Analysis of Yam Production in Ondo State, Nigeria

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Abstract: **- The study analyses determinants and profitability of yam production in Ondo State. A well-structured questionnaire was used to collect primary data. A multi-stage sampling technique were used to select respondents in the study area. The results shows a positive relationship between the amount realized from sale of yam output and the explanatory variables such as clearing cost(0.219), heaping cost(8.693), staking cost(1.241), cost of yam setts(3.925) and harvesting cost(5.383). The result also shows an inverse relationship between transportation cost (-1.185) and amount realized from sales of yam. The R^2 value of 0.898 indicating 89.8 % of the variance in the dependent variable is explained by the explanatory variables. The result of the socio-economic characteristics shows that 63.3% of the farmers were in their active age of not more than 45year, 66.7 % were male, 83.3 % married, 91.7% had one form of education or the other, 58.3% had contact with extension agents and 76.7% cultivated above 1ha of land. The gross margin analysis revealed that yam production had a positive gross margin of ₦31,981.66the implication of this is that yam production in the study area is profitable and a return on investment of ₦1.40 shows that on every ₦1 invested, 40 kobo is realized.**

Keywords: **Production, Efficiency, Profitability, Regression**

I. INTRODUCTION

Yams are among major cash and most consumed food crops in West African countries (GTZ, 1999)like Nigeria (Babaleye, 2005; National Bureau of Statistics, 2012. Therefore, the place of yam in the diet of people in West Africa in general and Nigeria in particular cannot be overemphasized. Yams are the fifth most harvested crops in Nigeria, following after cassava, maize, guinea corn, and beans/cowpeas. More so, after cassava, yams are the most commonly harvested tuber crops in the country (National Bureau of Statistics, 2012). According to Reuben and Barau (2012) yam contributes more than 200 dietary calories per capita daily for more than 150 million people in West Africa and also an important source of income generation and trade. Yam also has an important social status in gathering and religious functions which is assessed by the size of yam holdings one possesses. Yam production in Nigeria contributed over 65% of the world production in 2008 (FAO. 2010). The nation's yam production is estimated at about 38.92 million metric tonnes annually. (FAO. 2008). The crop constitutes a major staple food for the Nigerian population. Besides, yam grower could make an important contribution to the national food supply where a healthy and expanding market food crop industry is a safeguard against the lowering of health standards necessary for productive output in an expanding economy like ours (FAO. 2011).

Despite the importance of yams to people, the attention to its production is still questionable (Verter and Bečvařova, 2014).It is therefore necessary to lower its cost of production and scale up its production resources.)It is also important that yam profitability be accessed. (Babaleye, 2005,Ajijola et al 2014)

1.1 Yam production in Nigeria

In Nigeria, labour demand for yam production ranged from 300 to 400 man-days per hectare at costs of N30, 000.00 - N40,000.00, which is equivalent to $375-$500.US Dollars. From empirical point of view, about 10,000 normal size (150-250g) seed yams are required to cultivate an hectare for yam production. Hence, at N15.00 per seed yam, a total of N150, 000.00 ($1875.00) was required for planting materials. However, under the mini-setts as many as 60,000 mini-setts of 25-30grams are required to plant one hectare for seed yam production. A study has shown that about 35-50% of the total production cost is constituted by planting material (Orkwor, 1998 and Spore, 2011).Tab. I presented data available from FAO (2013) which shows the trends in annual yam production in the world and the three largest producers between 1961 and 2012. The area harvested in the world has increased from 1.15 million (Ha) in 1961 to 5.04million (Ha) in 2012. Yield (Hg/Ha) in the world also increased from 72.35 thousand metric tons in 1961 to 116.65 thousand metric tons in 2012. Over 58. 8 million tons of yams were produced in the world in 2012, out of which 92.2% were from West Africa. Nigeria accounted for over 65% (38 million metric tons) of the world yam production. Valued at $7.75 billion and cultivated about 2.9 million hectares of land in 2012. While trailing second and third positions by a wide margin were Ghana (6.6 million metric tons) and Cote D'Ivoire

I: ***Annual Yam production in the world, Ghana, Cote d Ivoire, Nigeria, (1961–2012)***

