

Analysis of Rice Production in Anambra State Nigeria; The Costs, Return, and Constraints

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Abstract: The study assessed the costs, return and constraints to rice production in Ayamelum Local Government Area of Anambra State, Nigeria. It described the socioeconomic characteristics of the rice farmers, estimated their net farm income, and identified the constraints to rice production. Descriptive statistics and budgetary technique were employed in analyzing data collected from a sample of 200 respondents. The findings confirmed that the rice farmers had an average age, rice producing experience and formal education of 44 years, 17 years and 13 years respectively while the average farm size was 10 plots (0.67ha). The results showed that rice production is profitable with an average selling price/50kg of processed rice, total cost of production on 0.67ha, total revenue and net farm income of ₦44,510.00, ₦765,150.00, ₦1,045,985.00, and ₦280,835.00 respectively. The net farm income/50kg bag of processed rice was ₦11,950.43, while the rate of return on investment was 0.37. The problems of climate change, inadequate processing and storage facilities, inadequate farmland, pest and rodent attack, and high cost of inputs were some serious constraints to rice production. The study recommended that adequate credit facilities and farm inputs should be made accessible to the farmers, rice farmers should be encouraged to use improved varieties of rice in order to increase their output, farmers should be exposed to farm practices that are less expensive to reduce the cost of production and increase the revenue, and land should be available and affordable for the farmers to increase their farm size.

Keywords: Rice Production, Farmers, Net Farm Income, Budgetary Technique, Profitable, Costs, Return.

INTRODUCTION

The Nigeria Agricultural sector provides employment and income for over 70% Nigerians, as well as foreign exchange and raw materials for the manufacturing sectors. Nigeria is endowed with fertile land for the cultivation of staple foods such as rice, yam etc. However poor growth has been recorded in agricultural sector and this is a reflection of food crisis in the sector in which the population growth rate exceeds the rate of food production (Uche *et al.*, 2020; Food and Agricultural Organisation (FAO) 2020).

Rice (*Oryza sativa*) is an important staple food consumed by about half of the human race. Mudashir *et al.*, (2025) noted that rice plays dual role to household food security as a food and income source for

smallholder farmers. Nigeria is the largest rice producing country in West Africa, and ironically, also the second largest importer of rice in the world despite being ecologically endowed to achieve self-sufficiency in rice production with land area that favours rice production (Nyong *et al.*, 2022; Uche *et al.*, 2020; Akinniran & Faleye, 2020; Ojumu *et al.*, 2024; Abdullahi *et al.*, 2022). Esheya (2024) reported that the South East Nigeria serves as a benchmark for Nigerian rice production as it is one of the main rice producing regions in the country while Nwalieji (2016) identified Anambra and Ebonyi States as the major rice producers in the Southeast Nigeria. It is however, worthy of note that most ecological zones in Nigeria are suitable for rice cultivation either as swamp, upland or under irrigation. However, despite the availability of cultivable land area, rice production in Nigeria has failed to meet local

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demand despite producing approximately 2 million metric tons of milled rice annually. This is evident in the fact that Nigeria relies heavily on imported rice with an estimated 3 million metric tons imported yearly which has led to increase in Nigeria's food import bill regardless of the very favourable ecologies for rice production, the potentials in rice production and profitability of rice production (FAO, 2020; Toba *et al.*, 2022; Ojumu *et al.*, 2024; Abdullahi *et al.*, 2022; Oloyede *et al.*, 2020; Okam *et al.*, 2016).

Rice farming has a number of expenses, and for profit to be maximized, the viability of rice production has to be determined before production starts. Over 90 percent of domestic rice production come from resource-poor and smallholder farmers whose livelihoods have been constrained by a host of challenges such as low productivity, limited access to productive assets and inputs, inadequate support services (extension and research); inadequate market and rural infrastructure, post-harvest losses, an unconducive environment, small farm land to cultivate, insufficient access to credits/loan, lack of technical know-how and access to larger market, which affect their scale of production and subsequently their net farm income. Moreso, these small-scale rice producers often operate with thin margins due to high costs of fertilizer, labour, and transportation (Mogues & Ayoola, 2021; Onubogu, 2021). Okam *et al.*, (2016) attributed the inability of Nigerian rice farmers to meet local demand for rice to low productivity, inefficient use of resources and low mechanization level.

