# Cost-Benefits Analysis of Cucumber (Cucumis Sativus L) Production in Delta State, Nigeria

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**DOI: https://doi.org/10.51584/IJRIAS.2025.10020030**

**Received: 27 January 2025; Accepted: 06 February 2025; Published: 12 March 2025**

## ABSTRACT

Cucumber is among important and exotic vegetable in Nigeria because of its inherent health benefits. The study analyzed the economics of cucumber production among smallholder farmers in Delta State, Nigeria. Data were collected with a well-structured questionnaire from a cross section of random selection techniques; with 100 cucumber farmers. The data were analyzed with descriptive statistics and gross margin. Results showed that smallholder cucumber production was dominated by male farmers (80.0%) with average age of 37 years, 14 years of farming experience and 8 people as the average farmer's household size. The study equally found that greater proportion (62.0%) of the farmers attended secondary education. The average farming experience was 6 years, the farmer's mean farm size (0.5ha), number of extension contact, number of training. The revenue realized from the sales was490, 618.14. The gross margin was ₦272, 138.14 while net return on investment was ₦ 155,030. The profitability index (PI) and return on investment (ROI) were 0.878 and 0.850 respectively. The study therefore suggests that farmers should be trained on post-harvest handling of produce.

**Keywords:** Economics, Cucumber, Production, Farmers

## INTRODUCTION

Cucumber (Cucumis sativus L) is an edible vegetable crop that belong to the family of Cucurbitaceae (Elum, et al., 2016.The plants are monoecious both male and female flower are produced on the same plant. The male flower grown earlier on the main stem in a larger number more than the female flower. Cucumber contains about 90% of water with long green cylindrical shape that helps in body building. Cucumber is considered a very vital crop in the whole world, however in tropical Africa; Nigeria has huge natural agriculture potentials yet it has remained a consuming class rather than a productive economy (Emegha, 2022). Cucumbers are grouped as supplementary fruits but are recognized and prepared to be eaten as vegetables. Cucumber (*Cucumis sativus L*.) gets spoilt within a short time when harvested and not stored properly or immediately. Cucumber is one of the most crucial market vegetables in the tropics (Fraser and Belete, 2021). Therefore, the production of vegetable and fruit in Nigeria has a very low record due to some challenges confronting the producers. Several crises like the boko harm attacks, herders and farmer clashes feuds have contributed to regional farming crises, food insecurity and famines in the south east, south south and other zones (emegha, 2023; emegha, 2021). Cucumbers are produced mainly in the northern states of Nigeria (Wilcox, Offor and Omojola, 2015). It is necessary to increase the production of cucumber in southern part of Nigeria in order to supplement the high intake of carbohydrate. The insufficient and over dependence of cucumber supply (for salad, vegetables and fruits) from the northern part of Nigeria made the price to be higher because cost of transportation and fruit spoilage (Adebayo, 2020). Cucumber contributes economically to the gross domestic product (GDP) of the nation when produced efficiently and sufficiently due to the high unit price of the commodity. Inefficiency in the use of available scarce resources has been the problem of increased food production (Saugat, Jiban, Jeevan, 2020). Despite the nutritional value and economic benefits of cucumber to its consumers and producers, yet there is no much research on the cost and returns of cucumber production in Delta State. Therefore, production of cucumber in South South especially in Delta State is beginning to gain attention, there is need to carry out a study on the economics of cucumber production in Delta State. The increasing demand for cucumber is an incentive to increase investment in the sub- sector and there is need to find out whether the enterprise is profitable or not. Hence, the focus of this study is to examine the economics of cucumber production in Delta State, this is the gap

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue II February 2025

that the study tends to fill. The broad objective of this study was to analysis the economics of Cucumber production in Delta State Nigeria. The specific objectives were to describe the socioeconomic characteristics of cucumber producers and estimate the costs and returns of cucumber production.

# METHODOLOGY

## The Study Area

### Delta State

Delta State was created from the former Bendel State in 1991 with Asaba as its capital city. The state lies between longitude 5°N and 6°45'N East and latitude 5° and 6°30' North, shares boundaries with Edo State to the South-west, Anambra to the East and Bayelsa state to the south. The state has a population of 4,098,391 by the census figure of 2006 (NPC, 2006). The state is made up of different ethnic groups, The Urhobos, Igbos, Izons, Itsekiri and The Isokos. It is made up of 25 local government areas with three agricultural zones namely: Delta North, Delta Central and Delta South.

