International Journal of Academic Accounting, Finance & Management Research(IJAAFMR)
ISSN: 2643-976X
Vol. 9 Issue 12 December - 2025, Pages: 1-11

Role of Agricultural Cooperatives in Strengthening Food Security Among Small-Scale Farmers in South-East Nigeria

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ABSTRACT: *This study examined the role of agricultural cooperatives in sustaining food security among small-scale farmers in South-East, Nigeria. The specific objectives of the study are to identify the extent to which extension services affect sustainable food utilization and analyze the extent to which input supply affect sustainable food stability among small-scale farmers in the study area. The study employed a descriptive survey research approach, with a population of 4,888 agricultural cooperatives in South-East Nigeria, comprising a total membership of 60,860 members. A sample size of 398 was calculated utilizing Taro Yamane's (1964) formula. The study utilized primary data, employing a structured questionnaire as the data gathering instrument. The instrument underwent face and content validity assessments, as well as a reliability test with Cronbach's Alpha, which yielded a reliability coefficient of 0.977. The collected data were analyzed utilizing descriptive statistics (mean) and inferential statistics (Simple Linear Regression via the Ordinary Least Squares method). The hypotheses were tested at a 5% significance level. The findings showed that there is a statistically significant relationship between extension services and sustainable food utilization, and that input supply statistically and significantly affect sustainable food stability of small-scale farmers in the study area. Sequel to this, concluded that these findings collectively highlight the diverse significance of cooperative organizations as catalysts for agricultural enhancement and food system resilience. It was recommended that the ministry of Agriculture should deploy community-based extension officers who will provide routine, hands-on training on modern food preservation, post-harvest handling, and nutrient conservation to ensure better utilization of available food.*

KEYWORDS: Food Security, Small-Scale Farmers, Extension Services, Input Supply, Sustainable Food Utilization, Sustainable Food Stability

INTRODUCTION

Food stability and nutritional adequacy are indispensable components of sustainable development. Although small-scale farmers produce nearly 80 percent of Nigeria's food, they face persistent obstacles that limit their ability to maintain consistent yields (Bello, Yahaya, & Adamu, 2024). Rising input costs, weak extension systems, and environmental stressors have aggravated regional food insecurity. Sustainable food stability—defined as the capacity of food systems to deliver adequate and nutritious food consistently despite economic or climatic shocks (Harper, Shepon, Ohad, & Berry, 2019)—depends largely on farmers' access to knowledge, inputs, and technology. Agricultural cooperatives play a pivotal role in facilitating these supports, helping farmers strengthen production systems and adapt to change (Musa, Jibrin, & Isyaku, 2024).

Extension services serve as a bridge between agricultural research and practical application on farms. They provide training on improved agronomic practices, pest management, and post-harvest handling that enhances food utilization and safety (Abhijeet et al., 2023). In Nigeria, however, extension coverage is limited, with one agent often serving thousands of farmers (Mgbenka & Mbah, 2016). Agricultural cooperatives thus complement state services by organizing workshops, demonstration plots, and peer learning. Such cooperative-based extensions have been linked to better productivity and nutrition outcomes (Gebrehiwot, Tadesse, & Mulugeta, 2022). By improving farmers' technical capacity, extension programs ensure that available food resources are effectively utilized for household consumption, addressing both quantity and quality dimensions of food security.

Equally important is the supply of agricultural inputs—fertilizers, improved seeds, and farm tools—which determines the stability and resilience of agricultural systems. Access to timely and affordable inputs remains a persistent challenge for most rural farmers (Gomina, 2015). Cooperatives mitigate these barriers through collective procurement and distribution, which lower costs and guarantee quality (Enefiok & Bassey, 2023). Such systems have proven effective in other African contexts: Kafle, Musabanganji, and Wanjala (2023) reported that cooperative-led input supply increased yield stability by 20 percent among East African smallholders. By enabling efficient input access, cooperatives foster steady production cycles that strengthen long-term food stability.

Despite multiple government initiatives—such as the Agricultural Credit Guarantee Scheme and the National Agricultural Mechanization Policy—food stability remains fragile in South-East Nigeria. Inefficiencies in extension and input supply chains continue to undermine farmers' capacity to adapt to external shocks. Hence, this study seeks to:

1. Identify the extent to which extension services affect sustainable food utilization among small-scale farmers in the study area
2. Analyze the extent to which input supply affect sustainable food stability among small-scale farmers in the study area

REVIEW OF RELATED LITERATURE

Agricultural Cooperatives

An agricultural cooperative is defined as a formal, voluntary, collectively owned, and democratically controlled organization established for the economic benefit of agricultural producers by providing services to its members that support agricultural activities, such as bargaining with customers or providing inputs, technical assistance, or processing and marketing services, agricultural cooperatives increase members' household incomes and, where cooperatives are the backbone of the household economy, increase members' resilience and food security (Billiet, 2021). Agricultural Cooperatives also known as farmers' cooperatives is a form of cooperative formed by farmers or agriculturalists which have combined their resources together for production and marketing of their produce.

