DETERMINANTS OF YAM PRODUCTION AND PROFITABILITY IN OBUBRA LOCAL GOVERNMENT AREA OF CROSS-RIVER STATE, NIGERIA.

S.O Mbah
Department of Agricultural Extension and Management,
Federal College of Agriculture, Ishiagu, Ebonyi State.
Email: samuchembah@gmail.com

ABSTRACT:

Information was gathered by means of structured questionnaire from one hundred and fifty (150) yam farmers in the study area. Data collected were analyzed using descriptive statistics, multiple regression analysis; costs and returns analysis, and profitability ratio analysis. Analysis of the socio-economic variables revealed that 81.33% of the farmers were in their economic active ages, and that both male and female were involved in yam production. Also, 82.67% of them had one form of formal education or the other. In the same vein, 96.67% of them were small-scaled with between 0.1-2.5 hectares. The regression analysis result showed that age, education, family size, farming experience, farm size, seed yam, marital status, and fertilizer have significant positive effects on the output of yam. The costs and returns analysis revealed that yam has become a luxury food in the market nowadays; rather than a staple; as a unit sales price of a kilogram of yam costs from ₦150.00 and above. Nevertheless, yam production enterprise is still a lucrative business in the study area; since a farmer on the average makes a net farm income of ₦158,500.00 per hectare; with a benefit-cost ratio of 1.71. The problems identified include: incidence of pests and diseases, inadequate capital, unimproved yam varieties, land ownership and fragmentation. It is therefore recommended that the government should come up with sustainable strategies to alleviate these problems of yam farmers in the study area.

***Keywords**: Determinants, Yam production, Profitability, Economic active ages, Fragmentation.*

INTRODUCTION:

Yam belongs to the genus "*Dioscorea*" and family "*Dioscoreaceae*" and is widely grown throughout the Sub-Saharan Africa (FAO, 2002). Yam (*DioscoreaSpp*) is among the oldest recorded food crops and ranked second after cassava as a major source of carbohydrates in the diet of Nigerians, and in West-African sub-region (Agwu and Alu, 2005). There are over six hundred (600) species of yam worldwide out of which only six are socially and economically important in terms of food, cash, and medicine (IITA, 2009). These are: white yam *(Dioscorearotundata)*, water yam (*Dioscoreaalata*), yellow yam*(Dioscoreacayensis)*, aerial yam *(DioscoreaBulbifera)*, Chinese yam*(Dioscoreaesculenta)*; and trifoliate yam (*DioscoreaDumentorum*) (Olubukola and Bolarin, 2006; and Zaknayiba and Tanko, 2013).

One of the principal tuber crops of Nigerian economy, both in terms of land under cultivation, and in the volume and value of production is yam (Bamire and Amujoyegbe, 2005). This implies that tuber crops such as yam has high relative value per unit of land used in their cultivation, when compared with other crops; particularly, the cereals. Although yams are grown throughout Africa, the West African yam belt accounts for 95% of the world yam output of 33 million metric tonnes, of which Nigeria is the largest regional and world producer, with yearly output of 27 million metric tonnes or 75% of the total output (FAO, 2002). Studies carried out at the National Root Crops Research Institute, Umudike (N.R.C.R.I, 1999), revealed that although Nigeria produces such a quantity, the annual demand for yam is estimated at 33 million metric tonnes, and this gap is still increasing with the annual increase in population (Ikeorgu and Igwilo, 2002).

Yam can be grown in nearly all the tropical countries, provided water is not a limiting factor. In Nigeria, it is grown within the coastal region up to latitude 12^0N, and corresponds to the rain forest, derived Guinea savannah and Southern Guinea savannah belts. This is the region where the annual rainfall ranges between 800mm-1500mm in amount, and 6-8 months in duration (Izekor and Olumese, 2011).

Agboola (1999) and Asiedu et al, (1996) asserted that the best location for yam production is the sub-humid Guinea savannah, followed by the humid-forest region, and then the transitional forest savannah zone. Though yam production has been enjoying prime position in the allocation of land for production throughout the country, the yield per hectare is highest in the eastern part of Nigeria, followed by the west and north respectively (Oluwasola, 1999).

