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Regression Analysis on Contribution of Labour, Irrigation and Fertilizer on the Producation of Rice (A Case Study of Olam Integrated Nigeria Limited)

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ABSTRACT
The statistical analysis on contribution of the labour, irrigation and fertilizer on the yield production of rice produce at Olam Integrated Nigeria Limited is aim to model equation for the production of rice , to examine the contribution of labour, irrigation and fertilizer on the production of rice and to determine whether the contribution of labour, irrigation and fertilizer will be increase or decrease the yield of rice at Olam Integrated Nassarawa state. The data use in the research work is secondary data and multiple regression was used to analyse the data and the result of the analysis show that the model is fitted for the data. Also analysis show that contribution of labour, irrigation and fertilizer increase the yield of rice production.
Keywords: Production, Rice, labour, irrigation and fertilizer

I. INTRODUCTION

Rice is cultivated in all regions of Nigeria. It ranks sixth after sorghum, millet, cowpea, cassava and yam (CBN, 2003). It accounts for about 12 percent of the total cereals produced in Nigeria (CBN, 2004). Five major production systems have been identified. These are the upland rainfed, inland shallow swamp, deep water floating, lowland and irrigated rice production systems Abdullahi , (2011). In 1990, rice yield in Nigeria was 2.07tonnes/hectare. This reduced to as low as 1.3 tonnes/hectare in 2007. In 2012, Nigeria rice yield was 1.88tonnes/hectare (FAO, 2013). The land area under rice cultivation in Nigeria in 2005 was about 2.708 million hectares. But the estimated area planted with rice in 2012 stood at 2.685 million hectares (FAO, 2013). These figures indicated a reduction in area cultivated for rice over the period 2005-2012 Adeoti (2009). Rainfed lowland, upland and irrigated systems accounted for 47%, 30% and 16% respectively to the total land area devoted to rice production (Daramola, 2005). Among these systems, it is known that the rainfed upland system is the least productive Huang (2016). The yield in the rainfed upland is relatively low when compared with the lowland and irrigated production systems Abdullahi , 2011).

Yet, most rice farmers are in the upland system due to the limited area available for lowland rice production. This is as a result of preference or priority given by government to horticultural crops in the lowland. In 1998, the World Bank gave a $3 million loan facility to Nigerian Rice Project. In 1999, it gave $300 million for horticultural crops under Fadama II project. To improve and encourage the increased production of rice in Nigeria, WARDA bred NERICA for upland ecologies which were introduced to farmers through the Participatory Varietals Selection (PVS) trials in 1999 and 2001. NERICA was to address the problem of low productivity of upland rice in Africa. It promised to be particularly well suited to the low input conditions of rain-fed upland rice production system Adeoti (2009). It is resistant to drought, weeds competition, blast virus diseases, soil iron toxicity and acidity (Jones et al., 1997) and has higher protein content Dillon (2011). The NERICA rice varieties embody improved seed technology to enhance yield and productivity. It embodies management practices in terms of

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biological and chemical technologies. Production parameters of the adopters of these technologies, their productivity levels and their determinants, the seed's response to inputs and overall, the efficiency of the adopters and how these can be used to solve the problem of low yield, low productivity and rice self-insufficiency in Nigeria require empirical quantification Dillon (2011). Hence, this study examined the measures of productivity, scale efficiency, and the factors that influence the productivity measures of NERICA in Kaduna State.

