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ANALYSIS OF NET RETURNS AND MEAN DIFFERENCE OF YAM PRODUCTION IN SOUTH-SOUTH REGION, NIGERIA

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ABSTRACT

Analysis of yam among smallholder farmers in the South-South Region of Nigeria was studied. Descriptive statistics, analysis of variance (ANOVA) and net returns model were used for analysis and two hundred and forty respondents selected through multi-stage sampling technique. Result of analysis showed that socio-economic attributes of yam farmers like age, sex, household size, educational level, marital status, farming experience, farm size, annual farm income type of cropping, mode of farm operation, and source of labour affected yam production in the region. The net returns of yam production across the six states showed that Cross River State recorded the highest net returns of ₦176, 460 (\$117.64), as against Akwa Ibom and Bayelsa States with ₦115,580 (\$77.05) and ₦110,870 (\$73.91), respectively. This is as a result of relatively low production cost because of cheap labour (family labour) for production of yam in the areas. The overall result shows that yam production in the South-South region of Nigeria is a viable and profitable enterprise. The ANOVA produced f-cal value of 0.697 compared with the f-critical value of 3.07, which implied that there were no significant differences in net returns of yam producers in the Six States of the region. The overall result shows that yam production in the region is profitable because of the average revenue of ₦115,878.33(\$77.12) per hectare. There were no significant differences in net returns of yam producers in the Six States sampled. This is because of the fact that the net returns across the six States studied are infinitesimal. It can be further concluded that the net returns of yam producers in the six States are statistically equal. The following recommendations were made based on the findings of this study: extension services and subsidies, grants and soft loans should be provided to yam farmers to boost profit. Emphasis should be placed on modern farming techniques, pest and disease management to boost profit of yam production. Also investing in rural infrastructure, particularly in storage facilities and transportation, can significantly reduce post-harvest losses and ensure that yams reach markets in optimal condition. Improved road networks will also ease the transport of inputs and produce, reducing costs and increasing market access. Encouraging policies that facilitate access to additional arable land for yam production could help address land shortages.

Key words: Analysis, yam production, south-south Nigeria, net returns socio-economic attributes

INTRODUCTION

Nigeria, the largest country in the African continent, is the world's largest producer of yam as at 2023, accounting for over 70–76 percent of the world production. Figures from the Food and Agriculture Organization (FAO), indicates that Nigeria produced 50,052.977 million tonnes of yam from 4,307,232.8 million hectares, representing sixty nine percent of total yam production in Africa, with value equivalent of US\$5.954 billion [1]. Nigeria's production is mind blowing when juxtaposed with the production of the world's second and third largest producers: Côte d'Ivoire and Ghana, respectively.

Yam (*Dioscorea species*) are annual root tuber-bearing plants with many species out of which six are socially and economically important in terms of food, cash and medicine [2]. Some of the yam species are water yam (*Dioscorea alata*), white yam (*Dioscorea rotundata*), yellow yam (*Dioscorea cayenensis*), Chinese yam (*Dioscorea esculanta*) and three-leaf yams (*Dioscorea dumetorum*). The king of crops as is known in Nigeria is a staple of Nigerian and West African diet, which provides some 200 calories of energy per capita daily [3]. The crop is deeply rooted in the socio-cultural fabric of most Nigerian communities [4].

In Nigeria, the production of yam is low and cannot meet the growing demand at its present level of production, given the exploding population [5]. This is in spite of the African and World's rating of the country in the crop production [6]. Socially, the crop is used in fertility and marriage ceremonies, and across the study area, yam festivals are held annually to herald its arrival and importance, showing also its ethnocentric leanings [7]. Yam is regarded as a source of food security, income, and used in festivities and employment to many Nigerians, hence derives its importance therein [8]. The crop is the major cash and most consumed food crop in the country, but its production is declining in some traditional yam-producing areas due to declining soil fertility, loss of land for cultivation, increasing pest pressures, declining producers, lack of incentives and the high cost of labor [9, 10].

Yam is consumed boiled or *fufu* (dough-like pounded yam eaten with soup) or fried in oil and then consumed. It is often pounded into a dough-like paste after boiling and consumed with soup [11, 12]. The importance of yam in the economy of some producing areas appears to be declining due partly to competition from other crops like cassava [13, 14]. Further exacerbating the problem of yam production, processes involved in its production from bush clearing, cultivation, chemical application, harvesting and transporting to markets, is labor-intensive, which is reducing in supply as a result of the quest for 'white collar' job [15]. Despite the large yam market in Nigeria and its socio-cultural significance, the yam value chain is rife

with challenges. These challenges, combined with the current economic condition across the country, affect the production of the crop.

