

FACTORS AFFECTING AGRICULTURAL PRODUCTIVITY AMONG FARMERS IN IMO STATE

Obasi, P.C¹, A. Henri-Ukoha¹, I.S. Ukwuihe¹, and N.M. Chidiebere-Mark²

e-mail: haukoha@yahoo.com

1. Department of Agricultural Economics, Federal University of Technology, Owerri, Nigeria

2. Department of Agricultural Economics, Imo State University, Owerri, Nigeria

Abstract

The study examined Factors affecting agricultural productivity among farmers in Imo state, South East Nigeria

A multi-stage random sample of 99 farmers were used and interviewed with validated and structured questionnaire. Data were analyzed using descriptive statistical tools such as frequency distribution, averages, tables and marginal value product and marginal factor cost. Results of the multiple regression showed that level of education, fertilizer use, extension contact and labour were the important determinants of agricultural productivity among farmers in Imo state. Farmers in the area should be educated and also provided with extension services.

Keywords: Resource use, Productivity, Food Crop Farmers

Introduction

Nigeria has not been able to attain self sufficiency in food production due to small scale nature of production and lack of mechanization. The country is among the countries in Sub-Sahara Africa experiencing significant food shortages as over 40% of the country's population is estimated to be critically food insecure. The inability of the state to meet the food needs of her teeming population has made her to resort to massive importation from the Northern states of Nigeria. This is worsened by the fact that food production is in the hands of small scale farmers with farm holdings of 1-2 hectares, which are usually scattered over a wide area (Fawole and Oladele, 2007). This development has undesirable effects on food security especially to the attainment of the millennium Development Goals. For instance, Obasi (2007), observed that, arable crops such as cassava, yams, maize, cocoyam, melon and vegetables are produced with different cropping patterns ranging from sole to mixed cropping systems. The productivity of these crops are affected by many factors which include; age of the farmer, cropping patterns, farming experience and access to credit. The crucial issue in the Nigerian agriculture is that of low productivity (Bamidele et al, 2006). Despite all human and material resources devoted to agriculture, the productive efficiency for most crops still fall below 60% (FACU, 1992; FDA, 1993; FDA, 1995). The inefficiency problem is

attributed to factors such as; use of low input technologies, lack of knowledge of available high input techniques or inadequate management (due to lack of skills, motivation, etc), use of poor crop varieties, cropping pattern practised, lack of or poor extension services, unavailability and affordability of inputs such as fertilizer. Determining the efficiency of farmers is very important for policy purposes (Yusuf and Malomo, 2005). Previous studies on efficiency of resource utilization (Oluwatusin, 2006; Moses and Adebayo, 2006; Iheanacho et al, 2000; Ike and Ogba, 2004) showed that there is wide variation in the levels of food crops productive efficiency and majority of the levels are far from the optimum. This indicates that, ample opportunities exist for farmers to increase their productivity and income through better agricultural techniques. In an economy where technologies are lacking, efficiency studies show the possibility of raising productivity by improving efficiency without increasing the resource base or developing new technology. It is against this backdrop that the study looked at factors affecting agricultural productivity in Imo state with the following objectives: to examine the socio-economic characteristics of arable crop farmers and to isolate the factors that affect agricultural productivity of the farmers in the state.

Materials and Methods

The study was carried out in Imo state, Nigeria. There are three agricultural zones that make up the state; Orlu, Okigwe and Owerri agricultural zones. Agriculture is a major occupation of most of the inhabitants. The main crops grown in the area include cassava, cocoyam, yam, maize, melon and vegetables (green, fluted pumpkin, water-leaf, bitter-leaf etc). Livestocks reared include sheep, goats, fishes, pig and poultry (broilers, layers, turkey etc). The proportionate random sampling technique was used in selecting the sample. Five local government areas were randomly selected from this Owerri agricultural zone. Three communities were selected from one of the five local government areas. From each of the selected communities, three arable crop farmers were randomly selected. Furthermore, two communities were randomly selected from each of the remaining four local government areas. Finally, from each of these communities, five arable crop farmers were randomly selected. Thus, a total of 49 farmers were randomly selected from the Owerri agricultural zone. From Orlu agricultural zone, four local government areas were randomly selected from this zone. From each of the selected local government areas, three communities were randomly selected. From one of the selected communities, three arable crop farmers were randomly selected. Furthermore, from each of the two remaining communities, four arable crop farmers were randomly selected. Thus, a total of 44 farmers were randomly selected

