

# Cooperative Society Membership and Yam Productivity in Ikole-Ekiti, Ekiti State, Nigeria

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## Abstract

Cooperative societies in Nigeria have a rich history of promoting cooperation, development and assistance within rural communities, although their ability to improve agricultural productivity has not been critically ascertained. This study, therefore, focused on the effect of cooperative membership on yam productivity in Ikole-Ekiti Local Government Area of Ekiti State, Nigeria. Primary data were collected with the aid of a well-structured questionnaire from 120 yam farmers (26 cooperative members and 96 non-members) through a multi-stage random sampling procedure. Data were analysed using Total Factor Productivity (TFP) and Ordinary Least Squares regression method. The results showed that all the yam farmers were male with mean age of 49 years, mean household size of eight persons and mean TFP of 3.08. Farmers belonging to cooperative societies were found to be significantly more productive (3.96) than the non-members (2.84) at 1% level. Cooperative society membership significantly and positively influenced productivity alongside years of formal education, farm size, age of farmers, fertilizer usage, access to extension service and credit. The study concluded that cooperative society membership influences farmers' productivity; hence, policy options that increase cooperative society membership as well as increased formal education, fertilizer use, in addition to extension services and credit access should be encouraged.

**Keywords:** Agricultural Productivity, Cooperative Members, Total Factor Productivity, Yam Farmers.

## Introduction

Yam is an annual crop and is grown in many tropical regions throughout the world. The main production centre is the savannah region of West Africa, where about 94% of the crop is grown and 83% consumed (Global News Wire, 2020). Globally, the area cultivated in the world is 8.6 million ha, while the yield is 8.8 tons/ha with a total output of 73 million tons (FAO, 2017). Nigeria is the largest producer of yam in the world, followed by Ghana, Ivory Coast and Benin. Nigeria accounts for about 66% of

the world yam production, valued at \$7.75 billion and cultivated on about 5.42 million hectares of land with annual production of 47.9 million tons (FAO, 2015 and 2017). National yield stands at 13.1tons/ha (IITA, 2020). Yam is one of the most important staple food crops in Nigeria. The crop is the fifth most harvested in Nigeria, following cassava, maize, guinea-corn and beans/cowpea, respectively. Hence, it is the second most harvested tuber crop in the country (National Bureau of Statistics, 2012). Benue State is the highest yam

producing state in Nigeria. Yam serve as a major source of earnings, food consumption source and an important source of employer for yam farming households in yam growing areas of Nigeria (Verter and Bečvářová, 2014). It is estimated that annual yam consumption per capita is 84.5kg (IITA, 2015).

There is a popular saying in Nigeria that "yam is food and food is yam". The delicacy of pounded yam is also a symbol of social status when served at social gatherings and religious functions (Maikasuwa and Ala, 2013). Ghana is the highest exporter of yam in the world accounting for about 90% of total yam exports in the world with export value of \$27.5million (GEPA, 2017). Nigeria does not export yam as all yam tubers produced in Nigeria are consumed domestically.

Despite the importance of yam to the Nigerian economy, farmers are consistently faced with challenges of production, storage and marketing. Considering that most yam farmers in Nigeria are not producing large scale with modern technology, farmers need support in the form of inputs, harvesting, storage facilities, distribution channels and a network of market information system (Verter and Bečvářová, 2014). There has been a growth in the recognition of the importance of empowering farmers to access factors of production for improved productivity (Ahmad *et al.*, 2004). Cooperative societies have long been seen as one of the means of reaching the neglected in society and providing members of the group the necessary incentives (Adewakun, 2012). They are informal but well-organized institutions (Oloyede, 2008) which provide support and sustainability to rural economic activities

by promoting the effectiveness of working together (Reeve, 2003). Cooperative societies help farmers get sustained income without negative externalities and help to involve women directly or indirectly in agriculture (Maleko and Msuya, 2015).

Several studies have been carried out on the importance of cooperative society in community development (Najamuddeen *et al.*, 2012 and Ojua *et al.* 2013). While studies on effect of cooperative membership on agricultural productivity exist but not substantial (Adepoju and Salman, 2013; Fakayode *et al.*, 2008), studies on yam productivity are scanty. This study attempted to bridge this research gap through empirical analysis of the effect of cooperative society membership on yam productivity. Specifically, the study estimated yam productivity levels of yam farmers and profiled them in relation to their cooperative membership status. In addition, the study analysed the effect of cooperative society membership on yam productivity of farmers.