Agricultural cooperatives are the best institutional intervention for attaining sustainable food security in any country and they do this through playing crucial roles in attaining sustainable food security through the provision of agriculture input and output marketing, facilitating access to agricultural credit, provision of inputs supply (fertilizers and seedlings), extension services, creation of employment and through establishment of small and micro enterprises (Urgessa, 2020). Urgessa (2020), also posit that in Nigeria agricultural cooperatives are considered avenues for social assistance to poorer rural communities as they effectively create and maintain employment (both direct/ salaried/ employment and self-employment) in both urban and rural areas. They can provide self-employment through millions of worker-owned production and service delivery activities (producer cooperatives); by promoting resource mobilizing and saving for productive investment and provision of affordable goods and services and thereby enable the community to save a proportion of their income for investment. They can promote, provide, and enhance services to small-scale farmers, thereby encourages members to jointly cultivate food and cash crops, engage in joint irrigation, and purchase farm implements, which promotes farm labor efficiency and boost sustainable food security (Mumararungu, Ca-Madeberi, Bisetsa and Burny, 2024).

Agricultural cooperative societies in particular are essential for increasing rural inhabitants' incomes and improving their quality of life and an effective mechanism and platform for mobilizing resources of disparate, small-scale farmers to enjoy the benefits of large-scale production (Aboramadan et al., 2023). Agricultural cooperatives' increasing involvement in production and farm input distribution has been widely reported. These include marketing, processing, the supply of farm inputs (seeds, fertilizers, chemicals, and modern farm implements), consumer goods, credit and banking, insurance, warehousing, farm extension, and relevant support such as research and publication (Enefiok and Bassey, 2023; Egwunyenga and Okoh, 2022). Agricultural cooperatives increase farm productivity by securing low-cost inputs, promoting sustainable farming practices, offering credit to members, and operating retail stores through agricultural marketing cooperatives, reducing costs while improving members' management and organizational skills (Adegoke, Ojiagu and Ariyo, 2023).

Through improving farm labor efficiency, lowering expenses, and supporting environmentally friendly practices, agricultural cooperatives foster several sustainable practices. By means of joint ownership of modern farm tools such as tractors, members gain from mechanized operations that would otherwise be too costly for individual farmers (FAO, 2023). These cooperatives also use scientific ideas to manage farms, therefore encouraging the combined production of food and cash crops—a tactic especially useful in underdeveloped countries with limited resources (IFAD, 2022). Moreover, agricultural cooperatives encourage environment-friendly farm practices by including sustainable agricultural methods and tackling more general concerns including population pressures and environmental deterioration inside rural development policies (World Bank, 2023). Agricultural cooperatives are quite important in encouraging sustainable rural development by means of cooperation, resource sharing, and environmental awareness.

Agricultural Cooperatives can enhance sustainable food security by providing functions such as access to credit facilities as governments and their agencies easily grant credit facilities to cooperatives rather than to individuals, who may lack collateral securities to obtain loans, provision of agricultural input supply as cooperatives give farmers access to modern farm and agricultural tools and implements that they may not be able to afford individually, marketing network as they help stabilize the prices of farm produce, Land and Soil conservation through collective effort that boost utilization and stability as cooperatives can engage in irrigation programs that benefit all the members, which an individual farmer may not be able to afford. Hence, agricultural cooperatives effectively overcome individual resource constraints and institutional barriers, promoting inclusive and sustainable food security systems.

Sustainable Food Security

Sustainability entails the appreciation and utilization of environmental resources while considering the present and future requirements of humanity (Eneanya, 2021). Food security on the other hand according to the Food and Agriculture Organization (FAO, 2020) is the condition in which all individuals, at all times, possess physical, social, and economic access to adequate, safe, and nutritious food that satisfies their dietary requirements and food preferences for an active and healthy lifestyle. Sustainable food security (SFS) therefore, tackles the necessity of providing adequate, healthy, and accessible food for everyone while reducing the environmental and social impacts of food production. Hence, effectively making sure that concern for the environment is paramount while making food available.

The quest for sustainable food security transcends conventional metrics of food availability and access, integrating aspects of environmental sustainability, economic equity, and social justice. Sustainable food security necessitates: (a) food availability or adequate food production, (b) access to food and the capacity to procure it, (c) nutritional sufficiency encompassing energy, proteins, and micronutrients, along with safety, and (d) the stability and predictability of these conditions (Vågsholm, Arzoomand, and Boqvist, 2020). Consequently, this enhances understanding by underscoring the incorporation of sustainability principles into the fundamental aspects of food security, emphasizing the necessity for environmentally sustainable, socially equitable, and economically successful food systems. It enhances the dialogue by conceptualizing sustainable food security as a multifaceted strategy crucial for attaining enduring global food resilience.

Sustainable food security is thus an intersection of four key pillars:

