PCM002

DETERMINANTS OF LABOUR USE EFFICIENCY AMONG YAM FARMERS IN EKITI STATE, NIGERIA

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ABSTRACT

Yam is an important crop for many producers and consumers in West Africa. A significant proportion of the required labour for yam production has become increasingly difficult to mobilize especially at peak periods. With the problem of scarcity of labour, the efficient utilization of available labour could be a way of increasing yam output and returns to yam farmers. This study therefore determined the labour use efficiency in yam production in the study area. A multistage sampling technique was used to select 180 yam farmers using a structured questionnaire while Labour-use frontier model was used to estimate the efficiency of labour-use and its determinants.

Results showed that farm size and seed yam has positive relationship with the amount of labour used. One percent increase in the farm size led to about 3.87 percent increase in the amount of labour used and one percent increase in the quantity of seedyam planted led to about 0.79 percent increase in the amount of labour used. Also, education, farming experience and off-farm income has a positive influence on labour use efficiency of the farmers, while household size and access to credit had negative influence.

In conclusion, labour use inefficiency in the study area is relatively low ranging from 1 percent to 100 percent with a mean of 9 percent. Yam farmers in this study area were not efficient in the use of labour except they have access to credit. However this labour was not sufficient.

INTRODUCTION

Nigeria is the world largest producer of yam (Offei, *et. al.*, 2006) accounting for over 65% of the total world annual production estimated at 38 million metric tonnes (FAOSTAT, 2014). Although, there has been an increase in the output of yam overtime, this is largely due to land extensification rather than input intensification (FAOSTAT, 2009). Human labour requirement in production process especially as regards smallholder farming communities is said to constitute almost 90 % of all farm operations in small scale farms (FAO, 2015). According to IITA (2009), labour is one of the most important factors of yam production, as labour requirements in production (land preparation, ridging, mulching, staking, weeding, and harvesting) account for about 40% of the total yam production costs. A significant proportion of the required labour has become increasingly difficult to mobilize for yam production particularly at peak periods. The inadequacy of labour in the production of yam has been further aggravated by a substantial reduction in the supply of family labour by persistent drift of rural family labour to the non-farm and off-farm activities, which potentially offers higher wages (Migap and Audu, 2012). This denies the yam farmers the much-needed human capital, weakens production capacity and reduces income levels of the farmers (Ogwumike and Aromolaran, 2000). This has also impacted negatively on planting precision, better weed control, timely harvesting and crop processing (Oluyole *et al.*, 2011). Given the above problem of scarcity of labour, especially in the study area, the efficient use of available labour could be a way of increasing yam output and returns to yam farmers (Ajijola *et. al.*, 2014). This study will therefore determine the labour use efficiency in yam production in the study area.

METHODOLOGY

The study was carried out in Ekiti State, SouthWestern Nigeria. A multistage sampling technique was used to select 180 respondents for the study. In the first stage, two local government areas were purposively selected from each of the three senatorial districts in the state (these include: Oye Ekiti and Ikole Ekiti from North Senatorial District; Aramoko Ekiti and Irepodun Ekiti from Central senatorial district and Emure Ekiti and Ose Ekiti from South senatorial district) that are predominant yam producers. In the second stage, 3 villages were purposively selected from each of the LGA and in the third stage, 10 yam farmers were selected using random sampling technique to make a total sample of 180 respondents for the study.

Analytical technique

Labour-use frontier model

Labour-use frontier model was used to estimate the efficiency of labour-use. The model was formulated using the stochastic frontier model and estimated in a single stage maximum likelihood estimation procedure using the computer software frontier version 4.1 (Coelli, 1996)

RESULTS AND DISCUSSION

Table 1 shows the description of the variables used in the estimation of labour use requirement frontier. For this analysis, it should be noted that outliers of variable used for analysis were removed.

Table 1:Summary statistics for variables used to determine the Labour use requirement frontier

Variables	Units	Mean	Minimum	Maximum	Standard deviation	Total
Land	Hectares	0.51	0.25	0.90	0.171	99
Seedyam	Kilograms	3497.20	2000	6200	1119.35	99
Yam output	Kilograms	10037.80	2200	24000	3940.92	99
Capital	Naira	111159.49	66000	210000	35422.88	99
Labour	Man-day	199.62	100	493	82.94	99

Source: **Data Analysis, 2015.**

Labour use requirement frontier and its efficiency

Table 2 shows the estimation of the labour required for yam production among the sampled farmers. Farm size and seedyam were the significant factors among the hypothesised variables.It showed that farm size had a positive effect on the amount of labour used.Onepercent increase in the farm size led to about 3.87 percent increase in the amount of labour used for yam production among the sampled farmers. This is in agreement with Effiong (2005); Nwachukwu and Onyenweaku, (2007), Anyiro et al. (2012) and Ezindima et al (2000) who also found out that the larger the farm size, the higher the amount of labour use. And this conforms with*a prior* expectation. The size of farm land should be increase by reducing the price of land that is used for production so that more labour can be used to increase the production of yam.