Knowledge of the socio-economical attributes of farmers underscores the influence of the farmers' characteristics in any agricultural production. The selection of relevant attributes among smallholder farmers in this area of study would assist in proper comprehension of the economic analysis of yam production. The study is necessitated by these inherent problems in production of yam in the area and is guided by the following specific objectives:

- i. analyzes the socio-economic attributes of yam farmers in the area,
- ii. determine the net returns in yam production in the area and
- iii. estimate the difference in mean of the net returns in yam production between the states.

MATERIALS AND METHODS

Study Area

This study was carried out in the south-south region of Nigeria, West Africa. The region is one of the six geopolitical zones of the country comprising six states– Akwa Ibom with thirty one Local Government Areas (LGAs), Bayelsa with eight LGAs, Cross River with eighteen LGAs, Delta with twenty five LGAs, Edo eighteen LGAs, and Rivers State with twenty three LGAs. The south-south region of Nigeria has a total population of about 26 million people, representing around 12% of the total population of the country [16]. The south-south region is located within Latitude 6.2059° N and Longitude 6.6959°E of the Greenwich Meridian and stretches along the Atlantic Seaboard from the Bight of Benin coast in the East and is sometimes called the Niger Delta because of the extensive oil and natural gas reserves, which is instrumental in the environment and economic development of the region [17]. The region is purposely chosen for this study because of the preponderance of yam production, a factor that facilitated data collection.

Method of Data Collection and Sample Size

A multi-stage sampling technique was employed in selecting the respondents. This was to enable the survey to cover the entire region. In the first stage, two LGAs were purposively selected from each of the 31 LGAs of Akwa Ibom, 8 LGAs of Bayelsa, 18 LGAs of Cross River, 25 LGAs of Delta, 18 LGAs of Edo and 23 of Rivers states, respectively. The areas selected were noted for their predominant yam production activities, thereby giving a total of twelve LGAs from one hundred and twenty-three LGAs of the region. In the second stage, from 38 communities of Akwa Ibom, 10 communities of Bayelsa, 16 communities of Cross River, 22 communities of Delta, 19 communities of Edo and 28 communities of Rivers States, respectively, two yam producing communities were selected. This selection was done from each of the



LGAs earlier selected in stage two, making a total of 24 yam producing communities. Finally, ten (10) yam farmers were randomly selected from each community to give a total of 240 yam farmers. The selection was from a total of 521 registered yam farmers for Akwa Ibom, 264 registered yam farmers for Bayelsa, 340 registered yam farmers for Cross River, 390 registered yam farmers for Delta, 360 registered yam farmers for Edo and 378 registered yam farmers for Rivers States, respectively. The method used for the selection was select-and -no-replacement. Primary data for this study were collected using a set of structured questionnaires, which were earlier subjected to face and content validity by experts and reliability tests for consistency authentication.

Analytical Tools

Data collected on the socio-economic attributes of farmers and the cost and returns in yam production were analyzed using descriptive statistics, analysis of variance and net returns model. Socio-economic characteristics of the farmers were analyzed using descriptive statistics such as the mean and tables. The net return in yam production in the various states was analyzed with the net return model. The resultant net incomes in the six states were tested for significant differences using analysis of variance (ANOVA) techniques; specified below:

Analysis of Variance (ANOVA)

$$F = \frac{MSSB}{MSSW} = \frac{SSB/(n-k)}{SSW/(k-1)}$$

$$SSB = \sum_{l=1}^k n_j (X - X)^2$$

$$SSW = \sum_{nj} \sum_k (X_{ij} - X_j)^2$$

Where F = Value of which the statistical significance of the mean difference will be judged.

SSB = Sum of square deviations between the net returns of yam production in the six states.

SSW = Sum of squares deviations within the mean net returns of yam production in the six states.

SST = Total sum of squares of the net returns of yam production in the six states.

X_j = Mean level of net returns of yam production in the state J.

X = Grand mean level of net returns of yam production in the six states.

