LABOUR-USE EFFICIENCY BY SMALLHOLDER RICE FARMERS IN EBONYI STATE NIGERIA: A LABOUR-USE REQUIREMENT FRONTIER APPROACH.

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ABSTRACT
Rice (Oryza sativa L.) production requires effective farmers training and involves set of labour-intensive activities, especially in the tropical zone. In Ebonyi State, Nigeria, this is generally done by smallholder farmers at a subsistence level due to the limited supply of labour. This study examined the efficiency of labour use by smallholder rice farmers inEbonyi State, Nigeria. A two-stage random sampling technique was used to select 120 smallholder rice farmers from the local government areas of Ivo and Afikpo South of the state. Data were collected during a survey with a well-structured questionnaire administered by the method of personal interviews with farmers. The result revealed that agricultural households provided an average of 408 man-days used in rice production activities, of which 34.17% used hired labour while family work, sharecroppers and exchange labour provided the rest of the workforce (65.83%) required. The Cobb-Douglas functional form of the labour use frontier estimates shows that the quantity of rice harvested, the size of agricultural land cleared, and the amount of fertilizer applied have significantly affected the quantity of labour used in rice production at the level of 10.0%, 5.0% and 1.0% importance respectively. The socio-economic determinants of labour use efficiency were age, education, farm size, gender, labour wages and household size which were statistically significant at 1% risk level with the exception of the age coefficient which was significant at 5.0%. The result showed that the estimated efficiency of the use of agricultural labour varied from 0.20 to 0.96 with an average value of labour efficiency of 0.77. Policies to scale up rice farmer's operation through better access to production inputs like fertilizers, agrochemicals and capital are needed to increase the efficiency of labor use in the area.
Key words: labour use, efficiency, smallholder yam farmers, labour use requirements frontier.

1. INTRODUCTION

Africa's socio-economic developments are mainly agrarian and around 70% of its `` workforce " who are directly or indirectly engaged in agriculture live in rural areas and depend on agriculture for their livelihood (Ugorji, 2013). In Nigeria, the food sub-sector of staple crops, rice production occupies an important place, especially among cereal crops (Nwilene, et al 2001). Rice is one of the most important grains in the world and is the staple food of millions of people in South Asia, America and Africa (FAO, 2017). In Nigeria, rice is an important component of the food from Nigeria. The average Nigerian now consumes 21 kg of rice per year, which represents 9% of total caloric intake and 23% of total cereal consumption with around 2.1 million tonnes of rice consumed annually by the population (Daramola, 2005). The increase in rice consumption could be largely linked to the increase in capital income, rapid population growth and changes in the taste and diet of Nigerians (Onwuka et al, 2010).

WARDA (2005) reported that Nigeria is the largest importer of rice, spending more than $ 300 million annually on rice inputs alone. In 2001 and 2002, Nigeria imported 1.7 million and 1.5 million tonnes of rice, respectively. Nigeria leads rice production in Africa (FAO, 2004). However, empirical evidence has shown that the absolute level of rice production in the country has remained static for the past three decades. This despite the endowments of the nation, including; production under diverse ecological conditions, many improved rice technologies and government rice policies and programs (Nwilene, et al 2001). This outright decline may not be unconnected with scarce and high cost of production resources needed in the production of the crop.

Farmers in the southern Nigeria complain of unavailability and high cost of labour, long period of propagation and high use of crude technologies in rice production (Anyanwu, 1993; Gocowski&Oduwole, 2003). To have sustainable development in agriculture there is need to make efficient use of basic production factors, which include; labour, land and capital (Bervidova, 2001) Human labour activates other production factors and transforms other farm inputs into the required outputs. The scarcity of farm labour has impacted negatively on planting precision, better weed control, timely harvesting and crop processing (Oluyole *et. al*., 2011). The inadequacy of farm labour to facilitate expansion of rice farms and intensify the already selected area for rice production in Eastern Nigeria has been noted (Sarma*et al.*, 2011). Empirical evidence has shown that available labour force comprised mostly of aged farmers to the exclusion of men and women within the active working age. This has impacted negatively on rice productivity (Oluyole&Lawal, 2010) The increasing absence of people within the active age could be attributed to drudgery in farm activities, rural-urban migration, and absence of social infrastructure in the