from the Orlu agricultural zone and from Okigwe agricultural zone, three local government areas were randomly selected from this zone. From each of the selected local government areas, three communities were randomly selected. From each of the selected communities, three arable crops farmers were randomly selected. Thus, a total of 27 farmers were selected from the agricultural zone.

This gave a total of 99 respondents. The sampling frame was obtained from the list of all arable crop farmers registered with Imo Agricultural Development Programme (Imo ADP).

Data were sourced through primary and secondary sources. Primary data used were collected with the aid of a structured questionnaire administered to the respondents while secondary data were collected from publications such as text books, journals etc. Data were collected on age, educational level, years of farming experience, land area cultivated (farm size), expenditure on planting materials, household size, expenditure on chemical fertilizer, labour used, extension contact, output, sex, marital status and crop mixtures in practice.

Data obtained were analysed using both descriptive, inferential statistics and OLS multiple regression analysis technique. In line with the use of the OLS multiple regression analysis technique, four functional forms (Linear, Cobb-Douglas, exponential and semi-log) were fitted to the data. The equation that gave the 'best fit' was selected based on conformity with apriori expectations (expected signs of the estimators), the magnitude of the coefficient of multiple determination (R^2) and the statistical significance of the parameter estimates (Olayide and Heady, 1982). However, since the linear and semi-log functions cannot be compared directly with the double-log and exponential functions on account of the specification of the dependent variable in both the double-log and exponential forms, the linear and semi-log forms were transformed to make them comparable with the double-log and exponential forms. The dependent variable in the linear and semi-log forms were transformed thus;

$$Y_t^* = CY_t \quad \text{eqn (1)}$$

where;

$$C = e^{-\left[\frac{\sum \text{Ln} Y}{n} \right]} \quad \text{eqn (2)}$$

e = exponential

Or C = reciprocal of geometric mean of Y values

Y_t = original value of Y in period t.

The explicit forms of the functions are given as:

$$(a) \quad \text{Linear: } Y = b_0 + b_1 X_1 + b_2 X_2 + \dots + b_9 X_9 + e \quad \text{eqn (3)}$$

$$(b) \quad \text{Cobb-Douglas: } \text{Ln} Y = \text{Ln} b_0 + b_1 \text{Ln} X_1 + b_2 \text{Ln} X_2 + \dots + b_9 \text{Ln} X_9 \quad \text{eqn (4)}$$

$$(c) \quad \text{Exponential: } \text{Ln} Y = b_0 + b_1 X_1 + b_2 X_2 + \dots + b_9 X_9 \quad \text{eqn (5)}$$

$$(d) \quad \text{Semi-Log: } Y = b_0 + b_1 \text{Ln} X_1 + b_2 \text{Ln} X_2 + \dots + b_9 \text{Ln} X_9 \quad \text{eqn (6)}$$

where; Y = gross value of output (₦)

X_1 = age of farmer (years)

X_2 = educational level (years)

X_3 = farming experience (years)

X_4 = farm size (hectare)

X_5 = household size (number of persons)

X_6 = extension contact (number of visits)

X_7 = expenditure on planting materials (₦)

X_8 = expenditure on chemical fertilizer (₦)

X_9 = labour input (man-days).

e = random error term

$b_0, b_1, \dots, b_9$ = regression coefficients

Ln = natural logarithm.

