

# Profitability and Economic Prospects of Tomato (*Lycopersicon esculentum*) Farming in Orumba North Local Government Area, Anambra State

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## ABSTRACT

## Original research paper

This study investigated the economic aspects of tomato production in Orumba North Local Government Area, Anambra State, focusing on socioeconomic characteristics, costs and returns of production. A structured questionnaire was used to collect data from a random sample of 100 tomato producers. The study employed various analytical techniques, including descriptive statistics, and budgetary analysis. The survey revealed that the majority were female (63%), with an average age of 38 years. Most farmers were married (57%) and had secondary (35%) or tertiary education (33%). Farming experience averaged 22 years, and the typical farm size was 0.9 hectares. The economic analysis showed that the total cost of production was ₦110,577.00, with variable costs accounting for ₦75,543.00 and fixed costs totaling ₦35,034.00. The total revenue generated was ₦152,000.00, resulting in a gross margin of ₦41,500.00 and a net profit of ₦41,423.00. The study recommended that the extension workers should be strengthened to provide farmers with improved tomato varieties, pest management techniques, and modern agronomic practices. And also the cooperative societies should develop storage and processing facilities to reduce post-harvest losses and enhance profitability through value addition.

**Keywords:** Profitability, Economic, Prospects, Tomato, Farming.

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## 1. Introduction

Agriculture remains a cornerstone of economic growth in many nations, including Nigeria, where it serves as a key source of livelihood for a large share of the population (Afolabi, 2019). It contributes significantly to food security, job creation, and income generation. Nigeria's agricultural sector is diverse, encompassing various crops and livestock that are vital for both domestic use and export (Agbam, 2021). Among the major crops is tomato (*Lycopersicon esculentum*), which is widely cultivated and consumed nationwide (Adebisi, Fapojuwo, & Adeola, 2021). Tomato is one of the leading vegetables produced in Nigeria and plays a vital role in household diets due to its

versatility. The country ranks among the largest producers of tomatoes in Sub-Saharan Africa and holds the 16th position globally. Nigeria produces approximately 1.8 million metric tonnes annually, accounting for about 68.4% of West Africa's total tomato production (Adeoye, Makinde, & Oke, 2017). Tomatoes contribute roughly 18% of the daily vegetable intake in households, largely because of their nutritional value, which includes vitamins A and C, essential minerals, dietary fiber, and antioxidants such as lycopene and beta-carotene (Aminu, Umar, & Abdulaziz, 2016).

The crop is adaptable to different farming systems, with a life cycle of three to four months, and commonly grown in

backyard gardens across Sub-Saharan Africa. In Nigeria, production is concentrated in the northern regions, where smallholder farmers cultivating less than five hectares dominate (Akinyemi, Lawal, & Adedayo, 2020). Large-scale production usually relies on irrigation during the dry season, when weather conditions are favorable. Conversely, during the rainy season, pest and disease outbreaks—exacerbated by humid and warm conditions—pose serious challenges (Aminu, Umar, & Abdulaziz, 2016).

Despite the scale of production, Nigerian tomato farmers face multiple constraints, including low soil fertility, inadequate access to improved seeds and technologies, insufficient pest and weed management, high post-harvest losses, and poor processing and marketing infrastructure (Babalola, Makinde, & Oke, 2016). Yields remain relatively low, averaging 20–40 tons per hectare annually, while about 40–50% of output is lost due to poor post-harvest handling, preservation, and processing practices (FAO, 2016). The broad objective of this study was to analyze the economics of tomato production among small holder farmers in Orumba North Local Government of Anambra State, Nigeria. The specific objectives of the study were to: describe the socio-economic characteristics of tomato farmers; estimate cost and returns of tomato production; and determine the factors affecting tomato production in the study area.

## 2. Literature Review

### Concept of Tomato Production

Tomatoes have their origins in the Andes region, specifically in present-day Peru, Bolivia, Chile, and Ecuador, where they grew in the wild. The Aztecs and Incas were among the first to cultivate them around 700 AD. Tomatoes made their way to West Africa via Portuguese traders or were transported across the continent from Egypt and Sudan. However, they did not reach Europe until the 16th century. In Nigeria, tomatoes are a significant agricultural crop due to their extensive use and economic value (Ibrahim, & Musa, 2017).