Many challenges have trailed the poor output and low profit in rice production. Onubogu, (2021), Mudashir *et al.*, (2025), and Ojehomon *et al.*, (2020) lamented that the economic efficiency of rice production is adversely affected by rising input costs, weak extension services, and climate-induced yield fluctuations. This has brought discouragement to rice farmers, especially smallholder farmers and those who intend to join rice production. According to Nwahia, (2020) low productivity of rice discourages the Nigerian youths from embarking in rice farming business. Chigbo *et al.*, (2025) and Akanbi *et al.*, (2019), on the other hand, identified poor financing, flooding and insecurity as some of the major problems militating against agricultural development in Nigeria and stated that insecurity contributes to poor yield in rice production as many rural farmers do not tend their rice farms as supposed for fear of invasion of bandits. Meanwhile, Okam *et al.*, (2016) had affirmed that profit efficiency among rice growers is affected by socio-economic factors, including household education, non-farm employment, credit constraints, and institutional constraints, while, Tiku *et al.*, (2017) highlighted that the key constraints militating against increased rice production were lack of adequate investment capital, poor storage and processing facilities, high labour cost, high cost of transportation, lack of adequate land for rice production, high cost of agricultural inputs such as

fertilizer, agrochemicals like herbicides and pesticides, and pest and disease infestation. Hence, it is obvious that the challenges are numerous and location specific.

The Federal Government of Nigeria, in a bid to improve productivity, increase the profit of farmers and reduce imports, introduced the Anchor Borrowers' Programme, the National Rice Development and the Agricultural Transformation Agenda Special Programme (ATASP). Several sub-programmes and initiatives were introduced by these programmes, yet their effectiveness in achieving sustainable food security remains doubtful due to numerous hinderances which include regional disparities and limited farmer inclusion amongst others (Okam *et al.*, 2016; Ojehomon *et al.*, 2020; Omolehin *et al.*, 2019). This is evidenced in the rice yield, area cultivated and rice consumption reports of Luka *et al.*, (2025). Luka *et al.*, (2025) explained that in 2016 rice output, area harvested and yield per hectare were 4.536 million tonnes, 3,300 hectares and 1.37 tonnes respectively, but in 2021, production output rose to 5 million tonnes, the area harvested increased to 3,650 hectares, while the yield per hectare declined to 1.36 tonnes. Likewise, there was an increase in rice consumption from 6.7 million tonnes in 2016 to 6.95 million tonnes in 2021. Luka *et al.*, (2025), hence, lamented that local production could not meet demand despite the increase in output that is sustained over the years and consumption increase likely because of population growth, urbanization, and consumers' preference for rice.

It is therefore against this backdrop that this study assessed the profitability of rice production in Anambra State. This study;

- i. Described the socio-economic characteristics of the rice farmers in the study area;
- ii. Estimated the net farm income of the rice farmers, and
- iii. Identified the constraints to rice production.

MATERIALS AND METHODS

The study was carried out in Anambra State, in the South-East geopolitical zone of Nigeria. Its capital is Awka. Anambra State is made up of 21 Local Government Areas (LGAs) and four Agricultural Zones (AZs) - Aguata, Anambra, Awka and Onitsha. It is located between longitude 6° 36'E and 7° 21'E and latitude 5° 38'N and 6° 47'N. The State is bounded in the north by Kogi State, in the west by River Niger and Delta State, in the south by Imo State and on the east by Enugu State. Anambra State occupies an area of 4,416 sq. km. It has fertile lands for production of food crops such as rice, maize, yam, cassava and assorted fruits (Nwalieji 2016). A multi stage sampling method comprising of purposive and random sampling techniques was used in selecting the samples for the study. One Local Government Area (LGA), Ayamelum, was purposively selected. This was based on the concentration of rice farmers in it. Moreover, Nwalieji (2021) reported that

