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Determinants of Output Performance of Cooperative Farmers in Anambra State, Nigeria

[1]Anigbogu, Theresa Ukamaka (Ph.D), Uzondu, [2]Chikodiri Scholastica (PhD)

[1]Department of Cooperative Economics and Mgt, Nnamdi Azikiwe University (NAU), Awka, Nigeria.
[2]Department of Cooperative Economics and Mgt, Anambra State Polytechnic Mgbakwu, Anambra State, Nigeria.

***Corresponding Author:** Anigbogu, Theresa Ukamaka (Ph.D), Department of Cooperative Economics and Mgt, Nnamdi Azikiwe University (NAU), Awka, Nigeria.. tessyanigbogu@yahoo.com*

ABSTRACT

This study examines the determinants of output performance of cooperative farmers in Anambra State, Nigeria using econometric regression model of the Ordinary Least Square (OLS) and a production function of the Cobb-Doughlas type. Agricultural cooperatives assist the farmers in their farming operations through provision of farm inputs, credit and extension services. Thus, two variables-provisions of credit and fertilizer use are included in the production function or model to capture the effects of cooperative services on member crop output. Indeed, preliminary investigations reveal that the members obtained much of their credit and fertilizer from their cooperatives. Also included in the model is cooperative member experience which is designed to capture the effect of the number of years the respondent has been a member of agricultural cooperative. All the entered variables - crop output, total credit, credit from cooperative, fertilizer use, cooperative experience, size of farm- except household size, were found to be significant at the conventional 5% level. Therefore based on the findings above it is recommended that the government should complement the effort of cooperatives by providing: Adequate agricultural education and extension services to cooperative farmers to enable them improve on food production. Adequate input supplies, improves crop varieties, good storage facilities among others to enable them improve on the food output. Mechanize agriculture to enhance productivity. A supervised Agricultural credit scheme using cooperatives as a platform.

Keywords: *Output Performance, Total Credit, Cooperative Experience, Credit From Cooperative*

INTRODUCTION

The output performance of Nigeria agricultural sector has had a chequered history (Oyinbo & Rekwot, 2014; Adefila, 2012; Lawal & Atte, 2006). According to Federal Republic of Nigeria (2000) in Lawal & Atte (2006), in the 1960s, agriculture accounted for well over 80 percent of the export earnings and employment; about 65 percent of the GDP (gross domestic product) and about 50 percent of the government revenue. Oyinbo & Rekwot (2014) and Eleri, Uduka, Akuto, Onuvae and Anwara (2012) also stated that the agricultural sector is strategic to national economic development and it remains a major source of food and raw material for agro-industrial processing and has strong links to employment, national income, market opportunities for industrial production and strong potentials for poverty reduction and health improvement. Anyanwuocha (2006) further supported that agriculture plays crucial role in the nation's socioeconomic transformation, apart from being the source of food to the people, it is the greatest employer of labour and provider of incomes, sources of industrial raw materials, and export products for foreign exchange earnings, and has in the past been an important provider of resources for investments in other sectors of the economy.

Despite the said contributions of agriculture to social and economic transformation in Nigeria, the performance of the sector has been on the decline or rather fluctuating over the years. For example, The contribution of agriculture to the GDP was about 50% in 1970, 34% in 2003, 41 percent of the real sector in 2006 and continues to fluctuate till date (Akpaeti, Bassey, Okoro & Nkeme, 2014; Adefila, 2012; Lawal & Atte, 2006; Central Bank of Nigeria, 2003). According to Adefila (2012), the performance of Nigeria agricultural sector over some decades has been rather disappointing in view of its low productivity.

In other to address this teething problem, the government, stakeholders and donor agencies have joined forces to improve the output performance of farmers in Nigeria. For instance, Akpaeti et al, (2014) stated that in recent years, successive government in Nigeria in attempt to promote investment and growth has formulated several policies prominent among which are: the National Economic Empowerment and Development Strategies (NEEDS) I and II, the Comprehensive Africa Agriculture Development Program (CAADP), the National Food Security Program (NSFP), as well as other Presidential initiatives tailored towards boosting the output of agriculture. Government efforts notwithstanding, Nigeria agriculture has remained import driven rather than production driven.