rural areas, as well as poor farm income and low life expectancy in rural areas (Gill, 1991). Human labour is about the only main source of labour available to small-holder rice farmers in Nigeria. Some studies (Echebiri&Mbanasor, 2003; King, 1972) confirm that farm labour supply by humans on the farm is not homogenous and job contents differ. These studies found that in general, men performed heavy farm operations such as land preparation, staking and harvesting with women and children performing lighter operations such as planting, fertilizer application and weeding. Ajibefun et. al., (2000) noted that hired labour contributes 88.0% of the total labour use on farms thus emphasizing its importance in agricultural activities. Other types of labour that could be employed are family labour and exchange labour. Researchers on farm labour supply have observed that total supply of labour depends on such factors such as the size of the population, its age composition and certain institutional factors (Hardwick, 1994). Efficiency of labour use as a production factor is expressed by the level of labour productivity. Labour productivity is regarded as technical efficiency of human work utilized in creation of useful goods (Bervidova, 2001). Achieving increases in rice production according to Tsado*et al*, (2014) requires increasing labour-use efficiency, intensification of use of land and expansion of indigenous technology. This study attempts to assess the effects of production resources on the production of rice farmers in the study area with a view to formulating appropriate political recommendations which will favor the agricultural development of the State in particular and the nation in general. The other specific objectives are as follows: describe the socio-economic characteristics of farmers, estimate the profitability of swampy rice and identify the constraints to the production of swampy rice in the study area.

2. MATERIALS AND METHODS

This study was conducted in the local government areas (LGAs) of Ivo and Afikpo South, in the state of Ebonyi in Nigeria. The LGAs were chosen on purpose due to the intensity of rice cultivation and the role of rice in the area (Ugorji, 2013). The Ivo and Afikpo South LGAs are two of the five LGAs that make up the southern agricultural area of Ebonyi state in Nigeria. The LGAs are located at latitudes 05030 'N and 05040' north of the equator and longitudes 07025 'E and 07032' east of the Greenwich meridian. Its population stood at 298,140 people who are mainly rural farmers, of which 48.0% are women and 52.0% men, over an area of approximately 521 km2 (FRN, 2006). The people are mainly farmers and some are engaged in stone crushing to supplement their farm income. The predominant farmers in these areas produce food crops such as yam, cassava, okra, palm oil, plantain, banana, vegetables and cash crops such as oil palm (EBSG, 2015). A two-stage random sampling technique was adopted in the selection of the panel of farmers involved in this study. First, 3 communities each were randomly selected from the LGAs (Ivo and Afikpo South), for a total of 6 communities. In the second stage, 20 rice producer households were randomly selected from each of the communities chosen, which gives a total sample of one hundred and twenty (120) rice producer households involved in this study. The sampling frame used was provided by agricultural extension agents (AE) of the Agricultural Development Program (ADP) working in the study area. The data collection instrument was a pre-tested structured questionnaire that was administered to rice farmers and their farming households using a personal interview method. Analytical techniques included descriptive statistics and the stochastic frontier function of labour-use requirements.

2.1. Theoretical Framework

Labour-use requirement frontier model helps to determine minimum amount of labour required to produce a given level of output. From this frontier, labour-use efficiency is attained when actual labour employed is on the labour requirement (Masso and Heshmati, 2003; Akanni and Dada, 2012). Labour-use requirement frontier model is expressed as:

$Lit^* f(W_{it}^* Y_{it}^* Z_{ut}^* t: \beta)$ ----------(1)

Where Lit^* is the labour requirement frontier (optimal), *Yit*is real value added (output), Wit is real wage, *Zut*is a vector characterizing the production process and the environment (economic policy variables), β are unknown parameters associated with determinants of optimal labour-use. Finally, variable *t* denotes time. The first approach is the relationship between the actual labour used by farmer *i*at time *t* (denoted as *Lit*) and the labour requirement function:

$Lit^* = L^*_{it} eu_{it}$ ----------(2)

Where $u_{it} > 0$;

Y_i and t was interpreted as technical inefficiency. $u_{it} = 0$ means that the employer uses labour efficiently which implies that $L_{it}^* = L_{it}^* eu_{it}$. The term $eu_{it} = L_{it}^*$ when $L_{it}^* \geq 1$ and measures labour-use inefficiency for Y_i. This approach was estimated using standard stochastic function technique in which distributional assumptions were made on the inefficiency and random error term. Labour-use by farm households can be expressed as;

$L_n L_{it} = L_n L_i^*{}_t V_{it}$ ----------(3)

Where, $V_{it}$is the randomly and identically distributed error term with zero mean and constant variance. The labour-use model is specified as a factor input requirement function in which labour is specified to be a function of independent variables. The empirical estimation was based on trans-log functional form of labour function using a simultaneous maximum, likelihood estimation method. In the second approach, estimation of labour-use efficiency was based on residual from the labour requirement model