Ayamelum LGA is “Rice Food Basket” of Anambra State because it is the major rice producing LGA among the 21 LGAs in Anambra State; .In the second stage, four communities, Omor, Anaku, Ifite Ogwari and Igbakwu, specifically known for rice production in the area were selected. The presence of lower Anambra river irrigation rice farmers’ project at Omor town is why more than 40 hectares of Fadama land has been cultivated with rice. There is also a new rice mill complex in the area with units for parboiling, milling, destoning and bagging capacity to produce over 10,000 metric tonnes of high quality rice annually (Obiekwe and Okonkwo-Emegha, 2025; Onubogu, 2023; Nwalieji, 2016). In the third stage, random sampling technique was used to select 50 rice farmers from each of the communities. In all, two hundred rice farmers were selected and interviewed for the study. Data for this study were collected by means of oral interview and structured questionnaire administered to the farmers.

A reasonable number of variables were deployed in this study. These variables were measured as follows:

House Hold Size: this is the total number of people living and feeding together in a house.

Sex: which took on the value of 1 if the farmer was a male, and 0 if the farmer was a female.

Age: This was measured in years.

Educational Level: the number of years the farmer spent in formal education.

Marital Status: The respondents indicated whether they were single, married, divorced or widowed. (a dummy variable was used to represent this; Married = 1; otherwise = 0)

Mode of Operation: Full time = 1; Part time = 0

Farm Size: this was presented in hectares

Cost of Labour: The farmers indicated how much they spent on labour/hectare /planting season.

Source of Labour: they indicated whether they used family, hired or both sources of labour.

Cost of Production: They indicated the various costs incurred on rice farming in each hectare of farm.

Extension Visits: the number of times they were visited by extension agents in a season.

Farming Experience: the number of years the respondent had spent in rice production.

Output: the number of 50kg bags of rice they harvest in a planting season.

Selling Price/Bag: price of a bag of rice at the time of this study.

Methods of Data Analysis

The constraints were weighed on a 5-point Likert scale of Very Unserious (1), Unserious (2), Undecided (3), Serious (4) and Very Serious (5) to identify the extent to which given constraints were serious $\frac{(1+2+3+4+5)}{5} = \frac{15}{5} = 3$. Hence, any constraint with a mean score above 3 was considered a serious constraint.

Budgetary Techniques:

The cost and returns of rice production were estimated with farm budgeting techniques as displayed by equations 1 and 2.

$$GP = TR - TVC \text{-----} (1)$$

Where GP = Gross Profit, TR = Total Revenue, TVC = Total Variable Cost. (The TVC included items such as total cost of labour, transportation, fertilizer, herbicides, planting material, etc, while the TFC included cost of renting land).

The net farm income was estimated thus

$$NFI = GP - TFC \text{-----} (2)$$

Where NFI = Net Farm Income, GP = Gross Profit, TFC = Total Fixed Cost.

The profitability of rice production was analyzed and compared using the various financial ratios:

Gross Ratio:

$$GR = \frac{GP}{TR} \text{-----} (3)$$

Where GR = Gross Ratio, GP = Gross Profit and TR = Total Revenue.

Return on Capital Invested (ROI): This is a measure of the amount that accrues to the enterprise as net income for every naira invested. The higher the return to investment, the more profitable the enterprise.

$$ROI = \frac{NFI}{TC} \text{-----} (4)$$

Where RoI = Return on Capital Invested, NFI = Net Farm Income, and TC = Total Cost.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Rice Farmers

The result as shown in the table 1 revealed that 92% of the rice farmers were male while 8% were female. This result shows that while rice is produced by male and female farmers, the male dominate the enterprise. This affirms that gender plays an important role in rice production, in terms of acquisition of fixed asset like lands and machines (Onubogu, 2023). This result is in line with the findings of Nwalieji (2021) in Anambra state, Obiekwe and Okonkwo-Emegha (2025) in Anambra state, Ojumu *et al.*, (2024) in Niger state and Oloyede *et al.*, (2020) in Kwara state which revealed that males are more involved in rice production than females, which may be attributed to lack of access to productive resources. The respondents had varying age distributions from 20years. About 76% of the farmers were in the age category of 20 – 50years, while 24% were above 50years. This implies that 76% of the farmers were within the economically active age bracket (20 – 50) with 44 years being the mean age. The respondents are said to be relatively young considering this mean age, which means that they will be economically active in the rice production industry. This result is also in line with the results of Onubogu (2023) in Anambra state, Mudashir