Nigeria is the largest producer of the crop, producing about 34 million metric tonnes annually (FAO, 2008). Yam production in Nigeria has more than tripled over the last 45 years; from 6.7 million metric tonnes in 1961 to 36.72 million metric tonnes in 2006 (FAO, 2007) (Table I). This increase in output is attributed more to the large area planted with yam than increase in productivity (Nwosu and Okoli, 2010). Over time, there has been a general decline in yam production in Nigeria over the years. Maduekwe et al, (2000), Agwu and Alu (2005) and International Institute of Tropical Agriculture (2009) reported that both the area under cultivation and the total yam output were declining. The decline in average yield per hectare has been more drastic as it

dropped from 14.9% in 1986-1990, to 2.5% in 1996-1999 (CBN, 2002; Agbaje et al, 2005 and FAO, 2007) (Table I).

InObubra L.G.A of Cross River State, yam cultivation still depends largely on the labour intensive, traditional hoe-cutlass technique of production. Thus, many aspects of production such as clearing, planting, weeding, staking, and harvesting still require considerable input of labour (Ike and Inoni, 2006). The production and utilization of yam is declining in most producing areas mainly due to high labour demand and the delicate nature of the harvested crop. As rural labour becomes more scarce and expensive, the price of inputs increase, the cost of yam in the market also increases; thereby making it a luxury food, rather than a staple (Ike and Inoni, 2006). However, the small-scale farmers who produce the majority of crops need access to innovations, which will reduce drudgery and improve productivity at all levels.

Iduman et al (2014) and Shehu et al (2010) demonstrated that despite the high production cost, yam is still profitable. What about Nigeria? There is death of well articulated economic studies on yam production. Bechman (2005) assessed the problems and trends of yam holdings; while Eluagu and Chinaka (2006) were concerned with the economics of different staking methods. However, available production statistics indicated that the global yam production, especially in West Africa is probably not increasing and production relative to alternative source of food energy is increasing (Coursey and Nweke, 2009).

The yam crop is unique among the food crops in relation to the prestige it enjoys and the central role it plays in the socio-economic life of the people of South-west and South-east Nigeria (Hahn et al, 1995). In Nigeria, yam is part of the religious heritage of several tribes and often plays a key role in religious ceremony (Sanusi and Salimonu, 2006). In fact, many important cultural values are attached to yam, especially during wedding and other social ceremonies. In many farm communities in Nigeria and other West African countries, the size of yam enterprise that one has, is a reflection of the person's social status. Due to the importance attached to yam, many communities celebrate the "New Yam Festival" annually (Izekor and Olumese, 2011).

Yam can be eaten boiled, roasted, baked or fried. In Nigeria, yams are processed into different food forms, such as pounded yam, and eaten as "fufu" or "utara". Fresh yam tubers are also peeled, chipped, dried, milled into flour, which is then cooked in boiling water and turned into a thick paste called "amala" in Western Nigeria; and thereafter eaten with soup. In Cross-River and Akwa-Ibom States of South-eastern Nigeria, it is eaten in either boiled or roasted form; or in a special mashed preparation called "ikpankwukwo". However, among the Ijebus of South-western Nigeria, a similar preparation called "Ikokore" is common (Bamire and Amujoyegbe, 2005). Most of starch industries make use of yam as one of their most important raw materials. It also provides job opportunities and income to both the producers and the marketers. Yam peels serve as feed for livestock and as a good component of farm yard manure. It is also used in the laboratory as crop for scientific investigations.

Hence, it is envisaged that through this study, some useful information will be obtained which will stimulate yam farmers to increase production; thereby increasing their net income. It is therefore against this backdrop that this study was undertaken to describe the socio-economic characteristics of yam farmers; determine the effect of the variables on the output of yam; estimate the profitability or otherwise of yam production enterprise and identify the problems faced by yam farmers in the study area.

