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Full Length Research Paper

Labour productivity among small- holder cassava farmers in South East agro ecological zone, Nigeria

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The study employed a Cobb-Douglas regression technique to measure labour productivity in the southeast agro ecological zone. A multistage random sampling technique was used to select 240 respondents from the zone in 2008. The study found gender and age to be negative and significantly related to labour productivity at 1.0% level of probability. The coefficients for fertilizer and hired labour were positive and also significant at 1.0% level of probability. The coefficient for land ownership was positive and household size negative, both significant at 10.0% level of probability. The results calls for polices aimed at making more lands available especially to women who are stronger, as well as production inputs like fertilizer.

Key word: Cobb-Douglas, labour productivity and cassava.

INTRODUCTION

Nigeria is the world largest cassava producing country in the world with about 45.75 metric tones annually (FAO, 2007). Cassava is a cheap and reliable source of food for more than 700 million people in the developing world (FAO, 2003). It is estimated that 250 million people in Sub-Saharan Africa derive half of their daily calories from cassava (FAO, 2005). Cassava is Africa's second most important food staple, after maize in terms of calories consumed (Nweke, 2004). It is the mostly widely cultivated in the country and the crop plays a vital role in the food security of the rural economy because of its capacity to yield under marginal soil conditions and its tolerance of drought (Ezedinma et al., 2006). In 2002, the government of Nigeria launched a presidential initiative on cassava. The aim of the initiative was to develop cassava, the engine of growth and diversify Nigeria's economic base away from its principal export – crude oil (Ezedinma et al., 2007).

The requirements of consistent supply of large volume of fresh roots by cassava – based industries cannot be supported by the current subsistence production systems. The critical constraint under such production systems is agricultural labour costs which have been estimated to be between 70 - 90% of the total labour cost (Ezedinma, 2000) in smallholder farming agriculture. With increase in rural – urban migration, the ageing of the rural population and the feminization of agriculture, rural farm labour is likely to remain inelastic and expensive for agro-industrial purpose (Ezedinma et al., 2006). Labour production or output per worker derives its importance from the relationship to economic and wellbeing of a nation. For economic growth to result in an increased standard of living, it is necessary for output to grow faster than the labour force in the population, which implies that labour productivity must grow (Ukoha, 2000). Therefore, policies aimed at improving the productivity of cassava farmers and increase the output of the crop are deemed necessary. The objective of this paper therefore is to determine the labour productivity of cassava farmers by providing a basis for a better allocation of resources and enable them to make more efficient and effective use of labour.

METHODOLOGY

The study area was the South East agro-ecological zone of Nigeria. A multistage randomized sampling technique was used in selecting

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240 cassava farmers. In the first stage four states namely Abia, Akwa Ibom, Imo and Cross River States were randomly chosen. In the second stage, two agricultural zones were selected from each state giving a total of eight agricultural zones. In the third stage, thirty (30) respondents were randomly selected from each zone giving a total of 240 respondents. Interview schedules were used to elicit information from the respondents on labour, farm size, input use, output, capital and their socio-economic characteristics Data was analyzed using descriptive statistics and the four functional forms of Regression model-Linear, exponential, Cobb-Douglas and semi-Log. The lead equation was selected based on certain econometric criteria.

Analytical procedures

The four functional regression models - linear, Cobb-Douglas, Exponential and Semi log were the econometric models specified for explaining productivity in cassava production.

Linear $YD/L = bo + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ldots\ldots b_9X_9 + e$

Cobb-Douglas:
$LnYD/L = bo + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + \ldots\ldots b_9 lnX_9 + e$

Exponential: $Ln\ YD/L = bo + b_1 X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \ldots\ldots b_9X_9 + e$

Semi-log: $YD/L = bo + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + \ldots\ldots b_9 lnX_9 + e$

Where YD = Cassava Out in kg; L = Labour input for all activities (in man days); Ln=Natural logarithm; X_1 = Age in Years; X_2 = Household size; X_3 = Gender (Dummy variable: 1 = Male, 0 = Female); X_4 = Occupational Status (Dummy; variable: 1 = full time farmer, 0 = Part time farmer); X_5 = Farm size in ha; X_6 = Fertilizer use in kg; X_7 = Hired labour in man days; X_8 = Family labour in man days; X_9 = Land ownership (Dummy variable: 1 = Market based, 0 = Non-market based)

$$\frac{\text{Yield}}{\text{L}} = \text{labour productivity (kg/man-day)}$$

$$\text{Yield} = \frac{\text{Output (kg)}}{\text{Area harvested } (M^2)}$$

RESULTS AND DISCUSSION

The data in Table 1 shows the results of the econometric analysis for cassava in the zone. The Cobb-Douglas functional form was chosen as the best fit because of its high R^2 value, number of significant variable in line with a priori expectations. The coefficient for gender was negative and highly significant at 1.0% level of probability. This implies that a 1% increase in the number of females will lead to a 0.41% increase in labour productivity for cassava production. Women dominate all activities in cassava production in the study area. The result confirmed earlier works by Ironkwe et al. (2007, 2009), which also indicated that women are mostly involve in farming activities in the South-East agro ecological zone.

