
Economics of Farm Outputs of Arable Crop Farmers Using Improved Soil Management Techniques in Imo State, Nigeria

Osuji E.E.

Department of Agricultural Economics,
Michael Okpara University of Agriculture Umudike,
Nigeria
osujiemeka2@yahoo.com

Okwara M. O., & Anyanwu U. G

Department of Agricultural Economics,
Federal University of Technology Owerri,
Imo State

Effiong J. A. L.

Department of Agricultural Technology,
Federal Polytechnic Nekede Owerri Imo State,
Nigeria.

Praise C. N.

Department of Cooperative Economics and Management,
Institute of Management and Technology,
Enugu

Irebuisi D. C.

Department of Agricultural Science,
AlvanIkoku Federal College of Education Owerri,
Imo State

Abstract

The study was designed to examine the economics of farm outputs of arable crop farmers using improved soil management techniques in Imo State, Nigeria. Primary data were collected using a set of structured questionnaire from 209 arable crop farmers' sampled from the three agricultural zones of the State using multi-stage technique. Data were analyzed using descriptive statistical tools, analysis of variance and net returns model. Results showed that Cassava production dominated the roots and tuber crops with more than 97 percent of the arable crop farmers engaging in its production. The mean output of cassava produced per farmer in the area is about 4,624.10kg. Thus, this implies a very high cassava production in Imo State with almost all the arable crop farmers engaging in its production. Other roots and tuber crops produced in the area are cocoyam and sweet potato with mean outputs of 1,399.60kg and 1,164.91kg. The result of the analysis of variance showed a significant difference in net returns of farmers across the various zones of the State. Farmers in Owerri zone generated a high net return of ₦126868.73 relative to Orlu and Okigwe zones with net returns values of 118132.54 and 101856.59. Hence, farmers are encouraged to effectively participate in agricultural workshops, seminars, etc., which exposes them to new technological innovations thus leading to increased outputs and income.

Keywords: Arable Crop Farmers, Economics, Farm Outputs, Net Returns, Soil Management

Techniques

Introduction

Agriculture is a vital sector of the economy and contributes extensively to the gross domestic product (GDP) of countries of the world. It offers employment for about 70 percent of the population and a very strategic tool for combating poverty and hidden hunger in the country (FAO, 2010). In developing countries, it boosts the economy by turning out labour for industries, increases food production and booms domestic market for industrial goods. Apart from food production, it is a precondition for economic growth and development (Ujah and Okoro, 2009). This underscores the basis for various feats made by both Federal and State governments including the private sectors in projecting agricultural programmes to guarantee sustainability and growth in the sector. There is arising acceptance by the Nigerian farmers on the relevance of improved soil management technologies on agricultural output. The use of these improved soil management techniques (crop rotation, alley cropping, contour/strip cropping, etc.) and the adoption of high yielding crop varieties have given rise to increased Agricultural production in the country (Osuji, 2017). The support for agriculture in Nigeria is driven mostly by the public sector, with the establishment of credit support systems in form of land use legislation, extension service delivery, commodity marketing, agricultural research, input supply, etc. which engenders agricultural development. Also, private sector participation is not left out as they have also contributed to both local and foreign direct investment opportunities, sponsorship of innovative research and other advisory services. Consequently, other International organizations such as the World Bank Group, Food and Agricultural Organization, etc., also contribute extensively through on-farm and off-farm support in form of innovative research, finance, input supply, and strengthening of technical efficiency of other support institutions, etc. (Eze *et al.* 2010). However, Agricultural output in Nigeria is increasingly declining in terms of its contribution to the Gross Domestic Product (GDP) as well as meeting the food needs of the country. Despite the fact that about 70 per cent of the Nigeria population engage in agriculture, our farm outputs' are still very low and cannot sustain the growing population hence leading to food insecurity, hunger, deprivation with its attendant high import bills (Odigbo, 2000).

Majority of Nigerian farmers are resource poor and small-scale in nature and cannot afford modern farm inputs such as fertilizers, improved seedlings, feeds and plant protection chemicals and other farm machineries and tools needed to improve crop production. Furthermore, these farmers are also hindered by unfavourable cultural, social, economic, and institutional conditions which reduce farm output and productivity (Orebiyi, 2000). The import-export gap has continued to widen making a mess of our agricultural policies. Hence, it is on this premise that this study seeks to evaluate the economics of farm outputs of arable crop farmers using improved soil management techniques in Imo State, Nigeria.

