

NET RETURNS TO CASSAVA-BASED CROP MIXTURES IN IMO STATE, NIGERIA**Obasi, P. C., A. Henri-Ukoha, O.N. Anosike; U.C. Ibekwe**Department of Agricultural Economics,
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ABSTRACT: *The study was carried out in Imo State, Nigeria. The primary objective of the study was among others to estimate the net returns to cassava based crop mixtures in the area. The multi-stage stratified random sampling technique was used in selecting a sample of ninety six respondents from the area. Data collected were analyzed using descriptive statistics and farm budget technique. The result of the analysis show that the net returns to cassava/yam/maize/melon crop mixture was ₦124,776.58, while the returns per naira invested by the farmer was 46k. The cassava varieties cultivated are TMS 419, TMS 30572, TMS 30555, TMS 4(2) 1425, TMS 98/002, NR 8083, NR 8082, NR 84292, NR 8212, IMO Best, and 98/0581. It was recommended that extension agents should encourage farmers to grow cassava/yam/maize/melon crop mixture since it gave both the highest net return and return per naira invested.*

KEYWORDS: Net Returns, Cassava-based, Crop mixtures

INTRODUCTION

Cassava (*manihot esculentum*) is a very important staple root crop in Nigeria. In Nigeria, cassava production is by far the largest in the world, a third more than production in Brazil and almost double the production of Indonesia and Thailand (FAO, 2004). Although Nigeria is the world's largest producer of cassava, production is largely by small scale illiterate and conservative farmers who cultivate the soil with rudimentary implements. The demand for cassava in developing countries is estimated to grow at 2% annually for food and 1.6% per year for feed, while total production is projected to reach 16.8million tons by 2020 based on current production rate (Mailumo *et al.*, 2012). This amount can only be achieved with the right cropping implements and methods. According to Keyser and Hahn (1985) and Hahn (1994), improvements in cassava production and processing techniques would greatly increase labour efficiency, income and living standards of producers and market opportunities and shelf life of the product. In addition, improvements in the cropping system will also boost productivity as well as enhance the net returns from the enterprise. Fakoyode *et al.*, (2008), observed that though cassava when cultivated as the sole crop result in high output, the greatest disadvantage of sole cropping is that in instances of pest and disease outbreaks, the farmer usually loses a significant part of his crop and sometimes loses all. In South East of Nigeria, there are essentially two types of cropping patterns involving cassava-based (cassava, maize, melon) and yam-based (yam, cassava, maize and melon). Other crops that may be found in this crop association are Okra, groundnut, cocoyam, pepper, tomatoes, and amaranths. In line with this, Nweke *et al.*, (1991) reported that cost and return estimates of cassava root production in South East Nigeria show that high root yields attained through adoption of improved field practices including high yielding varieties would not have had cost saving advantages at processing level. In view of the

fact that there is the dearth of literature on research studies on net returns to cassava based crop mixtures in Imo State, this study was therefore carried out to fill the gap.

MATERIALS AND METHODS

The study was conducted in Imo State, Nigeria. The State lies within latitudes $5^{\circ} 40'$ and $7^{\circ} 5'$ North and longitudes $6^{\circ} 35'$ and $8^{\circ} 30'$ East. It covers a land area of $7,480\text{km}^2$ with a population of 3,939,899 people (NPC, 2006). Five distinct soil types have been identified in the state and these include lithosols, alluvial soil, ferralithic soils, medium fine alfisols and clayey hydromorphic soils. The vegetation of the area is tropical rainforest which experiences soil erosion and degradation. The soil is slightly acidic with a pH of 5.0 to 5.5 (ISMANR, 1986). The state is characterized by tropical climate with high humidity and temperatures that range between 1500mm to 2300mm and 34°C to 37°C respectively (ISMANR, 1986). The occupation of the people is mainly agriculture. The system of land use in the state can be grouped into forest land, wood land and agricultural land. The state is divided into three main agricultural zones, namely Owerri, Okigwe and Orlu. It is further divided into 27 local government areas. The main crops grown in the area include cassava, cocoyam, yam, maize, melon, okra and vegetables (green, fluted pumpkin, water-leaf and bitter leaf). The live-stocks reared include; sheep, goats, fishes, pigs and poultry.

The multi – stage random sampling technique was employed in the selection of the respondents for the study. In the first stage, Imo State was stratified into three agricultural zones namely Owerri, Okigwe and Orlu. The second stage involved the random selection of two local government areas from each agricultural zone. In the third stage, four communities were randomly selected from each of the local government areas earlier selected, while one rural village was randomly selected from each of the communities. Finally, four farmers were randomly selected from each of the four selected rural villages from a list of cassava farmers supplied by staff of the Imo State Agricultural Development Programme (ISADP). This gave a sample size of ninety six respondents.