(Gocowski&Oduwole, 2003). Considering the residual plus intercept as a dependent variable, a labour requirement stochastic frontier model was estimated and efficiency point for each observation was computed. The estimable equation then became:

$V_{it} - \alpha_o + V_{it} + W\alpha$ ---------- (4)

The random error term is assumed to be normally distributed with N (*0*, α^2 W) and independent of the inefficiency unit. The latter are non-negative, which is the random variables assumed to account for the inefficiency in labour-use, given the levels of output and the quasi-fixed capital input. They are obtained as truncations at *0* of the N (m_{it}. α^2 W) distribution of v_{it}. The degree of labour over use is explained by a time trend, ownership and trans-regional trade;

$Mi_t = T_o + T_{it} + T2private_{it} + T3trans\text{-}regions_{it} + T4share_{it}$ ---------- (5)

These are variables affecting the labour-use efficiency. M_{it} is the average of the normal distribution truncated at 0. The lower the value of M_{it} the higher the labour-use efficiency. This frontier model based on Gocowski and Oduwole (2003) was treated as an invested factor requirement model and was estimated by method of Maximum likelihood. Thus, over use of labour is defined as 0 when L_{it} measure is > 1. In this study, however, labour use was assumed to be a flexible factor in production process in the rice farming economy of the study area.

2.2 Model Specification

Determinants of technical efficiency of small holder crop farming in Nigeria, in which the amount of labour-use is a function of farm output was stated implicitly as follows:

$H\ (L_i Y_i Y_n) = 0$ ----------(6)

Where; L is labour used in producing farm products *Yi;,Yn*are the rice outputs produced, using labour in a household. Solving for L gives;

$L = H\ (Y_i Y_n)$ ----------(7)

While the above equation was more simplified to ease quantitative analysis, we therefore had it that:

$H\ (Y_i Y_n) = 0\text{-}Y_i$ ----------8

Thus, the equation was used as an index of labour-use efficiency. Given the output vector Y_0, demand for labour will depend on the production technology, technical inefficiency and factors outside the control of the farm. A Cobb-Douglas labour-use frontier was a function that was estimated in the study as given below:

$L_n L_i = o + {}_i L_n Q\ Harvested + {}_2 L_n Q\ cleared + {}_3 L_n Q\ sprayed + {}_4 L_n Q fertilizer\ applied + V_1\text{-}V_1$--- (9)

Where Li = amount of labour-used (man-days);
Q Harvested = quantity of rice harvested (Kg);
Q Cleared = area of farm land cleared (m2);
Q Sprayed = volume of agrochemical sprayed (litres);
Q fertilizer applied = quantity of fertilizer applied (kg);
V = the two sided, independent normally distributed random error.

2.3. Determinants of Labour-use Efficiency:

To determine factors contributing to the observed labour-use efficiency, the following model was formulated and estimated jointly with the stochastic frontier model in a single stage Maximum likelihood estimation procedure using the computer software frontier version 4.1 (Coelli, 1996) as follows:

$LE = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \alpha_4 Z_4 + \text{---------} \alpha_{11} Z_{11}$ ---------- (10)

Where LE = Labour-use efficiency of the i-th farmer
Z_1 = labour wage (Naira);
Z_2 = Age of farmers (Years);
Z_3 = Level of education of the farmers (Years);
Z_4 = Membership of farmer's association/cooperatives (1 = yes; 0 = no);
Z_5 = Farm size (hectare);
Z_6 = Gender of the farmer (Male = 1; Female = 0);
Z_7 = Farm distance (km);
Z_8 = Farming Experience (years);
Z_9 = primary Occupation (farming=1, otherwise=0);
Z_{10} = Household size (number);
Z_{11} = Farm income (Naira);
While a_0, $a_1 a_2$ ……a_{11} are the parameters to be estimated.

