

Impact of liberalization on the efficiency of an agribusiness homestead fish production system in Southeastern Nigeria

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ABSTRACT

The purpose of this study was to determine the impact of liberalization on the efficiencies of agribusiness homestead fish production system using production function estimates for two periods 1980 – 1986 (Non-liberalization era) and 1997 – 2003 (Liberalization era). It was identified that liberalization has an impact on both technical and allocative efficiencies of the farmers. The farmers were technically more efficient during liberalization period than during liberalization. The result indicated that for absolute allocative efficiencies to be actualized during liberalization, the agribusiness homestead fish farmers need to reduce their use of farmland and labour by 1354% and 84% respectively. While at the same time increase their use of modern inputs, local inputs, and other operating expenses by 137% and 132% respectively.

Keywords: Liberalization, agri business enterprises, homestead fish production, markets, inputs

INTRODUCTION

Liberalization of both internal and external markets is an important step in the revitalization of African economies (Pinckney 1993). Nigeria, over the last 16 years has taken significant steps toward freeing exchange controls, trade barriers, and internal restrictions on Agribusiness enterprises especially Homestead fish production system.

In Agribusiness enterprises, there are several policies that are widely employed in liberalizing production systems in southeastern, Nigeria. The most widely applied ones include raising real producer prices of output, reduction of subsidies on

inputs especially fertilizer, irrigation and credit. Others are, the reduction of the operating costs and other production incentives. The liberalization of Agribusiness Homestead fish production system is aimed at altering and re-aligning aggregate domestic expenditure and production system so as to minimize dependence on imports, enhance non-oil export base and bring the economy back to the path of steady and balanced growth (Federal Government of Nigeria, 1986). In Agribusiness enterprises, there are several policies that are widely employed in liberalizing production systems in southeastern, Nigeria. The most widely applied ones include raising real producer prices of output, The

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The measures were expected to help boost Agribusiness Homestead fish production system in order to ensure significant level of self-sufficiency in rural fish production. Agribusiness Homestead fish production system is defined as any rural fish production enterprise whose primary objective is profit.

Liberalization which was introduced in 1986 partly as a result of decline in Agribusiness production system seems not to be addressing the issue. This has been attributed to inefficient use of resources (Eluagu, 1995). In spite of the potential impacts inherent in the efficient use of resources under Liberalization, agribusiness homestead fish farmers seem not to be efficient in the use of resources. It has therefore become imperative to determine the level of efficiencies in resource-use among this group of farmers prior to liberalization and during liberalization in order to ascertain the impact of homestead fish production system in southeastern Nigeria.

Homestead fish production system is some form of intervention in the rearing process of fish in order to enhance production. In the face of dwindling stocks of capture fisheries, homestead fish produc-

tion system has been taunted as a viable option for making up the deficit in national demand of fish. It is estimated that homestead could potentially raise up to more than 500,000 metric tones deficit in fish supply in Nigeria (Obiekezie 2000). Mohammed (1994) noted that fish is an important source of protein in Nigeria especially as there is no known religious rejection of it as taboo, which gives it an advantage over pork, beef or mutton.

According to Isu (1991) homestead fish production system is highly profitable with net return of about \$30 /ha or N3631.17/ha in Local currency for only a production season of nine months. He further observed that the return to labour for a 3 – hectare homestead fish farm was greater than the salary of a graduate on a grade level of 08 step 4 by \$10.34 or N1240.92 in local currency. It could be noted that homestead fish production system has contributed positively to gainful employment, creation of exports or in saving of the need to import and could contribute more, if resources are efficiently utilized under liberalization.

Furthermore, it may be worthy of note that in West Africa, only coted voire, Gambia, Senegal and Togo have caput fish consumption above the world average. Nigeria with about 8.4kg/yr per caput consumption falls below the world average of about 13kg/yr and bringing the consumption levels to required world standards would require efficient utilization of resources (Obiekezie 2000).

The objective of the study was therefore to determine the impact of liberalization on the efficient use of resources among agribusiness homestead fish producers prior to and during liberalization in the area.

