This bias against the cassava enterprise in the allocation of financial resources is probably also responsible for the continuous clamour for agricultural credit by the peasant farmers to be able to carry out their farm works.

CONCLUSION AND RECOMMENDATIONS

The present campaign to increase cassava production in Nigeria depends for its success on resource-poor peasant farmers who are constrained especially by insufficiency of funds. The agricultural loan promised farmers as a prerequisite to making the expansion in production successful, is limiting and cannot get to all farmers as and when due. Farmers who cannot get loan/credit or got sufficient amount, have to look elsewhere for funds. The study beamed its searchlight on the factors determining the magnitude of income generated from cassava production and the uses to which that income is applied by the farmer.

Empirical analysis shows that most of the farmers were females and majority of the respondents were married. The average size of the sole cassava farm is also considered small at 1.66ha. The cost implications for establishing a hectare of cassava was ₦9,180.82 while the profit generated was ₦88,319.18. The income earned was applied to varied uses and only 13.2% of it was re-invested on sole cassava farm. This level of plough-back is considered insufficient for any reasonable farm expansion programme to support earning of considerable foreign exchange from cassava exportation.

It is recommended that a special window be opened in the Agricultural Credit Agencies of the various State Governments specifically for cassava farmers. Part of this credit should be given in kind in form of improved planting materials and fertilizers while training in proper agronomic practices for cassava farmers should also be vehemently pursued by village extension agents. Farmers should also reshuffle their expenditure patterns and allocate more money for re-investment on sole cassava production. It is not proper to maltreat the "goose that lays the golden egg". This is what cassava is at present as income generated from it is far better than that of most arable crops.

REFERENCES

- Akinwunmi, J.A.: Mobilizing small-scale savings through co-operative savings and credit associations. Pp 6-11. In: *Mobilizing Savings Among Non-Traditional Users of the Banking Industry in Nigeria*. V.O. Akinyosoye (Ed.). Ibadan University Press, Ibadan (1999).
- Akinrinola, O.O. and Mafimisebi, T.E.: The Nexus between institutional attributes of formal institutional credit sources and credit acquisition: Empirical evidence from small scale farmers in southwest, Nigeria. *Journal of Food, Agriculture and Environment*, **5(1)**: (in press).
- Babalola, T.R.: *Gender Differences in the Productivity of Yam and Maize Farmers in Ondo State*. Unpublished project report, Department of Agricultural Economics and Farm Management, University of Agriculture, Abeokuta, Nigeria. P.46 (2004).
- CBN: *Statistical Bulletin and Statement of Accounts*. Central Bank of Nigeria, Abuja. (1999).
- Dipeolu, A.O., Ayinde, I.A., Adebayo, K., Oyewole O.B., Sanni, L.O., Pearce, D.M., Wandschneider, T.S., White, J.L. and Westby, A.: *Viability Analysis of Cassava Processing in South West of Nigeria*. Report submitted to the Department for International Development (DFID), Crop Harvest Research Programme (Project R7495), U.K. (2000).
- Hahn, S.K.: Root crops for food security in sub-saharan Africa. Pp 16-21 In: *Proceedings of the Fifth Triennial Symposium of the International Society*

- for *Tropical Root Crops*. M.O. Akoroda (Ed.). Campala, Uganda (1994).
- IFAD: *Multi-Stage Agricultural Development Project Interim Evaluation Report*, 2 Volumes, IFAD, Rome. (1994).
- Jones, W.O.: *Manioc in Africa*. Stanford University Press, Stanford California (1959).
- Mafimisebi, T.E., Okunmadewa, F.Y. and Oluwatosin, F.M.: Risks management and administration in crop enterprises by the Nigerian Agricultural Insurance Scheme in Oyo State, Nigeria. *The Ogun Journal of Agricultural Sciences*, **3(1)**: 26-44 (2004).
- Mafimisebi, T.E.: A comparative economic analysis of two cassava-based business activities exclusive to the female gender in Oyo State, Nigeria. *Journal of Agricultural Extension*, **10**: 24-31 (2007).
- Olaitan, S.O.: *Agricultural Education in the Tropics*. Macmillan Publishers, Hong Kong (2000).
- Olayemi, J.K.: The need to mobilize savings among non-traditional users of the banking industry. Pp 1-5. In: *Mobilization of Savings Among Non-Traditional Users of the Banking Industry in Nigeria*. V.O. Akinyosoye (Ed.). Ibadan University Press, Ibadan (1999).
- Olayide, S.O.: Characteristics, problems and significance of small farmers in Nigeria. Pp 1-15. In: *Problems and Prospects in Integrated Rural Development*. S.O. Olayide, J.A. Eweka and V.E. Bello-Osagie (Eds.), CARD, University of Ibadan, Ibadan (1980).
- World Bank: *A Strategy to Develop Agriculture in Sub-Saharan Africa and a Focus for the World Bank*. World Bank Technical Paper Number 203. Africa Technical Department Series (1993a).
- World Bank: *The Quiet Revolutionaries: A Look at the Campaign by Agricultural Scientists to Fight Hunger*. World Bank Development Essays No. 2 P (1993b).