RESULTS AND DISCUSSION

Socio-economic characteristics of arable crop farmers

Table 1: Socio-economic characteristic of farmers

Age (years)	Frequency (f)	Percentage (%)
≤ 20	0	0
21-30	0	0
31-40	1	1.01
41-50	24	24.24
51-60	42	42.42
61-70	32	32.32
≥ 71	0	0
Mean age = 56 years		
Number of years spent		
0-5	4	4.04
6-10	35	35.35
11-15	24	24.24
16-20	36	36.36
≥ 20	0	0
Farming Experience	7	7.07
1-10		
11-20	45	45.45
21-30	4	4.04
31-40	11	11.11
41-50	26	26.26
51-60	6	6.06
Mean years of farming experience = 28		
Farm size	5	5.1
0.0 – 0.8		
0.9 – 1.7	77	77.7
1.8 – 2.6	17	17.2
Mean farm size = 1.4 hectares		
Household Size		
1-5	2	2.0
6-10	86	86.9
11-15	11	11.1
Mean household size = 8 persons		
Gender		
Male	47	47.5
Female	52	52.5

Marital Status	83	83.8
Married		
Single	0	0
Divorce	0	0
Widow	14	14.1
Widower	2	2.1
Occupation	54	54.5
Farming		
Non-farming	45	45.5
Total	99	100

Source: Field survey data, 2010.

Table 1 suggests that majority of the respondents (42.42%) fell within the age bracket of 51 to 60 years. Zero percent of the farmers fell within the age bracket of 0-30 years. The mean age of the farmers was found to be 56 years. This age might not be appropriate for farm work that required back bending like weeding, planting and heaping (Adesoji and Farinde, 2005), and as a result may negatively affect production. That is, it might result into technical inefficiency.

The Table also show that majority (36.4%) of the farmers spent between 16 to 20 years in school. The least (4%) were farmers that spent between 0 to 5 years in school, and all of them spent zero years in school. Thus, 96% of the respondents had formal education, while 4% of them had no formal education. On average, a farmer spent 12.6years in school. It is expected that education would aid the farmers to interpret instructions on the use of agrochemicals, adoption of modern agricultural technologies and take wise decisions on their farming operations.

The Table show that majority (45.5%) of them had between 11 to 20 years of farming experience, while the least (4.0%) had farming experience of between 21 to 30 years. The mean years of farming experience was found to be 28 years. This will to a great extent impact positively on their general management skill of their farming operations.

Majority (77.7%) of the respondents cultivated between 0.9 to 1.7 hectares of farm land. The least (5.1%) cultivated between 0.0-0.8 hectare of farm land. Mean farm size was found to be 1.4 hectares as evident in Table 1. This means that the farmers were still operating on a small scale. Farm size tends to have negative impact on productivity if the farm size is too large for a farmer to manage or cope with, especially when manual methods and obsolete tools are

used in production. However, persistent food shortage could result if level of food production is low, as not enough to meet food demands.

Table 1 also show that household size of majority (86.9%) of the farmers fell between 6 to 10 persons. The least (2%) of the farmers had household size between 1 to 5 persons. The mean household size was 8 persons per household. This large household size could have positive impact on food production if its members are meaningfully engaged or used as farm labour. However, it can lead to economic inefficiency if large value of farm outputs, that could be sold, is directly consumed by the household.

The Table also showed that the respondents were mainly females (52.5%). 47% were males. Dominance of female in food production will have negative impact on the volume or level of total output achieved in a given cropping season. Ceteri peribus, males are naturally more productive than females. 100% of the farmers were married, though 16.2% had lost their partners. Marriage provided additional farm labour for a farmer and could affect food production in the same way as household size. None of the farmers was single or divorced. This implies that, young and unmarried farmers tend to move to cities in search of white-collar jobs (which are difficult to get these days), etc, as most of them see agriculture as occupation without dignity, which is meant for the old, poor and married people.

The Table also show that majority (54.4%) of the farmers had farming as their main occupation. While 45.5% of the farmers had other occupations (such as civil service, trading, processing of agricultural produces, brick laying, okada riding etc) as their main occupation, and civil service dominated this group (55.6%). This suggests that most of the farmers combined occupations to complement their earnings for better standard of living. It could as well afford them economic security. However, combining farming with other occupations may have negative impact on agricultural production, since farmers' attention and energy will be divided among the occupations.