METHODOLOGY

The study area was southeastern Nigeria. It is the area south of River Benue and East of River Niger. The area lies approximately between Latitudes $5^{\circ}\text{N} - 7^{\circ}\text{N}$ and Longitudes $7^{\circ}\text{E} - 8^{\circ}\text{E}$. It stretches from the humid forest to the Subhumid Guinea Savanna ecological zones (Nweke *et al.*, 1991). Mixed farming is the dominant farming systems in the area. The climate is characterized by uneven high temperatures and seasonal distribution of rainfall from March to November. The areas were purposely chosen because of the significance of agribusiness homestead fish production system.

The area was made up of five states, namely Abia, Anambra, Ebonyi, Enugu and Imo States.

Sampling procedure

Agricultural Development Programme (ADP) contact fish farmers were used. They were selected because they keep records of the activities and serve as intermediaries between government and other Farmers. They have records prior to and during Liberalization, and their primary objective is profit.

Each state was divided into three agricultural zones using ADP delineation. Ten contact fish farmers were selected from each zone, bring the number to 30 fish farmers per state and 150 fish farmers for the area. The households were selected based on a list compiled with the assistance of ADP staff in each agricultural zone. Secondary data were used, pre-liberalization data was defined as 1980-1986, while during liberalization was defined as 1997 – 2003. The average for each

period was used in the estimation.

Methods of Data Analysis

In determining the impact between the two periods, the production function model used in examining the production periods, namely; pre-liberalization and during liberalization was specified according to Olo-mola, 1988. The implicit form was specified as

$$\text{VTO} = F(\text{FS}, \text{LU}, \text{MM}, \text{LM}, \text{OE}, e)$$

Where

VTO = Value of Total Output measured in Naira

FS = Farm Size measured in hectare.

LU = Labour Used in Mandays

MM = Modern Material inputs (Naira)

LM = Local Material inputs (Naira)

OE = Other Operating Expenses (Naira)

e = Stochastic variable or error term which takes account of unexplained factors

Note: Naira = Local currency

This model was applied separately to the Pre-Liberalization and during liberalization periods. The inclusion of Farm size was not harmful due to the smallness of the Farm size which showed no case of collinearity and this has been substantiated by several authors (Singh, 1975; Mbanasor and Chidebelu, 2001).

Using the empirical data, the model was

estimated in three Functional forms namely ; Linear, semi-Log and Cobb Douglas functions.

Both the allocative and technical efficiencies were derived from the above models

Thus

- (1) During Liberalization because the Linear form was selected as the Lead equation, the allocative efficiency was calculated thus

$$VTO = b_0 + b_1x_1 + b_2x_2 + \dots b_5x_5 + e_i$$

Where VTO = value of Total output

b_0 = constant

b_1 - b_5 = regression coefficients

x_1 - x_5 =resources employed.

In this

Marginal product (MP) or Marginal Revenue = b (regression coefficients)

Elasticity = $b_i^{x/y}$

X = Average input

Y = Average value of output

MP for each resource was taken as MVP i.e marginal value product because y or VTO was in monetary terms.

Allocative efficiency was determined by equating the marginal value product (MVP) of each resource to its price or marginal factor cost (MFC).

$$\text{i.e } MVP_{xi} = P_{xi}$$

Maximum or absolute efficiency exists if $\frac{MVP_{xi}}{P_{xi}} = 1$

P_{xi}

The resource is over – utilized if the ratio is less than one (1), and under utilized if greater than one (1)

To determine the extent to which a particular resource should be increased or decreased from the current level of use in-

order to achieve maximum allocative efficiency. It was determined according to Nwaru 2003,

Thus

$$K_{ij} = \left(1 - \frac{MVP_{xi}}{P_{xi}}\right) \times 100$$

Where k_{ij} is the percentage by which the level of use of a particular resource could be increased or decreased to achieve the objective of Maximum allocative efficiency. A negative k_{ij} implies that an increased employment of the resource is required and vice – versa. If k_{ij} is zero, then absolute allocate efficiency is attained.

(ii) Before Liberalization

Because Cobb Douglas was the Lead equation for pre-liberalization, MP was calculated thus

$$MP_i = b^{y/x}$$

$$\text{Elasticity} = b^{1/y}$$

Where b_i , x_i , and y are already defined.

