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Optimizing resource utilization and productivity in cassava farming: A case study of Ogun State, Nigeria

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ABSTRACT

This study aimed to improve resource utilization and productivity among cassava farmers in Ogun State, Nigeria. Using a multi-stage sampling technique, 90 cassava farmers were selected from diverse agricultural zones in Ogun State, chosen for its significant cassava production and varied agroecological conditions to ensure a representative sample. Data collection involved structured questionnaires to gather socio-economic characteristics, farming practices, input usage, challenges, and productivity outcomes related to cassava cultivation. Descriptive statistics analyzed farmers' profiles, including age, education, farm size, and resource access. Inferential statistics like linear regression and probit models examined relationships between these factors and cassava output. Results highlighted farm size, labor input, and access to planting materials as positively influencing cassava yield, whereas fertilizer use showed a negative impact, suggesting inefficiencies in its application. Key challenges identified include limited financial services, inadequate farming resources, and technical knowledge gaps, hindering optimal input utilization and productivity. Recommendations include initiatives to improve access to agricultural credit, expand extension services, and implement educational programs aimed at promoting modern farming techniques. By adopting these measures, policymakers and stakeholders can support the adoption of sustainable agricultural practices, thereby fostering increased cassava yields and overall agricultural development in the region.

Keywords: cassava productivity, resource utilization, Ogun State, Nigeria, stochastic frontier analysis, agricultural development, farming efficiency

INTRODUCTION

Background to the Study

According to Gebremicheal et al. (2015), cassava (manihot esculenta) is one of the most important crops in West Africa, providing an economical source of energy and reliability under adverse conditions. Cassava is a drought-tolerant tropical crop available year-round, ensuring food security, employment, and income for those involved in its value chain. Its significance as a primary source of dietary energy for many people in West and Central Africa makes it a popular crop, garnering substantial food policy attention regarding production, processing, and utilization improvements. Nigeria contributes about 60% of the world's cassava production (Ohimain, 2015; Ogunniyi et al., 2016, 2018a). While high efficiency in staple crop production is essential for increased productivity and improved food security, inefficiency sources are diverse. Cassava producers' ability to adopt new technologies and achieve sustainable production levels depends on their economic efficiency, as efficiency gains drive productivity growth. As the third most important staple crop globally after rice and maize, cassava originated in tropical Brazil and spread to Africa in the 1850s, becoming a staple for about 700 million people. It offers commercial potential but needs a competitive edge to thrive in the global market. Its ability to grow in poor soils, withstand drought, and be available year-round makes it attractive to smallholder farmers (Obayelu et al., 2015). However, approximately 90% of the cassava produced in Nigeria is consumed locally (Chidozie et al., 2019).

To enhance cassava productivity, it is crucial to analyze economic efficiency levels, returns to scale, determinants of inefficiencies, and production constraints in Oyo State, Nigeria. This study identifies factors contributing to inefficient production to inform policy interventions that improve productivity among farmers (Bisseleua et al., 2018a, 2018b; Chimai, 2011; Ogunniyi et al., 2018b). Moreover, enhancing agricultural productivity through research and the development of new technologies is a capital-intensive, long-term endeavor. Adoption rates among resource-poor farmers, particularly in developing countries, remain low.

Given the need for competitive cassava production and its importance in ensuring food security and welfare (Adeoye & Balogun, 2016), this study examines resource-use efficiency, profitability, and constraints in cassava production. It specifically focuses on estimating both technical and allocative efficiencies among farmers in Oyo State. Although efficiency studies have been conducted on other crops and cassava in different regions of Nigeria, this study provides valuable insights into the efficiency of cassava production by revealing the level of resource use efficiency and the factors influencing efficiency among cassava farmers.