The state has an average annual rainfall of about 2667mm in the coastal areas and 1905mm in the northern areas. The rainfall is heavier in July with a short break in August. The state has an annual average temperature range of 29°c to 38°c. It has an estimated land area of 17,698 square kilometers which 1770km$^2$ is made up of fresh water swamp, 5840km$^2$ of mangrove swamp and 10088km$^2$ of rainforest. Thus, with abundant ground and surface water resources in the state. There is potential for production of crops, fish and livestock (Obi, 2011).

The major economic activities of the people are farming. The crops grown are tree crops such as rubber, oil palm, tuber crops, cereals and assorted vegetables.


Figure 3.4: Political Map of Delta State.Researchgate.net, (2024).

## Population of the Study

The population of the study constituted all the small scale cucumber farmers in Delta State.

## Sampling Technique and Sample Size

A multistage random sampling technique was adopted in the selection of agricultural zones, local government areas, communities and respondents.

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In the **First stage**, fifty percent (50%) of the agricultural zones, that is, two zones in the State were randomly selected. These were Delta North and Delta central.

In the **second stage**, twenty-fifty percent (25%) of the LGAS from the two selected agricultural zones were randomly selected. This gave 2 LGAs, giving a total of 10 LGAs.

In the **third stage**, from each of the selected LGAs twenty-five percent (25%) of the communities were randomly selected, this gave 5 communities, giving a total of 50 communities.

In the **fourth stage**, from each of the selected communities, 2 respondents each was randomly selected giving a total of 100 respondents that were selected for the study.

Table 1: Distribution of agricultural zones and local government areas in the three selected states of south-south Nigeria

| States | Agricultural zones | Local Government Areas |
|---|---|---|
| Delta State | Delta central | Ethiope East, Ethiope West, Okpe, Sapere, Udu, |
| | Delta North | Aniocha North, Aniocha South, Ika North-East, Ika South, Ndokwa East. |

Table 2: Distribution of Cucumber farmers

| Selected State | Selected Zones | Number of selected LGAs | Number of selected communities | Number of selected farmers |
|---|---|---|---|---|
| Delta | 1(2) | 2(5) | 5(10) | 2(50) |
| Total | (2) | (10) | (50) | (100) |

N.B: Figures in parenthesis = Number selected

**Method of Data Collection**

Data for this study were derived from primary sources which include the use of structured questionnaire, personal interviews, observations and informal discussion. Structured questionnaire was used for literate farmers and interview schedules for the illiterate farmers. All the copies of the questionnaires were administered to cucumber farmers. The questionnaire for cucumber farmers was divided into the following sections:

Section A: Socio-economic characteristics of cucumber farmers.

Section B: Cost and Returns on cucumber production.

**Validity**

The instrument was subjected to both validity and reliability test. Content and face validity was done by experts in the field of Agricultural Economics before administering to respondents. Test retest method was used for the reliability test.

**Reliability**

Reliability is usually expressed numerically as a correlation coefficient. A high correlation coefficient of a test instrument indicates a high reliability. The Cronbach's Alpha correlation technique was used to ascertain the reliability of the instrument.

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**Mathematical Expression/Model Specification**

**Model 1**

**Cost Function**

Cost function is specified as:

$$\boldsymbol{Tc = \sum X_i P_i + Fc}$$

Where Tc = Total cost $X_i$. $P_i$expenditure on ith

Input…, Fc=fixed costs.

**Model 2**

**Profit Function**

Profit function is specified as:

$$\pi = TR - TC$$

$$\pi = Q.P_q - (\sum X_i P_i - FC)$$

Where

π = Net profit

TR = Total Revenue

TC = Total cost

Q = Quantity of output

$P_q$= Unit Price of Output.

**Model 3**

**Enterprise Budget Analysis Model**

NP = (TR – TVC) – TFC

Where;

NP = Net Income or Net Returns in Naira (₦)

TR = Total Revenue in Naira (₦)

TVC = Total Variable Cost in Naira (₦)

TR –TVC = Gross Margin in Naira (₦)

TFC = Total Fixed Cost in Naira (₦)

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# RESULTS AND DISCUSSIONS

## Socio-economic Characteristics of Small Scale Cucumber Farmers

The socio-economic characteristics of smallholder cucumber farmers were discussed under the following, Age, Sex, Marital status, Educational level, Household size, Years of farming experience, Farm size, Frequency of extension contact per year.