Determinants of agricultural productivity of the farmers in the study area.

Table 2 shows the result of the multiple regression analysis on the determinants of agricultural productivity of arable crop farmers in Imo-state. The double log function was also chosen as the lead equation. Coefficient of multiple determination (R^2) of 0.87 implies that 87% of the variations in productivity (Z) are explained by the joint action of the independent variables. The analysis shows that educational level (X_2), farming experience (X_3), farm size (X_4), extension contact (X_6) and labor (X_9) had positive and significant

relationships with productivity. This suggests that total factor productivity will increase significantly if these factors are increased above their present levels of use. It is expected that productivity will increase if more experienced and educated farmers are given more expanse of farm land. On the other hand, age (X_1), planting materials (X_7) and chemical fertilizer (X_8) are inversely related to productivity. This suggests that if these factors are increased above their present levels, productivity will decrease significantly. This is expected if aged and weak farmers are involved in agricultural production. Also, coefficient of household size was found to be negative and statistically insignificant. This suggests that the negative relationship between productivity and household size could be attributed to error. However, productivity tends to decrease if household size adds more to the production cost than it adds to the value of output.

259

260

261

**TABLE 2: DETERMINANTS OF AGRICULTURAL PRODUCTIVITY
OF FARMERS IN IMO-STATE**

262

263

264

	LINEAR		SEMI-LOG		DOUBLE- LOG		EXPONENTIAL	
Explanatory variables	Coeff.	t-ratios	Coeff.	t-ratios	Coeff.	t-ratios	Coeff.	t-ratios
Age (X ₁)	-13.0841	-1.0923	-2.9138	-1.1193	-0.0718	-	-0.0073	-2.5172**
Educational level (X ₂)	10.9217	1.1981	1.5093	1.0117	0.0813	3.4686**	0.0092	1.0824
Farming experience (X ₃)	9.0829	2.8811**	2.6779	1.0701	0.0792	2.9887**	0.0071	2.4483**
Farm size (X ₄)	7.2217	1.1299	3.1095	2.9299**	0.0604	2.7834**	0.0074	1.0882
Household size (X ₅)	-13.0213	-2.1699*	-3.1943	-1.3341	-0.0529	-1.0644	-0.0042	-1.0769
Extension visit (X ₆)	10.3392	1.1324	2.0841	2.9321**	0.0849	3.9124**	0.0055	1.1225
Planting material (X ₇)	-6.5911	-3.1668**	-1.3391	-1.1097	-0.0339	-	0.0073	-3.0417**
Fertilizer (X ₈)	-6.8913	-1.2114	-1.0667	-1.0982	-0.0821	-	-0.0078	-1.1304
Labour (X ₉)	9.2813	1.1303	1.5912	1.2965	0.0518	3.3374**	0.0057	2.7143**
Constant	217.0928		173.1467		113.5006		89.4728	
Std. err of y est	16.1153		12.9814		0.0337		0.0934	
R ₂	0.4962		0.4022		0.8651		0.6025	
F-value	9.8452		6.7911		64.0815		15.2146	
N	99		99		99		99	

265

(**) = significant at 1%, (*) = significant at 5%

266

Source: Computer Analysis of the Field survey data, 2010

267

268

269

270

271

272

273

Conclusion

Based on the results of the analysis, productivity will increase if the level used of factors such as educational level, farming experience, farm size, extension contact and labour is increased. An increase in the level used of planting material and chemical fertilizer will increase output and decrease productivity. Also, productivity will decrease if the level used of age is increased. Age will not significantly decrease output if the level used of it is increased.

Recommendation

Based on the research findings, policy should be targeted to such factors such as educational level, farming experience, farm size, extension contact and labour is increased. This will increase the productivity in the area.

