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EMPIRICAL ANALYSIS OF THE EFFECTS OF AGRICULTURAL COOPERATIVES ON FOOD SECURITY AMONG SMALLHOLDER FARMERS IN BENUE STATE, NIGERIA

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Abstract

Food security is major problem among households in Benue State of Nigeria.

The main aim of the study was to analyze the effects of agricultural cooperatives on food security among smallholder farmers in Benue State, Nigeria. The specific objectives were: to examined the effect of cooperative membership duration on food security levels among smallholder farmers in Benue State; determine the effect of cooperatives credit access on food security of smallholder farmers in Benue State, and make recommendations based on findings. The study employed a survey research design, targeting 10,393 members of agricultural cooperatives. A sample of 385 cooperative members was selected using simple random sampling technique. A structured questionnaire yielded 354 valid responses, with validity confirmed by experts and reliability established with Cronbachs Alpha coefficient ranging from .970 to .981. Data were analyzed using regression analysis. Household Dietary Diversity Score was used to measure food security. Results revealed insignificant relationship between cooperative membership duration and food security levels($\beta = .461, p = .011$), while access to cooperative credit showed a strong positive effect on food security of households($\beta = .598, p = .003$). The study concludes that agricultural cooperatives are vital for enhancing food security among smallholder farmers and recommended that, there is a need to encouraged farmers to see cooperative membership as long term commitment, as the evidence shows that the most significant improvements in income and stability are achieved through sustained and active participation over years.

Keywords: Agricultural Cooperatives, Food Security, Smallholder-farmers.

1 Introduction

Agricultural cooperatives have emerged as pivotal entities in enhancing food security and improved livelihood of smallholder farmers, especially in Benue State, Nigeria (Olaoye, Muhammed, & Jirbril, 2024). "the role of cooperatives become even more critical as they strive to empower farmers through collective action and resource- pooling (Ubokwe, 2022). Through cooperative membership, farmers can access credit facilities at more favorable terms, allowing them to invest in essential inputs like quality seeds, fertilizers, and equipment, which are critical for enhancing food security and increasing smallholder income.

1.1 Problem Statement.

Agricultural cooperative members in Benue State face serve food security challenges primarily occasioned by persistent farmer-herder conflicts, banditry, and displacement, which have significantly reduced crop output. These constraints are compounded by inadequate access to credit, high cost of farm inputs, and poor transportation networks that restrict market accessibility. Cooperatives society is a vital instrument for achieving food security among household in Nigeria. They improve household income by providing access to resources. However, despite this role, many members of cooperatives society in Benue State are still food insecure, leading to income, food poverty, hunger, and diseases. Again, many farmers are not members of the cooperatives society therefore, have no potential benefits and the impact of the cooperative among members have not been established in the State. Therefore, Benue State requires special investigation to prevent a national agricultural crisis, as the State is traditionally Nigerians primary food producer.

1.2 Research Objectives

The main objective of the study was to analyze the effects of agricultural cooperatives on food security among smallholder farmers in Benue State, Nigeria, and the specific objectives were to:

i. examine the effect of cooperative membership duration on food security levels among smallholder farmers in Benue State.
ii. determine the effect of cooperatives credit access on food security of smallholder farmers in Benue State.
iii. Make recommendations based on the findings.

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1.3 Hypotheses of study.

The following hypotheses were formulated and tested for the study:

Ho1: There is no significant effect of cooperative membership duration on food security levels among smallholder farmers in Benue State.

Ho2: There is no significant effect of cooperative credit access on food security among smallholder farmers in Benue State.

