

EFFECT OF GROUP FORMATION ON THE FARM OUTPUT OF FARMERS IN ABIA STATE, NIGERIA

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Abstract

The study analyzed effect of group formation on farm output of cooperative and non-cooperative farmers in Abia State, Nigeria. Purposive and multi-stage random sampling techniques were used to select one hundred and twenty (120) respondents (60 cooperators and 60 non-cooperators). Data were collected with a structured questionnaire and analyzed using descriptive statistics and inferential statistics (multiple regression and Z-test analyses). Result showed that the mean age of cooperators and non-cooperators was 46.7 years and 47 years respectively. They had mean farming experience of 21.7 years (cooperators) and 18.9 years (non-cooperators), mean farm size of 1.9 hectares (cooperators) and 1.8 (non-cooperators), mean flock size of 1777.7 birds (cooperators) and 162.3 birds (non-cooperators), mean poultry output of 810,000kg (cooperators) and 764,000kg (non-cooperators) mean crop output of 106,950 kg (cooperators) and 973,000kg (non-cooperators), mean farm income of ₦ 231,300.00 (cooperators) and ₦188,800.00 (non-cooperators). A good proportion (53.3%) belonged to cassava growers cooperative society and affirmed that it improved their standard of living. The coefficients of flock size (0.1333), farm size (0.0948), farm income (0.6736) and extension contact (0.4998) influenced the output of cooperative farmers while education (0.1206), household size (-0.5897), farming experience (0.1406), farm size (0.0677) and farm income (0.6341) influenced non-cooperative farmers output in the study area. The Z-test result showed significant difference between farm output and farm income of both farmer groups at ($Z = p < 0.01$) and ($Z = p < 0.05$) respectively. The study recommends that farmers should be encouraged to form cooperative groups in order to access improved seeds and inputs for increased farm output.

Keywords: *Effect, Farm Output, Farmers, Group Formation*

Introduction

Agricultural groups or cooperative societies has been touted as the appropriate vehicle for harnessing and pooling the resources of millions of small holder farmer producers together to enjoy the benefit of large scale production. According to Omeregbee and Okoedo-Okojie, (2013) it is one of the most effective

vehicles for efficient mobilization of production resources and accelerated rural development. The agricultural cooperatives have been there over the years to play this role of drastic structural change in agriculture towards achieving food security and also the socio-economic upliftment of the farmers. Federal Ministry of Agriculture & Rural Development, (FMA&RD) (2016), emphasized that cooperative development is now on multipurpose agricultural cooperative for food production and marketing which are designed basically to serve the needs of agricultural production. International Fund for Agricultural Development, (IFAD) (2017) noted that all developing regions of the world have depend largely on agriculture for their livelihoods, improving the productivity, profitability, and sustainability of the sector is argued to be the main pathway out of poverty in the continent. Over the past four decades, agricultural productivity growth in Sub-Saharan Africa averaged only 2.4% while the productivity of the rest of the developing world improved by 4%. This is caused by dependence on outdated technologies coupled with lack of access to credit, market information, improved technologies, functioning markets (for inputs, outputs, finance, consumer goods, and services among others) (Diao *et al.*, 2016).

Farmers can overcome these problems by belonging to groups to obtain collective strength that they do not have individually, and in doing so, they find the pathway out of poverty and powerlessness. They need to get organized as groups in the institutional framework through which members control both production and marketing activities (Wikipedia, 2011). The role of agricultural cooperatives or groups has been neglected by our farmers because of government bureaucratic procedures, thus making it difficult for the few farmers to register as a legitimate entity. Food production scheme is so broad that an individual or a few of them would not be able and capable to supply and sustain the need and demand of its populace (Central Bank of Nigeria, 2013). Despite the existence of many registered groups, it seems there is dearth of information on their effect on farm output when compared to non-group members. In view of the above assertion, the study was undertaken to analyze the effect of group formation on the farm production of farmers in Abia State, Nigeria.