Table 1: Distribution of the Socio-economic Characteristics of the Respondents (n=100)

| Variable | Frequency | Percentage (%) | Mean/mode |
|---|---|---|---|
| **Age (years)** | | | |
| 20 and below | 8 | 12.81 | |
| 21 – 30 | 25 | 20.31 | |
| 31 – 40 | 55 | 53.75 | 36 years |
| 41 – 50 | 5 | 6.25 | |
| 51 and above | 7 | 6.88 | |
| **Gender** | | | |
| Male | 40 | 42.82 | |
| Female | 60 | 57.18 | Female |
| **Marital status** | | | |
| Single | 19 | 14.69 | |
| Married | 61 | 67.50 | Married |
| Widow/widower | 11 | 9.38 | |
| Divorced | 9 | 8.43 | |
| **Educational level** | | | |
| No formal education | 2 | 0.94 | |
| Primary | 11 | 6.56 | Secondary |
| Secondary | 58 | 71.56 | |
| Tertiary | 29 | 20.94 | |
| **Farm size** | | | |
| 0.5 and below | 34 | 28.13 | |
| 0.6 – 1.0 | 56 | 67.81 | 0.8 hectare |
| Above 1.0 | 10 | 4.06 | |
| **Household size** | | | |
| Less than 2 | 3 | 3.75 | |

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| | | | |
|---|---|---|---|
| 2 – 5 | 7 | 6.25 | 8 persons |
| 6– 9 | 74 | 84.38 | |
| 10 and above | 16 | 5.62 | |
| **Years of Experience** | | | |
| Below 10 | 76 | 82.50 | |
| 10–15 | 14 | 8.75 | |
| 16 – 21 | 4 | 4.07 | 6 years |
| Above 21 | 6 | 4.68 | |
| **Frequency of extension contact per year** | | | |
| Less than 3 times | 85 | 93.44 | |
| 3-4 times | 15 | 6.56 | |
| 5 times and above | 0 | 0 | |

Source: field Survey, 2024

**Age**

The results of age showed that more than half (53.75%) of the respondents were within the age bracket of 31-40 years in (Table 3). It indicated that cucumber farmers were within the productive age and could lead the farmers to be efficient and active. The average age of cucumber farmers in the study area was 36 years. The farmers are strong and are able of maintaining sustenance in cucumber production. This result agrees with the findings of Okonkwo-Emegha, et al. (2021) who reported that age bracket of 31-40 years' farmers dominates vegetable production in Ikwerre local government Area of Rivers State.

**Sex**

Slightly more than half (57.18%) of the respondents were female and fairly good proportion (42.82%) are males (Table 1). This implied that sex can influence the quality of work carried out by an individual. This result showed that females were more in cucumber production in the study area. This result agrees with the findings of (Okonkwo-Emegha, et al. (2020); Ndubueze-Oga, 2017) who stated that women dominates in vegetable production.

**Marital Status**

The result showed that majority (67.50%) of the respondents were married, in (Table 1). This implied that married farmers more committed in their business and also make use of family labor than the singles. This result is in line with the report of Okonkwo-Emegha *et.al.,* (2019) who reported that good number of small scale farmers are married and have better performance and efficiency in vegetable production.

**Educational level**

The results showed that (71.56%) of respondents obtained secondary education in (Table). This implied that education attainment of cucumber farmers could influence attitude to production and increase skills for high gain. This finding is in line with Ndubueze-Ogaraku, (2017) who reported also that about 80.00% of the farmers had some formal education which indicates good understanding among vegetable farmers. Also the report is in line with the result of Okonkwo-Emegha., Umebali & Isibor (2019) who revealed that majority of smallholder vegetable farmers obtained secondary education.

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**Farm size in hectare**

More than half (67.81%) of the respondents were medium size operators of (0.6-1.0) hectare. The average farm size of operation was 0.8 hectare in the study area in (Table 1). This implied that cucumber farmers in the study area were small scale producers. This agrees with the report of Okonkwo-Emegha, et al. (2021) who stated that majority of the farmers in Africa are small-holder farmers and operate in small scale.

**Household size**

Majority (84.38%) had a household size of 6 – 9 persons. The average household size was 8 persons in the study area (Table 1). This implied that the engagement of family labour will increase efficiency and reduce cost to a large extent, thereby promoting profit. This result agrees with the findings of Okonkwo-Emegha, (2019) who reported that average household size of small-scale farmers was within 7 persons.

