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Effects of Contract Farming Models for Increased Productivity in Nigeria: An Empirical Evidence

[1]Enwelu, I. A. and [*2]Iyere-Freedom, C. J.

[1]Department of Agricultural Economics and Extension,
Nnamdi Azikwe University, Akwa, Anambra State, Nigeria
[2]Department of Agricultural Extension, University of Nigeria, Nsukka, Enugu State, Nigeria
*Corresponding Author's email:iyerechioma@gmail.com

Abstract
This paper explored the different types of contract farming models and their effects, with a focus on their potential for increased agricultural productivity in Nigeria and their challenges. The study adopted the unique Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. An online search for relevant literature in the English language that was peer-reviewed and grey literature was used. Data were collected through a web search, Google Scholar, and open-access journals. Contract farming models identified included centralized, nucleus estate, multipartite, informal, and intermediary models. Furthermore, low pricing by firms and a lack of regulatory frameworks, among others, were challenges to contract farming schemes identified. Empirical evidence reveals that contract farming models increase the agricultural productivity of beneficiaries in Nigeria by giving farmers better access to inputs, technical support, and market opportunities. The study suggests the need for government, non-governmental organizations, and other relevant stakeholders' support through regulatory frameworks to ensure that the rights of contracting farmers are not marginalized.

Introduction

Contract farming is an agricultural production model where farmers produce specified agricultural commodities to the buyer's specifications for a guaranteed market and price (Ton *et al*., 2018). The contracting firm buys farm produce in advance in exchange for pre-financing agro-inputs and non-financial services like an extension on pre-agreed terms and conditions (Meemken *et al*., 2020). Staple food crops like cassava, maize, and rice are always employed in the model and can work in developing countries. Contract farming was employed for US vegetable production, European seed production before World War II, and US pig production and has grown significantly and accounts for about 15% of agricultural output in developed countries (Prowse, 2012; Hamilton, 2008). In China, the government has supported contract farming since 1990 with impressive results: by 2001, over 18 billion hectares were planted under contract-farming arrangements which indicates an increase of around 40% from the previous year (Rehber, 2007). In Nigeria, contract farming arrangement is less visible with the limited presence of OLAM Nigeria limited in their rice, cotton and ginger 'out growers' schemes, NESTLE SLABMARK for soya bean programs and British American Tobacco Isheyin Agronomy Limited (BATIAL) for tobacco program. In all these schemes, there were tremendous increases in the output, gross margin and net profit for each enterprise as well as improved qualities that met all the international standards criteria (Olomola, 2010). These examples show that contract farming is essential to food security and agricultural development in Nigeria.

Agriculture is the mainstay of the Nigerian economy but smallholder farmers still lack production and market information, according to Yakubu *et al*. (2015). Even with information on potential agribusiness, smallholder farmers typically lack the finance needed due to excessive interest rates on loans by agricultural commercial banks. Finally, smallholder farmers are risk-averse and would prefer to ensure to produce on a small scale before developing commercial production for an uncertain market. (Bijman, 2008). The contract farming model has the potential to transform Nigerian agriculture into an agro-industrial business, enhancing smallholder farmers' productivity, income and standard of living Contract farming in Nigeria can agricultural productivity and develop the value chain of those crops under contract arrangement for participating smallholder farmers. Therefore, due to the huge benefits, it has gained attention in Nigeria as a way of attaining agricultural development, food security and increased productivity for smallholder farmers. Contract farming boosts agricultural production by providing money, technical assistance, extension

services, and better inputs (Obi-Egbedi *et al*., 2022). However, the model yet still faces some hitches. The agribusiness sector needs to grow to link the farmers and manufacturing firms to commercialize agriculture (Adenle *et al*., 2017). This paper's overall objective is to ascertain the empirical evidence of the effects of contract farming on increased productivity in Nigeria. Specifically, the article sought to identify the various contract farming models and describe the effects of contract farming models on agricultural productivity and identify constraints to contact farming models in Nigeria.