Tomatoes (*Lycopersicon esculentum*) are an important crop in Nigeria because of their economic importance and nutritional benefits. The plant is abundant in vitamins A, C, E, and K, as well as minerals, dietary fiber, and bioactive compounds such as lycopene, which are vital for human health. Their cultivation is widespread across Nigeria, occurring in both small-scale and large-scale farming systems, with demand increasing due to their inclusion in various local dishes and their growing role in the food processing industry (Ibrahim, & Musa, 2017).

Tomato production typically begins with land preparation and farmers prepare their fields either manually or mechanically to create suitable growing conditions for the plants. The next step involves selecting seeds, and due to the preference for high-yielding and disease-resistant varieties, many Nigerian farmers choose improved seed types, which significantly enhance productivity (Adeoye,

Makinde, & Oke, 2017). Planting occurs when conditions are optimal, with seedlings being transplanted into the prepared fields. Both organic and inorganic fertilizers are applied to improve soil fertility and support healthy plant growth. Watering is crucial for tomato production, especially during dry seasons, and many farmers depend on irrigation to provide a sufficient water supply throughout the growing season. Weed control, pest management, and disease prevention are ongoing tasks that require constant monitoring and intervention to ensure optimal yields. Integrated Pest Management (IPM) strategies are often recommended to reduce pest and disease damage while promoting environmental sustainability (Kale, & Derek, 2020).

Harvesting tomatoes in Nigeria is generally done manually. Tomatoes are picked when they reach their mature green or red stage, depending on market demands. Due to their highly perishable nature, post-harvest handling and storage are critical steps in the production process. Farmers and traders often face significant challenges in maintaining the quality of tomatoes because of inadequate storage facilities, leading to substantial post-harvest losses. Improving transportation and storage infrastructure is vital for reducing losses and enhancing the profitability of tomato farming in Nigeria (Adebisi, Fapojuwo, and Adeola, 2021).

Tomato production is essential for generating income for farmers in Nigeria, and addressing production challenges, such as pests, diseases, and post-harvest losses, can greatly increase the profitability of this enterprise. The adoption of improved farming techniques, such as greenhouse farming, irrigation, and the use of certified seeds, has shown promise in boosting yields and ensuring a year-round supply of tomatoes (Akinyemi, Lawal, and Adedayo, 2020).

### Production Theory

Production involves the transformation of inputs into outputs. Production theory explores the relationship between the inputs utilized in the production process and the resulting output. The theory of the firm emphasizes the efficient maximization of resources used in production functions. The production function underpins the theory of the firm. In their research (Kumbhakar & Lien, 2020) investigate farm-level efficiency and productivity through production functions, highlighting how technological advancements and optimization of inputs lead to maximized output. The production function for a farming family can be represented as:

$$Y = f(X) \dots\dots\dots \text{(Equation 2.1)}$$

In this equation, Y represents the total output of tomatoes, while X includes the variables involved in the production process, such as land and capital.

## Production Function

The production function illustrates the input-output relationship, detailing how resources are converted into products. There are various input-output relationships in agriculture, as the rates at which inputs are transformed into outputs can differ based on factors like soil types, livestock, technologies, and rainfall. The production function is a technical and mathematical relationship that describes how a specific product depends on the quantities of inputs or services employed at a particular technological level and within a specific timeframe. It indicates the amount of output that can be generated using varying levels of inputs.

A production function can be expressed in several formats: in written form, detailing the inputs relevant to the output; by listing inputs and their corresponding outputs in a table; as a graph or diagram; or as an algebraic equation. According to Jhingan (2017), production theory aids in understanding the optimal combination of resources to achieve maximum output. In the context of tomato production in Orumba North Local Government Area, this theory will be utilized to analyze how land, labor, capital, and management practices affect the yield and profitability of tomato farms. By comprehending production functions, the study can identify levels of efficiency and recommend improvements for enhanced productivity.