2. Literature Review

2.1 Conceptual framework

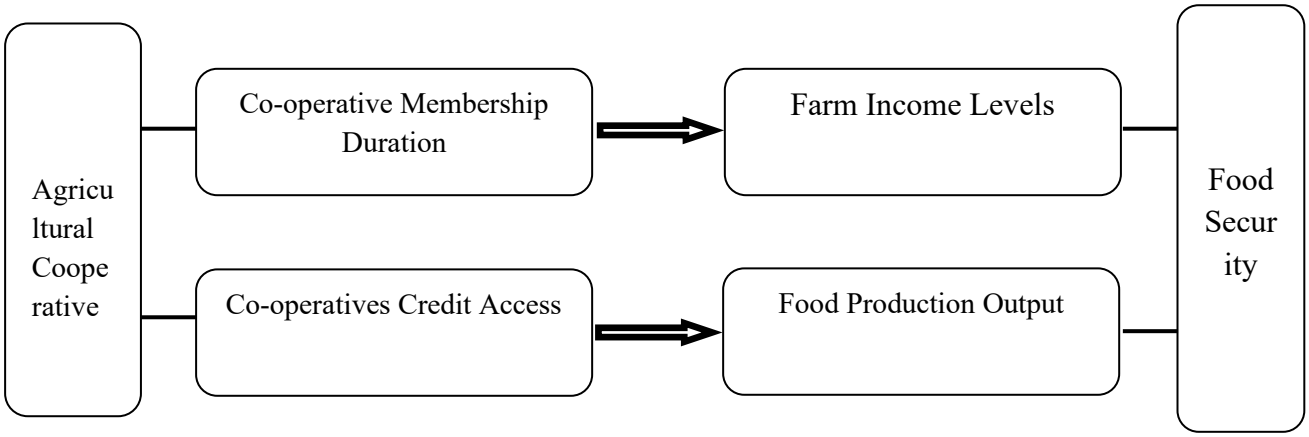

Figure:1 Conceptual Framework Diagram showing the relationships between the study variables.

The conceptual framework diagram for this study illustrates the relationship between Agricultural Cooperatives independent variable, and Food Security, dependent variable among smallholder farmers in Benue State, Nigeria. The framework specifically; it is designed to examine the effect of co-operative membership duration on food security, and co-operative credit access on food security among smallholder farmers in Benue state. This empirical model provides a theoretical foundation for assessing how key services offered by agricultural cooperatives directly contribute to enhancing various components of food security within the target population.

2.2 Theoretical framework

For the study, the institutional theory best explain why and how cooperatives are structured to successfully interface with the external environment to secure the resources necessary for improving food security. The suitability of institutional theory becomes evident when applied to the study's variables. In terms of cooperative membership duration and farm income, the

theory suggests that as members remain in a cooperative, they become more socialized into its legitimate practices. This long-term conformity signals reliability to external actors, leading to higher-value opportunities that boost farm income. The cooperatives own longevity establishes an institutional legitimacy that benefits its veteran members most. Regarding cooperative credit access and food security, this is a classic application of the theory. Individual farmers lack the institutional form to be considered legitimate by a bank. By forming a cooperative, farmers adopt a recognizable, legally sanctioned structure. This conformity grants them legitimacy in the eyes of financial institutions, and the cooperatives formal structure becomes the institutional key that unlocks the credit needed to fund increased food security.

2.3 Agricultural cooperatives and food security

The conceptual linkage between agricultural cooperatives and food security is direct and powerful. Cooperatives are as a critical institutional instrument for addressing the multifaceted nature of food insecurity among smallholder farmers (Mumararungu. Ca-Madeberi Ya-Bititi, Blisetsa, & Burny,2024).

Adegoke , Ojiagu & Ariyo (2023), argue that cooperatives serve as a key vehicle for enhancing food security by providing members with access to essential farm inputs, credit facilities, and output markets. These services directly bolster the pillars of food security. For example, access to inputs like improved seeds and fertilizer enhances productivity, which increases food availability, access to credit and improved marketing channels can raise farmer incomes, which strengthen economic access to food (Langyintuo, 2020). Empirical studies across Nigeria corroborate this link. Research in Ekiti State found that cooperative credit and input supply have a significant positive influence on food security (Adegoke, OJiagu, & Ariyo, 2023). Similarly, studies in Kwara, & Anambra States concluded that cooperative membership boosts farmer productivity and food security status , with another study finding that members experienced a unit increase in food security compared to non-members (Damiloa, & Emmanuel, 2022; Okafor, Okonkwo & Ngene.2024).

