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PRODUCTIVITY OF WOMEN FARMERS IN THE DERIVED SAVANNAH ZONE OF NIGERIA: PANACEA TO FOOD CRISIS

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ABSTRACT

There is food crisis in Nigeria. Food supply can no longer meet up with food demand. Since Women Farmers are the major food producers in Nigeria, it implies that their productivity is significantly low. This study therefore, explored the potential for improving productivity of women farmers in the Derived Savannah Zone of Nigeria. Primary data were collected using multi-stage random sampling technique. Kogi and Kwara states were randomly selected from the six states in the zone. Following this was a random selection of two ADP administrative zones from each state. A ramdom selection of four LGAs was then made, one from each ADP stratum from which four villages were selected per LGA. In the final stage 200 respondents were randomly selected from the villages on the basis of probability proportionate to size. Data were collected on socio-economic and demographic characteristics, institutional factors , quantities and prices of inputs and outputs. Data were analysed using Descriptive Statistics, Total Factor Productivity Analysis (TFP), and Ordinary Least Squares Regression (OLS) Analysis. The mean age and farming experience of the women farmers were 47.6 ± 9.5 and 20.4± 12.3years respectively. Their mean farm size and number of plots cultivated were 1.8 ± 1.18 acres and 2.0 ± 0.84 respectively. Total factor productivity index ranged from 2.7 to 1,104.6 with a mean of 489.9 indicating low productivity level . Factors found contributing to low productivity include; year of farming, extension and land fragmentation. A unit increase in years of education and MBO would increase productivity level by 0.8872 ($p<0.01$) and 0.1061 ($p<0.05$) while year of farming, extension and number of plots decrease productivity level by .0069 ($p<0.05$) , 0.4092($p<0.05$) 17.4419 and 0.6452 ($p<0.1$) respectively

Keywords: Women farmers, Total factor productivity , Factor Share and, Regression Analysis.

NTRODUCTION

Agricultural productivity has been declining in Nigeria. Its contribution to GDP declined from about 90% before independence to about 41% 2006 (CBN, 2003 and 2006). The low agricultural output has led to the poor performance of the food sector. Food production has not been able to keep pace with the demand in spite of the evidence that has shown that Nigeria is producing more food staples than it was a decade ago (CBN/NBS Joint survey, 2005). Demand is high as a result of the rapid increase in population which is estimated to be growing at 3.2% per annum (NPC, 2006) while agricultural production is growing at 2.5% per annum (Ogundari and Ojo, 2007). This discrepancy has led to a food demand – supply deficit which has induced tremendous increase in the country's import bills from N3.47 billion in 1990 to N113.63 billion in 2002 and then to N348 billion in 2007 (Okuneye, 2002 and Okunmadewa, 2003. This has subsequently increased the prices of major food staples over the years. Nigeria's food crisis is compounded by the fact that more than 54 percent of Nigerian population is poor (NBS, 2007). This has left many Nigerians in the dilemma of having neither the means to produce food nor the money to buy food (Adeoti and Egwudike 2003; Ogundari and Ojo, 2007). As a result 16 percent of Nigerians are currently severely undernourished while, about 41 percent are food insecure (FAO, 2005). This precarious situation calls for an urgent need to increase agricultural productivity. Nigeria is a country blessed with high concentration of women farmers producing food crops such as maize, yams, cassava and vegetables among other. A study carried out by the Food and Agricultural Organization (FAO, 2005) reveals that women farmers contribute 60 percent of the labour force and produce 80 percent of the food in Nigeria. If the productivity of these women could be increased, then, food productivity will increase and Nigeria would be able to save some of its foreign exchange. Hence, this study focuses on how to improve food productivity through the improvement of women farmers' productivity. To achieve this aim, the study intends to find empirical solution to the following research questions. What is the productivity level of the women farmers in the study area? What are the factors influencing productivity of these women? What is the possibility of increasing food production in the study area? The rest of the paper is structured as follows. Section 2 provides the

conceptual framework for the study while, section 3 is on the methodology. Section 4 focuses on results and discussion and the last section concludes the paper

THE OBJECTIVES

The main objective of the study is to analyze empirically, productivity of women farmers. The specific objectives are to:

- determine the productivity level of women farmers in the derived savannah zone of Nigeria.
- Identify the factors influencing their productivity.
- Proffer some policy recommendations based on the findings of this investigation.