The specific objectives were to

- examine the socio-economic characteristics of cooperators and Non-cooperators in the study area
- identify different cooperatives prevalent in the study area; and
- assess the benefits cooperators gain from being members.

Hypotheses of the Study

- Ho₁:** There is no significant relationship between socio-economic characteristics of cooperative non-cooperative farmers and their farm output.
- Ho₂:** There is no significant difference between farm size, farm income and farm output of cooperators and non-cooperators in the study area

METHODOLOGY

Study Area

The study was carried out in Abia state, Nigeria. Abia state lies between Longitudes 7°23' and 8°2' east of the Equator and Latitudes 4°47' and 6°12' north of the Greenwich Meridian (Wikipedia, 2017). The state is located East of Imo state and shares common boundaries with Anambra, Enugu and Ebonyi States on the North West, North and North East respectively. On the East and Southeast it is bounded by Cross River and AkwaIbom States and Rivers State to the South. A multistage sampling technique was used in the selection respondents. The lists of co - operators were obtained from the Abia State Ministry of Cooperatives and Abia State planning Commission, Umuahia. This formed the sampling frame covering the clients/members (co-operators) from the selected cooperatives. From the list 10 cooperative societies were randomly selected across the state. Furthermore, 6 co-operators were randomly selected from the selected cooperative societies to give a total of 60 co-operators. Also, 60 non-co-operators were randomly selected from the areas where the co-operators were selected and this gave a grand total of one hundred and twenty respondents (60 co-operators and 60 non co-operators).

Data Analysis

Descriptive statistics such as frequency counts, percentages and mean scores were used to analyze the stated objectives while the hypotheses were tested using multiple regression and Z - test analyses.

Model Specifications

The four functional forms of multiple regression models; linear, semi-log, exponential and cobb-Douglas were tried to test socio-economic characteristics of cooperative and non - cooperative farmers and their farm output. The best fit was

chosen as the lead equation based on its conformity with econometric and statistical criteria such as the magnitude of R², F-ratio and number of significant variables.

The four functional forms are expressed as follows:

Linear Function

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e_i$$

Semi - log function

$$Y = L_n b_0 + b_1 L_n X_1 + b_2 L_n X_2 + b_3 L_n X_3 + b_4 L_n X_4 + b_5 L_n X_5 + b_6 L_n X_6 + b_7 L_n X_7 + b_8 L_n X_8 + b_9 L_n X_9 + b_{10} L_n X_{10} + e_i$$

Exponential function

$$\ln Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10} + e_i$$

Cobb Douglas Function

$$\ln Y = L_n b_0 + b_1 L_n X_1 + b_2 L_n X_2 + b_3 L_n X_3 + b_4 L_n X_4 + b_5 L_n X_5 + b_6 L_n X_6 + b_7 L_n X_7 + b_8 L_n X_8 + b_9 L_n X_9 + b_{10} L_n X_{10} + e_i$$

Y = Farm Output from crop and poultry (tons)

X₁ = Age (years)

X₂ = Marital Status (married = 1, otherwise = 0)

X₃ = Education (years)

X₄ = Household Size (numbers)

X₅ = Occupational Status (farming = 1, otherwise = 0)

X₆ = Farming Experience (years)

X₇ = Farm Size (hectares)

X₈ = Flock Size (numbers)

X₉ = Farm Income (naira)

X₁₀ = Extension contact (numbers)

e_i = error term

- ii. The Z-test analysis was used to determine the difference between farm size, farm income and farm output of cooperators and non-cooperators.

