

**ECONOMIC AND ALLOCATIVE EFFICIENCY STATUS OF POULTRY FARMERS IN RIVERS STATE, NIGERIA: CASE STUDY OF PORT HARCOURT AND OBIO AKPOR LOCAL GOVERNMENT AREAS.**

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**ABSTRACT**

*The research aimed at evaluating the technical, allocative and economic efficiencies of poultry farmers in Obio/Akpor and Port Harcourt municipal council Areas of Rivers State, Nigeria and presenting the results in such a simplified manner for the farmers to read and understand because previous studies in these areas in times past were loaded with mathematical and analytical tools the farmers find very confusing to interpret. Data were collected through a multi-stage sampling technique and analysed using stochastic production frontier function and simple arithmetic. The results showed that feed intake was in excess and labour application which was family supplied was also in excess and both are eating deep into their revenue. The level of technical inefficiencies is also affecting negatively the economic and allocative efficiencies. Findings also showed the farmers were operating in stage one of production function and suggests the area of increasing returns to scale. It is therefore recommended the poultry farmers reduce the labour size and feed administration in other to operate at the stage two of production.*

**Key words:** layers, broilers, technical efficiency, economic efficiency, allocative efficiency

**INTRODUCTION**

Poultry farming is considered by many as an important agribusiness enterprise that can enhance the income of many farmers and educated unemployed persons in the rural areas as it is a means of self employment opportunities (Ohajianya et al 2013). Oseghale (2015), citing Rajendran and Mohanty (2003) noted that the poultry sub-sector of the livestock industry is of significant importance because egg and poultry make some of the highest contributions in terms of output in the livestock industry after cattle meat. Poultry birds are good converters of feeds into flesh and require low capital investment with a shorter time for returns.

In recent times globally, the poultry industry has witnessed significant growth. According to Mendes *et al* (2014), chicken meat in 2008 accounted for 2.94% of Brazil's total export volume and the fourth largest product in terms of revenues from exports. This suggests the industry showcased an increasing competitiveness in both the domestic and foreign

markets and there have been calls for improvements in management practices by the poultry farmers to increase their technical and economic efficiencies (Carvalho et al, 2015).

Efficiency may be seen as the effectiveness of a production process in terms of variable resource uses to maximize profit and output considering the production technology available (Ohajianya et al 2013). However, many empirical studies on poultry production in the study area targeted production constraints, economic analysis or profitability. Notably, measuring the efficiency of agricultural productions may be very important in developing countries like Nigeria. An efficient poultry farm sector will imply that output can be increased at minimal cost. This will be useful for policy purposes as efficiency studies will provide the theoretical basis for such policies (Mahjoor, 2013)

According to Odine et al, (2015), the poultry industry has made high contributions in terms of output in the livestock sector. However in Nigerian, events suggest the poultry industry has failed to meet the rising demand for poultry products and her imports of poultry products have remained high. Many farmers in poultry production have limited technical and managerial abilities and these have impacted their ability to optimize output and profit resulting in significant capital losses. It is therefore imperative to examine the efficiency level of these farmers with the aim of developing ways of improving on it. This study therefore seeks to examine the allocative and economic efficiency levels specifically of poultry farmers in Port Harcourt and Obio/Akpo municipal council areas of Rivers state.

While Technical efficiency emphasizes the case of production when there is limited possibility of increasing output without increasing input, economic efficiency considers the production cost been as low as possible. Economic efficiency looks on the prices linked to the factors of production, technical efficiency considers technical relationships. It should be borne in mind however that some things that are technically efficient may not be economically efficient. Technical efficiency ensures that resources are transformed into services and goods with limited amount of waste. The efficient utilization of resources is optimum aspiration in economic production. The