### **Materials and Methods**

The study was conducted in Ikole-Ekiti Local Government Area of Ekiti State, Nigeria. It is located on latitude 7°47'53.76"N and longitude 5°30'52.17'E. The town is situated on a very plain and well-drained land on the northern part of the state. It has an area of 321 km<sup>2</sup> and a population of 168,436 (NPC, 2006). The people of Ikole-Ekiti are predominantly farmers. The local government has 12 wards. A three-stage sampling technique was used to randomly select a total of 120 yam farmers. In the first stage, six (6) wards were selected at random from where 12 communities were further selected in the second stage (two communities per ward). The third stage involved the random selection of ten (10)

household heads from the 12 communities, giving a total of 120 farmers. A well-structured questionnaire was used to collect data on socio-economic characteristics of yam farmers, cooperative membership status, production activities and marketing information. The data were analysed using descriptive statistics, Total Factor Productivity and Ordinary Least Square regression model.

The Total Factor Productivity (TFP) analysis was used to estimate the productivity of yam farmers in the study area, while OLS regression method was used to analyse the effects of the yam farmers' cooperative status and other variables on their productivity.

Total Factor Productivity (TFP) estimation: TFP is the ratio of the output to the Total Variable Cost (TVC)

$$TFP = \frac{Y}{TVC} \quad (1)$$

Where Y= quantity of output in kilogramme

and TVC= Total Variable Cost in naira (°).

Also as,

$$TFP = \frac{Y}{\sum P_i X_i} \quad (2)$$

Where  $P_i$  = unit price of *ith* variable input and  $X_i$  = quantity of *ith* variable input. This methodology ignores the role of Total Fixed Cost (TFC) since TFC does not affect both profit maximisation and the resource-use efficiency condition. It is fixed and as such a constant (Fakayode *et al.*, 2008).

The effect of various variables on the TFP was determined by using the Ordinary

Least Square (OLS) regression model.

$$Y = f\{X_1, X_2, \dots, X_{10}\} \quad (3)$$

Where:

Y=TFP

$X_1$ =Age (years)

$X_2$ = Years of education (years)

$X_3$ =Access to extension (1=access to extension service, 0=otherwise)

$X_4$ = Access to credit (1=access to credit, 0=otherwise)

$X_5$ = Farm size (ha)

$X_6$ = Farming experience (years)

$X_7$ = Access to training (1=access to training, 0=otherwise)

$X_8$ = Cost of variable inputs (°)

$X_9$ = Cooperative membership (1=member of a cooperative, 0=otherwise)

## Results

### *Socio-economic Characteristics*

The results on Table 1 show that yam farming was a male-dominated enterprise in the study area as all yam farmers were male with a mean age of about 49 years, indicating that most of the farmers were in their productive age. Most yam farmers (39.2%) had basic formal education, while the mean years of education were about 8 years. Almost 51% of the farmers had access to credit facilities, while majority (85.8%) and (91.7%) of the farmers did not have access to extension service and formal agricultural training, respectively. The lack of access to extension service was an indication that farmers may largely not be informed about innovation and improved cultivation methods. The mean farm size in the study area was 0.88 hectares; an indication of small farm holdings among the farmers in

the study area which may have negative implications for their productivity. The mean years of experience in yam farming was about 25 years with half of the farmers having more than 20 years of experience. The mean cost of variable input incurred by the yam farmers was about ₦ 1.2 million, which may be relatively high because most farmers are poor. Finally, majority (78.3%) of the farmers were not members of a cooperative society, indicating a low cooperative membership among the farmers in the area. This may have negative implications for the smallholder farmers' productivity because cooperatives provide support in form of training, loans and other marketing functions which could enhance farmers' productivity.

***Benefits Derived from the Cooperatives by the Yam Farmers***

The results on Table 2 reveal that the most commonly derived benefit by the yam-farmer-cooperative members was purchasing farm inputs at subsidized prices, by 88.5% of the cooperative members.

The second most commonly derived benefit by 80.8% of the cooperative members was thrift and savings, followed by training, derived by 53.8% of the cooperative members. The least derived benefit by the yam-farmer-cooperative members was collective processing, by only 15.4%, while no cooperative member benefitted with respect to collective production.