METHODOLOGY:

Study Area:

Obubra Local Government Area lies between latitude 6^0 $08^/$ North of the equator and longitude 8^0 $33^/$ East of the Greenwich meridian. It has a total land area of 1,115km^2 and an estimated population of 172,444 people (NPC, 2006). It falls within the tropical rainforest zone of the country's vegetation, with a mean rainfall range of 1,300mm-2,500mm. The temperature ranges between 21^0C-29^0C and with a relative humidity range of 70%-80%. Being an agrarian area, the main occupation of the people is farming. Among the crops grown are; cassava, yam, rice, maize, and vegetables though on a small-scale basis. They also grow; oil palm, cocoa, plantain and banana. Lumbering and fishing activities are also carried out too.

Sampling Procedure:

Date were collected from the yam farmers using a multi-stage sampling technique. This involved administration of a structured questionnaire which was distributed randomly to the respondents. Firstly, three (3) communities were randomly selected from the array of communities that make up the L.G.A because of their leading role in yam production. These three communities were; Adun, Okun and Osopong. Secondly, five (5) villages were selected randomly from each of the three (3) communities already selected in Stage I. Thirdly, ten (10) yam farmers were selected randomly from each of the fifteen (15) villages already selected in Stage II. This gave a total of one hundred and fifty (150) respondents that were reached, which also represent the sample size.

Analytical Techniques:

Data collected were analyzed using descriptive statistics, budgetary technique and profitability ratio analysis. In addition, multiple regression analysis involving the use of Ordinary Least Squares (OLS) estimation technique was used

to determine the variables affecting the output of yam in the study area.

Model Specifications:

Descriptive Statistics:

These were used to analyze the socio-economic data using frequency distribution tables, means and percentages. These tools of analysis were used to describe the socio-economic variables of the respondents and identify the problems associated with yam production.

Budgetary Technique Using Gross Margin Analysis:

This was employed to estimate the profitability of yam production. Gross Margin is the difference between Gross farm income (GFI) and the Total Variable Costs (TVC). It is a useful planning tool in situations where fixed capital is negligible of the farming enterprises; and especially in the case of small-scale subsistence agriculture (Olukasi andn Erhabor, 2005). The model is expressed as thus:

π=TVP-TVC-TFC----------(1)

$$\pi = \sum_{j=1}^{m} P_j Q_j - \sum_{i=1}^{n} P_i X_i - \sum_{K=1}^{r} PKCK \text{----------(2)}$$

Where:

π - Net farm profit

TVP- Total Value of Production

TVC- Total Variable Cost

TFC- Total fixed cost

Q_j- Quantity of j^{th} variable output

P_j- Unit price of j^{th} Output

X_i- Quantity of i^{th} Variable inputs (i= 1,2,3…….n)

P_i- Unit Price of i^{th} variable inputs

n- Number of inputs used in production

m- Number of enterprises

PK- Unit price of k^{th} fixed inputs (k=1,2,3,……..n)

CK- Quantity of k^{th} fixed inputs

r- number of fixed inputs

$\sum$- Summation

Profitability ratio model:

The profitability ratio analysis was used to determine the economic performance of yam production enterprise.

NI/TR= Profitability Index or Return on Sales

NI/TC x $\frac{100}{1}$= Rate of Return on Investment (%)

TR-TFC/TVC x$\frac{100}{1}$= Rate of Return on Variable Cost (%)

TR-TVC/TFC x $\frac{100}{1}$= Rate of Return on Fixed Cost (%)

TVC/TR= Operating Ratio.

Multiple Regression Model:

This was used to investigate the effects of inputs on outputs in the yam production enterprise. Linear, semi-log, Cobb-Douglas and exponential functional forms were employed, fitted and tried; and on the basis of economic theory, statistical and econometric criteria. Cobb Douglas functional form was chosen as the lead equation.