implication of this is that production is achieved at the lowest possible cost. Consequently, Technical efficiency is a necessary condition for economic efficiency. Farrell (1957) states that technical efficiency measures the way inputs are used in the production process when the factors' use propositions are given. It evaluates how a firm chooses the ratio of various inputs compared to the market price of the competitors. It points to the concepts of productivity or performance, quality and the reduction of the energy employed. Economic efficiency is assessed by the combination of technical and allocative efficiency. The concept of economic efficiency will be associated to the criterion of value. Any change in the course of production inclined to increase value is an effective change and inefficient if otherwise (Ouattara, 2012). Conceptually, allocative efficiency and technical (productive) efficiency may differ in meaning; they are in some aspects connected as they must be achieved to increase a farmer's benefits. Allocative efficiency mostly considers the amount of production, while technical (productive) efficiency the method of production. However, technical efficiency and economic efficiency differ from each other in many aspects. Technical efficiency occurs where output cannot be increased without increasing the input and economic efficiency where production cost is as low as possible. Economic efficiency depends on the price related to factors of production and technical efficiency the production method. Technical efficiency is a necessary condition for economic efficiency. This implies that to achieve economic efficiency, technical efficiency must first be achieved. Economic efficiency minimizes inefficiency and waste. Once economic efficiency is attained, changes may negatively impact the economic prospects. Economic efficiency studies help to identify the potential gains in the farm/business sector under consideration.

Allocative efficiency should be noted by every farmer or business enterprise as been very important in making informed decisions on what to buy or produce and in what amount (Haque, 2015). Since poultry farmers face limitations in resource acquisition, the industry must make decisions on how the limited resources are distributed to obtain an optimum value and access an ideal opportunity cost. Farrell (1957) viewed economic efficiency from the product of technical efficiency and allocative efficiency. According to him, a firm cannot be 100% efficient economically when it is not simultaneously 100% efficient technically and allocatively (Ouattara, 2012)

Allocative efficiency generally portrays the level of output where marginal cost is equal or almost equal to marginal benefits. This shows that the price of the product or Services should be close to the marginal benefit gotten from using that product or service. However, allocative efficiency becomes very visible

to an enlightened farmer when market data can be easily accessed. It is necessary for informed decisions on purchases or produce and in what quantities (Corporate finance institute (CFI), 2015). Farms can use this concept to make decisions on the level of output and input that will be most profitable to them and also most beneficial. The need for adequate knowledge of allocative efficiency among the poultry farmers in the study Area is of significant importance because they face limited resource supply and must make informed decisions on how to distribute these resources to obtain a possible optimum value to achieve an ideal opportunity cost.

## MATERIALS AND METHODS

Obio/Akpor and Port Harcourt local government Areas of Rivers State rank as some of the highly populated local government Areas in Nigeria. The massive industrial establishments they parade, number of poultry farms and high population density informed their being chosen for the study. The population of the study comprise of poultry farmers in the study Area from which fifty (50) poultry farmers were randomly selected from several using the multi-stage technique. Structured questionnaire and personal interviews were adopted in data collection and data were analysed using the stochastic production frontier and simple arithmetic.

Response of outputs to input use was specified by the application of frontier production function specified as:  $\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \dots + \beta_n \ln X_n + (V_i - U_i)$

Where  $\ln$  = Natural logarithm.

$Y$  = Numeric number of broilers (and layers as the case may be) within the production period

$X_1$  = feed (kg)

$X_2$  = stock size

$X_3$  = labour

$\beta_0$  = constant term

$\beta_1 - \beta_n$  = Regression Coefficients (parameters to be estimated)

$V_i$  = random error term/variable which is assumed to be identically and independently distributed normal mean of zero and independent of  $U_i$

$U_i$  = Non-negative random variable which is assumed to account for technical inefficiency of the farm

The monetary values of the various coefficients of the inputs and output were incorporated into the equations to compare the magnitude of monetary changes (the economic and allocative efficiencies) respectively.

## RESULTS AND DISCUSSION

### Estimates of production function for layers

Technical efficiency is observed at the point where the level of output cannot be increased without simultaneously increasing that of the input. This however is primarily dependent on the method of production. Efficiency in the agricultural sector (and any other field of production) is the effectiveness of a

production process in terms of variable resource uses with respect to either profit maximization or output maximization considering the production technology available (Ohajianya et al 2013). Technical efficiency in its own consideration therefore looks at resource transformation into goods with limited amount of waste. Efficient utilization of resources is of optimum importance in economic production. Technical

efficiency given economic colouration will imply that production is achieved at the lowest possible cost. Consequently, Technical efficiency is a condition that should be attained if economic efficiency must be achieved. The technical efficiency of the study is shown in tables 1 and 2 below for broiler and layers farms respectively.