X_{ij} = its level of net returns of yam production in the state J.

n_j = Sample size of yam producers in the state J.

n = Number of observations in the six states.

k = Number of States.

The net return model

The net return model is generally specified as follows;

$$NR = TR - TC$$

Where: NR = Net return (in Naira)

TR = Total Revenue (in Naira)

TC = Total Cost (TVC + TFC) (in Naira)

RESULTS AND DISCUSSION

Socio-economic characteristics of yam producers

The socio-economic characteristics discussed in this chapter included age, sex, household size, educational level, marital status, farming experience, farm size, annual farm income, type of cropping, mode of farm operation and source of labour are shown in Table 1. The Table showed that the majority (64.5%) of the yam farmers examined were between the ages of 31-45 years. The mean age was 43 years, which implies that the majority of the farmers are within the active farming age. This result was consistent with the finding of Ettah, Ettah and Ukwuaba [3] who also found that the farmers they studied were within the same mean age (43 years) in this study, implying their activeness in providing labour and decision making. The result also showed that 66.16 % of the yam farmers were males, which meant that more males than females were involved in yam farming in the study area. This could be, as a result of the tediousness of the cultivation of this crop in the area being suited for the males and the belief in the area that that farm activity is masculine in nature [6].

The result further shows that the majority (50.83%) had a household size of 6-10 members, while 17.19 % had household size of 11 members and above. This result shows that 68.02% had a sizable household size to substitute for the cost of hired labour. This result is in consonance with the findings of Ettah *et al.* [3] who found that a higher proportion of the respondents had household size of 6-10 members. Educational qualification of the respondents showed that the majority (50.41%) had between 7 to 12 years of formal education and 13.33% had 13 to 18 years of formal education, while the remaining 6% had 18 and above years of formal education. This means that about 69% of the yam farmers had good education that will enhance adoption of new farming techniques that will facilitate efficiency and productivity. This result is in variance with the findings of Ettah *et al.* [3] who found that the majority of the farmers studied had no formal education and the findings of Omojola [11] also show that the majority of the respondents studied had only primary education.



The result for the farming experience of farmers further showed that those who had 31 years and above farming experience were in the majority (42.08%). Long experience would facilitate production [18] hence farmers in the area are expected to be highly productive. According to the table, the majority (43.75%) of yam farmers' farm size is 1.5-2.4 hectares and 33.75% had 0.5-1-4 hectares. This result means that 78.50% of the farmers are small scale farmers. This finding is also consistent with the findings of Wanasundera and Ravindran whose study showed that the majority of the farmers examined were also small-scale farmers [15].

Furthermore, the majority (70.83%) of the yam farmers received farm income of ₦100,001–₦250,000. This result shows how poor the income received from farming activities in the study area is, especially in this inflationary era in the area. Most respondents (88.5%) practiced mixed cropping. This result shows that a good number of farmers cultivate yam and other supporting crops which provides a useful deduction on efficiency of resource use in the study. However, the result contradicts the finding of Izekor and Olumese [14] whose study found that the majority of the farmers examined practiced mono cropping system. Again, the majority (72.91%) used simple farm tools in their farm operations. This result means that the majority of the farmers do not engage in new innovations in farm operation and their farm activities are still undertaken in crude and unproductive ways. Finally, 53.75 % of respondents used family labour and 32.5% made use of both family and hired labour. This high percentage of respondents who used family labour can be attributed to the large family size and high cost of hired labour in the area [7,19].

Net returns of yam production across the six States of the South-South of Nigeria

Table 2 showed the result of net returns of yam production across the six states. It could be deduced from the result that Cross River State recorded the highest net returns of ₦176, 460 (\$117.64) in yam production. This is slightly followed by Akwa Ibom and Bayelsa States with ₦115,580 (\$77.10) and ₦110, 870 (\$73.91) net returns respectively. These states seemingly have higher net returns as a result of relatively low production cost occasioned by the availability of cheap labour (family labour) for production of yam in the areas. The overall result according to the table below shows that yam production in the south-south region of Nigeria is a viable and profitable enterprise. This is collaborated by Ajah, *et. al.*, [21] who posited that any farm activity that returns more than ₦100,000.00 (\$66.67) per hectare per production cycle can be considered as productive and profitable [12, 14].