(iii) Impact of Liberation

In order to determine the more technically efficient period, Onyenweaku and Fabiyi (1991) and Chow (1960) were used. In this, comparison was made between the observed F – ratio and the theoretical value of F at the appropriate significant levels. If F-calculated (observed-F) was greater than F – table, the hypothesis of equal technical efficiency was rejected, implying that the period of liberalization has significant impact in the use of resources.

RESULTS AND DISCUSSION

The results presented in Tables 1 and 2 showed the estimated production func-

tions, for the two periods; before Liberalization and during liberalization respectively. The results showed that the three Functional Forms adequately characterized the empirical data as indicated by the significance of F-ratios, regression coefficients and the value of the coefficient of multiple determination (R^2).

The combined use of the simple correlation coefficient, the adjusted coefficient of multiple determination and the standard errors of the estimates indicated that there were no harmful econometric problems. The Durbin-Watson statistics also showed no autocorrelation problem.

Examining the estimated production function before Liberalization;

(Table1) the R^2 From the linear, semi-log and cobb-douglas functions showed that 14%, 36% and 23% respectively of the variations in the gross value of output were explained by the explanatory variable specified in the model. Though the value of R^2 was low within the period, it was significant based on the overall significance of the model, using F-test, thereby implying that the regression is significant i.e. not all the regression coefficients were zero. This showed that the explanatory variables actually had significant influence on the value of the output. It might be noted that R^2 value tended to be low in cross – sectional data and in whole farm analysis due to large variability that is possible across

Table 1 : Before Liberalization Estimated Production Function Model

Variables	Linear 10599.41	Cobb – Douglas 3.8	Semi – Log 81392.19
Constant			
Farm size	-418.41 (14485.82)	0.10 (0.09)	562.95 (1235.09)
Labour	6.96 (5.16)	0.14 (0.14)	3245.10*) 1861.26
Modern inputs	0.20 (0.11)	0.33** (0.11)	7564.82 (1441.79)
Local inputs	0.89+ (0.54)	0.10 (0.11)	1500.08 (1387.21)
Other operating costs	0.97 (0.81)	0.26* (0.15)	1772.45 (191.98)
R^2	0.14	0.23	0.36
F – ratio	Sig. at 1%	Sig. at 1%	Sig. at 1%
Dw	1.4	1.8	1.6

** Significant at 1% (Figures in brackets are Standard errors)

+ Significant at 10%

* Significant at 5%

the individual entities and lack of a common underlying trend (Mbanasor, 1997 ; Intriligator, 1978).

Estimates of the production function model during the Liberalization (Table 2) showed that the R^2 from the linear, semi-log and cobb-douglas Functions were 52%, 37% and 39%, respectively and the variations in gross value of output were explained by the explanatory variables included in the model. The regression coefficients have the expected positive signs and those that were statistically significant were shown in Table 2.

For further analytical purposes the power Function (Cobb-Douglas Function) provided the lead equation. The choice was based not only on the value of R^2 but on the appropriateness of signs and significance of coefficients.

Test of Impact on Technical Efficiency within the periods.

To identify whether there was impact on technical efficiency prior to and during liberalization, Onyenweaku and Fabiyi (1991) test of equality was adopted. The result is presented in Table 3.

Table 2: During liberalization Estimated Production Function Model

Variables Constant	Linear 33880.88	Cobb – Douglas 5.96	Semi – Log - 739510.19
Farm size	- 18815.96 (25331.65)	0.05 (0.06)	36.77 (9033.82)
Labour	48.77* (23.24)	0.23** (0.09)	31190.95 (13392.19)
Modern inputs	2.52** (0.47)	0.25* (0.11)	52855.82 (15960.13)
Local inputs	1.45 (2.64)	- . 0.3 (.08)	-6865.52 (11509.75)
Other operating costs	2.46* (1.20)	0.27 (0.07)	28180.59 (10893.19)
R2	0.52	0.39	0.37
F – ratio	Sig. at 1%	Sig. at 1%	Sig. at 1%
Dw	2.2	1.8	1.6