Yams Elements Areas	**1961**	**1980**	**1985**	**1990**	**1995**	**2000**	**2010**	**2012**
Area Harvested (Ha, 1,000) World	1,151	1,362	1,778	2,247	3,228	4,032	4,942	5,037
Area Harvested (Ha, 1,000) Cote d Ivoire	150	225	255	319	370	505	830	835
Area Harvested (Ha, 1,000) Ghana	150	113	178	119	176	261	385	426
Output in MT								
Production (MT million) World	8.32	12.01	12.11	21.76	33.24	39.55	53.60	58.75
Production (MT million) Cote d Ivoire	1.15	2.41	2.65	3.17	3.62	4.45	5.39	5.67
Production (MT million) Ghana	1.10	.650	.987	.877	2.13	3.36	5.96	6.64
Production (MT million) Nigeria	3.50	5.25	4.74	13.62	22.82	26.21	34.16	3800
Production (% of the world)Nigeria	42	44	39	63	69	66	64	65
Yield								
Yield (Hg/Ha) World	72,345	88,155	68,138	96,902	102,999	98,088	108,471	116,648
Yield (Hg/Ha) Cote d Ivoire	76,667	106,978	103,781	99,609	97,751	88,172	65,000	67,960
Yield (Hg/Ha) Ghana	73,333	57,522	55,449	73,451	120,710	128,847	154,841	155,717
Yield (Hg/Ha) Nigeria	77,778	105,382	56,405	106,771	107,734	98,984	119,073	131,034
Yield (MT/Ha) Nigeria	7.8	10.5	5.6	10.7	10.8	9.9	11.9	13.1

Source: FAOSTAT, 2013

This research is therefore imperative due to the rising cases of factors influencing yam production and revenue realizable from its production. One of the assumptions underlying factor product relationship is that farmers are aiming at maximizing their profits. Profit is the gain from a business venture and indicates the difference between its cost and revenue. In any production venture, a high profit and margin has always suggested efficiency. Many researches on yam in the past had considered profit maximization among the famers, some on output maximization, few were particular on Ondo State and non in the study area. However, it has been reported that yam output in Ondo State has declined in the last decade. What had depreciated the desire of farmers in the state to expand yam Production? This conviction led to the purposive isolation of profitability as item of interest in yam production with a view to generating data that would support informed judgment.

It is thus important that the profitability of its production be assessed. It is obvious that there is a potential for the increase in its production and much can be done to derive foreign exchange from its export (Ebewore et al., 2013).

Boosting yam production could lead to an improvement in the food production level of the nation. This, however, requires that resources be used efficiently to achieve optimum production. Thus, it is expected that the finding of this research would help in providing information and probably, solution to the declining yield of yam by identifying problems associated with yam production, prospects and potential areas of improvement. It is also expected that the research work will serve as a guide to farmers currently engaged in yam production to determine the actual level of their profitability and performance. Similarly the research work will be valuable to Government on the basis of rational and empirical policy formulation with respect to yam production. Finally, it is hoped that this research work will be of assistance to researchers who will identify other areas for further improvement in yam production.

1.2 Objective of the Study

The main objective of the study is to determine the factors responsible for yam production in the study area. The specific objectives are;

i. to ascertain the socio-economic characteristics of yam farmers in the study area
ii. to determine the profitability of yam production in the study area.

II. METHODOLOGY

2.1 The Study Area

The study was conducted Owo and Ose local government areas of Ondo State,Nigeria. These local governments are located in Ondo North Senatorial District of the state. The State is bordered by Edo State, Osun State, Ekiti and Kogi States. The environmental condition of the State is favorable for certain agro economic activities and animal rearing such as

poultry, piggery and fishing. Hence, the major occupation of people in the state is farming.

2.2 Data and Sampling Technique

The data used for this study were essentially from primary source, the data were collected with the use of well-structured questionnaires. Other sources of data collection were online journals (secondary data). Multistage random sampling techniques were used to select 120 respondents for the study. The first stage involve the purposive selection of Owo and Ose local government due to the intensity of yam production in the two local governments in the State. In the second stage, five (5) villages were selected from each of the local governments to make a total of ten (10) villages. In the third stage, yam farming households were purposely selected, while in the fourth stage (12) yam farming households were randomly selected from each of the villages, making a total of one hundred and twenty (120) respondents.

III. ANALYTICAL TECHNIQUES

The data collected were subjected to descriptive, regression and gross margin

3.1 Model Specification

3.1.1 Descriptive Analysis

Tools such as table, frequency distribution and percentage were used to analyze and categorize the socio-economic characteristics of the respondent.