Materials and Methods

This research was conducted in Imo State, located in the South Eastern part of Nigeria with a land area of 5,530sqkm. The State lies between latitudes $4^{\circ}45'N$ and $7^{\circ}15'N$ and Longitudes $6^{\circ}50'E$ and $7^{\circ}25'E$. The State shares boundaries with Abia and Cross Rivers State to the East, Delta State to the West, Rivers State to the South and Enugu and Anambra State to the North. The State is made up of 27 Local Government Areas grouped into three agricultural zones namely Owerri, Orlu and Okigwe. Two-stage sampling technique was used to select the sample. In the first stage, two local government areas (LGAs) were purposively selected from each of the three agricultural zones of the State. The selection of these LGAs was based on their predominant agricultural activities and use of improved soil management techniques.

The second stage involved a random sample selection of arable crop farmers from the list of registered farmers kept with the zonal ADP's. Owerri zone has 122 registered arable crop farmers while Orlu and Okigwe zones have 130 and 109 arable crop farmers. This shows that there are unequal numbers of arable crop farmers across the three zones; hence an equal representation of sample was made from a proportion of 70 percent of the total population from each zone. This gave a sample size of 85 for Owerri zone, 91 for Orlu zone and 76 for Okigwe zone making a total of 252 arable crop farmers across the six LGAs. However, the study eventually used only 209 valid questionnaires for data analysis. Data were analyzed using descriptive statistical tools, analysis of variance and net returns model. The resultant net incomes in the 3 agricultural zones were tested for significant difference using analysis of variance (ANOVA) techniques; specified below:

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

$$SSB = \sum_{J=1}^k n_j (\bar{X}_j - \bar{X})^2 \quad \text{eqn. (2)}$$

$$SSW = \sum_{I=1}^{n_j} \sum_{J=1}^k (\bar{X}_{ij} - \bar{X})^2 \quad \text{eqn. (3)}$$

$$SST = SSB + SSW \quad \text{eqn. (4)}$$

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 farm outputs in the three agricultural zones
- SSW = Sum of squares deviations within the mean net returns of farm outputs in the three agricultural zones
- SST = Total sum of squares of the net returns of farm outputs in the three agricultural zones
- \bar{X}_j = Mean level of net returns of farm outputs from agricultural zone J
- \bar{X} = Grand mean level of net returns of farm outputs
- X_{ij} = ith level of net returns of farm outputs from agricultural zone J
- n_j = Sample size of farmers from agricultural zone J
- n = Number of observations in the three agricultural zones
- k-1 = Degrees of freedom for between samples
- n-k = Degrees of freedom for within samples
- k = Number of agricultural zones in the State
- X = Net income from farm outputs

The net returns model is generally specified as follows:

$$NR = TR - TC \quad \text{-----} \quad \text{eqn. (5)}$$

Where:

- NR = Net returns (in Naira)
- TR = Total Revenue (in Naira)
- TC = Total Cost (TVC +TFC) (in Naira)

Results and Discussion

Descriptive Statistics of Different Output of Crops Produced in Imo State

The descriptive statistics of different outputs of crops produced in the area are shown in

Table 1. The Table shows that arable crop farmers in the area produced varieties of crops ranging from roots tubers, stem tubers, legumes, cereals to vegetables. Cassava production dominated the roots and tuber crops with more than 97 percent of the arable crop farmers engaging in its production. The mean output of cassava produced per farmers in the area is about 4,624.10kg. Thus, this implies that there is a very high cassava production in Imo State with almost all the arable crop farmers engaging in its production. This is in line with the findings of Osuji *et al.* (2013), and Okere (2013) who reported a very high production of cassava amongst arable crop farmers in the State. The mean output of yam produced is 1,848.89kg per cropping season. Other roots and tuber crops produced in the area are cocoyam and sweet potato with mean outputs of 1,399.60kg and 1,164.91kg respectively, per cropping season. Among the legumes cultivated, the result shows that melon dominated with over 60 percent of the farmers cultivating it and an average output of 2,298.58kg. The result also showed that less than 60 percent of the arable crop farmers engaged in cowpea production with a mean output of 1,271.14kg. Furthermore, vegetable production in the area is dominated by garden egg with about 77.5 percent of the arable crop farmers followed by fluted pumpkin, 62.7 percent with mean outputs of 1,199.63kg and 1,149.01kg. Again, about 59.8 percent, 58.4 percent and 57.4 percent of the arable crop farmers engaged in the production of okro, pepper and tomatoes with mean outputs of 1,293.28kg, 1,165.85kg and 1,323.81kg respectively. The only cereal crop produced in the area is maize with about 97.6 percent of the farmers cultivating it and a mean output of 2,299.71kg. Consequently, other crops produced in the area are plantain and banana with over 80 percent of the farmers engaging in its production and with a mean output of 1,160.32kg and 1,352.92kg. It therefore follows that among the various crops produced in the area, cassava recorded the highest mean output probably because of high concentration of the farmers on cassava crops more than any other crops in the area.