The United Nations Food and Agriculture Organization emphasizes cassava's importance to the livelihoods of millions of poor people and targets it for interventions. Despite their critical role, small-scale farmers in Nigeria, who produce the bulk of the country's food, belong to the poorest segment and cannot invest significantly in their farms, leading to unimpressive agricultural sector performance (Ajibefun & Daramola, 2003). According to Guangxi Academy of Agricultural Sciences, preparing land for cassava cultivation can be both labor-intensive and time-consuming. The process involves clearing vegetation, rocks, and other obstructions from the land. In areas with hard or compacted soil, tilling to create suitable seedbeds can be particularly challenging. Obtaining high-quality planting material, such as disease-free stem cuttings, is crucial for successful cassava cultivation. However, accessing these materials can be difficult, and limited availability or poor quality can significantly impact crop health and yield. Cassava is also susceptible to various pests and diseases, which can cause substantial damage. Farmers need to implement effective pest management strategies to protect their crops, but timely identification and control can be difficult, especially for those with limited resources and information. Weeds present another challenge by competing with cassava plants for nutrients, water, and sunlight. Manual weeding is labor-intensive, and without effective weed control measures, weeds can quickly outcompete cassava, reducing yields. Water management is crucial as cassava requires ample water during its growth phase. In regions with irregular rainfall or limited irrigation infrastructure, providing adequate water can be problematic. Farmers need to adopt proper soil management practices, including incorporating organic matter and balanced fertilization. Limited access to fertilizers and knowledge about nutrient management can pose additional challenges. Finally, cassava roots are highly perishable after harvest and require appropriate handling and storage to prevent spoilage and financial loss. It provides food and income to vulnerable segments of society and is a classic food security crop due to its underground storage. Globally, cassava cultivation has seen consistent annual growth exceeding 3% (Food and Agriculture Organization [FAO], 2018). In 2003, the total area harvested was 31 million hectares, with an average yield of about 11 tons per hectare (IITA, 2005). By 2018, Nigeria's production had increased to about 60 million metric tons (FAO, 2018; FAOSTAT, 2019). Worldwide cassava production reached approximately 278 million metric tons, with Africa producing around 170 million metric tons, accounting for about 56% of the global output (FAOSTAT, 2019). Cassava is rapidly becoming one of the most widely grown staple food crops in countries where it is a dietary mainstay. It has gained increasing popularity among farmers, and the industrial demand for it is also steadily rising (FAO, 2018). This main study therefore assessed the determinants of cassava production among cassava farmers in Ogun State, Nigeria.

Objectives of the Study

The main objective of the study is to investigate the optimization of resource utilization and enhancement of productivity among cassava farmers in Ogun State, Nigeria, while the specific objectives are, as follows:

(a) examined the socio-economic characteristics of the cassava farmers in Ogun State,

(b) determined the cost and return of cassava farming in the study area,

(c) examined the factors influencing the output of cassava among cassava farmers in the study area, and

(d) ascertained the challenges facing the cassava farmers in the study area.

Expected Outcomes

The findings from this study provided valuable insights into the socio-economic profiles of cassava farmers in Ogun State and the economic viability of cassava farming in the region. The identification of factors influencing cassava productivity, and the challenges encountered by farmers will inform policy makers and stakeholders about targeted strategies to improve agricultural efficiency and sustainability.

By addressing these objectives, this research contributed to the broader goal of enhancing agricultural productivity in Nigeria, particularly within the cassava sector, thereby supporting food security initiatives and economic development efforts.

MATERIALS AND METHODS

Description of the Study Area

The research was conducted in Ogun State, Nigeria. This rapidly developing region is situated in the southwestern part of the country, positioned between latitudes 6.20N and 7.80N and longitudes 3.00E and 5.00E, just east of the Greenwich Meridian. Ogun State shares its western border with the Republic of Benin; its eastern border with Ondo State, Oyo State lies to the north, and Lagos State and the Atlantic Ocean lie to the south. This strategic location provides Ogun State access to Nigeria's economically advanced regions. Ogun State comprises 20 local government areas (LGAs). The primary occupation in these communities is arable farming. Agriculture forms the backbone of Ogun State's economy, producing staples such as rice, maize (corn), cassava (manioc), yams, plantains, and bananas.