Contract Farming Models in Nigeria

Eton and Shepherd (2001) identified five contract models for firm-farmer contractual arrangements based on contractor type, product, and degree of vertical coordination between farmer and contracting firm, and number of key stakeholders. Nigerian contract models: First, a centralized model lets a major processing corporation contract with many smallholder farmers with rigorous quality and quantity criteria. Sugarcane, tea, coffee, and milk are highly processed under this approach. Strict coordination ensures controlled quality and pre-harvest quantity (Harish, 2019). The second is the nucleus estate model, when the firm enters production through an estate or plantation but contracts with independent producers. Perennial crops like oil palm use this concept. The firm's production plantations and smallholder farmers' contracted commodities ensure the processing unit (Food and Agricultural Organization, 2021). The third approach is a public-private partnership that contracts with farmers. This strategy can involve national and/or local governments in a public-private partnership (PPP) for national crops. Public or private providers of production inputs and services promote vertical coordination (Ncube, 2020). The fourth model is informal when smaller enterprises or dealers enter into annual agreements with a limited number of farmers based on verbal agreements, usually for fruit and vegetables that require minor processing. Due to their non-formal character and small business size, such initiatives partly depend on the extent to which other providers (such as the state and/or NGOs) can provide inputs like extension and credit, but they sometimes suffer from extra side-marketing. The formal relationship has more vertical integration (Vabi Vamuloh *et al*., 2019). The fifth option is the intermediary model, where the corporation subcontracts farmer interaction to a farming committee or trader. Distance between the firm and the farmer reduces control over the process and product (Hung Anh *et al*., 2019). Furthermore, this study identified the centralized and multipartite models out of the five as the major models identified in this study, as well as contract arrangements in Nigeria such as OLAM which is characterized by the following: Centralized rice millers buy rice from farmers; farmers register as cooperative group members; Operate through appointed group coordinators; Involvement of the Nigerian Agricultural Insurance Corporation (NAIC); Input supply in the form of credit in kind; Establishment of model farms to produce good-quality seeds for distribution to the farmers and to serve as demonstration plots during field days for training purposes; Provision of insurance coverage for participating farmers; Specification of variety and quality of rice desired and Purchase of rice from participating farmers (Olomola, 2010).

Methodology

The study adopted the unique Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. The framework, through its systematic approach, guides researchers on the basis of sourcing resources, acceptance or rejection using a stepwise review process, data abstraction, and proper analysis (Onyeneke *et al*., 2019). An online search for relevant literature in the English language that was peer-reviewed and grey literature was used. This was made possible using databases such as Google Scholar (GS) and the Agroscience Journal. Due to accessibility factors, the focus was on open-access publications. The review was for studies done between 2010 and 2021 on empirical evidence of the effects of contract farming on increased productivity in Nigeria.

Literature selection criteria

As shown in Table 1, a total of 21 works of literature were accessed from databases during the initial search, consisting of peer-reviewed and grey literature such as working papers and project reports. All the studies reviewed were conducted in Nigeria and involved crop production systems such as rice, maize, and cassava. In each study, we analyze the major information relating to the findings. For this study, we chose studies that refer to the effect of contract farming on farmers' productivity. We selected 21 studies carried out in Nigeria that fit our criteria for review; of the 21 studies, six were on the effect of contract farming on productivity.

Results and Discussion

Effects of contract farming models on agricultural productivity in Nigeria

The data presented in Table 2 reveal that all the studies agree that contract farming can increase the productivity of farmers in Nigeria. Based on the findings, we support the claim that the contract farming scheme has increased farmers' productivity in Nigeria through Improved access to inputs: Contract farming provided farmers with access to improved inputs such as high-quality seeds, fertilizers, and pesticides. This allows farmers to enhance their productivity by using modern agricultural techniques and technologies. *Market linkages and guaranteed markets:* Contract farming provided farmers with a reliable market for their produce, which was a constraint. Through contracts, farmers have a guaranteed buyer, eliminating the uncertainties associated with available markets where they can sell their products for a higher price. This availability of markets encourages farmers to invest in their farms, leading to increased productivity. *Technical assistance and extension training:* contracting farmers acquired new skills, knowledge, and techniques on improved

farming practices that can significantly boost their productivity due to the increased extension training as well as other program facilitators and technical assistance obtained by being beneficiaries.

Economies of scale: in contract farming, farmers are paid to produce large quantities, which enables farmers to benefit from economies of scale. This enables farmers to reduce their production costs, access bulk purchases of inputs, and adopt cost-effective production methods that boost their productivity.

Access to credit and finance: Contract farming improves farmers' access to credit and finance, which is one of the constraints farmers face. Through contracts, farms have access to agribusiness firms that often provide farmers with upfront payments or loans to cover input costs. This financial support enables farmers to invest in their farms, purchase necessary inputs, and improve productivity.

Knowledge transfer and innovation: Engaging with agribusiness firms through contract farming exposes farmers to new technologies, research findings, and innovative practices, which leads to increased productivity as farmers adopt more efficient and effective methods of farming.

Increased income: Contract farming arrangements can result in a higher income for farmers. Through assured markets, improved productivity, and value-added activities, farmers can earn better returns from their agricultural activities. This income increase provides an incentive for farmers to invest in their farms and further enhance productivity.