2.4 Cooperative Membership and Farm Income Levels

A substantial body of evidence suggests that joining a cooperative has a positive and significant effect on the income levels of smallholder farmers. Cooperatives create economic advantages for their members through several mechanism, including joint market actions that enhance bargaining power, and providing access to financial services that would otherwise be

unavailable (Akinola, Kehinde, Tijani, Ayanwale,Adesiyan, Tanimonure, & Ojo, 2023). A study conducted in Southern Nigeria, for instance, employed a propensity score matching method (PSMM), to account for selection bias and found that the income generated by cooperative members was approximately 10% higher than that of non-members (Ayouba, Duvivier, & Bussiere, 2025).Other research reinforces this, noting that cooperatives are a useful tool for raising farmer income and productivity, thereby contributing to poverty reduction (Shen, Wang, Wang, Wu, Ye, Han, & Chandio, 2022).

2.5 Cooperative Credit Access and Production Output

Agricultural cooperatives are uniquely structured to bridge credit gap by acting as financially intermediaries; cooperatives can mobilize member savings and aggregate them to form a substantial capital base. This collective financial strength, combined with their legal status as registered entities, allows them to secure larger loans from formal institutions like the Bank of Agriculture (BOA) on more favorable terms than an individual farmer could achieve (Balana, & Oyeyemi, 2022). Cooperatives then distributes these funds to its members, often using peer pressure and mutual guarantees as a substituted for physical collateral, which significantly reduces default risk and administrative hurdles. This process effectively breaks down the bureaucratic and financial barriers that prevent smallholders' farmers from accessing the credit needed for investment in production-enhancing technology (Flifli, Okuneye, & Akerele, 2020). Therefore, the provision of credit is not merely an ancillary service but a core function through which cooperatives directly empower their members to increase food production output, thereby contributing to both household and national food availability (Nakayiso, & Andrew, 2023).

2.6 Empirical Review

Gambo, A, & Kim, Y, (2024), investigated the impact of agricultural credit on the productivity and income of small-scale maize farmers in Kaduna State, Nigeria .The study objectives were to measure this impact and identify the factors determining access to credit. The methodology involved collecting primary data from 245 farmers (108 credit beneficiaries and 137 non-members) and analyzing it using a logit regression model and propensity score matching (PSM) for robust impact assessment. The findings from the PSM analysis revealed a significant positive impact of credit. The average treatment effect on the treated, (ATT) for productivity ranged from 1,164.50 kg/ha to 1,775.80 kg/ha (significant at 1%). Similarly, the ATT for income was significant, ranging from 30.90 USD/ha to 75.65 USD/ha while the logit regression

showed that cooperative membership was a significant determinant of credit access ($p<0.05$), alongside distance from the credit source. Gambo, A, & Kim, Y, (2024), concluded that agricultural credit significantly enhances both the productivity and income of small-scale maize farmers in Kaduna State and recommended that farmers be encouraged to join cooperative societies to improve their access to resources.

Olatinwo,Yusuf, & Bamidele (2023), analyzed the effect of cooperative societies on the agricultural production of their members in Kwara State, Nigeria. This study was grounded in the context of subsistence farming as a primary livelihood and the positioning of cooperatives as key development agents. The results showed that the most prominent cooperative activities were crop production information (mean=4.53) and credit facilities (mean=4.47). The main contribution were perceived as the procurement of farm inputs (mean=4.58) and an increase in farm output (mean =4.48). The authors concluded that cooperative membership significantly boosts agricultural development in Kwara State, primarily by facilitating access to inputs and improving output.

Wole-Alo, Akinwalere, & Alo (2022), examine the impact of credit on the farm incomes of 160 Cocoa growers in Ondo State, Nigeria, categorized into 80 credit beneficiaries and 80 non-beneficiaries. Its objectives were to compare costs and returns, and determine the effect of socio-economic characteristics on output. Data were collected via a questionnaire and analyzed using Gross Margin analysis and a multiple regression model. The findings from the Gross Margin analysis revealed that credit beneficiaries achieved a significantly higher net farm income of ₦10, 334,510.40 compared to ₦ 6,690,188.50 for non-beneficiaries. The multiple regression analysis produced an R^2 -value of 0.7565, and showed that credit availability (t=2.842), years of formal education (t=2.385), farming experience (t=3.108), and farm size (t=2.967) all had a positive and significant effect on cocoa growers output at the 5% probability level. The authors concluded that access to credit is a critical factor that lead to higher productivity and profit, and recommended that rural farmers should be encouraged to form cooperative societies to enhance their access to capital.