3.1.2 Regression Analysis

An ordinary least square (OLS) regression analysis was used to analyze the determinant of yam production in the study area

Specifically, the model is explicitly specified as;

$LnYi = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 - \varepsilon_1$

Where;

Y = revenue from yam produce (₦)

βo = constant estimate for efficiency model

X_1-X7 = efficiency parameters

X_1 = land area cultivated (ha)

X_2 = labour cost (₦)

X_3 = cost of land preparation (₦)

X_4 = cost of yam sett (₦)

X_5 = cost of weeding (₦)

X_6 = harvesting cost (₦)

X_7 = transportation cost (₦)

ε_1 = error term

3.1.3 Gross Margin Analysis

The gross margin analysis was used to determine the profitability of yam production in the study area.

Gross margin analysis is defined as the difference between total revenue and total variable cost.

Mathematically expressed as;

a. GM = TR – TVC = P×Q – TVC

Where; TR = total revenue

TVC = total variable cost

P = price unit of yam

Q = number of yam

Total revenue (TR) is the product output of yam while the total variable cost (TVC) is the aggregation of the cost of land preparation, planting materials, yam seeds, planting, weeding, mulching and harvesting.

b. Net Farm Income:

The net farm income is the difference between the gross margin (GM) and total fixed cost (TFC)

Mathematically,

NFI = GM - TFC.

IV. RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Famers

The socio-economic characteristics of the respondent considered include age, gender, marital status, educational level, area cultivated and extension contact. The result of the analysis are presented in Table 1

Age: The age distribution of respondent as shown in Table 1 revealed that farmers whose age were below 30 year were 20%, those between 31-45years were 43.3% while those between 46 – 55 years were 36.7%. The mean age was 21.67years. The implication is that most of the yam farmers in the study area are in their active age. The study however agrees withthe findings of Zaknayiba and Tanko, 2013. Rahman et al (2013) which showed that farmer's age may influences productivity. Ebewore (2012) also made similar observation among cocoa farmers in Edo and Ondo state.

Gender: the gender distribution indicated that there are more maleyam farmers than their female counterparts 66.7% were male, while 33.2% were female. This study agrees with the findings of the National Population Commission (NPC) (2006) who found out that men dominate the work force in Nigerian agricultural communities. This is so also because yam production is highly energy demanding activities, which requires men who are naturally endowed with abundant strength necessary for such job.

Marital Status: The table also revealed that majority (83.3%) of the respondent were married, while 16.7% were single.

This study agrees with the findings of Oderhohwo (2008). While only 16.7%. This findings can be attributed to the fact that more hands are required in yam production.

Educational Level: Result in Table 1 also shows the distribution of respondents according to their educational level 8.3% of the respondent had no formal education, 23.3% had primary education, and 40.0% had secondary education while 28.3% had tertiary education. The result indicated that majority 91.6% of the respondent had one form of formal education while and 8.3% had no formal education.

Extension contact:

Table 1 shows that majority (58.3%) have no contact with extension agent while 41.7% had contact with extension workers. This implies that majority of the yam producers in the study area do not have access to recent technologies on the best practices in the study area, this has a serious implication on their productivity

Farm size:

Result as presented in table 1 shows that 76.7% cultivated above one hectare of land, while 23.3% cultivated less than one hectare. This shows that the farm size is relativity large this is advantageous because to a large extent, farm size determines output level.

4.1 Socio-Economic Characteristics of Famers

Socio-economic variables	Frequency	Percentage	Mean
Age			
< 30	24	20.0	
31 – 45	52	43.3	
46 – 55	44	36.7	
	120	**100.0**	
Gender			
Male	80	66.7	
Female	40	33.3	
	120	**100.0**	
Marital status			
Married	100	83.3	
Singled	20	16.7	
	120	**100.0**	
Educational level			
No formal	10	8.3	21.67
Primary education	28	23.3	
Secondary education	48	40.0	
Tertiary education	34	28.3	
	120	**100.0**	
Extension Contact			
Yes	40	41.7	
No	80	58.3	
	120	**100.0**	
Area Cultivated			
< 1ha	28	23.3	
< 1ha	92	76.7	
	120	**100.0**	

Source: Field Survey Data, 2019

The Maximum Likelihood Estimate for Yam Production in the Area

Table 4.2 contains the results of the maximum likelihood estimate for yam production in the study area. The estimated input parameters have the anticipated positive sign and magnitude. Variables with positive coefficients indicated that a unit increase in all of these variables implied increase in amount realized from yam sales, while those with negative signs implies a reduction in the revenue of yam.