RESULTS AND DISCUSSION

Table 1. Socio economics of Rice Farmers in Abia State, Nigeria

Variable	Frequency	Percentage (%)
Age (Yrs)		
< 30	18	15.00
30 – 60	88	73.33
> 60	14	11.66
Gender		
Male	79	65.83
Female	41	31.17
Marital Status		
Single	23	19.17

Married	97	80.83
Household Size (number)		
1– 4	38	31.67
5– 9	57	47.50
9-12	25	20.83
Education level		
No formal Education	08	6.67
Primary Education	24	20.00
Secondary Education	67	55.33
Tertiary Education	21	17.50
Labour types Used		
Household only	27	22.50
Hired	41	34.17
Exchange	23	19.17
Casual	21	17.50
Share cropping	8	6.67
Farming Experience (years)		
1-10	32	26.67
11-20	42	35.00
21-30	28	23.33
31-40	18	15.00
Farm Size (hectare)		
< 1	61	50.83
1-2	43	35.83
3-4	17	14.17

Source: Field Survey, 2019

3.1. Socioeconomic profile of respondents

The socio-economic characteristics of rice producers in Ebonyi State, Nigeria are presented in Table 1. The Table revealed that majority of the rice producers (73.33%) was aged between 30 and 60 years, suggesting that rice production was an enterprise that demanded commitment of persons within the active labour force to activities (such as mound making, planting, staking, and weeding). The predominance of male (65.83%) against 31.17% of female, suggests that rice production is gender sensitive and requires innate physical effort of carefully selected strength. Most married people (80.83%) were involved in rice production using labour supplied by their households and / or hired from outside. A fairly good proportion of farmers (47.50%) had between five and nine members of the household, which was considered moderate and justifies the decisions of some households to hire labour to increase domestic work in rice production. It was further revealed that agricultural households in the study area provided an average of 408 man-days used in rice production activities, 34.17% using hired labor while labor family, the sharing of farmers and the exchange of labor provided the required balance (65.83%). This implies that farmers made significant use of hired labor in rice cultivation, but also depended heavily on other sources of agricultural labour. This result will emphasize the use by work of specific crops such as rice and the management of other crops in accordance with Ajibefun and. al., (2000) that hired labour represents more than three quarters (88.0%) of the total labour used for other crops on farms. The educational status of farmers revealed that 90.0% of them were literate and had various levels of formal education ranging from primary to higher education. These indices have implications for agricultural decision-making in the use of resources, the supply of products and the adoption of technologies (Obibuaku, 1983; Ojoko, 2001). The table also shows that 35.00% of rice farmers had an agricultural experience of 11 to 20 years, which indicates a relatively high agricultural experience with involvement in the management of the workforce in the study area. This is therefore in line with the conclusions of Njoku and Odi (1991) that agricultural experience promotes the efficient use of scarce resources. The size distribution of rice farmers revealed that 50.83% of them cultivated less than 1.0 hectare of agricultural land per season. None of the rice farmers sampled in the study area had an area of land greater than 4.0 hectares. This further confirms the fact that agricultural production in the region was on a small scale on small fragmented agricultural land. This result is in agreement with Olawepo (2010) according to which agriculture in Nigeria is characterized by a large number of these small farmers, dispersed over large tracts of land, with farms of between 0.05 and 3.0 hectares, but not more than 10 hectares per farmer, with low use of capital and low yield per hectare.

Table 2. Distribution of annual labour-use (mandays) by specific farm activities in Rice production in Ebonyi State, Nigeria

Farm activity	Number (man-days)	Percentages
Weeding	90	22.06
Planting	114	27.94
Transport to market	17	4.17
Fertilizer	21	5.14
Harvesting	26	6.37
Land clearing	70	17.16
Land cultivation	56	13.73
Agro chemical spraying	14	3.43
Total	**408**	**100.00**

Source: Field Survey Data, 2019.

3.2. Labour-use pattern by Specific Farm Activities in Rice production

The allocation of labour varied according to agricultural activities. Some tasks required skills and hired labour while household / family labour was sufficient for certain agricultural activities. Cost and availability may prevent the use of hired labour of different classes for activities such as land clearing, agrochemical spraying, harvesting, planting, staking, transportation to market and application of fertilizers which are the most labour intensive operations in rice production. Table 2 shows that the rice farmers in the study area provided an average of 408 man-days for rice production activities. The workforce was more engaged in planting, clearing, land preparation and weeding in the following average annual proportions, 27.97%, 17.16%, 13.73% and 22.06% respectively.

The labour use was very minimal in all households for the application of fertilizers (5.14%), planting (27.94%), harvesting (6.37%), agro-chemical spraying (3.43%) and transport to the market (4.17%). This was due to the seasonal demand for labor in these production activities. Gocowski and Oduwole (2003) observed that the cutting of vegetative under the growth of storeys and the weeding in rice farms were carried out twice a year before the harvest season while the fertilizers were applied once all through the production season.

Table 3. Estimated Labour-use requirement frontier Production Function for Rice production in Ebonyi State, Nigeria.