1. **Food Availability:** This occurs when there is consistently enough food available for everyone. Food production and trade determine this (FAO, 2008). To meet the demands of a growing world population, enough food must be produced. This entails raising agricultural output, cutting down on food waste, and creating robust food production systems that can withstand shocks like climate change. Conversely, it refers to the quantity of food that is physically present in a nation or region as a result of commercial imports, domestic production, stocks, and food assistance (Adegoke, Ojiagu, andAriyo, 2023). Therefore, food availability implies that sufficient quantities of food of appropriate quality, are supplied through domestic production or imports (including food aid).
2. **Food Access:** Economic access to food is vital. This refers to the ability of individuals and households to obtain adequate food, which depends on income levels, employment, and social safety nets. Policies aimed at reducing poverty and income inequality play an essential role in improving access to food. Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).
3. **Food Utilization:** Access to safe and nutritious food must also translate into positive health outcomes. This dimension highlights the importance of food quality, nutrition, and food safety. It emphasizes dietary diversity and the health implications of inadequate or poor-quality food consumption. Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security (Aiello, Schifanella, Quercia and Del Prete, 2019)
4. **Food stability:** Food stability denotes the dependable and continuous access to sufficient food over time, ensuring that food availability, access, and utilization remain unaffected by temporary disruptions such as economic crises, climatic events, or conflicts. It includes the capacity of food systems to endure and recuperate from disturbances, ensuring a consistent food supply to satisfy the population's requirements. This concept is essential to food security, as stability guarantees that transient disruptions do not result in food insecurity (Mkumbukiy, Loghmani-Khouzani, Madani and Guenther, 2025).

Extension Services and Sustainable Food Utilization

Extension services are programs designed to provide practical research based knowledge and support to individuals, communities, and organizations, typically in rural or agricultural setting. It can be defined as the practice of transferring agricultural technology and knowledge to farmers through diverse educational methods. International Journal of Environment and Climate Change (Abhijeet, Kanta, Raj, Chouhan, DevanshuandRizwan, 2023). The primary aim of extension services is to disseminate knowledge about modern farming techniques, improved seed varieties, soil management, pest control, water conservation, and efficient use of agricultural inputs. These services ensure that farmers are not only informed about the latest innovations in agriculture but are also trained on how to practically apply these innovations in their specific local contexts. Extension services serves as a link between agricultural researchers and farmers, ensuring that the latest scientific knowledge and innovations reach the field. They provide farmers with the information and skills needed to adopt improved farming techniques, leading to higher yields and increased food production. This includes providing information on crop diversification, new farming technologies, and sustainable agricultural practices (Nemassan, 2025). The objective of agricultural extension is to change farmer's outlook towards their difficulties. Agricultural extension is the

application of scientific research and knowledge to agricultural practices through farm education. cooperative extension services ensures small-scale farmers get easy access to information which facilitate sustainable best practices that enhances food security. Extension services play a crucial role in promoting sustainable agricultural practices that protect the environment and ensure long-term food security. This includes promoting practices like crop rotation, soil conservation, and integrated pest management. They also help farmers understand the importance of biodiversity and sustainable resource management.

Food utilization is a critical dimension of food security, focusing on how food is used to meet nutritional needs and ensure health. It involves the biological and practical processes that determine how effectively the body absorbs nutrients from food.According to the Global Food Security Cluster (GFSC) 2021, food utilization encompasses the storage, processing, and preparation of food, as well as feeding practices tailored to individuals' physiological needs. It highlights that health status and access to clean water and sanitation are vital for achieving nutritional well-being. Sustainable Food utilization implies appropriate use of food based on nutritional value, food safety, and social value. Utilization is the result of feeding practices, food preparation, diet diversity, and fair intra-household food distribution (GFSI, 2022). Effective agricultural extension services can improve sustainable food utilization by promoting nutrition-sensitive farming practices. Farmers are often trained in crop diversification, which not only boosts food availability but also contributes to a more balanced diet. By encouraging the production of various crops, extension services help ensure that small-scale farmers have access to a variety of nutritious foods (Nemassan, 2025)

Sustainable food utilization can be affected by nutritional value, health status, food safety and preparation and consumption therefore agricultural cooperative can impact these through provision of adequate and timely extension services that not only ensure food utilization but with future sustainability in mind.

Agricultural Inputs Supply and Sustainable Food Stability

Farm inputs are the resources that are used in farm production, such as chemicals, equipment, feed, seed, and energy. The backbone of any agricultural revolution is access of farmers to modern agricultural inputs. Agricultural cooperative Organizations are able, through their networks, to have access to high quality farm inputs such as improved seedlings, insecticides, pesticide, fertilizer etc. Agricultural inputs enhance yields in any type of agricultural production especially crop yields (Sahel, 2019). Agricultural cooperatives serve as avenues for channeling farm inputs to the farmers and through their nation-wide structure, they have developed a strong and reliable arrangements for the distribution of food crops, fertilizers, agro chemicals, credits, seeds and seedlings. This has been discovered to be so in the nation's context as the Nigeria government policies of distributing these farm inputs, usually at subsidized prices to farmers through the agricultural cooperative societies. The task expected of the cooperative societies is not just to regulate the prices of the inputs, but also to ensure that quality products with appropriate technical knowledge are offered to farmers through their extension agents.

Sustainable food stability denotes the ability of food systems to reliably deliver adequate, safe, and nutritious food consistently, while remaining resilient to shocks and stresses such as economic crises, climatic events, or social disruptions thereby ensuring both immediate security and enduring sustainability of food supplies (Harper, Shepon, Ohad, and Berry, 2019). The interconnection between sustainable food stability and agricultural input supply is significant, as dependable access to essential agricultural inputs such as seeds, fertilizers, water, and equipment fundamentally supports the capacity of food systems to consistently yield food over time, particularly amid shocks or environmental stresses.