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The concept of productivity as used in this study is a relative measure of actual food output produced by the women farmers compared to the actual input of resources. As output increases for a level of input or as the amount of input decreases for a constant level of output an increase in productivity occurs. Therefore, "productivity" in this sence describes how all available farm resources are being used to produce food output. Productivity could be measured using partial factor productivity, multifactor productivity or total factor productivity. However, total factor productivity was used as a measure of productivity in this study. This is because Partial productivity measures according to several authors (Alene and Hassan, 2003; Gorton and Davidson, 2002; and Alwarez and Arias, 2003) can be misleading if considerable input substitution occurs as a result of widely differing input prices due to market imperfection as is the case in the study area involving different states and LGAS with wide differences in input prices. More so, according to Rhaji 2006; Ashok and Balasubramaman, 2003 total factor productivity is a conceptually superior way of measuring productivity. It is measured by combining the effects of all the resources used in the production of food crops and dividing it into the output. Total factor productivity could be measured through two major approaches including; frontier and non-frontier approaches. The approaches are as illustrated in Figure 1.

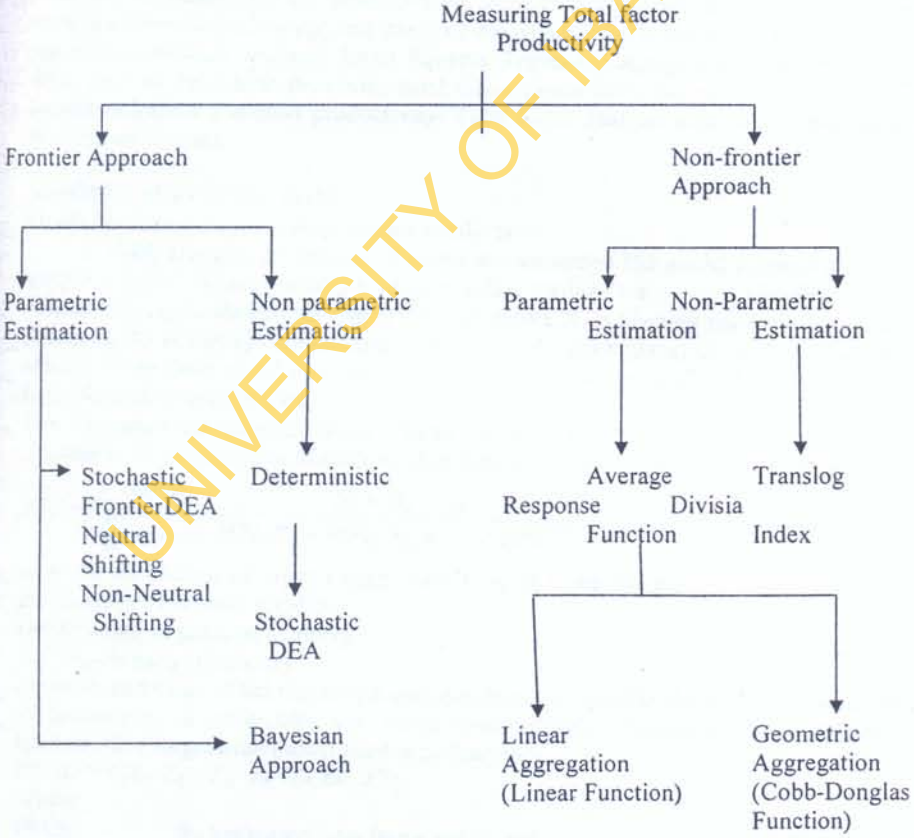

Figure 1: Total Factor Productivity Estimation Methods
Source: Udoh and Oluwatoyin (2006) and modified for the study (2010)

The study employed the use of geometric aggregation method. This method involves the estimation of production function. The estimated input coefficients (factor shares) are then used as weights to calculate the value of the bundle of inputs. The ratio of the observed output to the estimated bundle of input is the total factor productivity.