The model for Z-test analysis is specified thus:

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

n₁ + n₂ - 2 degrees of freedom

Where

“Z” = “Z” statistic

\bar{X}_1 = sample mean for cooperative farmers

\bar{X}_2 = sample mean for non - cooperative farmers

σ_1^2 = standard deviation for cooperative farmers

σ_2^2 = standard deviation for non - cooperative farmers

n₁ = sample size for cooperative farmers

n₂ = sample size for non - cooperative farmers

Results and Discussion

Selected Socio-economic Characteristics of Farmers

The socio-economic characteristics of respondents are shown in Table 1. The results revealed that the mean ages of the cooperators was 46.7 years as against the non – cooperators (47.0 years). The result is in consonance with Zhenget *al*; (2012) who reported that a greater number of young people

dominate membership of cooperative societies, in Nigeria. The mean household size of the cooperators was 7.7 persons as against the non-cooperators (7.6 persons). This result has some implications on the amount of labour available for co-operative and non-cooperative farmers, since it requires more labour to sustain its rigorous operations. Larger household sizes are found to be source of cheap labour in any agricultural activity this follows the findings of Bank of Agriculture (BOA) (2017). Also, the result indicates that 41.7% (cooperators) and 36.7% (non-cooperators) acquired secondary education. Oladeji, (2011) opined that education has been shown to enhance level of technology use and adoption of improved technologies among farmers, The mean farming experience of cooperative farmers was 20.8 years as against 18.9 years (non-cooperators). This result suggest that the farmers were dominated by cooperatives and non-cooperative farmers who were experienced and can easily perceive new improved ideas disseminated through extension. A farmer can become less averse to the risk either perceiving or accepting a new variety of technology (Ayodele and Akindele, 2018). The mean farm size of cooperators was 1.9 hectares and 1.8 (non-cooperators). The result infersthat cooperators and non-cooperators farmers in the study area had a small farm holding which in turn affects their production. With small farmers, it has been argue that a large fixed cost becomes a constraint towards the perception of new and improved varieties to be used in farming, especially if it is costly. According to Oboh, (2008), the fragmented farm land in the study area makes

mechanization difficult. The mean flock size of cooperative farmers was 177.7 birds as against the non-cooperators (162.3birds). The result suggests that the cooperators had more flock size than the non-cooperative farmers. The result suggests that co-operative farmers seem to have access to yield enhancing inputs and credit which in turn increase output. Kareem *et al*; (2012) affirmed that the major objective of cooperation is to increase output through incentives and subsidies enjoyed by members, The mean poultry output for cooperators was 810,000kg while the non-cooperators was 764,000kg, while mean crop output of cooperators was 106,95kg and 973,000kg (non-cooperators). The higher crop output realized by the cooperators may be attributed to the yield enhancing incentives received by the members as a group. This may be attributed to the trainings they received crop and poultry production technologies that enhanced their output. Nwaobiala (2017) identified training on agricultural production technologies as an avenue to increasing output. The mean farm income of the cooperators was ₦231,300 as against the ₦188,800 (non-cooperators). The result is not surprising because the cooperative farmers are exposed to trainings and access farm inputs than their counter parts, that increases income. Furthermore, the result shows that 40% of cooperators and 36.7% of non-cooperators had fortnightly extension contact. Farmers contact will extension has shown to be effective in accepting and dissemination of improved technologies to farmers which in turn increased their output and income (Gashaw and Gbreyohannes, 2016).

Table 1: Socio-economic Characteristics of Respondents in the Study Area

Variables	Indices	Indices
	Co-operators (n = 60)	Non Co-operators (n = 60)
Mean Age (years)	46.7	47
Mean Household Size	7.7	7.6
Secondary Education (%)	41.7	25
Mean Farming Experience	20.8	18.9
Mean Farm Size (hectares)	1.9	1.8
Mean Flock Size (numbers)	177.7	162.3
Poultry Output (kg)	810,000	764,000
Crop Output (kg)	973,000	106,950
Farm Income (Naira)	231,300	188,800
Forthrightly Extension Contact (%)	40	36.7

Source: Field Survey, 2018

Identification of Types of Agricultural Cooperative Societies

The result in Figure 1, shows that a good proportion (53.3%) of the respondents belonged to cassava growers co-operative society, while 36.7% belonged to multipurpose as against 31.7% that were members of women farmers' agricultural co-operative society.