Thequantity of seedyam planted had a positive influence on the labour used for yam production. Onepercent increase in the quantity of seedyam planted led to about 0.79 percent increase in the amount of labour used. This also is in line with*a prior* expectation because farmers depends on labour to plant and carry out daily maintenance activities on seedyam planted till harvesting.

Education had a positive effect on labour use efficiency and significant. This implies that a unit increase in the level of education of the farmer led to about 1.2units increase in labour use efficiency. This agrees with the *a prior* expectation that the higher the level of education, the higher the efficient use of labour. This does not agree with the findings of Sofoluwe*et.al*, (2011) that education increases efficiency of labour.Acquisition of education can assist the farmers in the efficient utilisation of labour.

Household size had a negative impact on labour use efficiency. A unit increase in the size of household resulted in 2.2 units decrease in the efficiency of labour use. The size of the household does not reflect the farmers' access to labour and the efficient use of labour. It conforms with the findings of Nwachukwu and Onyenweaku, (2007);Onyenweaku et al., (2004) who showed household size to be negatively related to labour use efficiency.

The coefficient of farming experience had a positive effect on labour use efficiency. A unit increase in the farming experience gave rise to about 0.9 unit increase the labour use efficiency of farmers. The more farming experience gained by the farmers, the more likely the farmers will be efficient in the use of labour. This is in line with *a prior* expectation that the more years of farming experience, the more efficient farmers will be in the use of labour as farmers gain more experience (techniques and innovation) as they carry out the yam farming practices every production season. This conforms to Njoku and Odi (1991) that farming experience promote efficient use of resources (particularly labour).

The coefficient of off farm income had a positive influence on labour use efficiency. A unit increase in the off farm income led to 0.00 unit increase in the labour use efficiency of farmers. This concurs with *a prior* expectation that the income farmers earned from their off farm occupation can help them to efficiently use their labour.

Access to credit had a negative impact on labour use efficiency. A unit increase in farmers' access to credit led to about 9.8 units decrease in the efficiency of labour use. This concurs with the *a prior* expectation that an increase to farmers' access to credit will cause farmers to efficiently use labour. Accessibility to credit can enhance labour use efficiency.

The total variance (which is defined as $\sigma^2 = \sigma_v^2 + \sigma_u^2$) was statistically significant. This indicates a good fit and the correctness of the specified distributional assumption of the composite error term. The coefficient of the variance ratio is 0.34 and was statistically significant. The variance ratio denotes that most variations of composite errors are due to inefficiency rather than measurement errors of random noise. About34 percent of the variation in labour use wasexplained by the independent variables included in the model. The LR for one sided error supports the specifications of $v + u$.

Table 2: Estimated labour-use requirement frontier production function for Yam production

Variables	Parameters	Coefficient	Standard-error	T-ratio
Constant	β_0	25.24	3.05	8.27
Land	β_1	3.87***	0.82	4.73
Seedyam	β_2	0.79***	0.39	2.04
Yam Output	β_3	-0.12	0.25	-0.50
Capital	β_4	-0.18	0.13	-1.41
Labour use Efficiency Model				
Constant	z_0	7.80	4.28	1.82
Education	z_1	1.19***	0.43	2.78
Household size	z_2	-2.21***	0.85	-2.61
Farming experience	z_3	0.88***	0.25	3.57
Off farm income	z_4	0.00***	0.00	-10.91
Access to credit	z_5	-9.81***	3.18	-3.09
Sigma-squared	σ^2	270.24***	4.27	63.27
Gamma	γ	0.34***	0.01	37.77
Log likelihoodfunction			-406.71	
LR test			21.20	

Source: **Data Analysis, 2015.**

Distribution of the Labour use efficiency of Yam farmers in Ekiti State.

Table 3 shows the distribution of the labour use efficiency. The estimate of the Cobb-douglas labour use efficiency shows the mean labour requirement frontier as 0.09 for the yam farmers in the study area which is within the range of 0.09-0.16 with a minimum labour use efficiency of 0.01 and the maximum labour use efficiency of 1.00.Anyfarmer employing below this requirement frontier is technically inefficient but any farmer employing above the requirement frontier is technically efficient. In other words, 9.1 percent of yam farmers employed labour below this mean which made them inefficient; while about 90.9percent of yam farmers employed labour close to the optimal level. The optimal labour use efficient farmer must operate on the frontier which is 1, since only a few of the yam farmers were close to the frontier, and then it indicates that additional man-days of labour should still be employed. Although, yam farmers in this study area were efficient in the use of labour but the labour was not available to them.