et al., (2025) who equally found an average age of 44years amongst rice farmers in Abuja as well as Luka *et al.*, (2025) in Taraba State, and Oloyede *et al.*, (2020) who both reported an average age of 45 years showing that farmers are still actively involved in rice production. The finding however differs from the 36years average age recorded by Obiekwe and Okonkwo-Emegha (2025) and the 41 years found by Eteyen and Mathew (2022) in Akwa Ibom state.

Education has been identified as an important factor in rice farming. The result in table 1 shows that 78% of rice farmers had spent up to 12years in school with an average of 13 years (above school certificate) in formal education setting. This implies that they had a minimum of secondary school education and are well positioned to understand better, while 6% of the farmers had no formal education. This result implies that 94% of the rice farmers were exposed to formal education. Luka *et al.*, (2025) and Ojumu *et al.*, (2024) likewise found that 89.4% and 98.3% of rice farmers respectively had formal education. However, the mean years spent in school differed from the 7 years reported by Eteyen and Mathew (2022). Table 1 revealed that 94% of rice farmers were married, while 6% were single. This implies that rice farming is a source of livelihood as majority of the rice farmers were married and had families to fend for. This agrees with Luka *et al.*, (2025). Table 1 shows that 70% of the respondents had more than 5 household members, 30% had 1 - 5 household members while the mean household size is 7 persons which suggests there is labour readily available for the accomplishment of farm activities (Onubogu, 2023; Nwalieji, 2021). Oloyede *et al.*, (2020), Mudashir *et al.*, (2025) and Obiekwe and Okonkwo-Emegha (2025) also reported an average household size of 7 persons but Ojumu *et al.*, (2024) reported 4 persons. Table 1 reveals that 70% of the respondents employed family labour, 8% employed hired labour while 22% employed both family and hired labour. This result implies that 92% of rice farmers employ family labour which will help cut down on the cost of production for them. Oloyede *et al.*, (2020) opined that household size in agriculture contributes to availability of labour for farm production, farm size, the amount of farm produce retained for domestic consumption, and the marketable surplus, though, large household size is associated with increased household

consumption expenditure which reduces the money that could be used for production purposes.

Farming experience is an important factor that can determine both the productivity and the production level in farming activities. The findings revealed that 70% of rice farmers had above 10years farming experience while only 30% of them had between 1-10years experience. The mean of the years of experience is 17years. This suggests that most of the farmers are well experienced in rice farming. This findings is in accordance with that of Nwalieji, (2021) which revealed that the mean farming experience was about 19 years and Oloyede *et al.*, (2020) who reported 15 years, but differs from the 8 years of Obiekwe and Okonkwo-Emegha (2025). It is expected that the higher the farmers' experience in farming, the better will be the production capacity of the farmers. From the findings of this study, 83% of the rice farmers have farming as their full time job while 17% only farm on part time basis. This implies that 83% of these farmers dedicate their time all year round to farming since that is their main source of income. Table 1 further shows that 72% of the respondents had more than 5 plots of land for their farming business. The mean farm size was 10 plots (that is 0.67ha which is less than a hectare) which confirms that rice farmers produce in small scale. This implies that rice production in the area was on small scale. This finding is in agreement with Eteyen and Mathew (2022) who found out that rice farmers had an average of 9 plots of land for cultivation, hence they produce on a small scale but contradicts the average farm sizes of 1.23 and 1.5ha – 2ha reported by Obiekwe and Okonkwo-Emegha (2025) and Uche *et al.*, (2020) in Ebonyi state respectively.