The coefficient for land ownership was positive and significant at 10.0% level of probability. This implies that any 1.0% increase in market based mode of landownership will lead to a 0.64% increase in labour productivity. Market based landownership system include outright land purchase, lease or mortgaged land while non-market based include communal and inherited lands. Farmers tend to be more labour productive to meet up with land rents, fees and recoup amount spent on purchase.

The coefficient for age was negative and significant at 1.0% level of probability. This indicates that any increase in age will decrease labour productivity by 2.03%. This implies that increasing age would lead to low productivity as a result of ageing farmers who would be less energetic to work (Chinaka et al., 1995; Ajibefun and Daramola, 2003; Ajibefun and Aderinola, 2004 and Anyaegbunam et al. (2006).

The coefficient for household size was negative and significantly related to labour productivity at 10.0% level of probability. A 1.0% increase in household size will lead to a 0.43% decrease in labour productivity. This is also in line with result of labour productivity on cocoyam by Okoye et al. (2008). Most house holdings are dominated by children who may not be able to work efficiently. Another plausible reason may be due to the fact that most of these household members are still in school and put in only a few hours in the field or when they are on breaks.

According Materson (2007) farmers with large household size tend to dissipate most of their resources on upbringing and education of their children, He also stated that, according to the process of selection happening with households “better” farmers opt to hire themselves out rather than working on their farms provided the wages they earn are higher than what they will get as returns by working on their own farms.

The coefficient of fertilizer was positive and highly significant at 1.0% level of probability with labour productivity. Mineral fertilizers require special consideration as they are both a conventional agricultural input and an important element boosting productivity. The coefficient for hired labour was positive and significant at 1.0% level of probability. This implies that increase in hired labour by 1.0% will lead to a 0.7% increase in labour productivity.

Hired labour tends to be more productive than family labour probably because of the remuneration/wage involved. Most times hired labour may be under supervision by the farmer to make for efficient labour input and usage in the field. The coefficients for family labour and occupational status were positive but not significant. Finally coefficient for farm size was negative but not significant.

The average statistics of the sampled cassava farmers are presented in Table 2. On the average, a typical cassava farmer in the zone is 49 years old, with 7 years of education, 24 years farming experience and an average household size of 8 persons. The average land owned by the farmers was 2 ha, hired labour used in man days was 182 and family labour utilized was 121. Cassava production in the zone is a female dominated

Table 1. Summary of regression analysis (four functional forms) on determinants of labour productivity in cassava production in the S/E zone.

Determinant variables	Linear (coefficients)	Exponential (coefficients)	Cobb- Douglas (coefficients)	Semi-log (coefficients)
Constant	8.6531	4.0490	-3.7428	-717.5176
X_1	(228.0871)	(5.110)	(0.6624)	(256.1044)
	-7.7127	-0.0397	12.0346	-410.2981
	(13.0493)***	(0.6550)***	(3.1536)***	(657.6367)***
X_2	-9.4379	-0.00.4638	-0.4389	-79.0100
	(0.0318)*	(-0.0005)*	(0.0317)*	(25.0093)
X_3	-71.8264	-0.2473	-0.4083	-0.920.7654
	(-16.1899)**	(0.0221)*	(-0. 1372)***	(-32.8186)***
X_4	35.1562	0.2742	0.1438	6.2838
	(97.99656)	(0.5782)***	(0.4764)	(79.8152)
X_5	-104.8488	-0.04751	-0.1767	02.2992
	(181.1007)**	(0.3215)	(0.2094)	(187.6428)**
X_6	0.42264	0.0025	0.9417	143.8814
	(0.75809)**	(0.0041)***	(1.2146)***	(214.7471)
X_7	1.8046	0.0038	0.7117	274. 2061
	(-0.8751)**	(0.007)*	(-0.2087)***	(163.0411)***
X_8	-0.0029	-5.836-0.6	0.6668	9.0136
	(0.0238)*	(0.0001)	(0.2085)	(40. 3649)
X_9	44.9254	0.0451	0.6412	159.5972
	(0.8418)	(0.1746)	(2.0081)*	(2.2668)
R^2	0.55	0.45	0.70	0.71
F	6.82	4.59	9.52	10.06

Source: Regression analysis of survey, 2008. Figures in parenthesis represents (t- ratios).***= Significant at 1%, **= Significant at 5%,* = Significant at10%.

Table 2. Average socioeconomics statistics of cassava farmers in the S/E zone.

S / NO.	Variables	Mean value	Maximum value	Minimum value
1	Age	48.72	80	20
2	Education (years)	7.53	18	0
3	Household size	8.90	40	1
4	Farming experience	24.15	50	3
5	Land ownership	2.13	20	0.02
6	Hired labour	182.34	282.34	42
7	Family labour	121.23	153.97	13
8	Gender (female)	60.95%		
9	Extension contact	68.48%		
10	Farmers' organization	84.18%		

Source, field survey 2008.

occupation as about 61% of the farmers are females. About 68% of the farmers were visited by the extension agents during the year of this study while 84% of the farmers belong to one farmer organization or the other.

Conclusion

All factors related to labour productivity in cassava production call for positive policies aimed at land reforms towards re-distribution of land to make more land available to farmers especially women. Those who are younger and more active need to be encouraged to stay in production as well as provision of inputs especially fertilizer. There may also be need for birth control policies aimed at reducing household holdings to improve labour productivity.

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