The explicit form of the model is presented below:

$LnY = lnb_0 + b_1 lnx_1 + b_2 lnx_2 + b_3 lnx_3 + b_4 lnx_4 + b_5 lnx_5 + b_6 lnx_6 + \ldots\ldots\ldots b_n lnx_n + e_i$

Where:

Y- Output of yam in kg/ha

X_1- Gender (male=1; female=0)

X_2- Age of the farmer (years)

X_3- Educational level (years)

X_4- Family size (numbers)

X_5- Farming experience (years)

X_6- Farm size (hectares)

X_7- Marital status (married=1; otherwise=0)

X_8- Fertilizer input (kg)

X_9- Yam seeds/ seeds planted (kg)

X_{10}- Capital input (Naira)

X_{11}- Labour input (man days)

E_i- error term

B_0- constant tern

B_1-b_{11}- coefficients to be estimated

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents:

Analysis of descriptive statistics on the socio-economic variables of the respondents (Table 2) revealed that majority (81.33%) of them were within the age range of 20-50 years. This implies that they are still in their economic active ages, which could result in a positive effect on yam output. This result agrees with the findings of Alabi et al (2005) who postulated that farmer's age has great influence on maize production in Kaduna State, with younger farmers producing more than the older ones, plausibly because of their flexibility to new ideas and risks. The table also indicated that both men and women were actively involved in yam production, with 40% of the farmers being female, while 60% of them were male. It is to be noted that the preponderance of males was due to drudgery and labour intensive nature of yam production, and therefore the need for simple labour saving technology. The study also showed that 80% of the married couples were involved in yam production in the study area. This emphasizes the importance of yam as a source of food and income to the resource-poor yam farmers who depend on it for livelihood. However, for the 20% of those that were not married, yet they want to remain in the business, since it is lucrative.

Furthermore, 82.67% of the sampled respondents had one form of formal education or the other. Onyenweaku et al (2005) and Idiong et al (2006) reported that formal education has positive influence on the acquisition and utilization of information on improved technology by the farmers, as well as their innovativeness in adoption of innovations.

Evidence before us revealed that 96.67% of the yam farmers had farm size of between 0.1-2.5

hectares. This portrayed their small-scale nature. But for the very few that had farm size between 3.0ha and above, have established themselves in the business and so devoted more land in yam production. However, the mean farm size of the respondents was 2.0ha. Also greater number (89.33%) of the yam farmers in the area had long years of experience for about 3-20 years, with a mean of 12.5. This implies that most of the yam farmers in the study area are well experienced in yam production. Yam farmers in the area have family sizes of between 3-12 members; especially with the mean of 7.5 members. Nevertheless, under the peasant agriculture, much reliance is often placed on the strength of the family to supply the much needed farm labour in the absence of mechanical equipment. The larger the family size, the greater the supply of family labour.

Results of the Multiple Regression Analysis

The regression analysis results are presented in Table 3. Based on the economic, statistical and econometric criteria; the Cobb-Douglas production function was selected as lead equation. The estimated coefficients of age, education, farm size, seed yam, marital status and fertilizer were positively signed and significant at varied probability levels. However, the coefficient of gender was negatively signed, but significant at 5% probability level. The negative coefficient of gender is in agreement with a priori expectations; but yam being culturally regarded as "man" crop in most producing communities, was statistically significant because males contributed more to yam production than their female counterpart. This is in line with Inoni (2010) who also had a similar result for gender. In specific term, age with a positive coefficient is not in tandem with a priori expectation; but could be deemed plausible given the tremendous decline of young people from the agricultural sector due to rural-urban migration.

The coefficients of education, family size, fertilizer and seed yam were positively signed and significant at 1% level of probability respectively. As the number of educated yam farmers increase, coupled with the large number of people in a household that are involved in yam production, the output of yam will increase. Farmers with low level of education would be less receptive to improved farming techniques (Okoye et al, 2004).

In the same vein, when good size of seed yams or yam setts are being planted and a reasonable quantity of recommended fertilizer applied to it, this would boost yam production too. Yam has to do with a lot of physical strength; probably that is why it is "married male" dominated. Farming experience had a positive relationship with the output of yam and significant at 5% level of probability. This implies that increase in farming experience would lead to an increase in the output of yam.

Marital status posited a positive coefficient and significant at 5% risk level; implying that yam production involves more of married people than their other counterparts. This is probably predicated on the need to cushion the pressure arising from family responsibilities. This is in line with the findings of Ekunwa and Alufohuai (2009) who reported that over 88% of egg marketers in Benin City, Nigeria, were married, while Mohammed et al (2012) posited that 95% of egg marketers in FCT, Abuja were married.