Table 1: Descriptive Statistics of Different Output of Crops Produced in Imo State

Crop produced	No. of Farmers F	%	Unit	Mean Output	Standard Deviation	Minimum Output	Maximum Output
Maize (<i>Zea mays</i>)	204	97.6	Kg	2,299.71	80.76869	250.00	2,450.00
Melon (<i>Cucumis spp</i>)	141	67.5	Kg	2,298.58	88.6291	100.00	2,500.00
Yam (<i>Dioscorea spp</i>)	135	64.6	Kg	1,848.89	301.2082	300.00	1,950.00
Cassava (<i>manihot spp</i>)	206	98.6	Kg	4,624.10	166.4228	400.00	5,000.00
Okra (<i>Abelmoscus esculentus</i>)	125	59.8	Kg	1,293.28	87.95981	104.00	1,468.00
Vegetable (Fluted Pumpkin)	131	62.7	Kg	1,149.01	31.12011	81.00	1,216.00
Cowpea (<i>Vigna unguiculata</i>)	123	58.9	Kg	1,271.14	80.72625	100.00	1,450.00
Cocoyam (<i>Colocasia spp</i>)	151	72.2	Kg	1,399.60	120.8629	140.00	1,630.00
Pepper (<i>Capsicum spp</i>)	122	58.4	Kg	1,165.85	51.64391	80.00	1,360.00

Garden Egg (Solanum spp)	162	77.5	Kg	1,199.63	70.92056	88.00	1,396.00
Sweet Potatoe (Ipomoea batatas)	114	54.5	Kg	1,164.91	76.98116	100.00	1,450.00
Plantain (Musa paradisiaca)	189	90.4	Kg	1,160.32	40.0221	75.00	1,365.00
Banana (Musa spp)	192	91.9	Kg	1,352.92	89.93211	110.00	1,495.00
Tomato (Lycopersicon esculentum)	120	57.4	Kg	1,323.81	66.53884	183.00	1,488.00

Source: Field survey data, (2015).

Net Returns of Arable Crop Farmers across the three Agricultural Zones of Imo State

The net returns of arable crop farmers across the three agricultural zones of the State are shown in Table 3 below. The Table revealed that Orlu zone incurred a high cost of ₦60432.87 on fertilizer applications relative to other two zones. Farmers in a bid to maximize outputs apply more of organic and inorganic fertilizers. These invariably could be the reason for the high cost of fertilizer in Orlu zone. A mean cost of ₦78432.45 was incurred on planting materials in Owerri zone while Orlu and Okigwe zones recorded a mean cost of ₦72654.12 and ₦70765.53. The high cost of planting materials in Owerri zone shows that farmers in the area planted more of crop seedlings than other two zones. Labour cost for Orlu zone was estimated at ₦25765.76 which is lesser when compared to other two zones. This could be due to the use of family labour as a result of high cost of labour in the area. Agrochemicals used in Owerri zone accounted for ₦12652.01 with over 85% usage in Orlu zone and 87% in Okigwe zone respectively. The essence of these chemicals is to mitigate pests and disease infestations on farm crops which result to value reductions. The transportation cost recorded in Owerri zone was ₦15341.42 which shows a high cost of transportation in the area. Similarly, total variable cost incurred in Owerri zone is higher relative to other two zones. However, Okigwe zone showed a total fixed cost of ₦91851.95 which is higher than other two zones in the State. Furthermore, a total of ₦395458.90 was generated in Owerri zone while ₦387986.54 and ₦377778.64 were generated in Orlu and Okigwe zones respectively. Consequently high net revenue was recorded in Owerri zone relative to other two zones which implies that farmers in the zone were able to maximize outputs given the level of resources at their disposal and this corresponds to the findings of Osuji *et al.* (2014) and Osuji *et al.* (2017). The outstanding performance of the farmers in the zone is also evidenced in the rate of return and benefit cost ratio estimated.

Table 2: Estimated Net Returns of Arable Crop Farmers across the three Agricultural Zones

Item Description	Value (₦/Hectare)		
	Owerri Zone	Orlu Zone	Okigwe Zone
A. Variable Cost			
Fertilizer	55456.34	60432.87	54876.23
Planting materials	78432.45	72654.12	70765.53
Cost of labour	27167.89	25765.76	30321.15
Agrochemicals	12652.01	14897.32	14453.98
Transportation	15341.42	14231.53	13653.21
Total Variable Cost	189050.11	187981.60	184070.10
B. Fixed Cost			
Depreciation of fixed items	8653.65	9342.43	10543.32

Rent on land	15432.65	14875.63	15987.27
Interest on loans	55453.76	57654.34	65321.36
Total Fixed Cost	79540.06	81872.40	91851.95
Total Costs	268590.17	269854.0	275922.05
Total Revenue	395458.90	387986.54	377778.64
Net Revenue	126868.73	118132.54	101856.59
Rate of Return	76.42	74.87	75.56
Benefit cost ratio	4.41	3.52	3.62

Source: Field survey data,(2015).