This result implies that farmers formed co-operative society with the objective to generate greater profit by obtaining inputs and services at lower cost than they could obtain elsewhere. Mbagwu (2018) and Effiong (2014) opined that cooperative membership helps members in accessing improved inputs and credit that would improve their living standards.

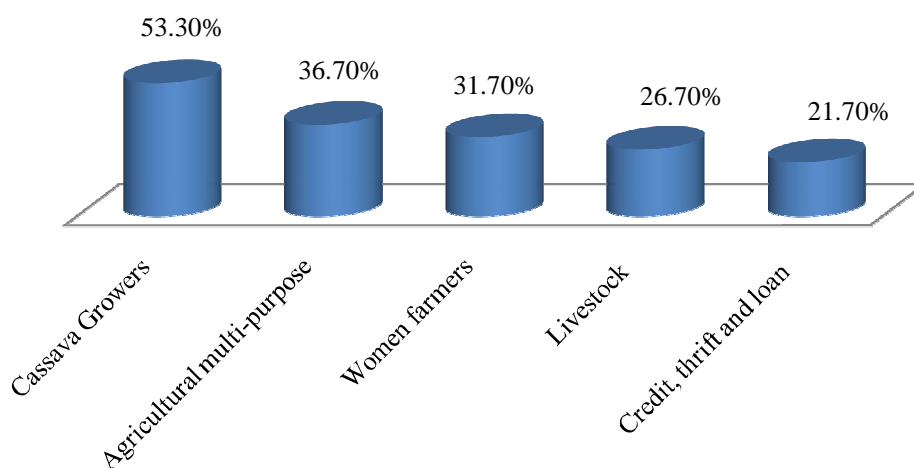


Figure 1: Showing Types Agricultural Cooperatives Prevalent in the Study Area

Benefits Derived from Cooperative Societies

The result in Figure 2 shows that most (60%) of the respondents affirmed that belonging to cooperative societies had increased their income, improved their

living conditions (55%) and helped in the marketing of their produce (52%). Alufohai and Ofoing (2012); Song *et al.*, (2013) in their study obtained a similar result among cooperative members.

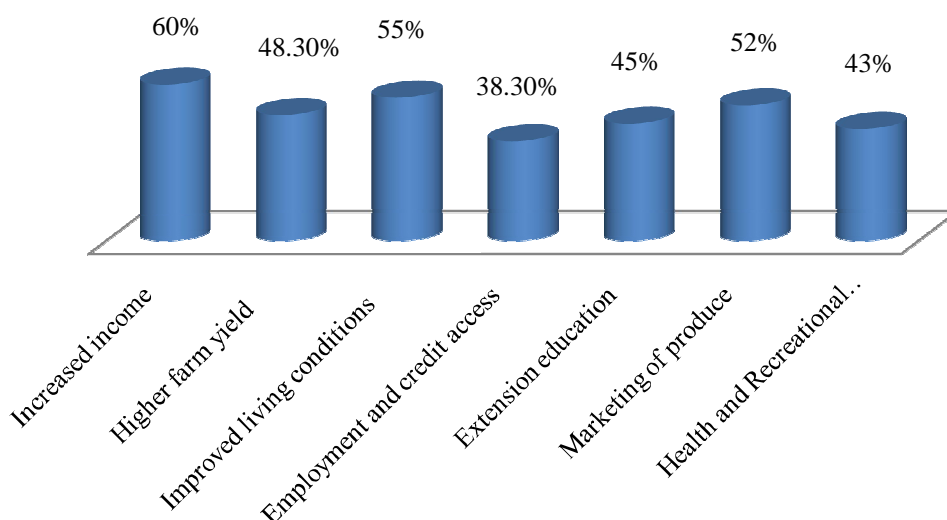


Figure 2: Showing Benefits of Agricultural Cooperatives in the Study Area

Socio-economic Determinants of Farm Output among Cooperative and Non- Cooperative Farmers

The results in Table 2 show the regression estimates of the determinants of farm output among co-operators and non – co-operators in the study area. The result shows that Cobb-Douglas functional form was chosen as the best functional form because of a higher R² value, number of significant factors and agreement with a prior expectation. The R²value 0.7147 (co-operators) and 0.6605 (non - co-operators) indicate 71.47% and 66.05% variability's in farm output explained by the independent factors respectively. The F-value of 12.27 (co-operators) and 8.49 (non - co-operators) were highly significant at

1.0% level indicating goodness of fit of the regression line.