**Table 1: Estimated Production Function for Layer Farmers**

Variables	Parameters	OLS Estimate		ML Estimate	
		Coefficient	t- ratio	Coefficient	t- ratio
Constant	( $\beta_0$ )	-2.6169	-4.3223***	-2.6379	-5.1733***
Feed	( $\beta_1$ )	-0.0670	-0.6612	-0.0700	-0.7978
Stock Size	( $\beta_2$ )	0.7930	9.3872***	0.8150	9.6796***
Labour	( $\beta_3$ )	0.2782	2.3190**	0.3333	3.2648***
Sigma-Squared ( $\delta^2$ s)				0.4180	0.4268*
Gamma ( $\gamma$ )				0.8471	2.3876**
Log Likelihood function			-11.1945		
LR Test				9.0614	
Mean T. E				0.8527	
Returns to Scale				1.08	

Source: Amadi, 2019

Figures in parenthesis are t-ratio; \*\*\* = significant at 1%, \*\* = significant at 5% and \* = significant at 10%. Returns to scale: >1 = increasing returns, < = decreasing returns, 0 = constant returns

**Table2: Estimated Production Function for broiler Farmers**

Variables	Parameters	OLS Estimate		ML Estimate	
		Coefficient	t- ratio	Coefficient	t- ratio
Constant	( $\beta_0$ )	1.8207	2.8561**	1.7461	3.0183***
Feed	( $\beta_1$ )	-0.1386	-1.5776	-0.1271	-1.3953
Stock Size	( $\beta_2$ )	1.0346	13.1652***	1.0574	14.4716***
Labour	( $\beta_3$ )	-0.1136	-1.1252	-0.0633	-0.6372
Sigma-Squared ( $\delta^2$ s)				0.0976	5.4844***
Gamma ( $\gamma$ )				-0.0238	0.1377
Log Likelihood function				-14.4680	
LR Test					
Mean T. E				0.8553	
Returns to Scale				0.87	

Source: Amadi, 2019

Figures in parenthesis are t-ratio; \*\*\* = significant at 1%, \*\* = significant at 5% and \* = significant at 10%

The result of the study shows an epitome of inefficiency in resource use. Feed and labour usage all posted negative values in all the enterprises (for the layers, the value was -0.0670 and -0.01386 for feed use in both layers and broiler enterprises respectively and -0.1136 for labour use in the broiler enterprises). This suggests excess use of feed and labour. The supply of labour was largely from the family and the opportunity cost was never valued or considered, more so, there were no proper assessment of the appropriate amount of feed to be administered to the birds. Stock size for the broiler industry was positive (at 1.0346) implying increasing returns and within the stage 1 of production functions. Labour and stock size in the layers farms showed marginal increments at 0.7930 and 0.2782 respectively. The result suggests an

industry in its threshold with rooms for expansion judging from the returns to scale if the production technology is upgraded. There is however, evident capacity under utilization. According to Kaleonui(2019), Capacity utilization has effects on products enterprises produce. Capacity utilization rate that is less than 50-70 percent is inefficient and puts pressure on the ability of the given enterprise to make a profit because many costs are fixed, the cost of producing a unit of a product will increase, which definitely will shrink the profit margin.

**Economic efficiency estimates of broilers and layers farmers in the study Area**

Economic efficiency addresses the production cost been as low as possible. It looks at the prices of the

factors of production. As economic efficiency considers prices that are related to the factors of production, technical efficiency addresses the production method. Technical efficiency is a necessary condition for economic efficiency. This implies that to achieve economic efficiency, technical efficiency must first be achieved. That is why the study evaluated first the technical efficiency to link up

the two functions. Economic efficiency minimizes inefficiency and waste. Once economic efficiency is attained, changes may negatively impact the economic prospects. Economic efficiency studies help to identify the potential gains in the farm/business sector under consideration. The economic efficiency of the broiler and layer farms in the study Area are shown in tables 3 and 4 below.