Constraints to contract farming models in Nigeria

According to several assessments of studies on contract farming, these arrangements do enable small farmers to produce higher yields. However, they also point out that a number of contract farmers experience market failure, particularly when cultivating new crops, production issues caused by crop failure, monopoly, ineffective management or marketing, low profit because farmers are indebted as a result of production issues, and excessive advances. Payment delays and lower contracting business costs are further problems. Prices are usually below market prices since businesses have the most control over them. This supports the findings of Akanbi *et al*. (2020), who claimed that farmers face issues with contracting firms' excessive pricing control as a result of the larger quantity of harvested goods that are collected by the firm and their dominance over price decisions, as well as with insurance coverage that is insufficient as a result of the contracting firms' requirement that farmers supply or pay for the required quantity even in the case of crop failure due to pests, diseases, or drought.

Conclusion

In light of the empirical research findings, it is evidenced that contract farming has significantly increased Nigerian farmers' productivity in crop production system. The enhanced productivity seen among participating contract farmers is a result of quality seed, availability of inputs, technical support, guaranteed market and risk-sharing arrangements provided by the contracting firm. To reduce or eliminate the identified challenges faced by farmers under contract arrangements, the study suggests the need for collaboration among government, non-governmental organizations and other relevant stakeholders to develop a policy environment that is favourable for contract farming models in Nigeria.

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Table 1: Literature selection criteria

Search checkpoints	Acceptance criteria	Rejection criteria
	Studies published in English	Studies published in other languages studies
Initial search	Effect of contract farming for increased productivity in the agricultural sector	Effect of contract Farming for increased productivity in the non-agricultural sector
	Studies focused on Nigeria	Other countries/regions
	Distinct/single studies	Non-distinct/duplicates
Title and abstract screening	Strictly focused on agricultural crop production systems	screening Non-agricultural crop systems crop production systems
	Focus on smallholder crop farmers	Large-scale crop farmers
The final step for review	systematic review studies	Non-systematic studies/discourse analysis

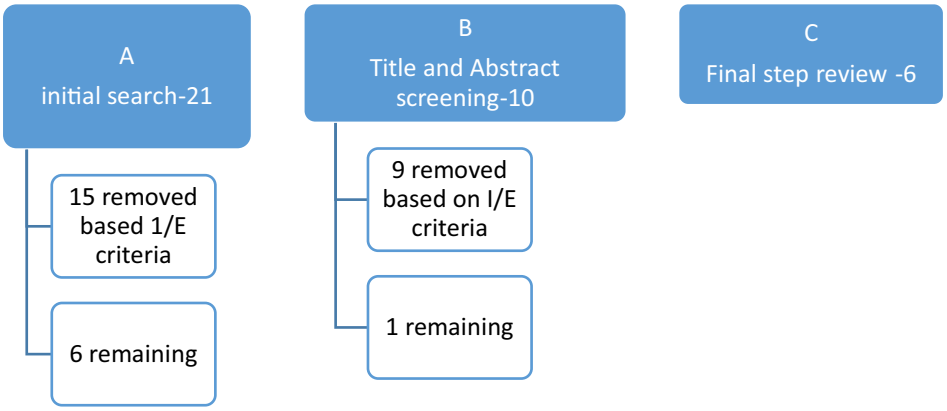

Figure 1: Flow chart of literature search and selection based on PRISMA framework

Table 2: Studies on effect of contract farming on productivity in Nigeria

Authors, products and Places	Findings
Nazifi, B., Bello, M., Suleiman, A., & Suleiman, M. S. (2021). Impact of Contract Farming on Productivity and Food Security Status of Smallholder Maize Farmer's Households in Kano and Kaduna States	contract farming had a positive and significant effect on maize yield of smallholder maize farmers which will result in result to yield increase by about 1.7tonne/ha
Akanbi, S. O., Alarape, W. I., & Olatunji, O. S. (2020). Economic implication of contract farming on small-scale rice farmers in Kwara State, Nigeria	Increase in productivity of rice contract farms was 2,006.04kg per ha against 1.9 metric tonnes
Igwe, O.B. (2014). Effect of contract farming on productivity and welfare of cassava-based farmers in South Eastern Nigeria.	The productivity of cassava farmers under contract farming was N1.8 against 1.2 for non-contract farmers
Fawole, P., & Thomas, K. A. (2011). Effects of contract farming scheme on cassava production enterprise in Oyo State, Nigeria.	92.2% of cassava beneficiaries had increased productivity than non-participating farmers
Kutawa, I. I. (2016). Empirical evidence on contract farming in northern Nigeria: Case study of tomato production.	Revealed that the contract farmers had significantly higher mean yield of 3.8 ton/ha and 3.7 ton/ha at 5% probability level suggesting that contract farming had a positive impact on the productivity of the farmers.
Olomola, A. S. (2010). Enhancing productivity, income and market access of rural producers in Africa: the case of contract farming in Nigeria.	The difference in rice yield between the contract and non-contract farmers is statistically significant. Rice yield for the contract farmers (2,651 kg) is significantly higher than that of the non-contract farmers (1,898 kg)