Co-operators

The result shows that the coefficient of farm size was positive and significant at 5.0% level. This implied that a 1.0% increase in farm size will lead to a 0.09% increase in farm output. This is expected and in accordance with a *prior expectation*. Farm size affects adoption costs, risk perceptions, human capital, credit constraints, labour requirements, tenure arrangements and more. With small farms, it has been argued that large fixed costs become a constraint to technology adoption (Agbo and Chidebelu, 2010). The coefficient of flock size was also positive and significant at 10.0% level. This

implies that a 1.0% increase in flock size will lead to a 0.13% increase in farm output. This is expected probably because flock size may augment for capital for purchase of farm inputs as well as form of organic fertilizer for increased farm output (Olayinka *et al.*, 2014). The coefficient of farm income had a direct relationship with farm output and highly significant at 1.0% level. This might that a 1.0% increase in farm income will lead to a 0.67% increase in farm output. This output may be because with more income, the farmers are assured of timely availability and access to farm inputs for enhanced farm output. A higher percentage of total household income coming from the farm through increased yield tends to correlate positively with increased output following the studies of Iheanacho *et al.*, (2012) and Oparaojiako *et al.*, (2011). The coefficient of extension contact was also positive and highly significant at 1.0% level of probability. This implies that a 1.0% increase in number of extension content will lead to a 0.49% increase in farm output. This might be because access to extension will enhance information in farm innovations that will increase farm output in the study area. Acquisition of information about a technology demystifies it and makes it more available to farmers (Fapojuwo *et al.*, 2012). Information reduces the uncertainty about a technology's performance hence may change individuals assessment from purely subjective to objective over time. Exposure to information about new technologies affects output following the result of Nderum. (2014).

Non – Co-operators

The coefficient of education is directly related to farm output and highly significant at 1.0% level. This implies that 1% increase in the number of years of education will lead to a 0.09% increase in farm output among the non-cooperatives in the study area. This might be because, educated farmers access and process information on farm innovations better than

non-educated counterpart. Generally, education is thought to create a favourable mental attitude for the acceptance of new practice for increased output (Ankanle and Olutayo. 2013). The coefficient of household size was negative and significant at 5.0% level. This implies that a 1.0% increase in household size will lead to a 0.58% decrease in farm output in the study area. This is against the expected probably because large household sizes draw down on financial resources that should have been put to use in purchase of farm inputs for enhanced farm output. Moreover, many at times children whom could have served as a form of labour in the farm are usually in school. Obasi, (2015) reported that a relatively large household size enhances the availability of labour, although this may not guarantee for increased efficiency since family labour comprises mostly children of school age. The coefficient of farming experience was positive and significant of 5.0% level. This implies that a 1.0% increase in number of years of farming experience will lead to a 0.14% to increase in farm output among the non - cooperators in the study area. This implies that farmers with more experience seem to be more credible than their counterpart with little or no experience. Omoregbee and Igborie (2012) noted that farmers count more on their experience than educational attainment in order to increase their productivity. The coefficient of farm size is positive and significant at 5.0% level of probability. This implies that a 1.0% increase in farm size will lead to a 0.07% increase in farm output in the study area. This is expected and in accordance with *a priori expectation*. The coefficient of farm income is positive and highly significant at 1.0% level. This implies that a 1.0% increase in farm income will lead to a 0.63% increase in farm output in the study area. This is also expected and in accordance with *a priori expectation*. This result concurs with the findings of Akanle *et al.*, (2013).