Table 3: Distribution of the Labour use efficiency of the respondents.

Labour use efficiency range	Frequency	Percentage
0.01-0.08	9	9.1
0.09-0.16	74	74.7
0.17-0.24	3	3.0
0.25-0.32	1	1.0
0.33-0.40	2	2.0
0.41-0.48	6	6.1
>0.49	4	4.1
Total	99	100
Mean Labour use Efficiency	0.09	
Maximum Labour use Efficiency	1.00	
Minimum Labour Use Efficiency	0.01	

Source: **Data Analysis, 2015.**

Description of labour use pattern per hectare by respondents

Table 4 shows the labour use pattern per hectare by respondents. It shows that 130 man-days of hired labour were used for all the yam production activities and that land preparation required an average of 34 man-days of labour. The table also reveals that majority of the yam farmers made use of hired labour for yam production in the study area. It also reflects the fact that men were more involved compared to women especially in land preparation and weeding. It also reveals that land preparation and weeding required about 163 man-days of the total production labour required. Although, child labour from family and hired of about 103 man-days were made use of by the sampled farmers of the total labour, men and child labour were mostly used for yam production. This could be as a result of increase in the rate of rural-urban drift and the involvement of the youths in commercial motorcycling popularly known as okada, thereby leaving yam production in the hands of old farmers and children. This agrees with the findings of Anyiro*et. al.*, (2012), who reported that more man-days of labour were engaged in land preparation and weeding.

Table 4: Description of labour use pattern per hectare by respondents

		Land Preparation	Planting	Mulching	Staking	Weeding	Harvesting	Total
Hired Labour (Man-days)	Men	34(10.3)	12(9.6)	15(9.1)	15(8.6)	30(19.0)	24(1.5)	130(47.8)
	Women	7(0.0)	3(0.3)	3(0.3)	5(0.3)	2(0.0)	13(1.0)	33(1.9)
	Childen	8(3.4)	3(0.6)	3(0.8)	6(0.9)	3(0.0)	8(5.0)	31(7.3)
	Total	49(13.7)	18(10.5)	21(10.2)	26(9.8)	35(19.0)	45(7.5)	194(57.0)
Family Labour (Man-days)	Men	12(9.2)	6(4.9)	7(5.8)	10(6.7)	24(0.3)	14(9.1)	73(26.8)
	Women	9(8.1)	7(1.9)	10(1.3)	5(0.7)	12(9.0)	11(8.3)	54(21.2)
	Childen	10(5.5)	9(1.8)	14(2.5)	18(3.2)	12(1.8)	9(3.0)	72(12.3)
	Total	31(22.8)	22(8.6)	31(9.6)	33(10.6)	48(11.1)	34(20.4)	199(60.3)
Pooled Labour (Man-days)	Men	46(19.5)	18(14.5)	22(14.9)	25(15.3)	54(38.0)	38(10.6)	203(93.3)
	Women	16(8.1)	10(2.2)	13(1.6)	15(1.0)	14(9.0)	24(9.3)	92(23.1)
	Childen	18(8.9)	12(2.4)	17(3.3)	24(4.1)	15(1.8)	17(8.0)	103(19.6)
	Total	80(36.5)	40(19.1)	52(19.8)	64(20.4)	83(30.1)	79(27.9)	398(117.3)

Source: **Data Analysis, 2015.**

Conclusion

From the estimation of the labour requirement frontier, since farm size and seedyam had positive relationship with the amount of labour used, it means that the larger the farm size cultivated to yam, the more the quantity of seedyam planted, the more the amount of labour used and this can cause an increase in the yam production in the study area. Again, from the determinants of labour use efficiency, education, farming experience and off-farm income had a positive influence on labour use efficiency of the farmers in the study. This signifies that an increase in the education of the farmers, their farming experience and off-farm income will assist in the efficient use of labourby yam farmers. It is concluded that the farmer with some levels of education who has farming experience and other forms of incomes will be efficient in the use of labour. Whereas household size and farmers' access to credit had positive relationship with labour use efficiency. The labour use efficiency of the yam farmers in the study was relatively low which ranged from 1 percent to 100 percent with a mean of 9 percent. This means that there are still opportunities opened for yam farmers to increase the level of labour use since only few farmers were close to the frontier in the study area. Yam farmers in this study area were efficient in the use of labour but this labour was not available to them.

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