All variables except the transportation cost were positively signed. The heaping cost, cost of harvesting and yam sett cost were positive and significant at 1% level, while the cost of weeding is also positive and significant at 10%, the implication of this is that, a unit increase in heaping cost, cost of harvesting, yam sett cost and cost of weeding will lead to 8.69%, 5.38%, 3.92% and 1.16% increase in revenue from yam respectively. However, the coefficients of the cost of clearing and staking were positive, though not significant in the analysis. The coefficients of the transportation costs were negative, indicating an inverse relationship with amount realized, as such, a unit increase in the cost of transportation will reduce revenue by 1.18percent.The R value of 0.948 is an indication of good fit for the model, the R^2 value which is the proportion of variance in the dependent variable that can be explained by the independent variables, has a value of 0.898 indicating that 89.8 % of the variance in the dependent variable can be explain by the explanatory variables.

Table 4.2. Distribution of the Maximum Likelihood Estimate for Yam Production in the Study Area

Variables	**Parameters**	**Coefficients**	**t- value**
Constant	*β0*	101.379	2.620
Cost of heaping	*β1*	8.693	12.791***
Cost of clearing	*β2*	0.219	0.269
Cost of staking	*β3*	1.241	1.391
Cost of planting	*β4*	3.328	0.418
Cost of yam setts	β5	3.925	6.096***
Cost of transportation	*β6*	-1.185	-1.628
Cost of harvesting	*β7*	5.383	3.148***
Cost of weeding	*β8*	1.161	1.696*

- 10 %, *** 1% significant level

Source; data analysis 2019

$R = 0.948$

$R^2 = 0.898$

4.2 Costs and Returns Analysis

The items of cost were classified into fixed and variables cost items. The return or revenue in the study area was realized from the sales of yam harvested from the farms by individual producers. The profitability of yam production enterprises were examined using cost and returns analysis. The estimated cost and returns of medium scale yam farmers in the study were as presented in below.

Average cost and returns per ha of yam produced

A) Average variable cost (AVC)

Labour Cost – ₦29 548.33

Yam setts – ₦28,066.67

Transport cost – ₦25, 600.00

TVC = ₦83,215

B)

Average fixed cost (AFC)

Land = ₦10,233.33

Equipment = ₦1,500

TFC = ₦ 11,733.33

TC = TVC + TFC

TC = 83, 215 + 11,733.33 = ₦94,948.33

Gross Margin (GM) = Gross Farm Income (GFI)- Total Variable cost (TVC)

115,196.66 – 83,215 = 31,981.66

Net farm income = GM–TFC =₦20,248.33

A simple straight line method was used in calculation the depreciation of the fixed assets

Depreciation of fixed asset

$$= \frac{\text{Cost - Salvage Value}}{\text{Useful Years}} = \frac{₦11,733.33}{3}$$

$$= ₦3,911.11$$

This implies that the farmer will have to save ₦3,911.11 yearly to purchase the fixed input when broken or damaged.

$$\text{BCR} = \frac{Benefit}{cost} = \frac{115,196.66}{83,215} = ₦1.40$$

Return on investment = ₦1.40

The return on investment indicated that on every ₦1 invested, 40kobo is realized

However, Yam production in the study area is profitable, this is because a positive gross margin of 31,981.66 realized. This study is in line with the findings of Folorunso et al. (2013) and Omojola and Joseph (2014).

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The study analyses some determinants of yam production and its profitability in the study area. The result of the socio-economic characteristics shows that 63.3% of the farmers were in the active age of not more than 45year, 66.7 % were male, 83.3 % married, 91.7% had one form of education or the other, 58.3% had contact with extension agents and 76.7% cultivated above 1ha of land.

The results of the regression analysis indicates positive relationship between the amount realized from sale of yam output and the explanatory variables such as clearing cost, heaping cost, staking cost, cost of yam setts and harvesting cost. While an inverse relationship exists between transportation cost and revenue derived from the sales of the yam. The R^2 value of 0.898, indicating 89.8 % of the variance in the dependent variable can be explain by the explanatory variables

The gross margin analysis revealed that yam production had a positive gross margin of ₦31,981.66 which indicates that yam production in the study area is profitable and a return on investment of ₦1.40 which mean that on every ₦1 invested, ₦1.40 kobo is realized.

5.2 Recommendations

Based on the findings of this study, following recommendations were suggested to improve yam output in Ondo State, Nigeria.

- It is recommended that policy that will encourage reduction in agrochemical price/ subsidies on agrochemical be considered so that farmers can afford it and reduce labour cost on weeding.
- It is recommended that more youth be encourage to reduce outmigration of labour from our villages
- It is recommended that more extension agents be deployed to rural areas to help improve on farmers productivity

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