**Table 1: Description of Socio-economic Characteristics of Yam Farmers**

<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
<b><i>Gender</i></b>		
Female	0	0
Male	120	100
<b><i>Age</i></b>		
0-30	10	8.3
31-60	97	80.8
>60	13	10.4
Mean ± SD	49±11.96	
<b><i>Years of Formal Education</i></b>		
<5	28	23.3
6-10	47	39.2
11-15	37	30.8
>15	8	6.7
Mean± SD	8±5.24	
<b><i>Access to credit</i></b>		
Yes	61	50.8
No	59	49.2
<b><i>Access to extension service</i></b>		
Yes	15	14.2
No	105	85.8
<b><i>Formal Agricultural Training</i></b>		
Yes	10	8.3
No	110	91.7
<b><i>Farm size</i></b>		
"	84	70.0
1-1.9	25	20.8
.	11	9.2
Mean ± SD	0.86±0.98	
<b><i>Farming Experience (years)</i></b>		
0-10	21	17.5
11-20	39	32.5
21-30	28	23.3
31-40	14	11.7
41-50	12	10.0
51	6	5.0
Mean ± SD	25±15.06	
<b><i>-----</i></b>		
<500,000	29	24.2
500,000-700,000	40	35.0
>700,000	51	40.8
Mean ± SD	1,206,678± 1,088,214.90	
<b><i>Cooperative society membership</i></b>		
Cooperative member	26	21.7
Non-member of cooperative	94	78.3

Source: Field survey, 2017. Standard Deviation – SD

**Table 2:-Benefits derived by yam-farmer-cooperative members from cooperatives**

Benefits	Frequency	Percentage
<i>Thrifty and Savings</i>		
Yes	21	80.8
No	5	19.2
<i>Collective Production</i>		
Yes	0	0.0
No	26	100.0
<i>Collective Processing</i>		
Yes	4	15.4
No	22	84.6
<i>Collective Marketing</i>		
Yes	8	30.8
No	18	69.2
<i>Training</i>		
Yes	14	53.8
No	12	46.2
<i>Subsidized Input Sales</i>		
Yes	23	88.5
No	3	11.5

Source: Field Survey, 2017.

### Participation Characteristics of the Yam Farmers in Cooperative Societies

From the results on Table 3, it can be seen that most yam-farmer-cooperative members participated in their associations. About 88.5% participated in meeting attendance and shared contributions, respectively, while 84.6% were active members of their cooperatives. Only about 11.5% were executive members as expected since only a few farmers could be elected to leadership positions in the cooperatives.

### Estimation of Farmers' Productivity Level in Relation to Cooperative Membership

The result of the analysis of yam productivity levels for the farmers by their cooperative society membership is summarised in Table 4. Majority (61.7%) of the yam farmers had productivity levels

between 2.00 and 3.99, while the mean productivity level was 3.08. This implies that majority of yam farmers were quite productive in their yam farming activities, as shown by the productivity level of farmers which is greater than one ( $>1$ ). In the same vein, Table 4 indicates that the yam farmers who were members of cooperative societies had a higher productivity level of 3.96. The difference in productivity level between cooperative society members and non-members was significant at 1% level.

### Effect of Cooperative Society Membership on Yam Productivity

The coefficient of determination ( $R^2$ ) was 0.729 indicating that 72.9% of the variation in total factor productivity is jointly explained by the explanatory variable (cooperative membership status and other socio-economic variables) in the model (Table 5). The value of the F-statistics was found to be significant at 1%; this establishes the overall significance of the specified model. The years of formal education, farm size, age of farmers, access to extension service and credit access were significant in influencing the productivity level of the yam farmers in the study area. Hence, a unit increase in years of formal education, farm size, access to extension service and credit access of the farmers would lead to an increase in yam productivity by 28.1%, 12.3%, 19.1% and 25.1%, respectively. Cooperative society membership was found to be significant at 1% level and had a positive effect on farmers' productivity. Hence, a unit increase in yam farmers' cooperative membership would increase their productivity by 21.8%. However, a unit increase in age of farmer would decrease the farmers' productivity by 9.7%.