Gross Margin Analysis:

The result of the costs and returns analysis (Table 4) revealed that the high cost of yam production has made per caloric cost of yam to be four times the cost of maize, and this is in line with the findings of IITA (2008) which towed the same line of thought. The study also showed that yam is costly in the market, as a unit sales price of a kilogram of yam is ₦150.00; and this is supported by Hahn, et al (1995) who stated that the costly nature of yam in the market has made yam to be a luxury food, rather than a staple. The result further revealed that yam production enterprise is a lucrative business; as an average of 2,550kg/ha (2.55tons/ha) of ware-yam tubers were realized per farmer per hectare of land; or a gross farm income of ₦382.500.00; with a total cost of production amounting to ₦224,000.00; thereby giving a net farm income of ₦158,500; and a benefit-cost ratio of 1.71 or Return Per Naira Invested of 0.71. this implies that for every naira invested on yam production in the study area, there is a profit of 0.71.

Profitability ratio analysis:

The profitability ratios on yam production were calculated to establish the profitability level of the enterprise. Table 5 reveals that the profitability index was 0.40; indicating that out of every ₦1 earned, about ₦0.40 returned to the farmer as net income. In addition, a yam farmer earns ₦0.71 profit on every ₦1 spent on yam production. The rate of returns on Variable Cost was estimated as 172.54%; that is on production basis, every ₦1 cost incurred on inputs generates about ₦1.73; which can be deduced that improving profitability in yam production in the study area will require that more efforts be put into increasing the efficiency of use of variable inputs.

Similarly, the rate of returns on fixed costs was estimated as 2981.82%; that is, on the production basis; every ₦1 incurred on inputs generates about ₦29.82; which can be deduced that improving profitability in yam production in the study area will require that more efforts be put into increasing the efficiency of use of fixed inputs.

Operating ratio that is less than one (<1) indicates a good, efficient, and profitable business; therefore an operating ratio of 0.571 as in this yam production enterprise portends larger Gross farm income (GFI) over Total Variable Costs (TVC) which is good for the enterprise.

Constraints to Yam Production:

The problems faced by farmers in yam production in the area include; pests and diseases, inadequate funds, lack of improved yam varieties, /seed yams, land ownership and fragmentation. This conforms with the findings of Reuben and Barau (2012) and Sanusi and Salimonu (2006) who listed the same variables as constraints to yam production in Taraba and Oyo States respectively.

CONCLUSION:

Yam is a staple food for the majority of Nigerians. Therefore, increased production of this important crop will help to achieve self-sufficiency in food production as well as reducing the proportion of hungry people in Sub-Saharan Africa and the world at large. Both male and female were involved in its production. Among the variables that contributed to yam production in the study area include; age, education, family size, farming experience, farm size, seed yams / yam setts, marital status and fertilizer. Of these, seed yam alone constituted 45.77% of the total variable costs and this implies that it is the most expensive resource in yam production. However, yam production is very rewarding and profitable enterprise, if well managed. Farmers can increase their productivity and by extension profit, by the use of improved seed yams, as well as maximize the use of the farmland by increasing the number of seed yams planted per hectare, coupled with the application of reasonable quantity of recommended fertilizer.

REFERENCES:

Agbaje, G.O.L; Ogunsunmi, O.L; Oluokun, J.A, and Akimioju, T.A. (2005): Survey of yam production system and impact of government policies in South-Western Nigeria. *Journal of Food, Agriculture and Environment*. 3(2):222-229.

Agboola, S.A. (1999): An agricultural Atlas of Nigeria. Oxford University Press, Great Britain. 30-45.

Agwu, A.E. and Alu, J.I. (2005): Farmer's perceived constraints to yam production in Benue State, Nigeria. Proceedings of the 39th Annual Conference of Agricultural Society of Nigeria: 34-50.

Alabi, O.O; Adebayo, O; Akinyemi, O; Olumuyiwa, S.A; and Adewuyi, D. (2005): Resource productivity and returns on maize production in Kauru L.G.A of Kaduna State. International Journal for Food and Agricultural Research. 2(1&2).