Table 2: Regression Estimates of Determinants of Farm Output among Cooperative and Non-Cooperatives Members in the Study Area

Variables	Cobb Douglas+(Co-operators)	Cobb Douglas+(Non - Co-operators)
Constant (b ₀)	2.8462 (1.75*)	2.7275 (1.32)
Age (X ₁)	0.0528 (0.16)	0.3248 (0.67)
Marital Status (X ₂)	-0.0084 (-0.06)	0.0920 (0.48)
Education (X ₃)	0.0170 (0.30)	0.1206 (4.10***)
Household Size (X ₄)	-0.0210 (-0.23)	-0.5897 (-2.74**)
Occupational Status (X ₅)	-0.0318 (-0.90)	-0.1690 (-0.97)
Farming Experience (X ₆)	-0.004 (-0.05)	0.1406 (3.38**)
Farm Size (X ₇)	0.0948 (2.65**)	0.0677 (3.87***)
Flock Size (X ₈)	0.1333 (2.25*)	0.0387 (0.44)
Farm Income (X ₉)	0.6736 (8.68***)	0.6341 (7.51***)
Extension Contact (x ₁₀)	0.4998 (3.22***)	-0.764 (-0.32)
R ²	0.7147***	0.6605
Pseudo R	0.6564	0.5827
F- Ratio	12.27***	8.49***

Source: STATA 13A Result Output

*P ≤ 10, ** P ≤ 0.5 and ***P ≤ 1 levels of probability. Figures in parenthesis are t-values, + is the lead equation

Differences in Farm Size, Farm Output and Farm Income of Respondents in the Study Area

The result in Table 3 shows the Z-test significant difference between farm sizes, farm output and farm income of co-operators and non-co-operators in the study area. The result shows a Z-test statistics of 0.0108 for farm size which was not significant, implying no significant difference in farm between the co-operators (0.776ha) and non-co-operators (0.775ha). The result shows a mean farm output of

61 tons for the non-co-operators and 111 tons for the co-operators in the study area, which was highly significant at 1.0% level of probability (Z-test=2.4005). The result also shows a Z - test statistics of 2.3356 for income which has significant difference between co-operators (N157, 733.3) and non - co-operators (N99, 333.3) at 5.0% level of probability. The result is in conformity with the findings of Allahdadi, (2011) who obtained a similar result among cooperative farmers in Iran.

Table 3: Z-Test of Significant Difference in Farm Size, Farm Output and Farm Income between the Cooperators and Non-Cooperators in the Study Area

Variables	Mean	Standard Deviation	Z - test
Farm Size (hectares)			
Co-operators	0.776	0.689	0.0106
Non - Co-operators'	0.774	0.977	
Farm Output (tons)			
Co-operators	111,616.70	156,098.40	2.4005***
Non - co-operators	61,033.33	47,708.85	
Farm Income (₦)			
Co-operators	157,733.3	177,844.50	2.3356**
Non - co-operators	99,333.37	76,710.20	

Source: Result from STATA 13 Output

** P≤ 0.5 and ***P≤ 1 levels of probability

Conclusion and Recommendations

The study has shown that majority of farmers belonged to cassava grower co-operative society which improved their standard of living. The coefficients of flock size, farm size, farm income and extension contact influenced the output of cooperative farmers whereas education, household size, farming experience, farm size and farm income influenced non – cooperative farmers output in the study area.

The following recommendations are made based on findings of the study;

- Need to encourage farmers to join and form cooperatives to enhance information dissemination and enable farmers bulk the produce for sale thereby reducing transaction cost of marketing.
- There is need to encourage the experienced farmers by granting them access to improved seeds and inputs to enable them remain in farming and increase their farm output.
- Provision of free and affordable education to enable the farmer access and process information in farm innovations better and put into use effectively and efficiently.

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