Analysis of Variance: Test of Significant Differences in Net Returns of Farm Outputs across the Three Agricultural Zones of Imo State

The results in Table 2; showed that the ANOVA model produced Fcal value of 3.23 which was significant at 5% when compared with the Ftab value of 2.47, which implies that there are significant differences in net returns of farm outputs across the three agricultural zones of the State. This stems from the fact that, the net returns across the three agricultural zones studied are quite different. It could be further concluded that the net returns of farm outputs across the three agricultural zones of the State are statistically unequal. Therefore, hypothesis 2 which states that there are significant differences in net returns of arable crop farmers was accepted. This contradicts the findings of Osuji *et al.* (2017).

Table 3: Results of Analysis of Variance for test of Significant Differences in Net Returns of Farm Outputs across the Three Agricultural Zones of Imo State

Sources of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	Fcal	Ftab
Between Groups	765432782	2	5564325	3.23	2.47
Within Groups	535678921	206	4456551		
Total		208			

Source: Anova results, (2015). Fcal; Significant @ 5% level

Conclusion and Recommendations

The findings of the study showed that arable crop farmers in the area produced varieties of crops ranging from roots tubers, stem tubers, legumes, and cereals to vegetables. Cassava production dominated the roots and tuber crops with more than 97 percent of the arable crop farmers engaging in its production. The ANOVA result showed that there is a significant difference in net returns of farm outputs across the three agricultural zones of the State. Findings further showed that Owerri zone had the highest net returns followed by Orlu and Okigwe zones respectively. Therefore, farmers should be encouraged to effectively participate in agricultural workshops, seminars, symposiums etc. These gathering expose them to innovative technologies which increases farm outputs and overall income. There is also need for corporate bodies through the extension agents and other agricultural officers to educate the rural farmers on the importance of using improved farming techniques for increased output and income.

References

- Eze, C.C., Lemchi, J.I., Ugochukwu, A.I., Eze, V.C., Awulonu, C.A.O and Okon, A.X. (2010). "Agricultural financing policies and rural development In Nigeria" A paper presented at the 84th Annual Conference of the Agricultural Economics Society, Edinburgh.

- FAO, (2010). Sustainable crop production intensification through ecosystem approach and enabling environment, capturing efficiency through ecosystem services and management. FAO, Rome
- Odigbo, E. U. (2000). "Mechanization of Nigerian agricultural industry: Patient notes, Pressing issues, pragmatic solutions" A public lecture organized by the Nigerian academic of science, International Conference Center, Abuja
- Okere, R. A. (2013). "Productivity of cassava under different value systems" in Imo State, Nigeria. Unpublished M.Sc Thesis, Department of Agricultural Economics, Federal University of Technology Owerri
- Orebiji, J. S. (2000). The Performance of Rural Credit Markets in Imo State, Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics, Federal University of Technology, Owerri
- Osuji, E.E., Ohajianya, D.O. Ibekwe, U.C., Eze, C.C., Ehirim, N.C., and Udensi, A.I. (2014). Productivity differential of selected land use systems in Imo State, Nigeria. *International Journal of Applied Research and Technology*, USA. 3(12): 3-9.
- Osuji, E.E., Anyanwu, U.G., Ehirim, N.C., Eze, E.U., and Tim-Ashama, A. (2017). Economics of processed cassava products in Imo State, Nigeria. *Journal of Research in Business and Management, India*, 5(3):09-19
- Osuji, E. E. (2017). Impacts of sustainable soil management techniques on land productivity and poverty levels of arable crop farmers in Imo State, Nigeria. Unpublished PhD dissertation. Department of Agricultural Economics, Michael Okpara University of Agriculture Umudike, Nigeria.
- Osuji, E.E., Ehirim, N.C., Eze, E.U., and Osuji, M.N. (2013). Analysis of socio-economic variables on agricultural productivity of some selected arable crops in Imo State, Nigeria. *International Journal of Agriculture and Rural Development*. 16(1):1390-1396
- Ujah, O. C., and Okoro, D. (2009). Agricultural expenditures; Budget tracking and investment analysis of the agricultural sector in Nigeria. Reports on Food Security by Civil Society Coalition for Poverty Eradication, Abuja.