Asiedu, C.I.A; Akamigbo, F.O.R; Nweke, F.I; and Ezumah, H.C. (1996): Evaluation of sixcultivars of white yam (Dioscorearotundata) across three yam growing areas in South-eastern, Nigeria. Journal of Agricultural Science. 127(4): 463-468.

Bamire, A.S. and Amujoyegbe, B.J. (2005): Economic analysis of land improvement techniques in small-holder yam based production systems in the agro-ecological zones of South-western, Nigeria. Journal of Human Ecology. 18(1): 11-12.

Bechman, E. (2005): Yam holdings in Southern, Nigeria: Economic assessment of problem trends. AnAgricultural EconomicDiscussion, Paper 2, IITA, Ibadan, Nigeria.

C.B.N (2012): Central Bank of Nigeria statistical bulletin of 2006, 2010, and 2012. Http://www.cenbank.org.

Coursey, D.E. and Nweke, F.I. (2009): Yam; the nature, origin, cultivation and utilization of three useful members of Dioscoreaceae. London, Longmans: 29.

Ekunwa, P.A. and Alufohuai, G.O. (2009): Economics of Poultry Egg Marketing in Benin City, Edo State, Nigeria. International Journal of Poultry Science, 8(2): 166-169.

Eluagu, L.S. and Chinaka, C.C. (2006): Economics of different methods of yam staking. N.R.C.R.I. Annual Report, 2006.

FAO (2002): FAO/STAT, Agricultural Database; Agricultural Production of Primary Crops, FAO, Rome.

FAO (2007): FAO/STAT, Statistics Division of FAO of the United Nations Statistical Data. Http://www.fao.stat.org.

FAO (2008): FAO/STAT, Statistics Division of FAO of the United Nations Statistical Data. Http://www.faostat.org.

Hahn, S.K; Osiru, D.S.O; Akoroda, M.O. and Aloo, J.A. (1995): Production of yams; Present Role and Future Prospects. IITA Research Guide 46, IITA, Ibadan: 36.

Idiong, I.C; Kuye, O.O and Oniah, M.O. (2006): Efficiency of Resource use in small-scale swamp rice production in Obubra L.G.A of Cross-River State, Nigeria. Middle-East Journal of Scientific Research; 3(3): 145-148.

Iduman, F.O; Owombo, P.T. and Ighodaro, U.B. (2014): Economics of yam production under agro-forestry system in Sapoba forest, area of Orhionmwon L.G.A of Edo State, Nigeria. International Journal of Agriculture and Forestry. 4(6): 440-445.

IITA (2008): An overview of yam production. Sustainable food production in Sub-Saharan Africa, IITA, Ibadan, Nigeria: 203.

IITA (2009): Yam (Dioscorea spp). Available at http://www.iita.org/yam

Ike, P.C. and Inoni, O.E. (2006): Determinants of yam production and Economic Efficiency among small-holder farmers in South-eastern, Nigeria. Journal of Central European Agriculture. 7(2): 337-342.

Ikeorgu, J.E.G and Igwilo, N.H. (2002): Effects of mulching and staking on yam grown under irrigation during the dry season in Umudike in South-eastern, Nigeria. Journal of Sustainable Agriculture and Environment. 4(1): 129-132.

Inoni, O.E. (2010): Economic analysis of yam beetles infestation in Oshimili North L.G.A. Of Delta State, Nigeria. Farm Management Association of Nigeria (FAMAN) Journal; 11(1): 10-15.

Izekor, O.B. and Olumese, M.I. (2011): Determinants of yam production and profitability in Edo State, Nigeria. African Journal of General Agriculture.6(4), 62-69.

Maduekwe, M.C; Ayichi, D. and Okoli, E.C. (2000): Issues in yam minisetts technology transfer to farmers in South-western, Nigeria. African Technology Policy Studies Working Paper 4, Nairobi, Kenya: 52.

Mohammed, A.B; Mohammed S.A; Ayanlere, A.F. and Afolabi, O.K. (2012): Evaluation of poultry marketing in Kuye Area Council Muncipality of F.C.T, Abuja, Nigeria. Journal of Agricultural Science. 3(1): 68-72.

NPC (2006): Provisional Census Figures. 2006 National Population Census. National Population Comission, Abuja.