RESEARCH METHODS

This study was conducted in the derived savannah zone of Nigeria. Two states including Kwara and Kogi states were used. The coordinates of Kwara State are 7° 45'N and 6°40'E while, Kogi State lies within 7°30N' and 6°42'E. Kwara State has a total population of 2,371,089 with males being 1,550,548 and females 1,150,508. Total population in Kogi State is 3,278,487 comprising of 1,691,737 males and 1,586,75 females (NPC, 2006). The study area is basically agrarian. 80 percent of the population in Kwara State resides in the rural areas. 90 percent of this population is farmers. In Kogi State, 70 percent of the population resides in the rural areas with about 80 percent being farmers (NBS 2006). More than 50 percent of the farmers according to (NBS 2006) are women in the two states. The region is blessed with suitable ecological and climatic conditions . The selection of respondent women farmers was multi-stage and involved random sampling method, as well as purposive sampling. The first stage was a random selection of four ADP administrative zones from the eight ADP strata in the two states (i.e. two from each state). The second stage involved random selection of four local government areas, one from each selected ADP's stratum. The third stage of sampling was a purposive selection of four villages with a high concentration of women from each local government area with the help of the list of women farmers provided by the states ADPs. In the fourth, the last stage, 10 to 15 women farmers were randomly selected from each selected villages on the basis of probability proportional to size to make up 200 women farmers included in the sample. Primary data were mainly used for this study using structured questionnaire , personal interview and direct observation methods. Data were collected on socio-economic characteristics including : age, year of schooling, farm size and family size among others. Also collected was information on farm inputs, outputs and their prices. Relevant secondary data were also collected to supplement the primary data being collected. Combinations of methods were used to analyze the data collected. These include descriptive statistics consisting of means and standard deviations used to examine the socio-economic characteristics of the women farmers, ordinary Least Squares Regression Analysis to obtain the regression coefficients that were used as weights to determine total factor productivity indices for the women farmers and to identify factors influencing women productivity. Total factor analysis was used to determine productivity levels of the women farmers.

MODELS SPECIFICATION

Ordinary Least Squares Regression Analysis

1. Cobb-Douglas production function was estimated.The model is specified as;

$$\ln Q = a_o + \ln x_i + a_2 \ln x_2 + a_2 \ln x_2 + a_3 \ln x_3 + a_3 \ln x_3 + a_5 \ln x_5 + e \qquad \text{(Eq 6)}$$

Where Q is aggregated output (kg grain equivalent), X_1 is planting material (kg grain equivalent), X_2 is Land (hectare), X_3 is Family labour (days), X_4 is Hired labour (days), X_5 is Fertilizer, A_s are coefficients(factor shares) to be determined and use as weights to determine total factor productivity, ln stands for natural logarithm and e is error term

The estimated coefficients (factor shares) were then used to estimate total factor productivity index to determine the productivity of each woman farmer. The model for the estimation is as specified.

$$TFP = \frac{\sum output}{\sum a_i x_i} = \frac{Q_1 + Q_2 + Q_3}{MPx_1 X_1 + MPx_2 X_2 + ... + MPx_5 X_5} \qquad \text{(Eq 7)}$$

ai is the coefficient of input i used. NOTE: a_i in Cobb-Douglas production function stands for marginal productivity of x_i used = (MPx_i)

Q = Output (in grain equivalent)

X_i = Inputs used (as above)

In the second stage of the regression analysis, farmers' specific characteristics were modeled as determinants of productivity to understand how these characteristics influence the level of productivity of the women farmers. The Regression model used is as follows:-

PROD = f (Z_1, Z_2, Z_3, Z_4, Z_5, Z6, Z7).

