COOPERATIVES IN SMALL SCALE AMARANTHUS PRODUCTION IN KWARA STATE NIGERIA

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ABSTRACT

The study assessed cooperative in small scale amaranthus vegetable production in Kwara State, Nigeria with reference to cooperator and non- cooperator amaranthus vegetable farmers. Specifically, the study looked at the costs and returns to amaranthus vegetable farming for both groups and the effect of cooperative membership on the amaranthus vegetable farmers' output. A three stage sampling procedure was employed to collect data from 140 (70 cooperator and 70 non cooperator) vegetable farmers using a well structured questionnaire. Descriptive statistics, gross margin analysis and Ordinary Least Squares (OLS) regression methods were the major analytical techniques employed. The result of the study showed a significantly higher gross margin for the co-operator vegetable farmers compared to the non-cooperator vegetable farmers. Family size, farm size, Labour and cooperative membership were the significant factors influencing vegetable farmers' output in the study area. The study recommends that the government should through appropriate ministries and agencies, organise periodic seminars and workshops for the farmers on the need to form viable cooperatives and ways to get the best out of the cooperative societies. Provision of machineries such as tractors to the farmers under the supervision of viable farmers' cooperative societies to help reduce the over dependence on human labour and consequently raise production is also recommended.

Keywords: Cooperator vegetable farmers, Non-Cooperator vegetable farmers, Gross margin, Ordinary Least Squares Regression, Kwara State

INTRODUCTION

Agriculture plays a significant role in the economies of developing countries including Nigeria especially in the supply of food for the population and raw materials for industries (Omotesho, 2005). Agriculture remains the mainstay of the Nigerian economy contributing about 45% to Gross Domestic Product (GDP), employs about 60% of the labour force, accounts for over 70% of the non-oil exports and more than 70% of the total farming

population is composed of smallholder farmers who are marginal and sub-marginal farm households, cultivating less than 5ha and producing up to 90% of the total national output concentrating on the production of staple crops such as cassava, maize, vegetables, yam, melon, etc (NBS, 2011;, IFAD, 2012). Agricultural holdings in Nigeria are generally small and scattered as farming is often of the subsistence variety, characterised by simple tools and shifting cultivation. Of the country's estimated 71 million hectares of arable land, only about half is presently under production (IFAD, 2012). With its reserves of human and natural resources, Nigeria has the potential to build a prosperous economy and provide for the basic needs of its estimated 170 million people (CIA, 2012)

In spite of Nigeria's huge agricultural resource endowment however, it still faces threat of hunger and poverty. Agricultural pursuit in the country is becoming more and more unbearable and unaffordable for the resource poor farmers due to high cost of inputs, inadequate access to market and credit, poor infrastructural facilities and inefficient production systems. There is an emerging consensus among actors including the United Nations (UN), the International Labour Organization (ILO), the International Cooperative alliance (ICA) and the European Union (EU) that cooperative enterprise is one of the few forms of organisations that meet all dimensions of poverty. The broad argument is that cooperatives have the advantages of identifying economic opportunities for the poor, empower the disadvantaged to defend their interest and provide security to the poor by allowing them to convert individual risk to collective risks (ILO/ICA, 2003; Birchal, 2004; Adebayo, Onuoha, Dabo and Pasca, 2010).