## 3. Methodology

### Research Design

This study used survey design to obtain data from the respondents as adopted by Okonkwo-Emegha, (2025).

### Study Area

Anambra State is one of Nigeria's 36 states, situated in the southeastern part of the country and home to over 11 million people. It was established in 1976, having been carved out from the former East Central State, and derives its name from the Anam clan. The state capital, Awka, is a rapidly developing city that saw its population grow from around 300,000 to 2.5 million between 2006 and 2018. Onitsha, a historic port city from pre-colonial times, remains a vital center of commerce within the state. Anambra is abundant in natural resources, including natural gas, crude oil, bauxite, and ceramics, and has nearly 100 percent arable land. The state also supports various agro-based activities, such as fisheries and farming, along with land used for grazing and animal husbandry. Notably, it has the lowest poverty rate in Nigeria.

The research study focuses on Orumba North Local Government Area in Anambra State, a region recognized for its vibrant agricultural activities. It is bordered by Orumba South LGA to the south, Aguata LGA to the west, Awka South LGA to the northwest, and Aniocha LGA to the north.

Orumba North spans approximately 957 square kilometers and is located between latitude 5.8167° N and longitude 7.3167° E, placing it within the tropical rainforest zone. This geographical positioning provides a climate conducive to year-round farming. The local government area consists of sixteen towns and villages, including Ajalli, which serves as the administrative center, as well as Oko, Ufuma, Amaetiti, Ndiokpalaeze, Ndiokolo, Ndiokpaleze, Ndiowu, Ndiukwuenu, Omogho, and Okpeze.

Agriculture is the primary source of income for residents of Orumba North, with tomato farming being a significant part of their agricultural practices. Other commonly grown crops in the area include cassava, maize, and yams. Livestock farming is also prevalent, contributing to the region's diverse agricultural economy.

Orumba North is home to several markets that are essential to the local economy, including the Eke-Okoko market, Orie-Ajalli main market, Afor-Ufuma market, Afor-Ndiok market, and Afor-Nanka market. These markets serve as major hubs for trading agricultural products, with tomatoes being central to the livelihoods of many local farmers.

The climate in Orumba North is characterized as tropical rainforest, with distinct wet and dry seasons. The wet season, which lasts from April to October, features significant rainfall averaging between 1500 and 2000 mm per year, resulting in humid weather with moderate temperatures. The dry season, from November to March, experiences lower humidity and reduced rainfall. The wet season is advantageous for crop cultivation, while the dry season provides time for harvesting and post-harvest activities.

### Population of the Study

The population of the study comprised of registered tomato farmers (1130) in Orumba North Local Government Area, Anambra State, Nigeria.

### Sampling Technique and Sampling Size

Two multi-stage sampling technique was used for this study.

In the first stage, Orumba North Local Government Area was purposively selected because of the dominance of tomato farmers. In the second stage, five communities were randomly selected. They include, Oko, Ufuma, Nanka, Amaetiti and Ndiok.

In the third stage, 20 tomato farmers from each of the communities were randomly selected, this resulted in a total sample size of 100 tomato farmers selected for the study.

### Specification of Model

The regression model was used to analyze the factors influencing tomato production.

Age shown as (AGE), Sex (SE), Marital status (MAS), Household size (HOS), Farming

Experience (FE), Labor cost (LAC), Seed cost (SEC), Education (EDU), Fertilizer cost (FEC).

$Y = f(\text{AGE, SE, MAS, HOS, FE, LAC, SEC, EDU, FEC} + e)$

**Where:**

**AGE** = Tomato producers age in years.

**SE** = Tomato producers sex.

**MAS** = Tomato producers marital status.

**HOS** = Household size (number of persons in the household)

**FEC** = fertilizer cost

**LAC** = labor cost

**SEC** = seed cost

**EDU** = producers education (years of schooling obtained)

**FE** = farming experience in years

**e** = stochastic error term.

## Determinants of tomato production

The multiple regression model were implicitly specified as:

$Y = f(X_1, X_2, \dots, X_n + e)$

The model explicitly specified as follows

(1) Linear form

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_{10}X_{10} + e$

(2) Semi – log form

$Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + \dots + b_{10}\log X_{10} + e$