Data used for the study were collected from primary source using structured questionnaire. The variables on which data were collected include the production practices of farmers, cultivars of cassava planted in the area, size of farm land cultivated, quantity of inputs used, labour availability, revenue derived from nonfarm sources, prices of inputs used and outputs produced, quantity of output produced, and expenditure on farm inputs used. The prices of inputs used and outputs produced were based on the prevailing market prices in the study area during the 2013 cropping season. The prices are as specified: land rent at ₦1,196.72 per plot; labour wage rate at ₦1,500 per man-day; cassava cuttings at ₦500 per bundle; fertilizer at ₦96 per kilogram (or ₦4,800 per 50 kg bag); capital at ₦1.00 ; output price at ₦12.50 per kilogram. The period of the research covered the 2013 cropping season. Data were analyzed using descriptive statistical tools, gross margin analysis and net returns model. The estimates were obtained as expressed:

$$GM = TR - TVC$$

--- eqn1

$$\pi = GM - TFC$$

--- eqn2

Where,

GM = Gross margin

Π = Profit

TVC = Total variable cost

TFC = Total fixed cost

TR = Total revenue

The net return model is specified as follows

$$NR = TR - TC$$

--- eqn3

$$NR = \sum_{j=1}^n TVP_j - \{TVC_j + TFC_j\}$$

--- eqn4

$$NR = \sum_{j=1}^n P_j Q_j - \sum_{j=1}^m \{ \sum_{k=1}^z P_k X_k + \sum_{l=1}^z P_l F_l \}$$

--- eqn5

Where:

TVP = Total Value of Production

FC = Fixed Cost

j = jth respondent

n = number of respondents

P_j = Price of jth respondent's output

Q_j = Output of jth respondent

P_k = Price of the Kth variable input

X_k = Variable inputs

m = number of variable inputs

P_L = Price of the Lth fixed input

F_L = Fixed input

z = number of fixed inputs

The capital inputs were depreciated using the straight line method. The revenue generated through sale of cassava tubers and stems as well as other associated crops were estimated. The difference between the revenue generated and cost incurred was then calculated.

RESULTS AND DISCUSSION

Socio- economic Characteristics of Respondents

Table 1: Distribution of respondents by Socio-demographic Characteristics

Variables	Frequency	Percentage
Household Size (persons)		
1 – 4	12	12.5
5 – 9	51	53.12
10 – 14	30	31.25
15 – 19	03	3.13
Mean	8 persons	
Age (years)		
31 – 40	04	4.17
41 – 50	20	20.83
51 – 60	48	50.00
61 – 70	24	25.00
Mean	55.01 years	

Level of Education (years)

1 – 6	25	26.04
7 – 12	39	40.63
13 – 15	09	9.38
16 – 18	15	15.63
19 and above	08	8.32
Mean	8.4 years	

Marital Status

Single	04	4.17
Married	62	64.58
Widow/Widower	16	16.67

Gender

Male	75	78.13
Female	21	21.87

Years of Farming Experience

1 – 5	09	11.25
6 – 10	20	25.00
11 -15	26	32.50
16 – 20	18	22.50
21 – 25	07	8.75
Mean	10.50 years	

Source: Field Survey (2014)

Table 1 show that the mean household size was 8 persons. This may imply that the farmers may not need to spend so much money on hired labour since the family could provide the much needed labour input. According to Ibekwe *et al.* (2013), large household size provides a source of labour to the farm household. The table also shows that the mean age of farmers was 55.08 years suggesting that the farmers are mostly middle-aged. The implication of this is that food production will be greatly enhanced especially if the farmers are provided with the needed high yielding inputs. Apart from increase in labour supply, respondents within the productive age bracket are likely to adopt innovation more than the aged farmers (Obasi *et al.*, 2012). The mean level of years of education was 8.4years, implying that the farmers had basic education. The level of education of a person not only increases his farm productivity but also enhances his ability to understand and evaluate new production technologies (Henri-Ukoha *et al.*, 2011). It is expected that the level of education attained by a farmer not only increases his farm efficiency and productivity but also enhances his ability to understand and evaluate new production technologies (Obasi, 2007). The table further shows that 64.58% of the respondents are married, 4.17% are single, 16.67% are widows, while 14.58% are divorcees. The mean farming experience is 10.54 years suggesting that the farmers have ample years of experience in cassava production.