The importance of vegetables as a major and efficient source of micronutrients in African diet cannot be overemphasized. Vegetables often provide a cheap and affordable source of high quality nutrients which could help boost the nutritive value of the diets of the mass of the populace. Amaranthus vegetable is considered as one of the most important green leafy vegetables of the tropics, because it provides minerals and vitamins (especially vitamin A) in the diet of many developing countries (George, 1985). Increased amaranthus vegetable production may improve food security and offer employment opportunities to the populace (Mlozi, 2003). Amaranthus Vegetable producers contribute significantly to the national economy and Farmers' cooperatives play a significant role in the production of vegetables in the country. Farmers' cooperative societies are voluntary associations among the rural people to solve common farm problems and broaden their livelihood options to ensure food security and have the following basic principles: spontaneity, universality, neutrality, mutuality, democracy, autonomy, homogeneity, equity and frugality (Krishnaswami and Kulandaiswamy, 2000). Consequently, the cooperative option comes into focus as a viable way to effectively mobilize the vegetable farmers to form groups and pool resources so as to become more effective in vegetable production. Although cooperation where people work together for mutual benefits has been practised since man's existence, the modern form of cooperatives can be traced to the period of industrial revolution in Europe and particularly to

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the Rochdale Equitable Pioneers in England in 1844(Adetunji, 2002; Ihimodu, 1988). The introduction of modern cooperative business into Nigeria dates back to the year 1935 following the acceptance, by the Colonial Administration, of Mr. C.F. Strickland's Report on the prospects of cooperatives in Nigeria (Federal Ministry of Agriculture and Rural Development, 2002). The central place of cooperative in vegetable production is all encompassing especially in food security, food supplies, income generation and employment opportunities (Ijere, 1992). However, Birchal (2003) in his study noted that cooperative record in reducing poverty in developing countries is less than stellar. With the spread of about six thousand cooperative societies and unions in the study area, an empirical investigation into the performance of the co-operator vegetable and non co-orperator vegetable farmers and factors influencing vegetable farmers' output would be very useful to policy makers in designing appropriate intervention policies, planning and building of viable cooperative societies which is essential for national development. It is on this basis that this study was carried out to:

(i) describe the socioeconomic characteristics of co-operator and non-co-operator amaranthus vegetable farmers;

(ii) determine the costs and returns to amaranthus vegetable production by the co-operator and the non-co-operator farmers; and

(iii) assess the determinants of the amaranthus vegetable farmers' output in the study area

METHODOLOGY

Study Area

Kwara state is a transitional state between Northern and Western part of Nigeria, it comprises sixteen Local Government Areas. The state is located between Latitudes $7^O 45^1$ N to $9^0 30^1$ N and Longitudes $2^0 30^1$ E to $6^0 25^1$E. The population of the state is put at 2,371,089 and covers an estimated land area of $32,500km^2$ out of which 75.3% is cultivable (NPC, 2006). The topography is mainly plain land. The climate is noted with dry and wet seasons. The dry season last from November to March while the wet season starts from April and ends by October; it has a short break between July and August. Average annual precipitation is about 1200 to 1700mm. The minimum temperature ranges between 21-25°C with favourable climatic condition for cultivation of wide variety of food crops, which include yam, maize, rice, cassava, groundnut, cowpea and vegetables. The climate is conducive for growing fruits and vegetables, such as mangoes, pineapples, bananas tomatoes and leafy vegetables (Kwara State Agricultural Development Project, 2006). There are different types of cooperative societies in the state which include: Thrift, and Credit society, Multipurpose cooperative society, Cooperative group Farming, produce and Marketing cooperatives etc. However,

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majority of the Cooperative Societies in the state are multipurpose and are into Agriculture one of which is the amaranthus vegetable farmers' cooperatives.

Sampling Techniques

A three stage random sampling technique was employed to select respondents for the study. The first stage was a random selection of seven Local Government Areas out of the sixteen Local Government Areas in the state. The second stage was a random selection of five registered amaranthus vegetable farmers' cooperative societies from each of the local governments selected. Two co-operator amaranthus vegetable farmers were then randomly selected from each of the cooperative societies giving a total of 70 co-operator amaranthus vegetable farmers and data were obtained from them using a well structured questionnaire. Within the same geographical location, seventy non- co-operator amaranthus vegetable farmers were also randomly selected and interviewed.