Studies have identified certain factors related to farm inputs which are insufficient membership, poor access to farm inputs and services, high cost of farm inputs, and poor access to markets and market information as well as limitations imposed by culture and land tenure system which hinder access to land (Gomina, 2015; Anigbogu, Abdulahi, andNwachukwu, 2016). Farm inputs are very important to farmers to boost their productivity and in turn promote diversification and as such should be made available to them by cooperatives.

Empirical Review

Nesirov (2025) conducted a comprehensive literature review to examine the role of sustainable agricultural policies in enhancing food security in Belgium.The study aimed to identify the underlying causes and impacts of food insecurity and assess how sustainable agricultural policies contribute to achieving food security and sustainable development.Findings shows that implementing agricultural policies within a sustainable development framework is crucial, as such policies positively influence individuals' quality of life, health, and well-being, while also shaping national healthcare costs, security strategies, agricultural trade, and the overall economic structure.Notably, Belgium's Common Agricultural Policy (CAP) Strategic Plan for 2023–2027 emphasizes income security, reduction of greenhouse gas emissions, climate change adaptation, and improving water quality and soil resilience as main objectives, reflecting the country's commitment to sustainable agriculture.This study is relevant to the current research as it provides a framework for understanding how integrating sustainability into agricultural policy can enhance food security and promote sustainable development.

Bello, Yahaya and Adamu (2024) carried out a research on An analysis of sustainable agricultural productivity and food security in Nigeria. With specific objectives to (1) analyze the relationship between sustainable agricultural productivity and food security in Nigeria, (2) examine the impact of agricultural value addition on poverty reduction, (3) identify coping strategies and policy measures addressing food insecurity and poverty, and (4) provide policy recommendations to enhance agricultural productivity and food security across Nigeria and Africa. Secondary data was gathered for this study and the study reviewed that Nigeria's agricultural sector contributed 22.61% to GDP in Q2 2024, with crop production accounting for 87.48% of the sector's nominal value, highlighting its vital role in feeding the population and supporting rural livelihoods. The study is related to the present study in that Both studies emphasize that enhancing agricultural value addition and improving access to resources through cooperative or community-based frameworks are essential strategies for reducing poverty and hunger.

Owoeye, Ojo, Ijigbade, and Oriola (2024) assessed the role of agricultural cooperative societies on farm input supply in Ekiti State, Nigeria, aiming to evaluate the extent of cooperative membership and its impact on farmers' access to inputs and markets. The study found that 71.1% of farmers belonged to cooperative societies, with over half (51.1%) having membership durations of 1-5 years. Notably, 35.6% of farmers inherited their land, cooperatives generally consisted of 6 to 10 members, and 60% of respondents had formal education. Additionally, 64.4% of farmers accessed output markets through their cooperatives, highlighting the critical role these societies play in facilitating farm input supply and market linkages. The findings underscore the importance of strengthening cooperative societies to improve input availability and market access, which is highly pertinent to current research focused on enhancing agricultural productivity and food security through collective action in rural Nigeria.

Nwankwo (2022) examined input use and sustainable food security among smallholder farmers in Enugu State, Southeast Nigeria. The study's objectives aimed to examine the impact of input access on production, identify barriers to input availability, assess the consequences for household food security, and recommend policy reforms and directly align with the goals of developing cooperative models that improve the accessibility and affordability of critical inputs. Using a quantitative survey involving 300 smallholder farmers across six local government areas, findings revealed that those with consistent access to agricultural inputs such as fertilizers, improved seeds, and mechanized tools achieved, on average, a 30% higher food production rate compared to their counterparts with irregular or limited access. Additionally, 68% of respondents cited high input costs as a primary barrier, while 55% reported long delays or shortages in input delivery. These constraints, according to the study, significantly undermined household food stability, with 47% of low-access households experiencing frequent food shortages during off-peak seasons. The study is related to the present work as it provide strong empirical justification for integrating input supply chain improvements, cooperative purchasing power, and subsidy advocacy into cooperative planning to support smallholder farmers and strengthen food security.

Eze and Nwankwo (2022) examined the influence of agricultural extension services on food utilization and nutrition among smallholder farmers in Enugu State, Southeast Nigeria. The objectives of the study were to (1) evaluate the impact of extension services on household food utilization, (2) assess how nutrition-focused programs improve dietary and hygiene practices, (3) identify the most effective components of extension efforts, and (4) propose strategies for integrating nutrition-sensitive approaches into rural agricultural support systems. Using a mixed-methods approachinvolving 250 households revealed that extension programs emphasizing nutrition education, crop diversification, and proper food processing contributed to a 40% increase in households adopting balanced diets and improved food hygiene practices. Furthermore, 62% of participants acknowledged that extension services enhanced their ability to diversify food sources and reduce post-harvest losses. The study concluded that effective extension systems are not only essential for knowledge transfer and capacity building but also for addressing malnutrition and promoting sustainable food utilization in rural communities. The study aligns with present research because it provides a strong empirical foundation for integrating cooperative-based solutions into sustainable food systems.