(3) Double log form

$\log Y = b_0 + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + \dots + b_{10}\log X_{10} + e$

(4) Exponential form

$\log Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_{10}X_{10} + e$

Y is the dependent variable with  $X_1, X_2, X_3 + \dots, X_{10}$  as the independent or

Explanatory variables

## 4. Results and Discussions

### Socioeconomic characteristics

The socioeconomic characteristics of tomato farmers in Orumba North Local Government Area, Anambra State, provide valuable insights into the demographics and economic conditions affecting agricultural practices in the region. As shown in Table 1, a majority of the respondents are female (63%), with males comprising 37% of the sample. This gender distribution suggests that women play

a significant role in tomato farming within the area, which aligns with findings of Olukosi, Ogungbile, & Makinde, (2019) that highlight the increasing involvement of women in agriculture in many parts of Nigeria. The age distribution indicates that the majority of farmers are between 31 and 40 years old, with a mean age of 38 years. This suggests that tomato farming in the area is predominantly managed by middle-aged individuals, who may possess the physical strength and experience needed for farming activities. The data also reveals that most farmers are married (57%), which could imply a stable family support system that may contribute positively to their farming activities.

In terms of educational attainment, a significant portion of the farmers have received formal education, with 35% having secondary education and 33% having tertiary education. This relatively high level of education among the farmers could influence their ability to adopt improved farming techniques and access information related to modern agricultural practices. The average farming experience among the respondents is 22 years, indicating that most of the farmers have substantial experience in tomato cultivation. This is in line with the report of Ojo, & Afolabi, (2020) which stated that the level of experience is likely to enhance productivity, as experienced farmers tend to have better knowledge of effective farming practices and pest management strategies. Furthermore, the mean household size is eight persons, suggesting that labor availability within the family may not be a significant constraint, as larger households often provide additional labor for farming activities.

The economic aspects of the respondents' farming activities are also noteworthy. With a mean farm size of 0.9 hectares, it is evident that most farmers operate on a small scale, which is common in many parts of Nigeria due to land fragmentation. The majority of the farmers (72%) rely on farming as their major occupation, with a mean monthly income of ₦124,653.73, which reflects the modest earnings from small-scale tomato production. Access to credit is reported by 60% of the respondents, indicating that a considerable number of farmers have some level of financial support, which is crucial for purchasing inputs and expanding farm operations Usman, Musa, & Umar, (2019). Additionally, 68% of the farmers own their farmland, which provides them with a level of security and incentive to invest in their farms. Overall, these socioeconomic characteristics highlight the challenges and opportunities faced by tomato farmers in the region and underscore the importance of targeted interventions to improve their productivity and income levels.



## Socioeconomic characteristics of Tomato Producers

Variable	Frequency	Percent	Mean
<b>Sex</b>			
Male	37	37.0	
Female	63	63.0	
<b>Age (years)</b>			
Less than 21	14	14.0	
21 – 30	24	24.0	
31 – 40	32	32.0	38 years
41 – 50	18	18.0	
51 – 60	8	8.0	
61 and above	4	4.0	
<b>Marital status</b>			
Single	29	29.0	
Married	57	57.0	
Divorced	8	8.0	
Widowed	6	6.0	
<b>Educational level</b>			
No formal	9	9.0	
Primary	23	23.0	
Secondary	35	35.0	
Tertiary	33	33.0	
<b>Farming experience (years)</b>			
0 – 10	28	28.0	
11 – 20	31	31.0	
21 – 30	25	25.0	22 years
Above 30	16	16.0	
<b>Household size (persons)</b>			
1 – 5	40	40.0	
6 – 10	38	38.0	8 persons
11 – 15	14	14.0	
Above 15	8	8.0	
<b>Membership of association</b>			
Yes	53	53.0	
No	47	47.0	
<b>Farm size (hectare)</b>			
0.1 – 0.5	20	20.0	
0.6 – 1.0	28	28.0	0.9 hectares
1.1 – 1.5	25	25.0	
1.6 – 2.0	27	27.0	
<b>Major occupation</b>			
Farming	72	72.0	
Trading	15	15.0	
Civil servant	13	13.0	
<b>Monthly income (₦)</b>			
Less than 100,000	35	35.0	
100,000 – 200,000	29	29.0	₦124,653.73
200,001 – 300,000	27	27.0	
Above 300,000	9	9.0	
<b>Access to credit</b>			
Yes	60	60.0	
No	40	40.0	
<b>Ownership of farmland</b>			
Yes	68	68.0	
No	32	32.0	