Research Design

This research addressed the previously stated objectives and employed statistical analysis to describe the respondents' situation at the time the data was collected. The design accounted for the frequency with which specific themes recurred. This was achieved through a well-structured questionnaire focused on the key determinants of cassava production among cassava farmers.

Study Population

The study included respondents over the age of 20 who are farmers residing in Ogun State. Therefore, all participants are typical farmers who are willing to contribute to the research on the determinants of cassava production among cassava farmers.

Sources of Data

This research utilized both primary and secondary data. The primary data were collected through questionnaires administered to farmers in Ogun State, and secondary data were utilized, as it provided relevant existing information that supported the research objectives.

Sampling Procedure and Sample Size

A multi-stage sampling technique was employed for sample selection. Ogun State is divided into four agricultural development project zones, namely Abeokuta, Ilaro, Ijebu-Ode, and Ikenne. In the first stage, two LGAs were randomly drawn from each of the four agricultural zones in the state. In the second stage, two towns were randomly selected from the LGAs, making a total of 10 towns. In the third stage, 10 cassava farmers were randomly selected from each of the 10 towns, giving a total of 90 cassava farmers.

Instrument for Data Collection

This study utilized both primary and secondary data. Primary data was collected through a well-structured questionnaire and interview schedule to gather relevant information from the field regarding the socio-economic characteristics of the farmers and their production levels. Secondary data was sourced from textbooks, the internet, journals, articles, and past project reports.

Data Analysis

Descriptive statistics, including frequency distribution, percentage, mean, and standard deviation, were used to present the data. Inferential statistics, such as linear regression, were employed to estimate the relationship between the socio-economic characteristics of the farmers and their output. Additionally, a probit model was used to investigate the socio-economic characteristics of households that influenced the probability of participating in contract farming, expressed, as follows:

$$Prob(D=1)=prob\ (U^*(\pi)>0)=g(Z_k\beta_k)+\mu_i\ \&\ \mu_i : N(0,\ 1) \quad (1)$$

$$Y_i=\beta_0+\beta_1X_1+\beta_2X_2+\ldots+\beta_{11}X_{11}\ldots e_i, \quad (2)$$

where Y_i is output of cassava, X_1 is cost of durable inputs, X_2 is cost of non-durable input, X_3 is cost of labor, X_4 is rent of land, X_5 is household size (number), X_6 is farm size (ha), and X_7 is farming experience (years).

Table 1. Distribution of the respondents by gender

Gender	Frequency	Percentage (%)
Male	62	68.8
Female	28	31.2
Total	**90**	**100**

Table 2. Distribution of the respondents by age

Age (years)	Frequency	Percentage (%)
16-25	10	11.1
26-35	10	11.1
36-45	6	6.6
46-55	50	55.5
≥56	14	15.5
Total	**90**	**100**

Table 3. Distribution of the respondents by marital status

Marital status	Frequency	Percentage (%)
Divorced	13	14.4
Married	67	74.4
Single	10	11.1
Total	**90**	**100**

Table 4. Distribution of the respondents by job specification

Job specification	Frequency	Percentage (%)
Civil servant	20	22.2
Business owners	56	62.3
Apprenticeship	14	15.5
Total	**90**	**100**

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Cassava Farmers in the Study Area

Gender

Out of the 90 participants, 68.8% were male, while 31.2% were female. This indicates that both genders were represented in the study, with a higher number of male participants than female participants (**Table 1**).

Age

Table 2 showed the distribution of respondents by age. Out of the total respondents, 11.1% are between 16-25 years and 26-35 years, while 6.6% are between 36-45 years. The majority, 55.5%, are between 46-55 years, and 15.5% are 56 years and older. This indicates that the largest group of respondents falls within the 46-55 year age range.

Marital status

Out of the total respondents, 11.1% are single, 74.4% are married, and 14.4% are divorced. This indicates that the study includes individuals who are single, married, and divorced, with married respondents comprising the largest group (**Table 3**).