Variable	Parameter	Coefficient	Standard error	T-value
Constant term	β_0	5.6018	0.3421	13.1574***
Qty of harvested Rice	β_1	0.3606	0.0923	5.2142***
Qty of fertilizer	β_2	0.4833	O.2460	1.8930**
Farm Size	β_3	2.258	1.2426	1.8992*
Qty of agrochemical sprayed	β_4	-0.132	0.164	0.746

Source: Field Survey Data, 2019.

*** Significant at 1.0%; * Significant at 10.0%

3.3 Labour Requirement Frontier

Table 3. revealed estimated labour-use requirement frontier production function for Rice production in Ebonyi State, Nigeria. The estimated coefficient (0.3606) for the quantity of rice harvested was positive and statistically significant at a confidence level of 99.0%. This implies that for every one percent increase in the quantity of rice harvested, there has been an increase of 0.3606 percent in the amount of labour used. This is in agreement with Akanni and Dada (2012) who have obtained similar results for smallholder cocoa farmers in southwestern Nigeria. The estimated coefficient (2.258) for the size of agricultural land cleared was positive and significant at the alpha level of 10.0%, suggesting that a 1% increase in farm size would result in a 2.258% increase in the amount of labor used. These results are in agreement with Effiong (2005); Nwachukwu and Onyenweaku (2007), that the larger the size of the farm and the quantity of products harvested, the higher the level of labour utilization. As for the quntity of fertilizer used, as more and more fertilizer was used in the production of rice, a lot of labour was employed. In accordance with classical production theory, the table showed that the quantity of fertilizer used had a positive coefficient and was statistically significant at a probability level of 5.0%. With an elasticity of 0.4833, this implies that each one percent increase in the amount of fertilizer used has resulted in a 0.4833 percent increase in the amount of labor used in yam production.

Table 4. Determinant of Labour use Efficiency in Rice Production

Variable	Parameter	Coefficient	Standard error	T-value
labour wage	Z_1	3.226	1.238	2.634***

Age	Z_2	-0.1467	0.715	-2.071**
Level of Education	Z_3	- 0.6651	0.0486	3.179***
Membership of co-op society	Z_4	-0.0645	0.177	-0.432
Farm size	Z_5	0.6671	0.4321	13.051***
Gender	Z_6	6.501	0.442	17.157***
Farm distance	Z_7	0.480	0.340	1.340
Farming Experience	Z_8	0.236	0.355	0.554
Household size	Z_9	2.6803	1.069	2.708***
Occupation	Z_{10}	0.312	0.216	0.148
Farm income	Z_{11}	0.636	0.634	0.818
Diagnostic statistics				
Total variance	σ2	0.165	0.058	2.236*
Variance Ratio	Y	0.999	0.180	5.679
L R Test		0.17569		
Log likelihood function		-5.7792		

Source: Field Survey Data, 2019.
*** Significant at 1.0%; ** Significant at 5.0%; * Significant at 10.0%.