Analytical Technique

To achieve the stated objectives, descriptive statistics such as percentages, frequency distribution and tabulation were used to describe the socioeconomic characteristics of the respondents, gross margin analysis was used to determine the costs and returns to farming for both groups and T-test analysis was used to test if there is any significant difference in the gross margin of the two groups. Fitting four different functional forms, the multiple regression analysis was employed to assess the determinants of amaranthus vegetable farmers' outputs in the study area.

Gross Margin Analysis

To determine the costs and returns to farming, Gross Margin Analysis was computed for the sampled co-operator amaranthus vegetable farmers and non-co-operator amaranthus vegetable farmers.

GM/ha = TR/ha – TVC/ha……………………………………… (1)

Where: GM/ha = Gross margin in naira per hectare

TR/ha = Total Revenue in naira per hectare

TVC/ha = Total variable cost in naira per hectare.

MULTIPLE REGRESSION ANALYSIS

The multiple regression analysis was used to assess the determinants of amaranthus vegetable farmer's output. For this study, the data obtained were fitted into four different functional

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forms namely, Cobb-Douglas, semi-log, exponential and linear functions to determine the factors influencing output of amaranthus vegetable production in the study area.

The regression model in its generalized or implicit forms is given as follows:

$$Y = f (X_1, X_2, X_3, X_4, X_5, u)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (2)$$

Where Y = Total value of output

X_1 = absolute household size measured in numbers.

X_2 = farm size in hectares

X_3 = labour in man-day

X_4 = level of education in years.

X_5 = cooperative dummy which takes 1 for co-operator vegetable farmers and 0 for non-cooperator vegetable farmers

U = Error term.

The *u* represents stochastic error term. The error term *u* is assumed to be normally distributed with a zero mean and a constant variance in accordance with the assumptions of ordinary least squares.

Data for co-operator and non co-operator vegetable farmers were fitted into the following functional forms: linear, semi log, exponential and Cob-Douglas production function.

Linear

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + U\dots\dots\dots\dots\dots\dots\dots. (3)$$

Semi log

$$Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + u\dots\dots\dots\dots. (4)$$

Cobb-Douglas

$$\text{Log } Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + u\dots\dots\dots. (5)$$

Exponential

$$\text{Log } Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + u\dots\dots\dots. (6)$$

The model specified was used to determine the relationship between the dependent variable (output) and independent variables.

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RESULTS AND DISCUSSION

Socio-economic Information of the Co-operator Vegetable Farmers and Non Co-operator Vegetable Farmers

The socio-economic characteristics of co-operator and non- co-operator vegetable farmers is given in Table 1

As shown in Table 1, for both categories of amaranthus vegetable farmers interviewed the modal age group is 41-60 years. The Co-operator farmers were generally younger as almost all of them were sixty years or below. More than a quarter of non-co-operator amaranthus vegetable farmers were more than sixty years of age. The study reveals that men dominate their women counterpart in farming in the study area. For the co-operator farmers, the average family size was 8 persons per family and only 25% of the respondents had family size greater than the average family size while the average household size for the non co-operator amaranthus vegetable farmers was 9 persons per family and more than 30% of those interviewed had family size above the average household size. Only 9% of the co-operator amaranthus vegetable farmers had no formal education. In the case of the non co-operator amaranthus vegetable farmers, as much as 56% had no formal education. About 81% of the co-operator amaranthus vegetable farmers had more than 16years experience in vegetable farming while about 92% of the non co-operator amaranthus vegetable farmers had over 16 years experience in vegetable farming. The modal class of farm size for the two groups of farmers is less than three hectares and the average farm size for the co-operator vegetable farmers' is 2.90 hectares per farmer while for the non co-operator farmers, it is 2.73 hectares per farmer.

Gross Margin Analysis

The farmers sell the vegetables in bundles with an average weight of 0.45kg. Though there is variation in the selling price per bundle, on the average, however, a bundle is sold for a price of ₦50 both for the co-operator and non co-operator amaranthus vegetable farmers in the study area as both groups sell their products in the same market. This translates to a price of ₦111.1 per kg**.** Table 2 and 3 give a summary of the gross margin of the co-operator and non-co-operator amaranthus vegetable farmers.

