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Research Article

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Economic Analyses of Smallholder Rice Farmers in Kebbi State, Nigeria

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Abstract

This study examined the economic analysis of rice production in Kebbi State, Nigeria. The specific objectives were to identify the socio-economic characteristics of the respondents, estimate the cost and returns, and evaluate the efficiency of resource use. Primary data were used in the study. They were obtained through a questionnaire A total of 160 rice farmers engaged in rice production were investigated. The collated data were analyzed using descriptive statistics, budgetary analysis, and resource use efficiency models. Results from the analyzes revealed that most rice farmers were above productive age, experienced, and could read and write. Empirical results also revealed that rice production is viable with approximately 40% return on investment for every N1 invested in the rice farming enterprise. Resource use efficiency in the study area showed underutilization of seed, farm size, fertilizer, and agrochemicals. It is recommended that the farmers in the study area should be provided with farm input and improved technologies, which could enable them to become more efficient in rice production and further guarantee sustainable growth and food security.

Keywords: Agriculture, Farmers, Rice, Production.

Introduction

Rice is one of the major staple foods in Nigeria, consumed across all geopolitical zones and socioeconomic classes [1]. Rice consumption is increasing rapidly in Nigeria because of a shift in consumer preference toward rice, increasing population growth, increased income levels, and rapid urbanization [2]. It is commonly boiled and eaten with stew or vegetable soup. It is also used in the preparation of several local dishes that are eaten in every home, especially during festivals and ceremonies. Demand for rice in Nigeria totals approximately 5.7 million tons (Mt) a year, of which 1.6 Mt is imported at an estimated cost of $1.6 billion. Moreover, local rice does not compete with imported brands in terms of quality and therefore sells at a significant discount [3]. The shortfall in production is compensated for by the massive importation of milled rice to bridge the gap between domestic demand and supply [4]. Increasing rice production could, therefore, contribute to domestic food security and foreign exchange earnings for the nation. Nigeria's domestic rice production has also increased significantly at an annual rate of almost 10% since the 1970s [5].

The Nigerian agricultural backdrop is changing with increased government policies aimed at stimulating private sector involvement and boosting local production [1]. The major rice-producing states in Nigeria are Kebbi, Borno, Kano, Ebonyi, and Kaduna, among others, where most of the farmers producing rice rely on traditional technology with low use of improved input technologies [2]. Farmers need to adopt improved varieties and have a good knowledge of rice agronomy to increase rice production and productivity in various states in Nigeria. The production of rice in commercial quantities will contribute to the development of the Nigerian economy by saving the much-needed foreign exchange used for the importation of rice from Asia and the rest of the world [6].

Rice production in Nigeria has been unable to keep up with demand over the years. The inability of Nigeria to achieve self-sufficiency in rice production is partly due to its inefficiency. The rice production system in Nigeria is characterized by inadequate knowledge of postharvest handling, processing and marketing, harvesting skills, poor means of transportation, and lack of industrial drive. Other factors include poor government policy and high production costs, poor market information, and inadequate credit facilities [7].

Rice production serves as a bridge between production and consumption. Kebbi State is one of the rice producing States in Nigeria with a high prospect for an increase in production over the

years. If rice production is assessed and empirical information on profitability, prices, and determinants of profit along with the constraints involved in rice production are examined and made available, there is probably an improvement in the performance of rice production in the State and the country at large. It is against this backdrop that this study aims to find answers to the following research questions;

- What are the socioeconomic characteristics that affect rice farmers?
- How efficient are the resources being used in the production of rice in Kebbi State?
- What are the constraints on rice production in the study area?

Methodology

Study Area and Location

The study was conducted in Kebbi State, Nigeria. The state lies in the northwest Sudan Savanah region between latitudes 10° 051 and 13° 271N of the equator and between longitudes 3° 351 and 6° 031E of Greenwich. The state has a population of 3,351,831 according to the 2006 census [8]. Projecting this population to 2022 at 3% growth rate reveals a population of 4,351,067. Over two-thirds of the population is engaged in agricultural production, mainly arable crops alongside cash crops and livestock production.

Sampling Design

The study employed a multistage sampling technique in the selection of rice farmers who were purposively selected. In the first stage, Kebbi State was divided into four (4) Agricultural Development Project (ADP) zones, namely the Argungu, Bunza, Yauri, and Zuru zones. Second stage, from each of the zones, two villages were randomly selected, giving a total of eight villages. From each village, twenty rice farmers were randomly selected. Thus, 160 respondents were used in the study as the sample size

Data Collection

Data were collected using a well-structured questionnaire administered to the respondents. Data collection covered one production cycle and included input-output data such as farm size, family labour, hired labour and planting material, capital, rice output, price and quantity sold, as well as socioeconomic characteristics of the respondents.

Analytical Technique

Tools such as descriptive statistics and gross margin analysis were performed to the collated data.

Gross Margin Analysis

It is used to determine the potential profitability of a farmer's farm income. It has the advantage of being simple and useful in the analysis of the profitability of small farms that have small fixed costs [9, 10].

Gross margin was estimated from costs and returns in rice production. The Gross model can be expressed as; GM = TR – TVC

Where:
GM = Gross margin (₦/ha)
TR = Total revenue or total value of output from the rice enterprise (₦/ha).
TVC = Total variable cost or the costs specific to producing (rice) output (₦/ha).