Okon and Etim (2021) investigated the effect of agricultural input supply on food security among small-scale farmers in Nigeria, aiming to (1) assess the impact of timely access to quality inputs on crop yields, (2) identify major challenges within the input supply chain, and (3) propose strategies to enhance input accessibility and affordability. Their study found that timely access to quality inputs resulted in a significant increase in crop yields ranging from 25% to 40%, which in turn improved food availability and household food stability. However, irregular supply and poor input quality were identified as critical constraints that reduced productivity and heightened vulnerability to food insecurity. The authors concluded that strengthening the agricultural input supply chain through improved distribution mechanisms, quality control, and subsidization is essential to achieving sustainable food production and stability for smallholder farmers. This study is particularly relevant to my current research on, as it highlights the necessity of organized cooperative structures to coordinate input procurement, ensure quality control, and advocate for affordable pricing, thereby enhancing food security outcomes for small-scale farmers in the region.

Adeoti and Ajayi (2021) investigated the impact of agricultural extension services on food utilization among small-scale farmers in Oyo State, Nigeria, with objectives to (1) evaluate the role of extension interactions in improving farmers' knowledge of post-harvest handling and nutrition, (2) assess adoption rates of improved food processing and storage techniques, and (3) recommend ways to strengthen extension outreach for better food utilization. Their study found that approximately 65% of farmers who regularly engaged with extension agents adopted enhanced food storage and preparation methods, which significantly reduced post-harvest losses and

improved food quality at the household level. These findings highlight that extension services not only transfer knowledge but also drive practical changes that improve sustainable food utilization. This research is highly pertinent to my current study on agricultural cooperatives in Eastern Nigeria, as it underscores the importance of integrating extension services into cooperative frameworks to disseminate critical knowledge and skills, thereby improving food utilization and household nutrition among cooperative members.

Mohammed and Musa (2020) examined the role of extension services in enhancing sustainable food utilization among smallholder farmers in Kaduna State, Nigeria, with the objectives to (1) assess the adoption rates of improved food preservation and preparation methods among farmers with and without extension access, (2) identify challenges limiting extension service effectiveness, and (3) recommend strategies to strengthen extension outreach for better food security outcomes. Their survey revealed that farmers with access to extension agents were 50% more likely to adopt improved food handling techniques compared to those without such access, demonstrating the significant impact of extension support on sustainable food utilization. Despite challenges such as limited coverage and insufficient resources, the study emphasized that extension services are critical for promoting food quality and household food security. This study is highly relevant to my current research, as it highlights the necessity of integrating robust extension services within cooperative frameworks to enhance knowledge transfer, adoption of best practices, and ultimately, sustainable food security for smallholder farmers.

METHODOLOGY

This study employs a descriptive survey research design, which entails posing questions, gathering, and analyzing data from representative members of the population at a specific moment to ascertain the current status of the population concerning one or more variables under examination. The study's population consists of all members of Agricultural Cooperatives who are small-scale farmers in South-East Nigeria. There are four thousand, eight hundred and eighty-eight (4,888) agricultural cooperatives in South-East, Nigeria. The total number of members is sixty thousand, eight hundred and sixty (60,860), which is the population of the study (Source: each State Ministry of Agriculture, 2025). Using Taro Yamane's (1964) formula for the finite population, the study's sample size was statistically found to be 398. The study used a multi-stage sampling technique to figure out how to sample. The research utilized primary data collected from respondents via a standardized questionnaire. To confirm the instrument's validity, it underwent both face and content validation. To ensure reliability, the questionnaire was subjected to an internal consistency test utilizing Cronbach's alpha, which yielded a coefficient of 0.977, indicating a good level of internal consistency for the scale. The acquired data was examined by descriptive statistics (mean) and inferential statistics (Simple Linear Regression employing the Ordinary Least Squares [OLS] method). The hypotheses were tested at at a 0.05 level of significance.

DATA PRESENTATION AND ANALYSIS

In accordance with the sample size of the study, a total of 398 copies of questionnaire were distributed to the respondents, after which 355 copies were returned. Out of the 355 returned, a total of 26 copies were not responded to completely, hence, the study analyzed 329 copies of questionnaire, which represents 83% of the sample size of the study.

Descriptive Statistics for Research Questions and Test of hypothesis

Research Question One

What is the relationship between extension services and sustainable food utilization of small-scale farmers in the study area?

Table 1: Distribution of responses for extension services and sustainable food utilization

S/N	ITEMS	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Decision
	EXTENSION SERVICES							
1	Members are able to receive agricultural extension services that focuses on sustainable food utilization	115	203	-	5	6	4.26	Accept
2	farm education ensures farmers get easy access to information which facilitate sustainable best practices	161	153	10	5		4.43	Accept
3	Advisory services provided have enhance preservation and waste reduction.	173	148	-	6	2	4.47	Accept
4	Training received have provided practical solutions to reduce food loss during harvesting.	196	123	3	3	4	4.53	Accept
5	knowledge gained from assistanship has contributed to making members nutrient rich.	204	112	8	23		4.56	Accept
	SUSTAINABLE FOOD UTILIZATION							

6	Food are adequately utilized as a result of farmer support services provided	215	98	6	8	2	4.57	Accept
7	Sustainable best practices are made easy due to farm education	207	114	3	3	2	4.58	Accept
8	Food storage, preservation, and waste reduction are enhanced due extension services provided	198	124	2	5		4.55	Accept
9	We now have practical solutions to reduce food loss during harvesting due to training received.	185	141	-	1	2	4.54	Accept
10	Long term sustainable production are made possible from knowledge gained from extension services.	160	164	-	2	3	4.45	Accept

Source: Field Survey, July, 2025

Table 1 indicates the distribution of responses for extension services and sustainable food utilization. The interpretation here is based on mean of the individual questionnaire items, with an acceptance benchmark of 3 and above. The item indicating that members are able to receive agricultural extension services that focus on sustainable food utilization has a mean of 4.26, which is above 3 and accepted. The statement that farm education ensures access to information that facilitates sustainable best practices recorded a mean of 4.43, making it accepted. The item that advisory services enhance preservation and waste reduction has a mean of 4.47, which is accepted. The assertion that training provides practical solutions to reduce food loss during harvesting has a mean score of 4.53, also accepted. The statement that knowledge gained from assistanship contributes to members becoming nutrient rich recorded a mean of 4.56, which is accepted.