As shown in Table 2, the total revenue for the co-operator amaranthus vegetable farmers is ₦144, 142.21 per hectare while for the non co-operator amaranthus vegetable farmers it is ₦136, 806.3. Total revenue is the product of the prevailing output price and quantity sold. The products are sold at the farm gate or in the nearest market at the prevailing market prices. The result of the gross margin analysis shows that the co-operator farmers are better off compared to the non co-operators farmers as the average Gross Margin per hectare for the co-operator amaranthus vegetable farmers is ₦68, 312.45/ha while that of the non co-operator

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amaranthus vegetable farmers is ₦51, 185.69/ha respectively. There were significant differences ($p<0.05$) in the gross margin of the co-operator amaranthus vegetable farmers and the non co-operator amaranthus vegetable farmers (Table 3). This could be as a result of better access of the co-operator amaranthus vegetable farmers to credit facilities and market for their products taking advantage of economies of scale which inadvertently may boost their gross income and eventually their gross margin. This result is similar to that of Adeyemo, (1994) who reported that member of cooperative societies performed better in terms of gross margin than individual farmers who were not members.

FACTORS AFFECTING OUTPUT OF FARMERS

Regression Estimates of the Determinant of Farmers' output

The econometric models (3-6) of all functional forms were estimated using ordinary least square (OLS) estimation technique. The respondents were pooled respondents comprising co-operator amaranthus vegetable farmers and non-co-operator amaranthus vegetable farmers. They were pooled to accommodate the cooperative dummy and to test for its significance as an explanatory variable. The Four functional forms i.e. Linear, Cobb-Douglas, Exponential and semi-logarithm functions were fitted, however, the Cobb-Douglass functional form was selected as the lead equation specified in equation 7 based on statistical, economic and econometric criteria which included the magnitude of the co-efficient of multi determination (R^2), the number of significant independent variables and the extent to which the signs of the co-efficient conform to the theoretical expectations.

The value of the coefficient of multiple determinations R^2 was 0 .961 signifying that all included variables in our model were able to explain about 96.1% of the variation in the farmers' output level. The F-ratio was 578.254 and was significant at 5% level, implying that the joint effects of all the included variables in our regression model were significant. The result of the Cobb-Douglas production function in equation (1) shows that the family size (X_1), farm size (X_2), Labour (X_3) and the cooperative dummy variables (X_5) were significant at 10% level. This result implies that these four variables are important factors that affect farmers' output in the study area. Given that the coefficients of these variables were positive, it therefore signifies that increases in family size, farm size in terms of cultivation of larger hectares of land, use of labour inputs and membership of cooperative society will lead to increases in output of the small scale farmers in the study area.

CONCLUSION AND RECOMMENDATIONS

From the result of the study, it can be concluded that cooperative development is essential to improved farmers' welfare; this is reflected in the difference in gross margin between the two groups of vegetable farmers. The government should therefore through appropriate ministries and agencies organise periodic seminars and workshops for the farmers on the need to form

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viable cooperatives and ways to get the best out of the cooperative societies. Resuscitation of the moribund agricultural produce and marketing cooperatives in the state would also go a long way. The government should also ensure that farmers' access to farmland is increased to enable them increase their production and consequently income. The significance of family size and labour in the study area could be adduced to the fact that the vegetable farmers still employ rudimentary techniques of production depending mainly on human labour. Provision of machineries such as tractor to the vegetable farmers under the supervision of viable farmers' cooperative societies would help reduce the over dependence on human labour in the study area and consequently raise amaranthus vegetable production.