N.R.C.R.I. (1999): Award report for 1998 N.R.C.R.I. Umudike.

Nwosu, C.S. and Okoli, V.B.N. (2010): Economic analysis of resource use by Wase yam farmers in Owerri Agricultural Zone of Imo State, Nigeria. Proceedings of 44th Annual Conference of ASN held in Ladoke Akintola University, from 18-22 October, 2010 in Osogbo, Osun State.

Okoye, B.C; Okorji, E.C. and Asumugha, G.N. (2004): Outlook on Production economics of paddy rice under resource constraints in Ebonyi State. Proceedings of the 38th Annual Conference of Agricultural Society of Nigeria (ASN) from 17th-21st October, 2004; in Lafia, Nasarawa State: 337-342.

Olubokola, A.A. and Bolarin, T.O. (2006): Production efficiency in yam based enterprise in Ekiti State, Nigeria. Journal of Central European Agriculture, 7(4): 627-636.

Olukosi, J.O. and Erhabor, P.O. (2005): Introduction to Farm Management Economics: Principles and Applications, Agitab Publishers Limited, Zaria: 48-56.

Oluwasda, O. (1999): Implications of peasant agricultural practices for environmental resources, food security and agriculturally sustainable development in Nigeria. In Fabiyi, Y.L. and Idowu, E.O. (Eds.): Poverty Alleviation and Food Security in Nigeria. Nigerian Association of Agricultural Economists, Ibadan: 197-206.

Onyenweaku, C.E; Igwe, K.C. and Mbanasor, J.A. (2005): Application of Stochastic frontier function to the measurement of technical efficiency in yam production in Nasarawa State, Nigeria. Journal of Sustainable Tropical Agricultural Research: 13: 20-25.

Reuben, J. and Barau, A.D. (2012): Resource use efficiency in yam production in Taraba State, Nigeria. Journal of Agricultural Science. 3(2): 71-77.

Sanusi, W.A. and Salimonu, K.K. (2006): Food security among households: Evidence from yam production in Oyo State, Nigeria. Agricultural Journal. 1(4): 249-253.

Shehu, J.F; Iyortyer, I.T; Mshells, S.I. and Jongur, A.A.U. (2010): Determinants of yam production and technical efficiency among yam farmers in Benue State, Nigeria. Journal of Social Science. 24(2): 143-148.

Zaknayiba, D.B. and Tanko, L. (2013): Costs and returns analysis of yam production among small-scale farmers in Karu Local Government Area of Nasarawa State, Nigeria. PAT, 9(1): 73-80.

Table I: Nigeria's Yam Production (10^3mt) per annum from 1961-2017

Year	Production (10^3mt)
1961	3.500
1962	3.500
1963	4.500
1964	5.000
1965	6.000
1966	6.987
1967	7.806
1968	8.233
1969	9.785
1970	12.033
1971	9.766
1972	6.900
1973	6.935
1974	7.160
1975	8.621
1976	6.556
1977	6.376
1978	5.780
1979	5.256
1980	5.248
1981	5.212
1982	5.385
1983	4.998
1984	4.600
1985	4.738
1986	5.209
1987	4.886
1988	9.132
1989	9.609
1990	13.624
1991	16.956
1992	19.781
1993	21.632
1994	23.153
1995	22.818
1996	23.201
1997	23.972
1998	24.768
1999	25.873
2000	26.201
2001	26.232
2002	27.911
2003	29.697
2004	31.776
2005	34.000
2006	36.720
2007	31.136
2008	35.017
2009	29.091
2010	37.328
2011	33.134
2012	32.318
2013	35.618
2014	45.152
2015	45.678
2016	49.384
2017	47.943

Source: Adapted from FAO/STAT, 2018.

Note: 10^3mt implies million metric tonnes.

Table 2: Socio-economic characteristics of respondents (n=150).