3.4 Determinants of Labour-use Efficiency:

The determinants of the efficient use of labour in rice production in Ebonyi State are presented in Table 4. The table has shown that age, level of education, farm size, gender, labour wages and household size were statistically significant at certain risk levels. The age of farmers showed a negative relationship (-0.1467) with the efficiency of the use of labour. This implies that increasing age would decrease the efficiency of labour use. This finding confirms the argument that farmers become less efficient as they age. This could result not only from a loss of efficiency as farmers age, but also from the fact that young farmers tend to be more open and likely to be exposed to new farming methods and techniques. This result was significant with an alpha significance level of 5.0% and agrees with Akanni and Dada. (2012); Oluyole and. al., (2011); Ayibefun and Daramola (2003) and disagrees with those of Belbase and Grabowski (1985), Kalirajan and Shand (1985); Bravo-Ureta and Pinheiro (1997) whose results showed that age was positively linked to the efficiency of the use of work. The coefficient for education (-0.6651) was negative and had a significant relationship (alpha level of 1.0%) with the efficiency of the use of labour. This implies that an increase in the level of education leads to a decrease in the efficiency of the use of work. This is contrary to a prior expectation (Sofoluwe et al, 2011) that education increases the capacity of farmers to use their resources efficiently. Rice farmers in the study area use more unskilled labour. The increase in the level of education did not imply an increase in the acquisition of skills in the production of rice. The acquisition of higher education simply produced labour for white-collar jobs, hence the widespread drift from rural to urban and the loss of agricultural labour resulting in an increase costs and reduced efficiency in the use of labour in rice. The positive coefficient on farm size (0.6671) was significant at a probability level of 1.0% and implies that the increase in farm size led to an increase in the efficiency of the farm. use of labor. This confirms the small size of their farms, as farmers are more aware of the resources when they deploy labour in their small plots. The size of the households was positive (2.6803) and significant at a probability level of 1.0%. This suggests that larger households can use family labour and reduce the costs of hiring (Mubmik and Flinn, 1998; Onwuka*et al* 2010). However, this result is not consistent with the conclusions of Bravo-Ureta and Pinheiro, 1997; Nwachukwu and Onyenweaku, 2007; Onyenweaku et al., (2004) who showed that household size was negatively and significantly related to the efficiency of labour use.
Gender had a positive coefficient (6.501) with a t-ratio of 17.157 and was highly statistically significant at an alpha level of 1.0%. This indicates that the efficiency of the use of labour in rice production was gender sensitive. Furthermore, it can be inferred from the result that the male was more effective in the use of labour. It has been reported that male perform certain agricultural operations with more skills than female (Anyanwu et al, 2009), hence the promotion of economic production and the efficient use of labour in the area. Real labour wages gave a positive coefficient (3.226) and were significant at the alpha level of 1.0%, indicating that real increases in labour wages resulted in increased efficiency of use labour. The inflation rate in Nigeria had remained stable, which could suggest little impact from the variability in rice market prices. The coefficient of total variance (σ2) was 0.165 while the variance ratio (Y) was 0.999. The variance ratio measures the ratio of the variance of the specific quantity of labour used (man-days) to the total variance. This means that 99.9% of the variation in the amount of labour used among rice farmers was due to disparities in the boundary of labour requirements. The total variance of 0.165 was statistically significant and, as such, indicated a good fit and accuracy of the specified distribution assumption of the composite error term.

3.5 Distribution of Labour use Efficiency:

Table 5. shows the distribution of labour use efficiency in rice production in Ebonyi State. The estimate of the Cobb-Douglas labour use shows that the average labour use requirement is 0.77 for smallholder farmers. Each of these farmers employing labour above this production border was technically efficient in the use of labour while those who operated with labour below the border were considered to be technically ineffecient. Additional man-days of labour were still technically necessary before they could be used at the frontier. However, the result showed that about 81.66% of rice farmers operated within the labour efficiency range of 0.81 to 1.00. Estimates are biased to the right, which implies a high level of efficiency. The minimum labour use efficiency was 0.20, which indicated gross under-utilization of labour resources, while the maximum labour use efficiency was 0.96. In other words, the best labour-efficient rice farmers were operating almost at the frontier.Table 5. Distribution of labour use Efficiency in rice production in Ebonyi State, Nigeria.

Labour use Efficiency Range	Frequency	Percentage
0.00-0.20	17	14.17
0.21-0.40	0	0.00
0.41-0.60	0	0.00
0.61-0.80	5	4.17
0.81-100	98	81.66
Total	120	100
Maximum Labour-use Efficiency	0.96	
Minimum Labour-use Efficiency	0.20	
Mean Labour-use Efficiency	0.77	

CONCLUSION AND RECOMMENDATION

The study indicated that all important variables (quantity of rice harvested, size of agricultural land cleared and quantity of fertilizer) had a positive influence on the amount of labour used in rice production in the Ebonyi State Nigeria. The socio-economic determinants of labour use efficiency were age, education, farm size, gender, labour, wages and household size which were statistically significant at certain levels of risk. The efficiency of labour use of rice producers in Ebonyi state was relatively high. Individual levels of labour utilization efficiency ranged from 20.0% to 96.0% with an average of 77.0%, suggesting that there are still opportunities to increase the efficiency level of rice farmers in the study area. Based on the results of this study, recommendations were made to improve the efficiency of the use of rice farmers' labour. Therefore, experienced rice farmers be the subject of policies to increase the scale of operations through better access to agricultural inputs. Policies should target subsidies to production inputs such as fertilizers, agrochemicals and capital to increase the efficiency of labour use in the state. There are still opportunities to increase the level of labour utilization of rice farmers in the area by increasing the efficiency of labour utilization at the farm level up to at 23.0%. Policies to encourage young people to engage in rice production should be enacted. Farmers should be encouraged to organize themselves into cooperative societies so that they can share labour and have access to agricultural resources to improve the efficiency and productivity of labour utilization. In addition, there should be an increase in the remuneration paid to hired agricultural workers, in order to adequately motivate them in rice production and other potential agricultural processes.

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