International Scholars Journals

International Journal of Plant Breeding and Genetics ISSN 2756-3847 Vol. 12 (4), pp. 001-003, April, 2025. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Short Communication

Analyzing the Key Drivers of Productivity Among Smallholder Cocoyam Farmers in Anambra State, Nigeria

B. C. Okoye[1]*, C. E. Onyenweaku[2], O. O. Ukoha[2], G. N. Asumugha[1] and O. C. Aniedu[1]

[1]National Root Crops Research Institute, Umudike, Abia State, Nigeria.

[2]Department of Agricultural Economics, Micheal Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Accepted 10 November, 2024

This study used the log linear model derived from the Cobb-Douglas functional form for explaining labour productivity of small holder cocoyam farmers in Anambra State. The study data were collected through a multi-stage random sampling technique from 120 farmers using the cost -route approach in 2005. The study found fertilizer, cocoyam setts, capital and farmer experience to be positively and significantly related to labour productivity at 5% level. Farm size and household size had a negative relationship with labour productivity and significant at 5% level. The coefficients for manure and education were negative but not significant. The results calls for policies aimed at increasing planting materials, fertilizer, capital inputs, encouraging experienced farmers to remain in production, birth control measures and access to productive resources to small scale cocoyam enterprises.

Key words: Labour productivity, log-linear model, Anambra State.

INTRODUCTION

Cocoyam (*Xanthosoma* sp., *Colocasia* sp.) is an important staple cultivated in the south-eastern and south-western parts of Nigeria (Ojiako et al., 2007). It is also an important food security crop in Nigeria and variously grown by resource poor farmers, mostly women, who intercrop cocoyam with yam, maize, plantain, banana, vegetables and rice (Ikwelle et al., 2003). Currently, Nigeria is the world's largest producer of coco-yam. The average production figure for Nigeria is 5,068,000 mt which accounts for about 37% of total world output of cocoyam (FAO, 2007).

Nutritionally cocoyam is superior to cassava and yam in the possession of higher protein, mineral and vitamin contents in addition to having a more digestible starch (Parkinson, 1984; Splitoesser et al., 1973).

Agricultural labour costs, which have been estimated to be between 70 and 90% of the total labor costs (Ezedinma, 2000) in smallholder farming (Ezedinma, 2006) is a critical constraint under the present cocoyam production system which is manual in nature. Labour pro-ductivity or output per worker derives its importance from relationship to economic well being of a nation. For economic growth to result in an increased standard of living, it is necessary for output to grow faster than the labor force in the population, which implies that labor produc-tivity must grow (Ukoha, 2000). With increase in popula-tion, rural urban migration, the ageing of the rural popula-tion and the feminization of agriculture, rural farm labor is likely to remain inelastic and expensive (Ezedimma, 2006)

Therefore, policies to improve the productivity of coco-yam farmers and increase the output of the crop are necessary. The objective of this paper therefore is to provide a basis for a better allocation of resources in coco-yam production and enable cocoyam farmers to make more efficient and effective use of labor.

METHODOLOGY

The study area is Anambra State. A multi stage randomized sampling technique was used in selecting 120 cocoyam farmers from the three out of four Agricultural zones in the state using the cost- route approach. Two extension blocks were randomly selected from each zone and two circles from each block. Finally ten farmers were randomly selected from each circle for detailed study. The data collected on per hectare basis.

*Corresponding author. E-mail: okoyebenjamen@yahoo.com.

Table 1. Determinants of labor productivity in cocoyam production.