REFERENCES

- Adesoji, A.S and A.J Farinde (2005): Socio – economic factors Influencing yield of Arable crops in Osun – state, Nigeria. *Asian Journal of plant Science* 5(4): 630- 634.
- Bamidele, F.S, O. R Babatunde and A. Rasheed (2006): Productivity Analysis of Cassava – Based Production systems in the Guinea Savannah: Case study of Kwara state, Nigeria. *American-Eurasian Journal of Scientific Research* 3 (1): 33-39.
- Central Bank of Nigeria (CBN) (2004): Annual Report and Statement of Accounts. Central Bank of Nigeria Publications.
- Farell, J. M (1957): “Measurement of Productive Efficiency”. *Journal of Royal Statistical Soc. Series*, 3: 253-290.
- Fawole, O.P and I. O. Oladele (2007): Sustainable Food Crop Production through Multiple Cropping Patterns among farmers in South-West Nigeria. *Journal of Hum. Ecol*, 21 (4): 245-249.
- Federal Agricultural Coordinating Unit (FACU) (1992): Proceeding on the 4th Annual National Farming systems. Research and Extension Workshop. Federal Agricultural Coordinating Unit Reports, Ibadan.
- Federal Department of Agriculture (FDA) (1993): Food Security and Nigeria agriculture, water resources and rural development. Federal Department of Agriculture, Abuja, Nigeria.
- Federal Department of Agriculture (FDA) (1995): Federal Department of Agriculture; Federal Ministry of Agriculture Reports. Abuja, Nigeria.
- Food and Agricultural Organization (FAO) (1990): Food and Agricultural Organization “Production Year book”, No. 143.
- Iheanacho, A.C, J.O. Olukosi and A.O Ogunbible (2000): Economic efficiency of resource use in Millet-Based cropping system in Borno-state, Nigeria. *Nigeria Journal of Tropical Agriculture*, 2:18-30.

- 313 Ike, C.P and A. Ogba (2004): Resource use efficiency by cassava women farmers: Evidence
314 from Enugu state, Nigeria. Proceeding of 39th Conference of the Agric society of
315 Nigeria, Benin, October 9-13.
- 316 International Institute of Tropical Agriculture (IITA) (1990): Cassava: Production and
317 processing, International Institute for Tropical Agriculture publication, Ibadan,
318 Nigeria. Pp: 4-10.
- 319 Moses, J and E.F Adebayo (2006): Efficiency of factors determining Rainfed Rice production
320 in Ganye LGA, Adamawa state. *Journal of sustainable development in agricultures
321 and environment, Vol. 3: 20-30, 2007*
- 322 Obasi, P.C. (2007): Farm size- productivity relationship among arable crops farmers in Imo
323 State, Nigeria. *International Journal of Agriculture and Rural Development, Vol. 9,*
324 *No. 1; Pp. 91-99*
- 325 Odurukwe, O.S and E.J Ikeorgu (1991): Effects of fertilizer and time of introduction of
326 cassava in Yam/maize/cassava intercrop on component yield. Proceedings of the 9th
327 symposium of the international society for tropical root crops.
- 328 Olayemi, J.K and S.O. Olayide (1981): Elements of Applied Econometrics, 1st ed., Card
329 publisher, Ibadan University Press, Ibadan Nigeria. Pp.175-177.
- 330 Olayide, O.S, A.J Eweka and E.V Osagie (1980): The Nigerian small farmers Centre for
331 Agricultural and Rural Development, University of Ibadan, Nigeria.
- 332 Olayide, O.S and E.O Heady (1982): Introduction to agricultural production economics.
333 Ibadan University press Pp. 24-109.
- 334
- 335 Olukosi, J.O. and A.O. Ogunbile (2005): Introduction to Agricultural Production
336 Economics, 2nd printing. Agitab publishers Ltd., P.O. Box 561 Samaru Zaria P.27.
- 337 Oluwatusin, F.M (2006): Resource use efficiency among Maize Grower Households in Ekiti
338 state, Nigeria. *Agricultural Journal 3(2): 134 – 141.*
- 339 Yusuf, A.S and O. Malomo (2005): Technical efficiency of poultry egg production in Ogun
340 state: A Data Envelopment Analysis (DEA) Approach. *International Journal of
341 poultry science, 6 (9): 622- 629.*