**Farming experience**

Majority (82.50%) of the respondents were within the years of farming experience of below 10 years. The average farming experience was 6 years in the study (1). The result implies that the greater use of skills and sustenance for efficiency in production is highly dependent in the years of farming experience. It agrees with the findings of Oluwa, (2016) who stated that farming experience of about 9 years provide efficiency and mastery of the enterprise. The result is in line with the report of Okonkwo-Emegha, Achoja & Okeke (2019) who reported that average farming experience of vegetable farmers were about 7 years.

**Frequency of extension contact per year**

Majority (93.44 %) of the respondents were in contact with extension workers for three to four times per year. This result implies that extension services were poor in the study area and this could affect the level of productivity and efficiency. This result agrees with the findings of K'esit, *et.al.,* (2015) who reported that vegetable farmers in Cross River state were not having an adequate extension contact with agricultural extension services. Emegha (2023) also reported that security challenges have disruptions to essential services to farm business operations and extension services on rural farming setting.

**Cost and Returns of Cucumber Production**

The result on costs and returns of smallholder cucumber farmers were shown in table 2. The result showed the revenue realized from cucumber sales was ₦490,618.14 the total variable cost and fixed cost were **₦ 218,480.00 and** ₦157,108.14 respectively. The gross margin ₦272,138.14 while net return on investment were ₦ 155,030. The profitability index (PI) and return on investment (ROI) were 0.878 and 0.850 respectively. This implies that cucumber farming was 87.8% profitable, and for every ₦1 investment made would return a profit of ₦0.85. These results were in agreement with the work of Adebayo, (2020) who noted that cucumber is a profitable venture. Therefore, the result inversely agreed with the findings of Emegha (2019) who stated that within rural areas in Nigeria, altercations are most times allowed to degenerate into communal clashes which have negative effects on farming and its profits.

Table 2: Cost and returns

| **Item** | **Quantity** | **Price (NGN)** | **Amount (NGN)** |
|---|---|---|---|
| Sales (kg) | 2575.72 | 101.72 | 490,618.14 |
| Variable Cost: | | | |
| Seedlings | 7.23 | 820.33 | 7890.00 |
| Fertilizer | 220.65 | 223.58 | 6,323.00 |

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| | | | |
|---|---|---|---|
| Agrochemical | 4.17 | 1545.7 | 17,000.00 |
| Labour | 64.05 | 1978.3 | 102,400.00 |
| Transport | | | 53,433.00 |
| Communication | | | 31,834.00 |
| TVC | | | **218,480.00** |
| Fixed Cost | | | 117,108.14 |
| Total cost (TC) | | | **335,588.14** |
| Gross margin | | | 272,138.14 |
| Net returns | | | 155,030.00 |
| Profitability | | | 0.878 |
| ROI | | | 0.850 |

Source: Field Survey Data, 2024.

## CONCLUSION

Cucumber (Cucumis sativus L) belongs to the family of Cucurbitaceae and is an edible vegetable crop. Firstly, the average age of cucumber farmers in the study area was 36 years. Slightly more than half (57.18%) of the respondents were female and fairly good proportion (42.82%) are males. This result showed that females were more in cucumber production in the study area. The results showed that majority (67.50%) of the respondents were married. The results showed that (71.56%) of respondents obtained secondary education. More than half (67.81%) of the respondents were medium size operators of (0.6-1.0) hectare. The average farm size of operation was 0.8 hectare in the study area. Majority (84.38%) had a household size of 6 – 9 persons. The average household size was 8 persons in the study area. Majority (82.50%) of the respondents were within the years of farming experience of below 10 years. The average farming experience was 6 years in the study area. Majority (93.44 %) of the respondents were in contact with extension workers for three to four times per year.

**Secondly,** the result on costs and returns of smallholder cucumber farmers showed the revenue realized from cucumber sales was ₦490,618.14 the total variable cost and fixed cost were ₦ **218,480.00 and** ₦157,108.14 respectively. The gross margin ₦272,138.14 while net return on investment were ₦ 155,030. The profitability index (PI) and return on investment (ROI) were 0.878 and 0.850 respectively. This implies that cucumber farming was 87.8% profitable, and for every ₦1 investment made would return a profit of ₦0.85. These results were in agreement with the work of Adebayo, (2020) who noted that cucumber is a profitable venture.

## RECOMMENDATIONS

i. Financial institutions should guarantee access to cucumber farmers at relatively low interest rate. This could promote efficiency and sustainability in cucumber production in Delta State, Nigeria.

ii. There should be organized and improved market price of cucumber for higher returns and profits.

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