**Table 3: Participation Characteristics of the Yam Farmers in Cooperatives**

Participation	Frequency	Percentage
Active member		
Yes	22	84.6
No	4	15.4
Meeting attendance		
Yes	23	88.5
No	3	11.5
Shared contribution		
Yes	23	88.5
No	3	11.5
Executive member		
Yes	3	11.5
No	23	88.5

Source: Field Survey, 2017

**Table 4: Distribution of Yam Farmers' Productivity Based on Cooperative Membership**

TFP	Members		Non-members		Pooled	
	Frequency	%	Frequency	%	Frequency	%
0.00-0.99	0	0.0	2	1.7	2	1.7
1.00-1.99	0	0.0	19	15.8	19	15.8
2.00-3.99	9	7.5	65	54.2	74	61.7
4.00-4.99	9	7.5	8	6.7	17	14.2
5	8	6.7	0	0.0	8	6.7
Total	26	21.7	94	78.3	120	100.0
Mean± S.D	3.96±0.82		2.84±0.59		3.08±0.79	
F-value	60.940					

Source: Field survey, 2017. Standard Deviation – SD

**Table 5: Effect of Cooperative Society Membership on Yam Productivity**

Variable	Coefficient	Standard Error	t-statistics	P value
Constant		0.999	5.684	0.000
Age	-0.097	0.006	-1.760*	0.073
Year of education	0.281	0.14	4.471***	0.000
Access to extension	0.191	0.234	2.965***	0.005
Access to credit	0.251	0.142	4.248***	0.002
Farm size	0.123	0.670	2.249**	0.027
Farming experience	-0.35	0.004	-0.642	0.522
Access to training	0.077	0.344	0.978	0.330
Cost of variable input	-1.113	0.003	-2.11	0.656
Cooperative membership	0.218	0.204	3.123***	0.002
R-squared	0.729			
Adjusted R-squared	0.698			
F-statistics	23.945			

Source: Field survey, 2017

\*\*\*significant 1%, \*\*significant at 5% and \* significant at 10%

## **Discussion**

The results of this study shows that high cost of variable inputs impacts negatively on productivity in the study area. Although, cooperatives may be a source of alleviating farmers' challenges of high input prices due to the opportunity of purchasing inputs at subsidised prices. Low input prices have positive implications for yam productivity. Similarly, the opportunity of thrift and savings, training afforded by the cooperatives to the farmers, have positive implications for yam productivity of the cooperative members in Ikole-Ekiti. The least commonly derived benefit of collective processing may be a pointer to less importance placed on value addition of yam.

The relatively high productivity level of most yam farmers may be an indication of good agronomic environment and practices employed by the farmers. Although, the members of cooperative societies had a higher productivity level, suggesting that cooperative membership and TFP may be directly related. The finding agrees with Mbam and Edeh (2011) and Adepoju and Salman (2013). This may be because Cooperatives provide information to farmers on production, storage and marketing. In addition, cooperatives often buy farm implements in bulk and sell it at subsidised price to their members. The cooperatives also organized training for their members thereby improving their productivity levels.

Increase in years of formal education of farmers will enhance their use of improved farming techniques which would result in increased productivity. This was also observed by Mbam and Edeh (2011) and Olumba (2014). Similarly, access to extension service will increase farmers'

access to information on improved farming techniques with consequent result in increased productivity. This also follows in line with the findings of Afolami *et al.* (2012) and Ukoha *et al.* (2013). The results indicate that credit access of the farmers increase the ability to procure better quality inputs and other production technology leading to increased productivity. This agrees with the findings of Nto and Mbanasor (2011). In the same vein, an increase in farm size is expected to affect productivity positively as also observed by Ezekiel *et al.* (2012). On the other hand, the negative relationship between age and productivity may be an indication of the labour-intensive nature of yam production, requiring immense physical strength and agility which both decrease with age. This is corroborated by the findings of Obasi *et al.* (2013) who reported negative relationship between age and productivity in Imo state, Nigeria.

Finally, Cooperative society membership had a positive influence on farmers' productivity. This may be due to the various beneficial services offered by Cooperatives which can put their farmer-members at an advantage and hence, increase their productivity. Services provided by cooperatives include; providing production information, storage and marketing services to farmers, bulk buying of materials for both production and domestic purposes and subsidized sales to their members and organized regular training for their members, which all contribute to enhancing productivity.

## **Conclusion and Recommendations**

This study observed that yam farming was a male-dominated enterprise with most farmers still in their productive

years and operating on small-scale production. The study established that cooperative society membership significantly increased productivity of yam farmers along with years of formal education, farm size, access to extension service and credit access, while age negatively affected productivity in the study area.

Policies that encourage yam farmers' cooperative membership should be formulated and implemented in order to, increase formal education, farm size and access credit and extension service for yam farmers. Non-governmental organizations should be encouraged to deal with farmers through cooperative societies. This would encourage active participation of yam farmers in cooperative societies and consequently improve their productivity level.

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