Explanatory variables	Coefficients	Standard error	t-value
Intercept	0.6954	0.6534	1.06
ln FARS	-0.3055	0.0839	-3.64**
ln FERT	0.2115	0.0823	2.57**
ln SETT	0.3140	0.0898	3.50**
ln Capital	0.2399	0.0659	3.64**
ln MANR	-0.0132	0.0590	- 0.22
ln EXP	0.1537	0.0746	2.06**
ln EDU	-0.0360	0.0828	- 0.43
ln HHS	-0.2908	0.1335	- 2.18**
R^2	0.7213		
F	14.88		

**Significant at 5%. Ln = represents the natural logarithm.

Analytical procedures

The log-linear model derived from the Cobb Douglas functional form was the econometric model specified for explaining labor productivity following Ukoha (2000) in cocoyam production. This functional form is the most popular in applied research because it is easiest to handle mathematically (Koutsoyiannis, 1979). Evidence from most studies depicts that the Cobb-Douglas functional form gives the best results than other functional forms. It is only when satisfactory results are not obtained from this model that other forms will be tried out, following Ukoha, (2000). The model is described thus:

Y/N = f (FARS, FERT, SETT, K/N, MANR, EXP, EDU, HHS)

Where Y = cocoyam output in kg; N = Labor input for all activities (in man days); K = capital input in naira made up of depreciation, charges on farm tools and equipment, interest on borrowed capital and rent on land; FARS = farm size in hectares; FERT = fertilizer input in kg; SETT = cocoyam setts planted in kg; MANR = manure input in kg; EXP = farming experience in years; EDU = farmers level of education in years; HHS = household size.

Yield (tons/ha) = [Sample output (kg) × 10] / Area harvested (m^2)

Yield/N = Labor productivity (kg/man day)

K/N = capital intensity of production (naira/man day)

RESULTS AND DISCUSSION

The data in Table 1 show the results of the econometric analysis for cocoyam in Anambra State, Nigeria. As expected, the signs of the coefficients for fertilizer, cocoyam setts, capital and experience were all positive and significant at 5% level. The coefficients for farm size and household size were negative and significantly related to labour productivity at 5% level. The coefficients for education and manure were negative but not significant. This implies that if the farm size is small, they are able to combine their resources better, following Hazarika and Subramanian (1999), Okoye et al (2007), and Lau and Youtopoulos (1971). Carter (1984) sets out possible explanations for the observed inverse relationship. Village-specific factors might be correlated to farm size (such as the Malthusian argument that greater land quality would lead to greater population density). Then there are possible characteristics of small farms them-selves: they may have better quality soil within villages; size may be a proxy for mode of production; there may be diminishing returns to scale; they may be more tech-nically efficient. Many authors conclude that the inverse relationship is a result of differential factor use intensity (Carter 1984; Newell et al., 1997; Byiringiro and Reardon, 1996; Masterson, 2007) . They conclude that as a result of this, small farms have greater average and marginal productivity of land. Farmers with large household size tend to dissipate most of their resources on upbringing and education of their children. Another possible explanation as posited by Materson (2007) is that there is a process of selection happening, with households' "better" farmers opting to hire themselves out, rather than working on the farm. This makes sense if the wages they can earn are higher than the returns to working on their own farm.

Following Senedecor and Cochran (1967) and Ukoha (2000), the importance of the variables in explaining labor productivity can be determined by applying their regretssion coefficients with the quantity S_i/S_y which serves as a correction scale. S_i is the standard deviation of the independent variable whose regression coefficient is being standardized, whereas S_y is the standard deviation of the dependent variable. The regression coefficients as shown in Table 2 were standardized in order to make them unit free and comparable.

The standardized regression coefficients show that 1% increase in cocoyam setts, fertilizer, farming experience and capital used leads to a 5.74, 0.41, 0.056 and 0.043% increase in labor productivity respectively. A 1% increase in household size and farm size would lead to a 0.04 and 0.004% decrease in labor productivity respectively.

Conclusion

All factors directly related to labour productivity call for

Table 2. Relative importance of the explanatory variables.