Kehinde, Ayodeji Damilola, & Kehinde, Mary Adedolapo, (2020), this study investigated the impact of credit access and cooperative membership on food security of rural households in south-western Nigeria. A multistage sampling procedure was employed to select 300 rural households for the study. Data were analyzed using a food security index, binary logit model, propensity score matching (PSM) and augmented inverse-probability weighting model

(AIPW). The binary logit estimates revealed that age, household size, years of education, farm size, farm income and non-farm income significantly influenced the likelihood of rural households being members of cooperatives while household size, years of education, farm size, gender; household assets and farm income significantly influenced the likelihood of rural households' access to credit. The food security index revealed that 66% of households were food insecure. PSM revealed that cooperative membership and credit access are expected to increase the food security of rural households by approximately 1,446 and 1,496 kilocalories per person per day, respectively. AIPW revealed that cooperative membership and credit access are expected to increase the food security of rural households by approximately 1,888 and 1,899 kilocalories per person per day, respectively. The study concluded that both credit access and cooperative membership have a positive and significant impact on food security of rural households. Thus, any programmers targeted at ensuring rural households' food security, particularly in south-western Nigeria, should take cognizance of their credit access and cooperative membership.

3. Research Methodology

The study adopted a survey research design because it gives first-hand primary data that were collected and analyzed. Albert (2022), posits that survey research design is a methodological approach used to collect data by asking individuals questions through survey or questionnaire.

3.1 Area of Study

The study was conducted in Benue State, Nigeria located in the middle-Belt region.(Longitude 7^0 E and 9^0 $30^/$E of Greenwich Meridian; Latitudes $6^0 30^/$N and 8^0N of Equator), (Shomkegh, Ancha, & Onuche,2019). The State is known for its rich agricultural activities and is often referred to as the "Food basket of the nation" due to its significant contributions to stable crop production, such as, yams, maize, cassava, rice, and groundnuts.

3.2 Sampling

The study used 385 cooperative members which were selected using simple random sampling technique. Use of Simple random sampling was because it allows for unbias selection of a sample. This sample was statistically determined from the population of 10,393 members of agricultural cooperatives in Benue State in accordance with Taro Yamane (1967) which is stated as follows:

$$n = \frac{N}{1 + (e)^2}$$

Where: n= Sample size

N = Population

e = error of sample (Level of significance)(0.05)

$$n = \frac{10.393}{1 + 10.393.(05)^2}$$

Therefore: $\frac{10.393}{1+10.393(0.0025)}$

$= \frac{10.393}{1+25.9825}$

$= \frac{10.393}{26.9825}$

n= 385

3.3 Data Collection

The main source of data collection was the primary; the primary data were obtained from the use of a well-structured questionnaire, which is based on the research objectives for the study. 385 questionnaires were administered to the respondents; however 354 questionnaires were properly filed and returned, representing a response rate of 91.9% which was deemed adequate for the study. Validity of the instrument was confirmed by experts and reliability established with Cronbachs Alpha coefficient 0.97 was obtained.

3.4 Data Analysis

Inferential statistical tools including simple regression, t-tests, and F-statistics, were employed to test the formulated hypotheses and achieve objectives i and ii. The hypotheses were tested at 5% level of significance.

3.5 Model Specifications

Objective i and ii were analyzed using multiple regression analysis, while advanced t-test analysis was used to test the null hypotheses. The regression equations were specified as:

$\boldsymbol{Y_i} = \beta_0 + \beta_1 X_1 + \varepsilon$ …… Eqn(1)

$\boldsymbol{Y_i} = \beta_0 + \beta_2 X_2 + \varepsilon$ ……Eqn(2)

Where; $\boldsymbol{Y_i}$ = Food security;

X_1 =cooperative membership duration

X_2=cooperative credit access

ε= error term

3.6 Limitation of the Study

The major limitation of the work relates to cross sectional data that were collected and used in the analysis. A preliminarily survey of food security was conducted in the area of study between March to April 2026, prior to the main survey.