However, addressing this problem of decline in agricultural output in Nigeria will revamp and boost the nation's socioeconomic status by way of food security, employment generation, increased income, increase in investment opportunities, availability of raw material and export products for foreign exchange earnings which the sector had performed satisfactorily in the past.

The focus of this study is the cooperative subsector that has been used by the government and other stakeholders to intervene in the agricultural sector. According to Adefila (2012), in an effort to overcome some of these issues (decline in agricultural output), donor agencies and governments have re-emphasized cooperatives as a strategy to promote collective action to strengthen small-holders' livelihoods by linking them to national and international markets. Farmers forms themselves into cooperatives so as to have access to improved imputes in order to increase their output. Therefore, the inability of farmers to bridge the gap between the demand and supply of food suggest that the output performance of the cooperative farmers be investigated in order to redress the conundrum.

STATEMENT OF THE PROBLEM

This study was informed by the declining output performance of Nigeria agricultural sector over some decades. Researchers have attributed the gap between the demand and supply of food in the country to the fact that the agricultural production in Nigeria is dominated by small-scale farmers characterized by small, uneconomic and often fragmented holdings that make use of simple implements and unimproved planting materials for farming. The attendant economic plight of these small household farmers has been aptly described as a vicious web of low productivity in output, income and capital investment (Akpaeti et al, 2014; Nchuchuwe & Adejuwon, 2012). Adefila (2012) and Veerakumaran (2005) added that the small-holder farmers are constrained by many problems including those of poor access to modern inputs, inadequate credit facilities, poor infrastructure, inadequate access to markets, environmental degradation, and inadequate agricultural extension services. Over the years, the government and donor agencies have continued to intermediate in the agricultural sector in a bid to increase output performance through (Adefila,2012) cooperatives as a strategy to promote collective action to strengthen small-holders' livelihoods by linking them to national and international market. Unfortunately, food deficit gap still persist, therefore, warranting an empirical probing to examine the determinants of output performance of cooperative farmers in Anambra State, Nigeria.

EMPIRICAL LITERATURE REVIEW

Ojiako, Tarawali, Okechukwu and Chianu (2017) examined the determinants of productivity of smallholder farmers supplying cassava to starch processors in Nigeria using a combination of descriptive and inferential statistics, and multivariate regression techniques. Results revealed the calculated average yield to be 12.39 t/ha thereby leaving an average yield-gap of 7.61 t/ha when compared with an average of 20 t/ha being promoted for farmers under the project. Use of improved varieties ($p<0.01$) and full-time farming ($p<0.05$) had significant positive influence on productivity. Also, training, credit use and marital status of farmers influenced productivity positivity at $p<0.10$ levels. Productivity increased with increase in the variables, but the degree of responsiveness was inelastic in each case. Together the included variables explained 72.1% of the variation in the productivity model.

Onogwu, Audu and Igbodor (2017) examined the factors influencing small- holder farmers' productivity within Taraba state Agricultural zone II using descriptive analysis and binary logistic analysis. The variables found to be highly significant and which influenced farmers' productivity include access to formal credit or

loan (at 5%), farm size of the respondents (5%), membership of farm based organization (FBO, at 1%)) and number of years the farmers had spent in school (at 10%), among others. The variables that are not highly significant, but exact some influence on farmers' productivity include age, experience, access to extension agent, and gender.

Mohammed, Abukari and Abdul (2016) estimated factors responsible for the variation of rice yield in Northern region of Ghana using multivariate empirical regression model. They tried to determine the parameters of the internal and external factors that influence rice yield. The results from the double logarithmic regression model indicate that yield increased with producer price of rice and labour availability because of improvement in purchasing power and labour efficiency in farming activities. It was decreased with increasing harvested area and price of fertilizer due to fertility inadequacy in application and also increased with a rise in producer price of maize because of a shift in resource allocation in favour of maize production.