Job specification

Table 4 illustrated the responses of respondents regarding their job specifications. Out of the total respondents, 22.2% are civil servants, 62.3% are business owners, and 15.5% are apprentices. This suggests that the majority of respondents are

Table 5. Distribution of the respondents by educational background

Educational background	Frequency	Percentage (%)
No formal education	10	11.1
Primary education	12	13.4
Senior secondary school	22	24.4
Tertiary education	46	51.1
Total	**90**	**100**

Table 6. Distribution of the respondents by years spent in formal education

Years spent in formal education	Frequency	Percentage (%)
Below 5	12	13.3
5-10	6	6.6
10-15	36	40.0
>20	36	40.0
Total	**90**	**100**

Table 7. Distribution of the respondents on major occupation

Major occupation	Frequency	Percentage (%)
Farming	70	77.7
Non-farming	20	22.3
Total	**90**	**100**

self-employed as business owners, outnumbering both civil servants and apprentices.

Educational background

Table 5 displayed the distribution of responses regarding the educational background. Out of the total respondents, 11.1% have no formal education, 13.4% have primary school certificates, 24.4% have senior secondary school certificates, and 51.1% have tertiary education certificates. This distribution revealed that respondents with tertiary education certificates constitute the largest group in the study.

Years spent in formal education

Table 6 presented the distribution of responses regarding number of years spent in formal education by the respondents. Out of the total respondents, 13.3% spent less than 5 years, 6.6% spent between 5 and 10 years, while 40% spent between 10 and 15 years, and 20 years or more in formal education. This distribution indicates that the highest percentages are attributed to respondents who spent 10-15 years and 20 years or more in formal education, while those who spent between 5 and 10 years have the lowest percentage.

Major occupation

Table 7 illustrated respondents' distribution based on their primary occupation, with farmers comprising 77.7% of the total respondents, while non-farmers account for 22.2%. The data indicates that farmers outnumber non-farmers in this study.

Access to credit

Table 8 presented the distribution of respondents based on their access to credit, with 20% of the total respondents reporting access, while 80% indicated they did not have access to credit. The data indicated that those without access to credit outnumber those with access.

Table 8. Distribution of the respondents on access to credit

Access to credit	Frequency	Percentage (%)
Yes	18	20.0
No	72	80.0
Total	**90**	**100**

Table 9. Distribution of the respondents on extension service

Extension service	Frequency	Percentage (%)
Yes	30	33.3
No	60	66.7
Total	**90**	**100**

Table 10. Distribution of the respondents on household size

Household size	Frequency	Percentage (%)
2	6	6.7
3	5	5.6
4	10	11.1
5	11	12.2
6	8	8.9
7	20	22.2
8	30	33.3
TOTAL	**90**	**100.0**

Table 11. Distribution of the respondents on belonging to any association

Belonging to any association	Frequency	Percentage (%)
Yes	30	33.3
No	60	66.7
Total	**90**	**100**

Extension service

Table 9 illustrated the distribution of respondents regarding their access to extension services, with 33.3% of the total respondents reporting access, while 66.7% indicated they did not have access to extension services. The data indicates that those without access to extension services outnumber those with access.

Household size

Table 10 showed the distribution of respondents based on household size. The largest group, comprising 30 respondents 33.3%, reported a household size of 8, while the smallest group, consisting of 5 respondents 5.6%, reported a household size of 3.

Distribution of respondents on belonging to any association

Table 11 presented the distribution of respondents based on their membership in any association. The majority, 60 respondents (66.7%), reported not belonging to any association, while the minority, 30 respondents (33.3%), indicated that they are members of an association.