Where

PROD = the estimated total factor productivity index

Z_1 = Years of schooling
Z_2 = Membership of organization
Z_3 = Faming experience (Years)
Z_4 = Access to credit (Dummy Variable Yes = 1 otherwise = 0)
Z_5 = Contact with extension agent (Dummy variable Yes = 1 Otherwise = 0)
Z6 = Family size
Z7 = Farm plots

RESULT AND DISCUSSION

Socio-Economic Characteristics of Women Farmers

Efforts were made to understand the socio-economic characteristics of the women farmers in the study area. This was done with the hope of finding those characteristics affecting productivity of women farmers. The characteristics considered were; farming, experience, years of schooling, family size , farm size and number of plots. The result is presented in Table 1 The Table reveals the average household size of 7 persons consisting 4 adult members and 3 children. It further shows that women farmers in the study area are experienced farmers with an average farming experience of 20 years. However, analysis shows that they had an average of 4.5 years of formal education, 1.87 acres of farmland and a number of farm plots raging between 1and 5.

Table 1: Descriptive Statistics for Selected Socio-economic characteristics of Women Farmers

Variable	Min	Max	Mean	Std. Dev.
Age (Years)	23	68	47.45	9.80
Farming Experience (Years)	1	50	20.42	12.26
Years of schooling	0	14	3.72	1.58
Family Size (No)	2	20	7.80	4.72
Adult Members (No)	1	17	4.6	2.98
Children (≤ 15 years) (No)	0	10	3.06	2.43
Farm size(acres)	0.5	5	1.87	1.18
No of plot	1	5	2	0.84

Source: computed from field survey data 2009.

ANALYSIS OF PRODUCTIVITY OF WOMEN FARMERS

The total factor productivity model derived earlier allows us to compute relative measure of productivity of the women farmers in the study area. The distribution of the productivity indices is as presented in Table 2

Table 2: Distribution of Women Farmers Productivity Indices in the Derived Guinea Savannah Zone of Nigeria

Productivity class index	Kwara state		Kogi state		overall	
	No. of farmers	% of Farmers	No of farmers	% of farmers	No of farmers	% of farmers
< 50	20	20	34	34	51	51
50 – 99.99	25	25	14	14	40	40
100 – 149.99	12	12	17	17	28	28
150 – 199.99	20	20	10	10	31	31
200 – 249.99	05	05	07	07	13	13
250 – 299.99	03	03	07	07	10	10
300 – 349.99	03	03	06	06	08	08
350 – 399.99	02	02	02	02	05	05
400 – 449.99	05	05	01	01	06	06
450 – 500	02	02	00	00	03	03
> 500	03	03	02	02	05	05
Total	100		100		200	

Lowest	6.5		2.7		2.7	
Highest	1104.6		1097		1104.6	
Mean	485.9		139.6		311.9	

Source: Computed from field survey data 2009.

The result of the analysis reveals that all the women farmers in the study area are productive. The results of the ratios are positive and greater than one for all women farmers in the study area. However, there is a wide variation across the farms. The overall productivity indices range from 2.7 to 1104.6 with a mean productivity of 489.9.grain equivalent per factor share of the inputs use. The Implication of this finding is that majority of the women farmers did not manage the available resources very well to produce their output. There is some sort of waste in the use of resources. The gaps between the least productive farmer and the most productive shows that there is ample opportunity to tremendously increase food productivity in the study area in particular and Nigeria as a whole. This will however depends on the adoption of the production principles of the most productive farmer. Similar trends were observed across the states. In Kwara state the productivity indices range from 6.5 to 1104.6 with a mean of 479.9. Kogi state has the least value of 2.7 productivity index and 1097.0 as the maximum value with the lowest mean of 139.6. The implication of this finding in relative terms is that Kogi state contributes more to low level of food productivity observed in the study area.