Further analysis of the data show that majority (46%) of the farmers practiced cassava/yam/maize/melon/cocoyam, 23% practiced cassava/yam/maize/okra/cocoyam, 13% practiced cassava/yam/maize/melon and cassava/maize/vegetable/okra respectively, while 5% practiced cassava/maize/vegetable/yam crop mixtures. None of the farmers interviewed practiced

sole cassava enterprise. The respondents may have engaged in mixed cropping so as to reduce the danger of crop failure usually associated with sole cropping, and to make for a balanced use of soil nutrients whereby deep feeder crops are combined with shallow feeder crops in association with a nitrogen fixing crop. The cassava varieties cultivated by the farmers are TMS 419, TMS 30572, TMS 30555, TMS 4(2) 1425, TMS 98/002, NR 8083, NR 8082, NR 84292, NR 8212, IMO Best, and 98/0581.

Net Returns to Cassava Cropping Systems

Cassava/Yam/Maize/Melon Crop Mixture

Table 2: Income and expenditure analysis for Cassava/Yam/Maize/Melon crop mixture

Item	Quantity	Unit Price(₦)	Value(₦)/ha
Revenue			
Cassava tubers	14.5 tonnes	12,500	181,250
Cassava cuttings	102 bundles	500	51,500
Associated crops			162,000
Total Revenue			394,750
Expenditures			
Variable cost			
Planting materials			42,633.73
Fertilizer	8 bags of 50 kg	4,800	38,400
Cost of Labour			
(i) Land clearing	12 man-days	1,500	18,000
(ii) Land preparation	20 man-days	1,500	30,000
(iii) Weeding	16 man-days	1,500	24,000
(iv) Fertilizer application	8 man-days	1,500	12,000
(v) Harvesting	20 man-days	1,500	30,000
(vi) Staking	11 man-days	1,500	16,500
(vii) Planting	15 man-days	1,500	22,500
Total cost of labour			153,000
Total Variable Cost			234,033.73
Gross Margin			160,716.27
Fixed Cost			
Land rent per year			29,580.56
Depreciation on capital			6,359.13
Total Fixed Cost			35,939.69
Total Cost (TFC + TVC)			269,973.42
Net Farm Income (TR – TC)			124,776.58
Return per Naira invested			0.46 or 46k

Source: Field survey data, 2013.

1USD = ₦167.5 as at 6th January, 2015

Table 2 shows the income and expenditure analysis for cassava/yam/maize/melon crop mixture. The analysis show a total revenue of ₦394,750 and a total cost of production of ₦269,973.42. The net farm income was ₦124,776.58. Total variable cost constituted 87% of the total cost of

production while the total fixed cost contributed 13% of the total cost of production. The return per naira invested was ₦0.46. This result indicates that cassava/yam/maize/melon crop mixture has both the highest net return, and return per naira invested and therefore ranked first among the cropping systems practiced by farmers. The income and expenditure analysis for cassava/yam/maize/melon shows a total revenue of ₦385,000 and a total cost of production of ₦287,911.16. The gross margin for the enterprise was ₦134,595. The total fixed cost amounted to ₦37,506.16 which shows 13% of the total cost of production. The net farm income was ₦97,088.84. The analysis shows that the cropping system is profitable and ranked second. Similarly, the income and expenditure analysis of cassava/yam/maize/okra/cocoyam crop mixture gave a total revenue of ₦357,000 and a total cost of ₦262,975.76. Total fixed cost was ₦30,088.53 while the total variable cost was ₦232,887.23. The net farm income was ₦94,024.24. This result implies that cassava/yam/maize/okra/cocoyam crop mixture is profitable and was ranked third among the existing cropping systems adopted by farmers in the area. The total revenue for cassava/yam/maize/melon/cocoyam crop mixture was ₦368,000 and the total cost of production was ₦278,643.91, while the net profit was ₦89,356.09. The total variable cost and total fixed cost were ₦239,015 and ₦39,628.91 respectively. The total variable cost on farm inputs are; planting materials (₦46,115 or 19%) and fertilizer (₦38,400 or 16%), land preparation (₦37,500 or 17%) and weeding (₦24,000 or 10%) respectively. The return per naira invested was ₦0.32. The result suggests that the crop mixture is profitable and ranked fourth among the existing cropping systems practiced by the farmers.

CONCLUSION

Based on the results of the analyses which showed that the net returns to cassava/yam/maize/melon; cassava/yam/maize/vegetables; cassava/yam/maize/okra/cocoyam; and cassava/yam/maize/melon/cocoyam crop mixtures are ₦124,776.58; ₦97,088.84; ₦94,024.24 and ₦89,356.09 respectively, we therefore concluded that the four crop mixtures are profitable and can be embarked upon by farmers.

RECOMMENDATION

It was recommended that extension agents should encourage farmers to grow cassava/yam/maize/melon crop mixture since it gave both the highest net return (₦124,776.58), and return per naira invested (0.46).

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