Anigbogu, Agbasi and Okoli (2015) examined the socioeconomic factors influencing agricultural production among cooperative farmers in Anambra State, Nigeria using a regression model of the ordinary least square. Findings revealed that eight (Age, Educational Qualification, Farming Experience, Farm Size, Income, Seedling Obtain, Fertilizer Obtain and Fertility of the land) out of the fourteen coefficients of the variables included in the model are significant. Twelve of the coefficients have positive relationship with the cooperative farmers output, while four of the coefficients have inverse relationship with cooperative farmers output. The joint effect of the explanatory variable in the model account for 95.9% of the variations in the factors affecting the cooperative farmers output performance.

Omorogiuwa, Zivkovic and Ademoh (2014) examined the role of agriculture in the economic development of Nigeria using trend analysis in terms of a historical and current perspective and various descriptive methods to analyse the development of Nigeria through each decade since its independence in 1960 and examines the factors that have had an impact on its agricultural productivity. This paper proves that an in-depth research on the development of the agricultural sector is essential to the progress of the country. Also, it is important to find out what has not worked previously and why, before taking any steps to develop the agriculture or the economy.

Akpaeti, Bassey, Okoro and Nkeme (2014) examined the growth rates in agricultural investments and output in Nigeria from 1970-2009 using ordinary least square in a time series analysis. Findings revealed that agricultural investments and growth recorded a growth rate of 37.44 percent and 30.47 percent in the pre-financial sector reform periods. The result for the financial sector reform periods showed a growth rate of 23.00 percent and 7.04 percent for agricultural investment and growth respectively. The differences in growth rates were not significantly different at 5 percent (tcal < ttab at P=0.5) between the periods. There was also deceleration in growth of agricultural investments in the two periods under consideration, implying that financial sector reform might have brought an overall decrease in agricultural investments in the two periods. Also, while there was stagnation in the growth process of agricultural output in the pre-financial sector reform periods, there was acceleration in the financial sector reform periods.

Oyinbo and Rekwot (2014) examined the relationships of inflationary trend, agricultural productivity and economic growth in Nigeria using investigated the links existing between inflationary trend, agricultural productivity and economic growth in Nigeria using time series data spanning from 1970 to 2011. The results of the analyses indicate a unidirectional causality from inflationary trend to agricultural productivity, unidirectional causality from agricultural productivity to economic growth with no causality between inflationary trend and economic growth.

Adefila (2012) examined the spatial assessment of farmers' cooperative organizations in agricultural development in Gurara area of Niger State using descriptive statistics such as frequencies, mean, percentages and ordinary least square multiple regression. The study revealed that income generation, duration and years of cooperative experience, type of agricultural activities and quality of leadership were found to be significant at 0.01 alpha value while enrolment in terms of population size was found to be significant at 0.05 alpha value.

Mbugua (2009) examined the factors that determine performance of agriculture sector in Kenya using a regression analysis of the ordinary least square (OLS) method to evaluate significance of the factors. The study utilized annual data for the period from 1968 to 2008. The study established

that agriculture output is responsive to both price and non price factors. The price factors such as agriculture price index and input price index alone were found to be inadequate in explaining agricultural growth. It was established that non price factors including weather, adjusted exchange rate, election violence and agricultural budgetary allocation were significant in explaining the agriculture output.

Muhammad and Atte (2006) did an Analysis of Agricultural Production in Nigeria. Efforts were made to highlight factors affecting domestic agricultural production. Descriptive statistics and regression analysis were the major tools of analyses in this study. The study showed that the overall agricultural production average growth rate was 5.4% and that GDP growth rate, population growth rate, and the Consumer Price Index were the main factors affecting domestic agricultural production.

Available literature examined has shown that there is a dearth of empirical literature in this study area particularly in Anambra State. Also, none of the literature reviewed was investigated the output performance farmers on the platform of cooperative. For example, out of the ten empirical literature reviewed, two were carried out outside Nigeria. Mohammed, Abukari and Abdul (2016) estimated factors responsible for the variation of rice yield in Northern region of Ghana and Mbugua (2009) examined the factors that determine performance of agriculture sector in Kenya. The limited number of available studies created a literature and knowledge gap for this study. In order to bridge the literature and knowledge gap, this study therefore focuses on ascertaining the determinants of output performance of cooperative farmers in Anambra State, Nigeria with a view to establishing a linkage between cooperative farmers output and various farm production indicators like crop output, credit, credit from cooperative, household size, fertilizer use, years of cooperative membership and size of farm.