As shown on table 1, 54% of the respondents are members of a cooperative society while 46% of them do not belong to any. Belonging to a cooperative will help farmers in respect to getting loans for their business as well as other forms of support. The finding implies that 54% of rice farmers had the support of cooperative. This supports Mudashir *et al.*, (2025) that 69% of rice farmers belonged to cooperative society but disagrees with the report of Luka *et al.*, (2025) that only about 28% of rice farmers belonged to cooperative groups. Table 1 further reveals that the average selling price for 1 bag of 50kg processed rice was ₦44,510.00.

Table 1: Socioeconomic characteristics of Rice farmers

Variables	Frequency	Percentage %	Mean
Sex			
Male	184	92%	43.78
Female	16	8%	
Age (years)			
20 – 40	48	24%	13.4
41 – 50	104	52%	
>50	48	24%	
Years in School (years)			
0	12	6%	

Variables	Frequency	Percentage %	Mean
1 – 6	32	16%	17.18
7 – 12	77	38.5%	
> 12	79	39.5%	
Marital Status			
Single	12	6%	7 persons
Married	188	94%	
Farming Experience (years)			
1 – 10	60	30%	10 plots (0.67ha)
>10	140	70%	
Household Size			
1 – 5	60	50%	3
> 5	140	70%	
Mode of Operation			
Full time	164	83%	3
Part time	36	18%	
Farm size (plots)			
1 – 5	56	28%	3
> 5	144	72%	
Source of Labour			
Family	140	70%	3
Hired	16	8%	
Both	44	22%	3
Extension Visits			
1 – 5	176	88%	3
> 5	24	12%	
Selling price of 50kg bag of rice (₦)			
40, 000 – 50,000	132	66%	₦44,510
> 50,000	68	34%	
Member of a Cooperative Group			
Yes	108	54%	3
No	92	46%	

Source: Field Survey, 2025

Net Farm Income of Rice Farmers

The income and costs accrued in the course of production of rice in the study area presented in table 2 show that the average farm size of the farmers is 10 plots which is approximately 0.67ha., and this implies that rice production in the study area is on small scale. The average quantity of rice harvested from the 0.67ha gave 1175kg of processed rice, which is 1.175tonnes of processed rice (that is 23.5bags when measured in 50kg bags) while the selling price of each bag of rice is ₦44,500 on the average. The total revenue and average total revenue/bag were ₦1,045,985.00 and ₦44,510.00 respectively.

It can also be seen in table 2 that the total cost and average total cost /bag of rice were ₦765,150.00 and ₦32,559.57 respectively while the net farm income from

0.67ha and net farm income per bag of rice were ₦280,835.00 and ₦11,950.43 respectively. This implies that there is profit in rice farming in the study area. Table 2 further reveals 37% return on investment per planting season. This implies that 37k is returned as profit for every ₦1.00 invested in rice production. The findings show that rice farming is a profitable business to venture in. A greater farm size for the rice farming will eventually result to higher output and hence, a higher net farm income. These findings agree with that of Tiku *et al.*, (2017) which revealed that each of farmer can make an estimated profit of ₦103, 973.85 per season. It also tallies with the findings of Nwalieji, (2021) which concluded that farmers engaged in rice production because it is a lucrative crop production enterprise capable of generating real income and guaranteed sustenance of livelihood.

Table 2: Costs and return of processed Rice production

Variables	Value
Average farm size	10 plots (0.67ha)
Average selling price/50kg bag	₦44,510.00
Average quantity of processed rice produced from 0.67ha	23.5 bags
Total revenue	₦ 1,045,985.00
Average total revenue/50kg bag	₦44,510.00

Total variable cost	₦670,150.00
Average total variable cost/50kg bag of rice (TVC/23.5 bags of rice)	₦28,517.02
Total fixed cost	₦95,000.00
Average total fixed cost/50kg bag (TFC/23.5 bags of rice)	₦4,042.55
Total cost	₦765,150.00
Average total cost/50kg bag (TC/23.5 bags)	₦32,559.57
Gross profit = TR – TVC	₦375,835.00
Average gross profit/50kg bag = ATR – ATVC	₦15,992.98
Net farm income = GP – TFC	₦280,835.00
Net farm income/Bag = AGM – ATFC	₦11,950.43
Gross ratio = GP/TR	0.35
Return on investment = NFI/TC	0.37