Note ; Figures in brackets are standard errors

** Significant at 1%

* Significant at 5%

x Significant at 10%

The result of the test showed that liberalization had impact on the technical efficiency of the farmers within the periods. In other words, the coefficient of the fitted equations were not equal i.e there was change in technical efficiency between the two periods. From the theory of production, it was noted that the more technically efficient period would have a larger constant term than the less efficient one (Koutsoyiannis,1979). One could therefore infer that the farmers were more technically efficient during Liberalization than prior to liberalization. The constant term

(5.9) in the estimated model during liberalization was higher than that of non-liberalization era (3.8) (Table 1 and 2).

Increased technical efficiency during liberalization might be attributed to the reduced subsidies prevalent during the period and the high cost of inputs, which might have caused the agribusiness homestead fish farmers to be more technically efficient. It could also be stated from this study, that liberalization was able to engender increase in the production efficiency of this group of farmers.

Table 3: Impact of Liberalization on the Efficiency of Agribusiness Homestead fish production system

Estimated models	Observed variance ratio	Critical F-value at 1% and 5% levels of significance	
		F-01	F-05
VTO =F (FS, LU,MM, LM,OE,e)	4.40**	2.80	2.10

Comparative Allocative Efficiency Prior to and During Liberalization

The relative allocative efficiency of the farmers in the use of resources prior to and during Liberalization was based on the neo-classical requirement that each factor be paid equal to its marginal value product (MVP). As a test of allocative efficiency, the ratio of marginal value product MVP to marginal factor, cost (MFC) was computed. The MFC or the opportunity cost of farm size within the two periods was (N450 before Liberalization and N150 during liberalization). Interest of 6% was used to obtain the opportunity cost of capital and other operating inputs while labour

was N300 and N100 during and before liberalization respectively.

The result showed that the Agribusiness fish farmers over-utilized all the resources specified in the model before the introduction of liberalization. This implies that more than the profit maximizing quantity of all the resources were used. This might be responsible for the poor performance of most of the agribusiness homestead fish production system, which eventually prompted the intervention of government through the provision of incentives during the Liberalization period.

The result is presented in Table 4.

Table 4: Ratios of Marginal Value Products to the Marginal factor costs of Resources within the two periods

Resources	Liberalization Era	Non-Liberalization Era
Farm size	- 12.54	.18
Labor	0.16	.001
Modern Inputs	2.37	.06
Local inputs	1.37	.93
Other ex-penses	2.32	.27

It was observed that during liberalization, the agribusiness homestead fish Farmers over-utilized farm size and labour, while under utilizing modern inputs, Local inputs and other operating expenses. This shows that less than the profit maximizing quantity of modern inputs, local inputs and other operating expenses were utilized while more than the profit maximizing quantity of farm size and labour were employed within the same period.

The result further revealed that the farmers did not achieve absolute allocative efficiency in the use of resources within the two periods. They were inefficient in the allocation of resources within the two periods. On the whole, the farmers achieved better allocative efficiency during liberalization than before liberalization with allocative indices closer to unity in modern inputs, local inputs and other operating expenses. In order to achieve absolute allocative efficiency and hence maximum profit during liberalization, the agribusiness homestead farmers need to reduce their use of farm size and labour by 1354%

and 84% respectively as well as increase their use of modern inputs, local inputs and other operating expenses by 137%, 37% and 132% respectively.

Conclusion and Recommendation

The result of this Study showed that liberalization has enhanced the efficiency of agribusiness homestead fish production system in the area. The farmers were technically more efficient during liberalization than before liberalization.

Liberalization has some positive impacts in inducing more efficient use of resources, and this could be improved by the removal of current restriction against production for export. In the spirit of liberalization, government should establish without further delay, the approved commodity exchange and futures market, to give agribusiness homestead fish production system free access to the international market which will provide the required price incentive for efficient allocation of resources, hence accelerated production. It is our that without attractive and competitive marketing arrangements evident in the Commodity Exchange Market, the full benefits of other incentives (infrastructural, modern inputs supply, and funding facilities), embodied under liberalization cannot be fully exploited.

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