METHODOLOGY

Research Design

Okeke, Olise and Eze (2008) defined design as a plan or structure of any aspect of the research procedure. Such plan, he added will be realized in the selection of the most appropriate concepts, hypothesis, analytical paradigms, specific sampling techniques, instrument and tools of data collection, test for the hypotheses and also the most effective format to present the research report. In this paper, the area of study, population of study, sample size determination, sources of data, data Analysis technique and validity of data will be treated.

Area of Study

This study was carried out in Anambra state. The state is in the south-eastern Nigeria. Its name is an anglicized version of the original 'Oma Mbala', the native name of the Anambra River which is a tributary of the famous River Niger. The Capital and the Seat of Government is Awka. Onitsha and Nnewi are the biggest commercial and industrial cities. The state's theme is "Light of the Nation". The boundaries are formed by Delta State to the west, Imo State and Rivers State to the south, Enugu State to the east and Kogi State to the north.

Population of the Study

The population of the study consist of members of agricultural cooperatives in Anambra state. Multi-staged sampling technique was used to determine the sample size of the study. This was carried out in four stages. According to Chukwuemeka (2002), multi-stage sampling is somewhat the combination of the other sampling techniques. At least, it combines two methods. The first stage was the division of the state into four agricultural zones. The administrative structures of agricultural development in the state are four agricultural zones. They are:

- Aguata Agricultural Zone-This constitutes, Orumba North,Orumba South,Aguata,Nnewi North and Nnewi South.
- Awka Agricultural Zone, constitutes Awka North,Awka South,Njikoka,Anaocha and Dunukofia.
- Anambra Agricultural Zone: This includes Anambra-East, Anambra-West, Oyi and Ayamelum.
- Onitsha Agricultural Zone: This constitutes Onitsha-North, Onitsha-South, Ogbaru,Ihiala,Ekwusigo,Idemili North and South.

The second stage was a sub-sampling also called a two-stage sampling. This was a random selection of selecting two local governments each (Anambra East L.G.A, Anambra West L.G.A,; Orumba North L.G.A, Orumba South L.G.A,. Ogbaru L.G.A,,Ekwusigo L.G.A, Awka North L.G.A. and Awka South L.G.A.) from the

agricultural zones. In the third stage otherwise called the three-stage sampling, the simple random sampling technique was also used to select two towns each from each of the selected local governments in the agricultural zone. This gives a total of sixteen towns. In the fourth stage, simple random sampling technique was again used to select two farmers' cooperative societies from each of the towns. On the whole a total of thirty-two cooperative societies were selected with membership strength 171 farmers. This served as the sample size for the study. 171 questionnaires were given out but only 111 were dully completed and returned. The population and sample of this study was adopted because of an established contact with the lead researcher in an earlier research conducted by the lead author.

Data Analysis Technique

To examine the determinants of output performance of cooperative farmers in Anambra State, Nigeria, a production function of the Cobb-Doughlas type was employed. Agricultural cooperatives assist them in their farming operations through provision of farm inputs, credit and extension services. Thus, two variables-provisions of credit and fertilizer use are included in the production function or model to capture the effects of cooperative services on member crop output. Indeed, preliminary investigations reveal that the members obtained much of their credit and fertilizer from their cooperatives. Also included in the model is cooperative member experience which is designed to capture the effect of the number of years the respondent has been a member of agricultural cooperative. Cooperative experience is particularly important because of the conventional assumption that members who have stayed long in the cooperative are likely to benefit more from agricultural extension services of the cooperative in terms of adoption of better farming methods and practices.