Gender	**Frequency**	**Proportion (%)**
Male	90	60
Female	60	40
Total:	**150**	**100**
Age (in years)	**Frequency**	**Proportion (%)**
20-30	30	20
31-40	54	36
41-50	38	25.33
51-60	20	13.33
61-70	8	5.33
Total:	**150**	**100**
Marital Status	**Frequency**	**Proportion (%)**
Single	30	20
Married	90	60
Divorced	15	10
Widower	9	6
Widow	6	4
Total:	**150**	**100**
Educational Level	**Frequency**	**Proportion (%)**
No formal Education	26	17.33
Primary Education	40	26.67
Secondary Education	63	42
Tertiary Education	21	14
Total:	**150**	**100**
Family size	**Frequency**	**Proportion (%)**
1-3	40	26.67
4-6	42	28
7-9	50	33.33
10-12	18	12
Total:	**150**	**100**
Farm size (ha)	**Frequency**	**Proportion (%)**
0.1-0.5	50	33.33
1.0-1.5	70	46.67
2.0-2.5	25	16.67
3.0-3.5	5	3.33
Total:	**150**	**100**
Farming experience (yrs)	**Frequency**	**Proportion (%)**
1-5	16	10.67
6-10	45	30
11-15	57	38
16-20	32	21.33
Total:	**150**	**100**

Source: Field Survey, 2017.

Table 3: Estimates of the Cobb-Douglas Production Function for yam in Obubra L.G.A of Cross-River.

Variables	Coefficients	Standard errors	t-values
Constant	9.2843	3.6842	2.5200**
X_1- Gender	-2192.614	981.962	-2.233**
X_2-Age of the farmer	2.6349	1.0024	2.6286**
X_3-Educational level	0.2863	0.0624	4.5881***
X_4-Family size	0.0290	0.0100	2.9000***
X_5-Farming experience	0.0639	0.00281	2.2740**
X_6-Farm size	0.8678	2.6800	0.3238 NS
X_7-Marital status	0.157	0.065	2.415**
X_8-Fertilizer input	12.0686	2.0639	5.8475***
X_9-Seed yam/ yam setts	0.2861	0.0865	3.3075***
X_{10}-Capital Input	0.2869	0.8622	0.3328 NS
X_{11}-Labour Input	6.2444	9.6833	0.6449 NS
R^2	0.632		
F-ratio			46.540***

Source: Computed from the field survey data, 2017.

Note: *** means significant at 1% level; ** means significant at 5% level, NS means not significant.

Table 5: Profitability ratio analysis of yam production enterprise in Obubra L.G.A of Cross-River State.

1. Profitability Index= NFI/GFI
   =158,500/382,500
   =0.414
2. Rate of returns on Investment (%)= NFI/TC x $\frac{100}{1}$
   = 158,500/224,000 x$\frac{100}{1}$
   =70.8%
3. Rate of returns on variable costs(%)= GFI-TFC/TVC x $\frac{100}{1}$
   = 382,500-5,500/218,500
   = 172.54%
4. Rate of returns on fixed costs(%)= GFI-TVC/TFC x $\frac{100}{1}$
   382,500-218,500/5,500 x$\frac{100}{1}$
   2981.82%
5. Operating ratio= TVC/GFI
   218,500/382,500
   =0.571

Table 4: Costs and Returns of yam production enterprise in the study area per hectare.

Budget Items	Unit	Quantity	Price/unit (₦)	Value (₦)
Output of ware yam	Kg	2,550	150	382,500
Gross farm income:				382,500
A) Variable Costs:				
Yam seeds/ setts	No	1,000	100	100,000
Staking materials (sticks)	No	1,000	30	30,000
Angling sticks	No	3,000	10	30,000
Fertilizer	Bag	8	1,600	12,800
Herbicides	Liter	4	800	3,200
Empty jute bags	No	50	50	2,500
Labour	Man-days	100	400	40,000
Total Variable Costs (TVC):				218,500
B) Fixed Costs:				
Land rent				3,000
Depreciation				2,500
Total Fixed Costs (TFC):				5,500
Total Costs (TC)= (TVC+TFC)				224,000
Gross Margin (GM)= (GFI-TVC)				164,000
Net Farm Income (NFI)= (GM-TFC)				158,500
Benefit-Cost Ratio (BCR)= GFI/TC				1.71
Return Per Naira (N) invested=NFI/TC				0.71

Source: Computed from field survey data, 2017.