FIELD SURVEY: 2024

## Costs and returns

The cost and return analysis of tomato production in Orumba North Local Government Area, as presented in Table 2, provides a comprehensive understanding of the financial aspects of tomato farming among the respondents. The analysis reveals that the total cost incurred in the production process is ₦110,577.00, with variable costs accounting for ₦75,543.00 and fixed costs totaling ₦35,034.00. The breakdown of variable costs indicates that land preparation, fertilizer, and planting are among the highest expenses, with fertilizer costing ₦20,021.00, which is in line with the high cost of inputs often reported by small-scale farmers in Nigeria. These costs are significant because they directly impact the profitability of tomato farming, particularly when input prices are high and farmers have limited access to affordable alternatives.

The total revenue generated from tomato production is ₦152,000.00, yielding a gross margin of ₦41,500.00. This figure represents the difference between total revenue and total variable costs, providing a clear indication of the profitability before considering fixed costs. The gross margin suggests that tomato farming can be a viable

economic activity in the region, provided that farmers manage their variable costs efficiently. However, when the fixed costs are considered, the net profit is slightly lower at ₦41,423.00. This net profit reflects the overall profitability after accounting for both variable and fixed costs, which is critical for assessing the sustainability of tomato farming operations in Orumba North Olukosi, Ogungbile, & Makinde, (2019).

The findings underscore the importance of cost management in small-scale tomato farming. Given that the profit margins are relatively modest, farmers must focus on strategies to reduce input costs, such as bulk purchasing of fertilizers and pesticides, or exploring organic alternatives that may be less expensive. Additionally, improving access to credit could help farmers invest in more efficient tools and equipment, potentially lowering fixed costs and increasing overall profitability (Ojo & Afolabi, 2020). The economic analysis highlights that, despite the challenges, tomato farming in Orumba North can be profitable with proper cost management and access to necessary resources, aligning with broader agricultural development goals in Nigeria.

**Table 2: Costs and returns**

Items	Quantity	Unit price (₦)	Amount (₦)
<b>Variable cost</b>			
Land preparation	3	5,000.00	15,000.00
Seed cost	20	402.50	8,050.00
Cost of planting	10	995.50	9,955.00
Cost of weeding	7	1,000.71	7,005.00
Cost of harvesting	6	916.67	5,500.00
Fertilizer cost	4	5,005.25	20,021.00
Pesticide cost	10	501.30	5,013.00
Transportation cost		999.80	4,999.00
<b>Total Variable cost</b>			75,543.00
<b>Fixed cost</b>			
Cost of storage facilities			10,020.00
Tools and equipment cost			15,015.00
Cost of rent of land			9,999.00
<b>Total Fixed cost</b>			35,034.00
<b>Total cost</b>			110,577.00
<b>Total revenue</b>			152,000.00
<b>Gross margin</b>			41,500.00
<b>Net profit</b>			41,423.00

FIELD SURVEY: 2024

## 5. Conclusion

This study provides a comprehensive analysis of tomato production in Orumba North Local Government Area, shedding light on the multifaceted aspects that influence this

agricultural activity. Through an exploration of the socioeconomic characteristics of tomato farmers, the economic dimensions of production costs and returns, and the various factors and constraints affecting the industry, the

research highlights the complex interplay between financial resources, educational attainment, and agricultural practices.