4. Results and Discussion

This section highlights the results of the study.

4.1 Effect of cooperative membership on food security

The effect of cooperative membership on food security is reported in Tables 1, 2, and 3.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.461[a]	.213	.210	.88134

Table 2: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	73.441	1	73.441	94.576	.011
Residual	273.153	352	.776		
Total	346.594	353			

Table 3: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.884	.216		8.722	.000
Membership Duration	.519	.053	.461	9.725	.011

Source: SPSS Output

The regression analysis for hypothesis (i) revealed that co-operative membership duration has a statistically significant positive effect on farm income levels. The model was not statistically significant, (F= 94.576, t= 9.735;p = .011), and accounted for approximately 21% of the variance in farm income (R^2 =.210). The beta coefficient (β = .461) indicates an insignificant

positive relationship between food security and cooperative membership duration. Since the p-value (.011) greater than 0.05, the null hypothesis (i) was accepted. This result allied with that of Okonkwo, Onyeze, &, Mbaoga, (2022), their findings revealed that the duration of a farmer's membership in a cooperative had a significant positive effect on key rural welfare indicators, including income, agricultural output, and the total value of productive assets. The study specifically highlights a strong correction between the length of time spent in a cooperative and the increase in the value of member's productive assets. It implies that cooperatives function as more than just a source of short-term financial support, they serve as a platform for long-term capital formation and assets building.

4.2 Effect of cooperative credit access on food security of smallholder farmers

Effect of cooperative credit access on food security in Benue State is reported in Tables 4, 5, and 6.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.598[a]	.358	.356	.71209

Table 5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	99.718	1	99.718	196.681	.003
Residual	178.506	352	.507		
Total	278.224	353			

Table 6: Estimated Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.209	.179		6.754	.000
Credit Access	.681	.049	.598	14.024	.003

Source: SPSS Output

For hypothesis (ii), the analysis showed that access to cooperative credit has a highly significant positive effect on food security. The model was significant,(F= 196.681,t=14.02;p = .003), with

credit access explaining 35.6% of the variation in food security ($R^2 = .356$). The standardized beta coefficient ($\beta = .598$) signifies a very strong positive relationship between cooperative credit access and food security. Given that the p=.003 is less than 0.05, the null hypothesis is rejected. Similarly, an analysis by Osabohien, Adeleye,& De Alwis, (2022), conclude that, a 1% increase in farmers access to agricultural finance was associated with an increase in food production output of up to 0.006%. This is because agro-funding motives farmers to secure high-yields seedlings, machinery, and other farm implements that directly boost total agricultural yield. Therefore, the provision of credit is not merely an ancillary service but a core function through which cooperatives directly empower their members to increase food production output, thereby contributing to both household and national food availability, (Nakayiso, & Andrew, (2023).

5. Conclusion

In conclusion, cooperative membership duration has no significant effect on food security while, cooperative credit access has a significant effect on food security of the smallholder farmers in Benue State.

The study main objective was to determine the effects of cooperative member's duration on food security, and to examine the cooperative credit effect on food security level of smallholder farmers in Benue State.

Agricultural cooperatives are undeniably vital instruments for enhancing the food security of smallholder farmers in Benue state. The study confirms their institutional capacity to channel critical resources as evidenced by the significant impact of sustained membership on income, and credit access on production output. These successes show that cooperatives function effectively as mechanisms for improving and stabilizing exiting farming practices. Cooperatives are falling as incubations for genuine entrepreneurial transformation. This distinction is crucial, as achieving long-term, resilient food security in the "Food Basket of the Nation" requires not just producing more, but also creating a more dynamic diversified rural economy.

5.1 Recommendations

Based on the findings, the study recommends that:

Smallholder farmers needs to be encouraged to view cooperative membership as long-term commitment, as the evidence shows that the most significant improvement in income and stability are achieved through sustained and active participation over several years.

Development and commercial banks needs to create specialized, low-bureaucracy loan products specifically for cooperative societies to simplify the credit application process identified as a key challenge for smallholder farmers in Benue State.

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