Cost and Return of Cassava Farming in the Study Area

Table 12 detailed the costs and returns of cassava farming in the study area. Labor costs amount to N180,000, representing 68.03% of the total cost, while fertilizer costs N17.000 per 50 kg, accounting for 6.42% of the total cost. Additionally, the cost for cassava cuttings is N25.000 for hiring 10 workers. Herbicide costs are N7.600, making up 2.87% of the

Table 12. Cost and return of cassava farming in the study area

	Quantity	Price per unit	Total cost
A. Variable costs (per production)			
Labor	10	18.000,00	180.000,00
Fertilizer	50 kg	17.000,00	17.000,00
Cassava cuttings	10	2.500	25.000,00
Herbicides	5,00l	3.800	7.600,00
Transportation	#35.000,00	35.000,00	35.000,00
Total variable cost			**264.600,00**
B. Fixed cost (per production)			
Depreciation of farm tools	9.000,00		
Depreciation on land	30.000,00		
Total fixed cost	**39.000,00**		**39.000,00**
C. Total cost revenue			**303.600,00**
Total revenue (N)	**450.000,00**		
Net farm income (N)	**146.400,00**		
Gross margin (MG)	**290.600,00**		
Benefit cost ratio (BCR)	**2.11**		

Table 13. Factors influencing cassava output among cassava farmers in the study area

S/N	Labor used	Percentage (%)	Total
1	Planting	97.98	97.98
2	Weeding	96.86	96.86
3	Fertilizing	97.98	97.98
4	Harvesting	89.99	89.99

total cost, and transportation costs are N35.000, which constitutes 13.23% of the total cassava production cost. These expenses are crucial for the success of smallholder farmers. The average farmer earns a net revenue of about N146.400.00 with a benefit-cost ratio of N2.11 per farming season, indicating that producing cassava is profitable.

Factors Influencing the Output of Cassava Among Cassava Farmers in the Study Area

Table 13 illustrated the percentage adjustments needed for optimizing factors influencing the output of cassava farmers in the study area. For optimal input utilization, the marginal value product should equal the input unit price. The adjustments required are 97.98% for planting materials, 96.86% for weeding, 97.98% for fertilizer, and 89.99% for harvesting. These results indicate a significant need to optimize resource use to achieve better profitability by the end of the planting season.

Challenges Facing Cassava Farmers in the Study Area

Table 14 revealed that the majority of respondents, 93.2%, cited poor access to financial services as the primary obstacle to smooth operations and production. Additionally, 90.0% indicated that the non-availability of resources was a major issue. A significant portion, 86.6%, pointed to a lack of technical know-how for operating machinery and handling farm equipment as their main problem. Furthermore, 78.0% and 76.6% identified inadequate extension services and pest and disease issues, respectively, as major production constraints. Moreover, 69.9% of the farmers agreed that poor storage facilities pose a significant problem for cassava production. Meanwhile, 84.3% noted that the lack of a market to sell cassava products is a critical issue. In addition, 75.5% believed that poor market prices and a lack of financial support are significant challenges. Lastly, 78.8% of the farmers indicated that high labor costs were a major production problem.

Linear Regression Showing Relationship Between the Socio-Economic Characteristics of the Farmers and Their Efficiency in the Use of Resources

The estimated coefficients of the independent variables were used to calculate the marginal value products and their corresponding marginal factor costs. MVP to MFC ratio was employed in the resource utilization analysis presented in **Table 15**. The results reveal that several of the ratios for all variables exceed 1, suggesting that increasing each input would enhance efficiency, thus indicating that all inputs were utilized effectively. The reliance on labor-intensive technology, rather than labor-saving equipment like tractors, required labor efficiency. This efficiency could be attributed to the high cost and difficulty in obtaining farm inputs, prompting cassava producers to increase output by optimizing input levels.

Linear Regression Analysis of the Relationship Between Socio-Economic Characteristics of Cassava Farmers and Their Productivity

The regression results showed that the explanatory variables accounted for 66% of the variation in production among the sample farmers, with error terms and omitted variables potentially contributing to the remaining 24% (**Table 16**). The joint explanation of the dependent variable by the explanatory variables is supported by an F-ratio of 26.189, which is significant at the 1% level. The findings indicated a positive correlation between farm size and output at the 1% level, suggesting that a larger farm size leads to greater involvement in cassava production. The use of fertilizer by farmers was found to be negative and statistically significant at 1%, indicating a negative correlation between fertilizer use and cassava production. This implies that increasing fertilizer use results in lower outputs, although fertilizers still contribute to overall cassava output. Excessive fertilizer use can cause soil acidity and the binding of essential micro and macro nutrients, detrimental to optimal crop growth, which aligns with prior expectations. The total cost of production