Test of significant differences in net returns of yam producers in the six states



The results in Table 3 showed that, the ANOVA model produced, f-cal value of 0.697 which was significant at 5% when compared with the f-critical value of 3.07, which implies that there are no significant differences in net returns of yam producers in the Six States of the South-South region of Nigeria. This stems from the fact that the net returns across the six States studied are infinitesimal. It can be further concluded that the net returns of yam producers in the six States are statistically equal [21].

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

The study on analysis of yam production in the south-south region of Nigeria was studied. Socio-economic attributes of respondents like age, sex, household size, educational level, marital status, farming experience, farm size, annual farm income type of cropping, mode of farm operation, and source of labour affected yam production in the area, leading to low income levels derivable from production. The net returns of yam production show average revenue of ₦115,878 (\$77.25) per hectare across the six states and hence can be considered a profitable enterprise. The result of ANOVA indicated a statistical equality, showing that there is no significant difference in the income of the various states of the south- south region. The following policy recommendations were proffered based on the result of the study: there is urgent need for the government to assist the yam farmers by providing direct extension services to cushion the processing inefficiencies faced by them and subsidies, grants and soft loan should be provided to enable yam farmers acquire new innovations in yam production.

Use of modern farming techniques should be encouraged like pest and disease management to boost profit of yam production. Investment in rural infrastructure, particularly in storage facilities and transportation, can significantly reduce post-harvest losses and ensure that yams reach markets in optimal condition. For instance, improving road networks will ease the transport of inputs and produce, reducing costs and increasing market access. Encouraging policies that facilitate access to additional arable land for yam production could help address land shortages.

Table 1: Socio-economic characteristics of farmers

Variable	Frequency	Percentage (%)	Mean
Age (years)			
15-30	35	14.58	
31-45	170	70.83	
46-60	21	8.75	
61 and above	14	5.83	
Total	240	100	43 (19.043)
Sex			
Male	154	64.16	
Female	86	35.83	
Total	240	100	
Household size (number)			
1-5	75	31.25	9 (5.121)
6-10	122	50.83	
11 and above	53	17.19	
Total	240	100	
Educational qualification (years)			
1-6	71	29.58	10 (5.183)
7-12	121	50.41	
13-18	32	13.33	
18 and above	16	6.66	
Total	240	100	
Marital status			
Married	142	59.16	
Not married	66	27.5	
Divorced	32	13.33	
Total	240	100	
Farming experience (years)			
1-10	14	5.8	9 (7.013)
11-20	39	16.25	
21-30	86	35.83	
31 and above	101	42.08	
Total	240	100	
Farm size (Ha)			
0.5-1.4	80	33.65	1.8 (1.145)
1.5-2.4	105	43.75	
2.5-3.4	41	17.08	
3.5 and above	14	5.82	
Total	240	100	
Annual farm income (₦)			
50,000 – 100,000	30	12.5	176,000 (107400)

100,001 – 250,000	170	70.83
250,001 – 300,000	23	9.58
300,001 and above	17	7.08
Total	240	100

Type of cropping

Mixed cropping	213	88.75
Mono-cropping	19	7.91
Others	8	3.33
Total	240	100

Mode of farm operation

Use of simple farm tools	175	72.91
Mechanized system	11	4.58
Both of the above	54	22.5
Total	240	100

Source of labour

Family labour	129	53.75
Hired labour	33	13.75
Both family and hired labour	78	32.5
Total	240	100

Source: field survey, 2024

Note, figures in brackets represent standard deviation

Table 2: Net returns of yam production per hectare and per production cycle across the six States

States	Akwa Ibom	Bayelsa	Cross River	Delta	Edo	Rivers
Total cost (₦)	155,720	171,420	115,640	158,570	161,490	169,490
Total revenue (₦)	311,300	282,290	292,100	249,570	271,100	261,240
Net returns (₦)	115,580	110,870	176,460	91,000	109,610	91,750

Source: field survey, 2024

Table 3: Results of analysis of variance for test of significant differences in net returns of yam producers in the six States

Source of variation	SS	Df	MS	f-cal	F-tab
Between States	36089	2	18019.5	0.697ns	3.07
Within States	2661018	102	25834.6		
Total	2697107	104			

Source: field survey, 2024.

ns = F-cal not significant at 5%, $f = 0.05 = 3.07$.

Note: exchange rate of Nigeria naira to US Dollar is ₦1500.00 to 1 (one) US Dollar



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