II. METHODOLOGY

METHOD OF DATA ANALYSIS

METHODOLOGY

MULTIPLE REGRESSION MODELS

Multiple linear regression was used to analy the data

MODEL OF THE ANALYSIS $\hat{Y} = a_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$

Where: a = intercept, b_1= Regression coefficient for first predictor variable, X_1

b_2= Regression coefficient for second predictor variable, X_2

b_3= Regression coefficient for third predictor variable, X_3

y = dependent variable

III. DATA ANALYSIS

:**PRESENTATION OF DATA**

Table 1 : Shows the distribution of the data collected with Labour,Fertilizer and Irrigation

SN	YEAR	LABOUR	IRRIGATION	FERTILIZER	YIELD
1	1995	56728	259506	20000	1280000
2	1996	57605	266200	20000	1300000
3	1997	58503	222600	20000	1430000
4	1998	59428	256700	20000	1416320
5	1999	60368	235100	20000	1780000
6	2000	61311	325200	20000	2081000
7	2001	62237	363900	20000	3303000
8	2002	63134	400380	230000	2500000
9	2003	64001	429200	233000	3226000
10	2004	64843	440000	233000	3260000
11	2005	65663	461000	233000	3065000
12	2006	66465	296000	233000	2427000
13	2007	67252	183000	233000	2920000
14	2008	68026	1735000	233000	3122000
15	2009	68787	137700	233000	3268000
16	2010	69547	163200	233000	3275000
17	2011	70316	167700	245000	3277000
18	2012	71101	187500	257000	3298000
19	2013	71908	221000	270000	2752000
20	2014	72732	166200	282000	2928000
21	2015	73570	229747	268752	3116000
22	2016	74415	152170	272579	3334000
23	2017	75261	215171	276407	3567000
24	2018	76108	157166	276407	4042000
25	2019	76956	150864	286235	3186000
26	2020	77807	144814	284062	4179000
27	2021	3402590	78662	1139007	287890

SOURCE: OLAM INTEGRATE PRICE PRODUCTION 2022

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Table 2 : Show the Analysis of Variance for the data analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16744128385125.797	3	5581376128375.266	21.760	.000[b]
	Residual	5899525407740.871	23	256501104684.386		
	Total	22643653792866.668	26			

a. Dependent Variable: YIELD
b. Predictors: (Constant), IRRIGATION, FERTILIZERS, LABORERS

Table 3 : Shows the Coefficients of the regressionmodel

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1800957.566	218770.553		8.232	.000
	LABORERS	-2.520	.316	-1.733	-7.987	.000
	FERTILIZERS	.025	.329	.008	.076	.940
	IRRIGATION	6.204	.959	1.400	6.468	.000

a. Dependent Variable: YIELD

$Y(\text{yield}) = \beta_o + \beta_{x1} + \beta_{x2} + \beta_{x3}$

$Y_t = 1800957.566 - 2.520\ x_1 + 0.025\ X_2 + 6.204X_3$

Where

Y_t is the Yield

X_1= is the Labour

X_2 = is the Fertilizers

X_3= is the Irrigation

Ho: The model does not fit the data

Hi: The model fit the data

TEST STATISTICS : P value = 0.000 $\alpha = 0.05$

DECISION RULE = Reject Ho if P (value)< α (0.05), if otherwise do not reject

DECISION: Reject H_O

CONCLUSION: Since P (0.000) < α (0.05) we there for concluded that the model is fitted for the production of rice

INTERPRETATION: Based on the mode fitted $\hat{Y}_t = Y_t = 1800957.566 - 2.520\ X_1 + 0.025\ X_2 + 6.204X_3$ show that that the value of labour is -2.520 which prove that labour is negatively use in the production of the rice while the impact of fertilizer applied is low (0.025) and irrigation value (6.204) is the most Impact factor that they applied most the in the production of rice.

IV. SUMMARY AND CONCLUSION

The research work aim to investigate the contribution of labour, irrigation and fertilizer on the production of rice produce at Olam Integreted Nigeria Limited , result of the analysis show that in the production of the rice the labour adopted is minimal while the fertilizer used during the process is also minimal and the irrigation adopted is very higher during the production of the rice. The model obtain from the analysis is fitted for the production of rice produce at Olam Integrated Nigeria Limited.Based on the result of analysis we therefore conclude that more emphasis should laid on irrigation in the yield of rice production in Olam Integrated because it has major contribution on the increase of the yield of rice..

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