Table 14. Challenges facing cassava farmers in the study area

S/N	Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	Rank
1	Technical know-how	45 (50.0)	33 (36.6)	6 (6.6)	6 (6.6)	-	3.92	3rd
2	Non-availability of resources	45 (50.0)	36 (40.0)	2 (2.2)	7 (7.7)	-	3.95	2nd
3	No financial support	40 (44.4)	28 (31.1)	5 (5.5)	10 (11.1)	7 (7.7)	3.73	9th
4	Non-availability of market	35 (38.8)	41 (45.5)	6 (6.6)	15 (16.6)	5 (5.5)	3.76	6th
5	Poor storage accessibility	51 (56.6)	12 (13.3)	7 (7.7)	14 (15.5)	6 (6.6)	3.75	7th
6	High cost of labor	35 (38.8)	36 (40.0)	3 (3.3)	14 (15.5)	2 (2.2)	3.38	10th
7	Poor market prices	40 (44.4)	28 (31.1)	5 (5.5)	8 (8.8)	9 (10.0)	3.74	8th
8	Inadequate extension services	36 (40.0)	33 (36.6)	6 (6.6)	6 (6.6)	9 (10.0)	3.82	5th
9	Pest and diseases	40 (44.4)	33 (36.6)	2 (2.2)	7 (7.7)	8 (8.8)	3.87	4th
10	Poor access to financial services	51 (56.6)	33 (36.6)	-	2 (2.2)	4 (4.4)	4.12	1st

Note. Grand mean = 3.80

Table 15. Linear regression result showing relationship between the socio-economic characteristics of the farmers and their efficiency in the use of resources

Variable	Coefficient	MPP	MVP	MFC	MFC/MVP	Efficiency
Farm size	8.2679	721.5840	7.215.840	9,585.52	1.32839	Efficient
Fertilizer	-9.0140	0.0644	0.644	3,832.56	5,951.18000	Efficient
Labor	2.1385	8.3557	83.557	5,221.51	62.49039	Efficient
Herbicides	1.5193	192.6451	1,926.451	3,134.46	1.62706	Efficient
Planting	1.3212	0.0254	0.254	938.60	3,695.27500	Efficient

Table 16. Result of linear regression on relationship between the socio-economic characteristics of cassava farmers and their productivity

Variables	Coefficient	Standard error	T-statistics	p-value	R^2	Adjusted R squared	F-ratio
Farm size	8.2679	1.5121	3.82	0.0000	0.599	0.562	26.189
Fertilizer	-9.0140	2.4614	-4.98	0.0000			
Labor	2.1385	1.4115	2.58	0.0003			
Herbicides	1.5193	1.3614	-1.49	0.2120			
Planting	1.3212	1.0125	2.14	0.0340			
Constant	0.8455	0.3411	3.52	0.0000			

Note. Significant at 1% and 5%, respectively

increases with additional expenses. While fertilizers are necessary to enhance soil fertility, overuse can harm the soil. Labor was significant at the 5% alpha level, demonstrating that an increase in labor productivity leads to higher output. This is because more labor in cassava production results in greater output, reducing total production costs and increasing farmers' returns. Planting material showed a positive correlation with output and was significant at 5%, implying that increasing cassava stem usage yields higher output. Statistical significance indicates that the use of cassava stems is related to farmer outputs. Consequently, the stated hypothesis was accepted. This finding is consistent with Yakasai's (2010) results on cassava production in Abuja, Nigeria.