Source: Field Survey, 2025

Constraints to Rice Production

Table 3 displays the constraints militating against rice production. Climate change ($\bar{X}$ = 3.8), inadequate storage facilities ($\bar{X}$ = 3.7), high incidence of weed ($\bar{X}$ = 3.7) and inadequate land for rice production ($\bar{X}$ = 3.7) were the most serious constraints to rice production. Other serious constraints to rice production include: low crop yield ($\bar{X}$ = 3.5), pests and rodent attack ($\bar{X}$ = 3.5), decrease in soil fertility ($\bar{X}$ = 3.3), inadequate processing facilities ($\bar{X}$ = 3.2), and high cost of agricultural inputs, fertilizers and chemicals ($\bar{X}$ = 3.1). This implies that the listed constraints are the main bottlenecks to rice production in the area and the output

of rice could be increased if the constraints are dealt with. Chigbo *et al.*, (2025) in Niger state, Mudashir, *et al.*, (2025), Onubogu, (2023), Uche *et al.*, (2020) and Tiku, *et al.*, (2017) in Cross River likewise reported similar constraints as the bottlenecks in rice production.

The constraints identified as unserious were high cost of transportation ($\bar{X}$ = 2.9), high cost of labor ($\bar{X}$ = 2.8), poor extension services ($\bar{X}$ = 2.7), bad roads ($\bar{X}$ = 2.6), lack of sufficient buyers ($\bar{X}$ = 2.4), inefficient fund or start-up capital ($\bar{X}$ = 2.1), poor access to credit ($\bar{X}$ = 2.1) and untimely access to improved seed ($\bar{X}$ = 2.0).

Table 3: Constraints to Rice Production

Constraint	Mean scores	Decision
Climate change	3.8	Very serious
Inadequate storage facilities	3.7	Very serious
Hugh incidence of weed	3.7	Very serious
Inadequate land for rice production	3.7	Very serious
Low crop yield	3.5	Very serious
Pest and rodent attack	3.5	Very serious
Decrease in soil fertility	3.3	Serious
Inadequate procession facilities	3.2	Serious
High cost of agricultural inputs, fertilizers and chemicals	3.1	Serious
High cost of transportation	2.9	Not Serious
High cost of labour	2.8	Not Serious
Poor extension services	2.7	Not Serious
Bad roads	2.6	Not Serious
Lack of sufficient buyers	2.4	Not Serious
Insufficient fund or startup capital	2.1	Not Serious
Poor access to credits	2.1	Not Serious
Untimely access to improved seed and other inputs	2.0	Not Serious

Source: Field Survey 2025

CONCLUSION AND RECOMMENDATION

Based on the findings of this study, it is confirmed that rice farming in Ayamelum Local Government Area, Anambra State, Nigeria is a very lucrative business with good return on investment for anyone who is interested to venture in as justified by the gross margin analysis. However, there is need to address those challenges and bottlenecks facing the farmers like problems of climate change, non-availability of lands to

cultivate, problem of pest, processing and storage facilities so they can process more rice produce and store well before sales. Though rice production is profitable in the area, the researcher believes that if these constraints are well taken care of, the quantity of rice produced will increase and that is tantamount to increased income for the farmers. Based on the findings of the study, the following recommendations were made;

1. The average land available for these rice farmers is 10 plots which is small. Lands should be made available and affordable to the farmer to expand their scale of production since rice is very profitable.
2. Farmers should seek and adopt farm practices that are less expensive so as to reduce the cost of production and increase the revenue.
3. Farmers should be encouraged on the need to join farmers associations and cooperatives to serve as a support group and to increase their chance of obtaining loan from financial institutions, and other various farm credit schemes, and also to learn more on how to mitigate climate change.
4. High cost of input was identified as major constraints to rice production; the government should encourage rice farmers to boost their productivity by providing input subsidies to farmers.
5. Government and non-governmental organizations should assist rice farmers in boosting their productivity and income through provision of credit facilities to enable them produce more, as well as organizing trainings for farmers to learn how to grow their business.

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