Explanatory variables	Standardized estimates	Rank
Cocoyam setts	5.7411	1
Fertilizer	0.4100	2
Experience	0.0562	3
Capital	0.0435	4
Household size	-0.0417	5
Farm size	-0.0040	6

policies aimed at increasing the cocoyam setts, fertilizer, encouraging experienced farmers to stay in production and capital inputs in descending order. This study's most important contribution to the continuing debate over the relationship between productivity and farm size is an affirmation of the inverse relationship in the case of Anambra State, Nigeria. Policies favourable to large- scale farms in Anambra State may lead to overall growth in the agricultural sector, but they will do less than nothing to combat the problem of rural poverty. They will contribute neither to the well being of small farmers nor to employment opportunities for landless peasants, since the larger farms are so capital intensive. Giving land to smaller farms will increase overall production, as well as improve the welfare of the small and landless peasantry since the bulk of agricultural food production is dominated by the small-holder farmer in Anambra State, Nigeria. There is also the need for provision of value re-orientation in birth control measures

REFERENCES

Byiringiro F, Reardon T (1996). "Farm productivity in Rwanda: Effects of Farm Size, Erosion, and Soil Conservation Investments." Agric. Econ 15(2): 127–136.

Carter MR (1984). "Identification of the Inverse Relationship between Farm Size and Productivity: An Analysis of Peasant Agricultural Production." Oxford Economic *Papers* 36(1): 131–145.

Ezedinma CI (2000). Farm Resource Allocation and Profitability of Arable Crop Enterprises in the Humid Forest Inland Valley Ecosystem: A case study of Ozu Abam in Southern Nigeria UNISWA J. Agric., 9: 48-56.

Ezedinma CI, Okarter C, Asumugha G, Nweke F (2006). Trends in Farm Labour Productivity and Implications for Cassava Industrialization in Nigeria. Proc. Of the 40th Conference of the Agricultural Society of Nigeria held at the National Root Crops Research Institute, (NRCRI), Umudike, Abia State. Oct. 16th – 20th, pp. 109-115.

FAO (2007). FAOSTAT Statistics Division of the Food and Agriculture Organization, http://faostat.fao.org.

Hazarika C, Subramanian SR (1999). Estimation of Technical Efficiency in the Stochastic Frontier Production Function Model – An Application to the Tea Industry in Assam.

Koutsoyiannis A (1979). Modern Microeconomics, 2nd (ed), (London and Basinagstoke): The Macmillan Press Ltd., p. 75

Lau L, Yotopoulos J (1971). A test for Relative Efficiency and Application to Indian Agriculture. Am. Econ. Rev. 61(1): 94 – 109.

Masterson T (2007). "Productivity, Technical Efficiency, and Farm Size in Paraguayan Agriculture". The Levy Economics Institute of Bard College. Working Paper No. 490, Feb.

Newell A, Pandya K, Symons J (1997). "Farm Size And The Intensity of Land Use In Gujarat." Oxford Economic Papers 49(2): 307–15.

Ojiako IA, Asumugha GN, Ezedinma CNE (2007). Analysis of Production trends in the Major Root and Tuber Crops in Nigeria, 1961-2005. Res in Crops 8(2): 371-380.

Okoye BC, Onyenweaku CE, Asumugha GN (2007). Allocative Efficiency of Small-Holder Cocoyam Farmers in Anambra State, Nigeria. The Nig. Agric. J. 38: 70-81.

Parkinson S (1984). The Contribution of Aroids in the Nutrition of People in the South Pacific. In: Chandra, S, ed., Edible Aroids. Clarendon Press, Oxford, UK: pp. 215-224.

Senedecor GW, Cochran WG (1967). *Statistical Methods*, 6th ed, (Ames: Iowa University Press).

Splitoesser NE, Martin FW, Rhodes AM (1973). The Nutritional Value of some Tropical Root Crops. Proc. of the Tropical Region of the American Society for Horticultural Science. 17: 290-294.

Ukoha OO (2000). Determinants of Labour Productivity on Small-Holder Sole Crop Farms: A Case of Waterleaf Enterprise (*talinum triangulare*). Nig. J. Agribusiness Rural Dev. 1: 3.