Limitations of the Study

1. **Sampling bias:** The study utilized a multi-stage sampling technique, which could introduce bias if certain segments of cassava farmers were underrepresented or overrepresented.
2. **Data collection method:** Reliance on questionnaires for primary data may have introduced response bias or inaccuracies due to self-reporting by farmers. Additionally, recall bias could affect the accuracy of reported data on costs and yields.
3. **Generalizability:** Findings may not be universally applicable beyond Ogun State due to regional variations in agricultural practices, socio-economic conditions, and infrastructure.
4. **Time constraints:** The study may not capture seasonal variations in cassava farming practices and yields, potentially limiting the generalizability of the findings across different times of the year.
5. **Dependency on secondary data:** While secondary data enriches the study, its quality and relevance could vary, potentially influencing the robustness of conclusions drawn from the integrated data sources.

Factors affecting experimental results

1. **Economic factors:** Variations in input costs (e.g., labor, fertilizers) and market prices of cassava could significantly impact the profitability and economic efficiency of farmers.
2. **Technological adoption:** The level of adoption of modern agricultural technologies and practices among farmers, such as improved varieties or mechanization, could affect productivity and efficiency.
3. **Policy environment:** Changes in government policies related to agriculture, including subsidies, infrastructure development, and market regulations,

could influence farmers' decisions and outcomes in cassava production.

4. **Climate and environmental factors:** Given cassava's sensitivity to climate variability, factors such as rainfall patterns, temperature changes, and pest outbreaks could affect production levels and efficiency.

Directions for future research

1. **Longitudinal studies:** Conducting longitudinal studies to track changes in cassava farming practices and productivity over time could provide deeper insights into the sustainability and resilience of farming systems.
2. **Comparative analysis:** Comparing cassava farming practices and outcomes across different states or regions within Nigeria could help identify regional best practices and factors influencing productivity.
3. **Impact of climate change:** Investigating the specific impacts of climate change on cassava production and exploring adaptive strategies could guide policy interventions and farmer resilience.
4. **Value chain analysis:** Exploring the entire cassava value chain, from production to processing and marketing, would provide a holistic view of economic opportunities and challenges for farmers.
5. **Policy evaluation:** Assessing the effectiveness of existing agricultural policies and interventions aimed at improving cassava productivity and farmer livelihoods could inform future policy directions.

By addressing these limitations and exploring these factors in future research, the study can contribute more comprehensively to understanding cassava farming dynamics in Nigeria and enhancing agricultural productivity in the region.

CONCLUSIONS

This study investigated optimizing resource utilization and enhancing productivity among cassava farmers in Ogun State, Nigeria. The study revealed that farmers in Ogun State generally exhibit high levels of resource use efficiency, particularly in labor, fertilizer, herbicide, and planting materials. This efficiency contributed to overall productivity and profitability in cassava farming. The socio-economic characteristics of farmers, such as farm size, education level, access to credit, and extension services, significantly influence cassava production outcomes. Larger farm sizes positively correlate with increased cassava production, while access to credit and extension services enhances productivity through improved input availability and technical knowledge. Farmers face numerous challenges, including poor access to financial services, inadequate market access, high labor costs, and technical know-how limitations. Despite challenges, cassava farming remains economically viable in Ogun State, as evidenced by a benefit-cost ratio of 2.11 per farming season. The average farmer generates a net income and benefits from a positive benefit-cost ratio, indicating profitability and encouraging further investment in the sector.

Practical Implications

1. **Financial interventions:** Improving farmers' access to financial services through microcredit schemes or cooperative societies could enable them to invest in essential inputs and technologies.
2. **Capacity building:** Training programs focused on technical skills and modern farming techniques can enhance farmers' productivity and efficiency.
3. **Strengthening extension services:** Enhancing extension services can provide farmers with the necessary support and information to adopt best practices and innovations.
4. **Pest and disease management:** Implementing integrated pest management strategies can help mitigate the adverse effects of pests and diseases.
5. **Market linkages:** Developing better market linkages and infrastructure can help farmers access profitable markets and reduce post-harvest losses.
6. **Improved storage solutions:** Investing in modern storage facilities can minimize post-harvest losses and ensure better quality produce.

By addressing these constraints, cassava production in Ogun State can be significantly improved, leading to increased income for farmers and enhanced food security for the region.

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