DETERMINANTS OF PRODUCTIVITY OF WOMEN FARMERS

The result of the productivity model shows that s1x of the seven variables have significant impact on the farmers productivity. These include – family size ($P<0.01$), level of education ($P<0.01$), farming experience ($P<0.05$), membership of association ($P<0.1$) visit of extension agents ($P<0.01$) and number of plots ($P<0.1$) . Total family size is significant and positively related to productivity at 1% level. This reveals that family size is an important determinant of women farmers productivity. It is an important source of family labour. This finding is consistent with findings reported by Okoruwa et al.,(2006). Number of plots has negative sign and significant at 10% level. The sign indicates that land fragmentation causes farmers' productivity to decline. This is because in addition to not permting farm mechanization, the variale adds to the distance that will be covered by the farmers. This finding is in line with Kebede, (2001) and Adewuyi (2002). Similarly the coefficients of years of education and membership of farmers association are significant and positively related to productivity as expected. This implies that women farmers with more years of education and membership of an association tend to be more productive presumably due to their enhanced ability to acquire technical knowledge through education and (or) sharing information in crop husbandry, marketing channels and other useful information at association level which also tend to improve their technical know-how on food production. This finding agrees with Seyoun et al (1998) and Yusuf and Malomo (2007) on education Binma et al (2004) and Chirwa (2007) on Membership of association. However, It is surprising that extension visits have negative impact on productivity. T his result could be explained by the fact that extension services in Nigeria in general is no longer effective, especially after the withdrawal of World Bank funding from the Agricultural Development Project (ADP) which is the main agency responsible for extension services. Given the problem of inadequate funding of the extension outfit, dissemination of agricultural innovation to farmers are done in most cases at wrong periods and more importantly farmers do not have access to yield improving inputs at the right time. Hence, extension visits might not have expected impact on productivity. This finding corroborates the findings of Seyoun et al (1998) who reported negative influence of extension contact in their study of technical efficiency and productivity of maize farmers in Eastern Ethiopia. Farming experience, contrary to expectation also has negative coefficient implying that the more the years of experience the less the productivity. This result can be explained on the fact that farmers with more years of experience and are older are likely to be more conservative and, therefore, less willing to adopt new practices, thus leading to low efficiencies in production.

Table 3 ;Determinants of productivity of Women Farmers in Food Crop Production

Variable	Double log	t-value
Constant	-0.5360	-4.61***
Education (Z^1)	0.8872	3.68***
MBO (Z^2)	0.1061	1.99*
Access to credit (Z^3)	0.0492	0.46

Year of farming (Z^4)	-.0069	-2.03**
Extension (Z^5)	-0.4092	5.172***
Family size	0.7625	5.421399***
Number of plots	- 0.13304	-1.948739*

***** Significant at 1%**
**** Significant at 5%**
*** Significant at 10%**

The outcome of this analysis thus suggest that education and awareness (extension and associations) are vital variables to be considered seriously when policy makers deliberate on ways to improve productivity among women farmers. Most important are the existing technological packages that need to be critically examined

CONCLUSION

The following conclusions were drawn from this study. Women farmers in the study are predominately illiterates and small-scale food producers who cultivate on fragmented farm land and learn the art of farming from their experience and those of their forefathers. They are productive. The average ratio of output to inputs is positive but very low when compared to the most productive farmer in the sample. Their low productivity resulted from land fragmentation, year of farming and lack of proper and adequate extension services.Total family size, education and membership of an association all contribute positively to women productivity.

RECOMMENDATIONS

Following from the findings and conclusion the following recommendations are made. The strong relationship existing between resource productivity and family size, an important source of family labour is a pointer to the fact that women farmers have to rely heavily on family labour to satisfy the household needs, this may have negative implication on the rural children who are suppose to be in schools considering their age, but been used to provide farm support. Therefore, for a better tomorrow of the rural children and economic development of the country, labour substituted modern farm implements specifically designed for female farmers should be provided. Also the positive and significant relationship between productivity and farming experience implies that majority of women farmers though young and active because they are illiterates have to learn the art of resource managament from experience. The negative but significant estimated coefficient of the variable in the productivity equation has shown that experience alone is not enough for the adoption and use of improved techniques. There is therefore, the need for the policy makers to look into the aspect of girl-child education for the purpose of increasing agricultural productivity in particular and economic development in general.

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