For sustainable food utilization, the item stating that food is adequately utilized as a result of farm support services has a mean of 4.57, which is accepted. The statement that sustainable best practices are easier due to farm education has a mean of 4.58, which is accepted. The item that food storage, preservation, and waste reduction are enhanced due to extension services recorded a mean of 4.55, which is accepted. The item that practical solutions to reduce food loss during harvesting are now available due to training has a mean score of 4.54, which is accepted. Finally, the item indicating that long-term sustainable production is possible from knowledge gained from extension services has a mean of 4.45, which is also accepted.

Research Question Two

In what way does input supply affect sustainable food stability of small-scale farmers in the study area?

Table 2: Distribution of responses for input supply and sustainable food stability

S/N	ITEMS	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Decision
	INPUT SUPPLY							
1	The availability of agricultural inputs (e.g., seeds, fertilizers, tools) has a significant impact on the sustainability of food production on our farms	134	181	6	2	6	4.32	Accept
2	Agricultural inputs supply has a significant effect on members ability to achieve food stability and sustainability.	164	155	2	3	5	4.43	Accept
3	Agricultural inputs supply affects members decision to grow certain types of crops on their farms	192	120	9	7	2	4.50	Accept
4	Quality agricultural inputs directly supports members ability to produce food in a way that is both stable and sustainable.	166	154	2	7	-	4.46	Accept
5	Agricultural inputs allows Low-impactfarming methods which support stable food production.	115	86	17	53	58	3.45	Accept
	SUSTAINABLE FOOD STABILITY							
6	Sustainable food production are enhanced through availability of agricultural inputs supply.	178	144	4	1	2	4.50	Accept
7	Members ability to achieve food stability and sustainability are made possible through Agricultural inputs supply.	189	125	6	1	8	4.48	Accept
8	Members decision to grow variant crops on their farms that are stable and sustainable are influenced by Agricultural inputs supply	218	108	-	-	3	4.64	Accept

9	Members are able produce food that is both stable and sustainable due to quality agricultural inputs supply.	205	117	2	5	-	4.59	Accept
10	Low-impact farming methods are made possible due to availability of agricultural inputs.	212	104	6	3	4	4.57	Accept

Source: Field Survey, July, 2025

Table 4.5 reveals the distribution of responses for input supply and sustainable food stability. Mean figures of the individual questionnaire items were used for the analysis, with an acceptance threshold of 3 and above. The item stating that availability of agricultural inputs significantly impacts farm sustainability has a mean score of 4.32, which is above 3 and accepted. The statement that agricultural input supply affects members' ability to achieve food stability and sustainability produced a mean of 4.43, which is accepted. The item that agricultural inputs influence the decision to grow certain crops recorded a mean value of 4.50, making it accepted. The assertion that quality agricultural inputs support the ability to produce food in a stable and sustainable manner has a mean score of 4.46, which is accepted. The item stating that agricultural inputs allow low-impact farming methods has a mean of 3.45, which is above the threshold and therefore accepted.

For sustainable food stability, the statement that sustainable food production is enhanced through agricultural input supply gave a mean of 4.50, which is accepted. The item that members' ability to achieve food stability and sustainability is due to input supply has a mean of 4.48, which is accepted. The assertion that members' decisions to grow stable and sustainable crops are influenced by input supply recorded a mean of 4.64, which is accepted. The item that members are able to produce stable and sustainable food due to quality inputs has a mean of 4.59, which is accepted. Lastly, the statement that low-impact farming methods are made possible due to input availability produced a mean of 4.57, also accepted.

Test of Hypotheses

Hypotheses One

There is no significant relationship between extension services and sustainable food utilization among the small-scale farmers in the study area.

SFDUTL=f(EXTSERV)----------(1)

Where:

SFDUTL = Sustainable Food Utilization for farmer

EXTSERV= Extension services accessed by farmer

Table 3:Model Summaryfor Hypothesis Three

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.691[a]	.477	.475	1.634	298.126	.000[b]

a. Predictors: (Constant), EXTSERV

Source: Field Survey, July, 2025

Table 3 reveals the model summary for hypothesis three which states that there is no significant relationship between extension services and sustainable food utilization among the small-scale farmers in the study area. The Table presents an R value of 0.691, indicating a strong positive relationship between extension services and sustainable food utilization. The R Square of 0.477 shows that 47.7% of the variation in sustainable food utilization is explained by extension services. The adjusted R Square (0.475) affirms the model's strength. With a standard error of 1.634, the model demonstrates good predictive capacity, meaning extension services play a meaningful role in food utilization. Table also indicates that the link between extension services and sustainable food utilization is statistically significant at p = .000. The F-value of 298.126 shows a very strong model, suggesting that extension services has a significantly relationship with sustainable food utilization among small-scale farmers. The null hypothesis is therefore rejected, confirming the importance of extension services in enhancing food use and nutrition practices.