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Table 1: Socio-economic Characteristics of Respondents

Characteristics	Farmer co-operators		Farmer non- Co operators	
Age in years	Frequency	Percentage (%)	Frequency	Percentage (%)
21-40	13	19	12	17
41-60	56	80	40	57
> 61	01	1	18	26
Total	70	100	70	100
Gender				
Male	59	84	58	83
Female	11	16	12	17
Total	70	100	70	100
Household size				
1-5	09	13	13	19
6-10	43	61	35	50
11-15	14	20	21	28
16-20	04	06	02	03
Total	70	100	70	100
Level of education				
Non formal education	06	09	39	56
Primary education	23	33	10	14
Secondary school	32	46	14	20
Post secondary	9	12	7	10
Total	70	100	70	100
Farming experience in years				
1-5	01	1	01	1
6-10	04	6	05	7
11-15	08	12	03	4
16-20	22	31	34	49
21-25	12	17	09	13
26-30	12	17	08	12
31 & above	11	16	10	14
Total	70	100	70	100
Farm size in hectares				
Less than 3	40	57	42	60
3-4	16	23	16	23
5-6	09	13	09	13
7-8	05	07	03	04
Total	70	100	70	70

Source: Field Survey, 2012

Table 2: Gross Margin Analysis for Co-operator and Non Co-operator vegetable Farmers

Cost Item	Value in Naira(₦) per hectare	
	Co-operators	**Non Co-operators**
Yield in kg/ha	1297.41	1231.38
Price per unit (₦/kg)	111.1	111.1
Total Revenue(₦)	**144,142.21**	**136,806.3**
Less		

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Variable costs		
Fertilizer	5,885.00	6987.43
Seed/Seedlings	3280.48	4657.92
Agro chemical	6,641.72	8650.30
Hired labour	31,373.68	31819.53
Imputed cost of family labour	17,077.68	18734.23
Pump repair/fuel/lubricants/maintenance	7,016.48	9123.44
Marketing/transport	4,554.72	5647.76
Total Variable Cost(₦)	**75829.76**	**85620.61**
Equals		
Gross Margin (₦)	**68312.45**	**51185.69**

Source: Field Survey, 2012

Naira (₦) = Nigerian currency 1₦ = $0.0064

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Table 3: Testing for significance difference in means of gross margin using t-test

Statistics	Number	Mean	Standard deviation	Standard error of mean	T-value	Sig
Co-operators	70	68,312.45	27,431.62	3,452.67	6.784	0.003
Non Co-operators	70	51185.69	18457.11	2,568.75		

Source: Data Analysis, 2012

Table 4: Farmers' Regression Estimate

Function	Constant	X_1	X_2	X_3	X_4	X_5	Adjusted R^{-2}	F-statistic
Linear	4.505	0.648	-4.90	-0.00046	0.055	-1.321		
(standard Error)	(0.533)	(0.197)	(0.400)	(0.000)	(0.074)	(.446)	0.448*	23.547*
Exponential	-3051.301	251.262	1210.430	2.243	-38.761	1228.696		
(Standard Error)	(481.298)	(171.206)	(348.391)	(0.348)	(64.359)	(388.221)	0.887	218.476*
Cobb-Douglas	5.461	0.397	0.773	0.124	0.0961	0.262		
(Standard Error)	(0.139)	(1.134)	(.125)	(.033)	(0.060)	(.079)	0.961*	578.254*
t-value	39.231	2.962*	6.172*	3.731*	1.596	0.961*		
Semi log	-16070.614	1096.461	6106.879	1170.189	1665.547	731.347		
(Standard Error)	(2137.483)	(2059.369)	(1924.274)	(511.634)	(923.781)	(1210.650)	0.811*	100.795
t-value	-7.518	-.532	3.174*	2.287*	1.803*	0.604		

Source: Field Survey, 2010

Log y = 5.461 +0.397 $\log x_1$ + .773$\log x_2$ + 0.124 $\log x_3$ + 0.0961 log x_4 +0.262 $\log x_5$.....................(7)