**Table 3: Economic efficiency status of Layers farmers in the study area**

X	$\Delta Px$	Px/unit(₦)	$\Delta Y$	Py/unit(₦)	Py $\Delta y$ (marginal revenue)	Px $\Delta x$ (marginal cost)	Remark
Feed	1	3631.80	-0.0670	3000	-201	3631.80	inefficient
Stock Size	1	3000	0.7930	3000	2.379	3000	inefficient
Labour	1	11350	0.2782	3000	834.6	11350	inefficient

Source: Amadi, 2019

**Table 4: Economic efficiency status of broiler farmers in the study Area**

	$\Delta Px$	Px/unit(₦)	$\Delta Y$	Py/unit(₦)	Py(marginal revenue)	Px $\Delta x$ (marginal cost)	Remark
Feed	1	3631.80	-0.1386	3000	-5032566	3631.80	inefficient
Stock Size	1	3000	1.0346	3000	31038	3000	inefficient
Labour	1	11350	-0.1136	3000	-3040.8	11350	inefficient

Source: Amadi, 2019

The level of economic efficiency was extremely low or nonexistent as the cost of production was far higher than the revenue level. In the layers enterprises, the study suggests they are still in business because labour was supplied largely from the family and the opportunity cost was never considered and stocking size which the result suggests defrayed reasonably the inefficiencies observed in the use of some inputs. In the broilers industry, it was a display of economic inefficiency all through as seen in the table. The size of the farms may have also contributed to their levels of inefficiency as they may never enjoy the economies of scale.

#### Allocative efficiency estimates of poultry farmers in the study Area.

Allocative efficiency in the farm or business sector is very important in making informed decisions on what to buy or produce and also, in what quantity. It generally indicates the level of output where marginal cost is equal or almost equal to marginal benefits. This implies that the price of the product or Services should be close to the marginal benefit gotten from using that product or service. The allocative efficiency status of broiler and layer farmers in the study Area is shown in tables 5 and 6

**Table 5: Allocative efficiency status of layers farmers in the study Area**

Variables	Output level (Y)	Marginal cost(Px $\Delta X$ )	Marginal revenue (Py $\Delta Y$ )
Feed	<b>210</b>	3631.80	-201
Stock Size	<b>210</b>	3000	2.379
Labour	<b>210</b>	11350	834.6

Source: Amadi, 2019

**Table 6: Allocative efficiency status of broiler farmers in the study Area**

Variables	Output level (Y)	Marginal cost(Px $\Delta X$ )	Marginal revenue (Py $\Delta Y$ )
Feed	<b>384</b>	3631.80	-5032566
Stock Size	<b>384</b>	3000	31038
Labour	<b>384</b>	11350	-3040.8

Source: Amadi, 2019

Allocation of resources is deemed efficient if the marginal cost of inputs is equal or almost equal to the marginal revenue at a given output level. A look at the table shows the same inefficiency scene previously observed in the other sectors of the analysis. It is only increments in stock size in the broiler section that showed evidences of some form of efficiency. Evidences tend to suggest that increments in stock size reduced the additional costs from the employments of excess labour already observed (the cost of labour was imputed because, labour was largely supplied by the farm family and the opportunity cost was never evaluated by the farmers) which by implication suggests increases in the output of labour. Marginal cost was far higher than the marginal revenue however; they are still in business because they refused to pay themselves. This created the illusion of making profit. Evidently, there is an overconsumption of resources or inputs by the farmers which technically amounts to wastes.

### CONCLUSION

This study on the allocative and economic efficiencies of poultry farmers in Obio/Akpor and Port Harcourt municipal council Areas of Rivers State, Nigeria has shown that there are evidences of excess application of resources at a reasonable loss to the farmers. The poultry farmers in the study Area are not technically and economically efficient in the use of resources. Therefore, allowance should be made to increase the present level of efficiency and some policy variables must be addressed as urgent. If technical efficiency is improved on substantially, it will also reflect on economic efficiency which has always been a product of technical and allocative efficiencies.

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