Hypotheses Two

Input supply does not affect sustainable food stability of small-scale farmers in the study area.

SFDSTAB = f(INPUTSUP)----------(1)

Where:

SFDSTAB = Sustainable Food Stability for farmer

INPUTSUP = Input supply available to farmer

Table 4:Model Summaryfor Hypothesis Four

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.536[a]	.287	.285	1.980	131.894	.000[b]

a. Predictors: (Constant), INPUTSUP

Source: Field Survey, July, 2025

Table 4 reveals the model summary for hypothesis four which states that input supply does not affect sustainable food stability of small-scale farmers in the study area.The Table shows an R value of 0.536, indicating a moderate positive effectof input supply on sustainable food stability. The R Square of 0.287 means that input supply explains 28.7% of the variation in food stability. The adjusted R Square of 0.285 supports the model's adequacy, while the standard error of 1.980 reflects an acceptable level of predictive accuracy. The table confirms that the effect of input supply on sustainable food stability is statistically significant at p = .000. The F-value of 131.894 demonstrates that the model is strong and that input supply has a significant effect on sustainable food stability among the farmers. This leads to rejection of the null hypothesis and affirms that input supply plays an important role in stabilizing food production.

Conclusions

In many developing areas, sustainable food security is still a major problem. Small-scale farmers still have to deal with problems that make it hard for them to be productive. In this context, cooperative organizations have become crucial places for farmers to get resources, information, and assistance that help them make a living from farming. This study examined the role of cooperative-driven mechanisms in enhancing the sustainable food security among small-scale farmers in South East Nigeria. The empirical evidence showed that extension services further enhanced farmers' knowledge, resulting in better food utilization through improved handling, preservation, and nutritional practices. Input supply, though contributing at a comparatively moderate level, still played a significant role in stabilizing food production and ensuring consistency across farming seasons. It is therefore, concluded that agricultural cooperatives in play a significant role in strengthening food security among small-scale farmers in South-East Nigeria.

Recommendations

Sequel to the findings of the study, the following recommendations are made:

- **a)** The Ministry of Agriculture should deploy community-based extension officers who will provide routine, hands-on training on modern food preservation, post-harvest handling, and nutrient conservation to ensure better utilization of available food.
- **b)** State agricultural agencies and Agricultural Cooperatives in particular should implement season-long input distribution systems that guarantee timely and subsidized access to quality seeds, fertilizers, and farm tools, enabling consistent and stable food production.

REFERENCES

Abhijeet, Kanta, Raj, Chouhan, Devanshu & Rizwan (2023). A Comprehensive Review on Role of Agricultural Extension Services in the Sustainable Development of Global Agriculture *British Journal of Environment and Climate Change*, *13*(10), 3514-3525.

Aboramadan, M., Kundi, Y. M., & Becker, A (2023). "Green human resource management in nonprofit organizations: effects on employee green behavior and the role of perceived green organizational support", *Personnel Review, 51*(7), 1788-1806

Adegoke, T. D., Ojiagu, C. N., & Ariyo, C. O. (2023). Influence of agricultural cooperatives in promoting food security in Ekiti State, Nigeria. *International Journal of Research and Innovation in Social Science, 7*(9), 1–10. https://doi.org/10.47772/IJRISS.2023.7903

Adeoti, A. I., & Ajayi, O. C. (2021). Impact of agricultural extension services on food utilization among small-scale farmers in Oyo State, Nigeria. *Journal of Rural Development and Agriculture*, 7(3), 45–53. https://doi.org/10.3126/jrda.v7i3.37721

Adeoye, I. B., Ogunniyi, A. I., & Yusuf, S. A. (2023). Market access, cooperative membership, and welfare of smallholder farmers in Nigeria. *Journal of Agribusiness and Rural Development, 70*(3), 215–230.

Aiello, L. M., Schifanella, R., Quercia, D., & Del Prete, L. (2019). Large-scale and high-resolution analysis of food purchases and health outcomes. *EPJ Data Science*, *8*(14). https://doi.org/10.1140/epjds/s13688-019-0191-y

Bello, M. M., Yahaya, J. U., & Adamu, I. (2024). An analysis of sustainable agricultural productivity and food security in Nigeria. *Journal of Political Development, 2*(1), 45-60.

Billiet C. (2021) Agricultural Cooperatives and food security in Encyclopedia of food security and sustainability (vol. 1, (342-348).E'lsevier

Egwunyenga, E. J., & Okoh, J. O. (2022). Perception of cooperative farmers on extension service delivery in Delta State, Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology***,** *9*(1), 33–41. https://njaat.com.ng/index.php/njaat/article/view/619

Eneanya, A. N. (2021). Innovation and sustainable food security in Nigeria. *Covenant University Journal of Politics and International Affairs*, *9*(1), 133–146.

Enefiok, E. O., & Bassey, E. (2023). Assessment of the role of agricultural cooperatives in input supply among rural farmers in Ekiti State, Nigeria. *Asian Journal of Agricultural and Horticultural Research***,** *11*(4), 12–22.