The explicit specification of the model is as follows:

$$\text{Log}Y = \beta_0 + \beta_1 \text{Log } X_1 + \beta_2 \text{Log } X_2 + \beta_3 \text{Log } X_3 + \beta_4 \text{Log } X_4 + \beta_5 \text{Log } X_5 \text{ Log } X_5 + \text{Log } X_6 + U$$

Where

Log Y = Natural logarithm of total crop output (Naira)

Log X_1 = Natural logarithm of total credit (Naira)

Log X_2 = Natural logarithm of credit from cooperative (Naira)

Log X_3 = Natural logarithm household size (proxy for agricultural labour force)

Log X_4 = Natural logarithm of fertilizer use (kilogramme)

Log X_5 = Natural logarithm of years of cooperative membership (proxy for cooperative experience).

Log X_6 = Natural logarithm of size of farm (hectares).

β_0 = Constant

β_1 - β_6 = Regression coefficients to be estimated

U = error term designed to capture the effect of variables not included in the model

T = test and F-test are used to test the significance of regression estimates of the explanatory variables.

DATA PRESENTATION ANALYSIS

Table1. *Determinants of output performance of cooperative farmers (Regression Results)*

MODEL	COEFFICIENT ESTIMATES	T-VALUE	SIGNIFICANCE
(CONSTANT)	1.061	3.770	0.000
Log X_1	1.015	18.750	0.000
Log X_2	.097	2.740	0.003
Log X_3	.079	.255	0.799
Logx_4	.048	3.770	0.000
Log X_5	.084	2.332	0.018
Log X_6	.046	2.888	0.042
R^2	.862		
Adj R^2	.855		
F	112.766 (significance:000)		
DW	1.740		

Dependent Variable: Log Y

The estimates of R^2 suggest that all the variables in the model collectively accounted for over

85% of the variations in crop yields of members. F test was also significant at 1% level. All the entered variables, except household size, were found to be significant at the conventional 5% level. The signs for all the variables were also positive. The cooperative related variables such as credit from cooperatives (X_2), fertilizer use (X_4) were both found to be significant at 1% level. Also cooperative member experience (X_5) was both found to be significant at 5% level respectively. Indeed, the coefficient estimates suggest that cooperative credit, fertilizer use and member cooperative experience affect crop output of members positively. A ten percent increase in cooperative credit would induce an increase of about one percent in crop output and a ten percent increase in fertilizer use will induce 0.5% increase in output. Also a ten percent increase in the experience of cooperative producers would induce about one percent increase in crop output. Indeed, the significance of cooperative experience variable would also suggest that the longer a person is a member of cooperative the more his output in agriculture will increase. The implication of these estimates is that cooperative efforts in the promotion of members' food production activities were paying off. This then is in line with the thinking of experts and multilateral agencies that the cooperative institution in view of its nature and antecedents could play a significant role in ensuring food security in developing countries (see FAO. 1996 and 1997; Birchall, 2003; Galor, 2010 etc).

CONCLUSIONS

This paper has revealed that agricultural cooperatives are important organization for achieving and sustaining food security. They provide platform for mobilizing small farm holders for increased production of food crops. The results of the study revealed that the agricultural cooperatives have played an important role in the farming operations of their members. They contributed to the food production efforts of the members through the provision of agricultural extension services, input supply, and provision of seedlings/cassava cuttings, marketing/processing facilities and loan/credit extension.

Furthermore, the estimates from the production function have suggested that credits and fertilizer that are sourced from the cooperative are significant determinants of agricultural output of members. Also cooperative experience variable has suggested that long membership in agricultural cooperative will lead to increased agricultural output of the member.

RECOMMENDATION

Since our analysis has shown that cooperative has been playing an important role in food security, it is clear that any assistance rendered to strengthen their efforts and activities will positively contribute to availability of food in the country. Therefore based on the findings above it is recommended that the government should complement the effort of cooperatives by providing: Adequate agricultural education and extension services to cooperative farmers to enable them improve on food production. Adequate input supplies, improves crop varieties, good storage facilities among others to enable them improve on the food output. Mechanize agriculture to enhance productivity. A supervised Agricultural credit scheme using cooperatives as a platform.

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