## 6. Recommendations

The following recommendations are made based on the results of the study:

- i. Government agencies and financial institutions should collaborate to develop tailored credit schemes for smallholder tomato farmers. These schemes should offer favorable terms, such as lower interest rates and extended repayment periods.
- ii. Agricultural extension services should be strengthened through increased funding and training. Extension workers should be equipped with updated knowledge on pest management, crop nutrition, and modern farming techniques.
- iii. Encourage government intervention in infrastructure such as irrigation systems and rural roads to improve production efficiency and market access.
- iv. Further research should examine comparative profitability across regions, resilience strategies against climate risks, and opportunities in the tomato value chain (processing, preservation, and export).

## 7. References

1. Adebisi, A. A., Fapojuwo, E. O., & Adeola, O. (2021). Post-harvest losses in tomato production: Challenges and solutions. *Journal of Agricultural and Food Economics*, 9(1), 1-12. <https://doi.org/10.1186/s40100-021-00216-6>
2. Afolabi, J. A. (2019). Land fragmentation and its impact on agricultural productivity in Nigeria. *Nigerian Journal of Agricultural Economics*, 30(1), 50-65.
3. Agbamu, J. U. (2021). The role of education in agricultural productivity: Evidence from Nigeria. *Journal of Agricultural Education and Extension*, 27(3), 215-230. <https://doi.org/10.1080/1389224X.2021.1941652>
4. Adeoye, I. A., Makinde, E. A., & Oke, O. (2017). Input costs and yield determinants in tomato production: A case study of Nigeria. *African Journal of Agricultural Research*, 12(14), 1160-1168. <https://doi.org/10.5897/AJAR2017.12345>
5. Aminu, U., Umar, J., & Abdulaziz, A. (2016). Challenges of tomato production in Nigeria: Pest and disease management strategies. *International Journal of Agricultural Science, Research and Technology*, 6(2), 15-23.
6. Akinyemi, A. A., Lawal, M. A., & Adedayo, O. (2020). Greenhouse farming: A sustainable approach to increasing tomato production in Nigeria. *Sustainable Agriculture Research*, 9(2), 88-97. <https://doi.org/10.5539/sar.v9n2p88>
7. Babalola, O. O., Makinde, E. A., & Oke, O. (2016). Nutritional value and economic importance of tomatoes in Nigeria. *Journal of Food Science and Technology*, 53(1), 1-10. <https://doi.org/10.1007/s11483-015-0866-5>
8. FAO. (2016). *The state of food and agriculture 2016: Climate change and food security*. Food and Agriculture Organization.
9. Ibrahim, M. O., & Musa, A. (2017). The history and economic importance of tomato in Nigeria. *Journal of Agricultural History*, 14(2), 45-59.
10. Jhingan, M. L. (2017). *Microeconomics: Theory and applications*. Vrinda Publications.
11. Kale, A. M., & Derek, A. (2020). Tomato production in West Africa: Challenges and prospects. *West African Journal of Agricultural Research*, 6(1), 25-34. <https://doi.org/10.11648/j.wajar.20200601.14>
12. Kumbhakar, S. C., & Lien, G. (2020). Farm-level efficiency and productivity: A review and meta-analysis. *Agricultural Economics*, 51(2), 143-157. <https://doi.org/10.1111/agec.12510>
13. Oladipo, O. R., Ojo, A. O., & Oyinbo, O. (2018). Integrated pest management strategies for sustainable tomato production in Nigeria. *Journal of Agricultural Science*, 10(4), 123-130. <https://doi.org/10.5539/jas.v10n4p123>
14. Olukosi, J. O., Ogungbile, A. O., & Makinde, E. A. (2019). Economics of tomato production in Nigeria: A case study. *Nigerian Journal of Agricultural Economics*, 31(2), 101-110.
15. Ojo, O. J., & Afolabi, J. A. (2020). Access to credit and its impact on agricultural productivity in Nigeria. *International Journal of Agricultural Research*, 15(3), 50-58. <https://doi.org/10.3923/ijar.2020.50.58>
16. Usman, A. K., Musa, A. M., & Umar, A. (2019). The role of tomatoes in the Nigerian economy: Trends and prospects. *African Journal of Agricultural Research*, 14(5), 210-218. <https://doi.org/10.5897/AJAR2018.13836>