Eze, S. O., & Nwankwo, F. C. (2022). Agricultural extension services and their influence on food security and nutrition in Southeast Nigeria. *African Journal of Food, Agriculture, Nutrition and Development, 22*(4), 15801–15816. https://doi.org/10.18697/ajfand.108.21323

Fan, S., & Brzeska, J. (2016). Sustainable food security and nutrition: Demystifying conventional beliefs. *Global Food Security, 11*, 11–16. https://doi.org/10.1016/j.gfs.2016.03.005

FAO, IFAD, UNICEF, WFP and WHO. (2024). The State of Food Security and Nutrition in the World 2024 – Financing to end hunger, food insecurity and malnutrition in all its forms. Rome. https://doi.org/10.4060/cd1254en

FAO. (2002). "The State of Food Security in the World." Food and Agriculture Organization of the United Nations.

FAO. (2018). "The 10 Elements of Agroecology." FAO.

Food and Agriculture Organization (FAO). (2023). *Building climate resilience in smallholder agriculture: A global perspective*. Rome: FAO.

Food and Agriculture Organization of the United Nations (FAO). (2020). The State of Food Security and Nutrition in the World 2020: Transforming Food Systems for Affordable Healthy Diets. FAO.

Food and Agriculture Organization of the United Nations. (2021). *Sustainable food and agriculture*. http://www.fao.org/sustainability/en/

Food Security Information Network (2023). https://www.fsinplatform.org/global-report-food-crises-2023.

Gebrehiwot, H., Tadesse, B., & Mulugeta, D. (2022). The role of agricultural extension in improving smallholder productivity and nutrition outcomes in Ethiopia. *Agricultural Extension Review, 28*(2), 55–67. https://doi.org/10.1016/j.ager.2022.02.008

GFSI (2022). Global Food Security Index . The Economist Intelligence Unit Limited.

Harper, M., Shepon, A., Ohad, N., & Berry, E. M. (2019). The challenges of sustainable food systems where food security meets sustainability – what are countries doing? In B. Burlingame and S. Dernini (Eds.), *Sustainable diets: Linking nutrition and food systems* (pp. 22–31). CABI Publishing. https://doi.org/10.1079/9781786392848.0022

Kafle, G., Musabanganji, E., & Wanjala, P. (2023). Input supply cooperatives and yield stability in smallholder farming systems: Evidence from East Africa. *Food Policy, 120*, 103511. https://doi.org/10.1016/j.foodpol.2023.103511

Mgbenka R. N., & Mbah E.N. (2016) Review of Smallholder Farming in Nigeria: Need for Transformation. *International Journal of Agricultural Extension and Rural Development Studies*. *3*(2), 43-54.

Mumararungu, I., Ca-MadeberiYa-Bititi, G., Bisetsa, E., & Burny, P. (2024). Enhancing agricultural cooperatives' resilience to food insecurity through cash injection: A case of the Kita Circle in Mali. *African Journal of Food, Agriculture, Nutrition and Development*, *24*(3), 25942–25962. https://doi.org/10.18697/ajfand.128.24280

Musa, M. B., Jibrin U. Y., & Isyaku A. (2024). An Analysis of Sustainable Agricultural Productivity and Food Security in Nigeria. *Journal of Political Discourse*. *2*(1), 45-60.

National Bureau of Statistics (NBS). (2025). *Nigerian Gross Domestic Product Report Q4 2024*. Abuja, Nigeria: National Bureau of Statistics.

Nemassan, N. O. (2025). Extension services delivery and national food security [Keynote address]. 30th Annual Conference of the Agricultural Extension Society of Nigeria (AESON)

Nesirov, E. (2025). The role of sustainable agricultural policies in food security. Paper presented at the [Conference Name], [Location]. https://doi.org/10.5281/zenodo.14602671

Nwankwo, F. C., Eze, S. O., & Okeke, C. C. (2022). Input use and food security status of smallholder farmers in Enugu State, Southeast Nigeria. *Agricultural Economics and Extension Journal*, *16*(2), 56–68. https://doi.org/10.4314/aeej.v16i2.6

Okon, E. U., & Etim, N. M. (2021). Agricultural input supply and food security among small-scale farmers in AkwaIbom State, Nigeria. *Journal of Agricultural Extension and Rural Development*, *13*(5), 110–118. https://doi.org/10.5897/JAERD2021.1107

Owoeye, R. S., Ojo OlaniyiOluwatosin, J. O. Ijigbade & Moyinoluwa AyomideOriola (2024) "Assessment of Agricultural Cooperative Societies on Farm Input Supply in Ekiti State, Nigeria". *Asian Journal of Advances in Agricultural Research*, *24*(6), 40-47. https://doi.org/10.9734/ajaar/2024/v24i6511.

Urgessa, H. T. (2020). Review on contribution of agricultural cooperative for socio-economic development with special reference to Ethiopia. *Agricultural Economics and Marketing Journal*, *7*(1), 11–19. © IDOSI Publications.

Vågsholm, I., Arzoomand, N. S., & Boqvist, S. (2020). Food security, safety, and sustainability—Getting the trade-offs right. *Frontiers in Sustainable Food Systems*, *4*, Article 16. https://doi.org/10.3389/fsufs.2020.00016

World Bank. (2017). "Agriculture for Development: World Bank's Role in Agriculture." World Bank.