Efficiency Ratio

Efficiency is generally defined as the quantity of output (У) per unit of input (X) used in the production process, that is, the average physical productivity (APP).

To determine whether resources were efficiently utilized, the marginal value product (MVP) of the variable inputs used was computed and compared with their input prices. The following ratio was used to compute the efficiency of resource use.

$$R = \frac{MVP}{MFC}$$

Where:
R= Efficiency ratio
MVP =Marginal value product (value addition in maize output due to the use of additional unit of input)
MFC = Marginal factor cost (unit cost of a particular resource used).

Results and Discussion

Socioeconomic Characteristics of Rice Farmers

The socioeconomic characteristics of interest in this study are; age distribution of the farmers, gender, education, membership of an association, experience, and source of funds. These have been represented in the frequency table and are shown in Table 1. Empirical results show that most farmers between the ages of 46 years and above (50%) were more involved in rice production in the study area. The average age of the respondents is 46. Age is an important determinant of social – the socioeconomic status of a population since people wear in energy as they advance in age. Therefore, these generally aged rice farmers could have negative implications for the future of rice cultivation in the study area.

Table 1: Social-Economic Characteristics of Rice Farmers

Variable	Frequency	Percentage
Age of the Respondent		
≤ 30	26	16.25
31 – 45	44	27.5
46 – 55	80	50
≥55	10	6.25
Gender		
Male	135	84.4

Female	25	15.6
Education Status		
No formal education	80	50
Primary education	36	22.5
Secondary Education	15	9.4
Tertiary education	09	5.6
Qur'anic education	20	12.5
Membership in a cooperative society		
Yes	140	87.5
No	20	12.5
Major Source of Funds		
Personal saving	90	56.3
Money lender	20	12.5
Bank loan	10	6.2
Cooperative fund	40	25
Years of Experience		
≤ 10	30	18.8
11 – 20	90	56.3
21 – 30	25	15.6
≥ 31	15	9.3

Source: Field survey 2023

Table 1 also shows that rice production is dominated by males in the study area, as approximately 84.4% of the respondents are male. This can be attributed to the fact that men always have the right to land as a productive resource Quisumbing reported a great disparity between women and men in the size of landholdings and that the mode of women's participation in agricultural production varies with the land-owning status of households [11]. The male domination of male farming may also be due to the high demands of time and energy required to work in such an enterprise. This agrees with the study of Baiyegunhi and Fraser [12].

The study shows that 50% of the farmers had no formal education, whereas about 50% of farmers had one form of formal education or the other. This implies that rice farmers in the study area are generally knowledgeable. Education is an investment in human capital, which enables it to raise the skill and quality of the individual. Therefore, the introduction of new ideas and the adoption of innovations and technology into the study areas will be easy. This will in turn increase yield, income, and agricultural production in general.

The majority of the rice farmers (56.3%) have been producing rice for more than 11-20 years, while approximately18.8%) have at most 10 years of experience. Therefore, it can be inferred that most farmers are experienced rice growers. The credit facility was predominantly through personal savings (56.3%). Only about 6.2% borrowed money from banks for farming activities. This situation calls for urgent interventions by stakeholders in the agricultural sector.

Costs and Returns Analysis

A gross return was calculated by multiplying the total quantity of produce harvested by the price of the output sold. The results are shown in Table 2. The gross return per hectare in rice production in the study area was N80,701.42. For the cost of production, the total variable cost and total fixed cost were considered to calculate the total cost of production. The total variable cost includes the cost of labour, chemicals, fertilizer and seeds, whereas the total fixed costs include the cost of renting/borrowing land and depreciation on farm tools. The straight-line method, which assumed a constant rate of annual depreciation, was used to calculate the depreciation of farm tools.

The labour used consists of family, hired and group labour. The wage rate varies slightly depending on the operation to be performed on the farm. The average wage rate of N850.00 per man-day was used to calculate the total labour cost. The total cost of labour per hectare was N27, 826.54. This cost accounted for 54.5% of the total production. Labour is generally noted to be one of the most important factors of production, especially regarding farming experiments. Fertilizer accounts for approximately 25.3% of the production cost. Agrochemicals account for 15.7% of the total variable cost.

Baiyegunhi and Fraser observed that to increase yield, seed-dressing chemicals such as herbicides and pesticides that prevent undue exposure of cultivated seeds to fungal attacks must be used [12].

The gross margin and net farm income (profit) per hectare were N80,701.42 and N91,416.67. The rate of return on in-

vestment was N140%. These results imply that for every N1 invested in the rice farming enterprise in Kebbi State, N1.40 was made as revenue. That is, approximately 40 kobo are realized as profit. The rate of return on capital invested estimate (RORCI), otherwise called the efficiency level, is 0.40. This suggests the profitability and viability of rice farming in Kebbi State as this value is higher than the lending rate of between 6 % and 25% charged by both cooperative societies and commercial banks in the study area.

Table 2: Gross margin and returns in investment/acre

Item	Amount (₦)
Total Revenue	80,701.42
Labour	27,826.54(54.6)
Cost of chemicals	8,013.99(15.7)
Cost of fertilizer	12,907.63(25.3)
Cost of the seed	2,262.50(4.4)
Total variable cost	51,010.66
Gross margin	29,690.76
Fixed cost/depreciation*	6,760.49
Net Farm Income/Profit (NFI)	22,930.27
Rate of Return on Investment (ROR)	1.40 (140%)
Efficiency level/(RORCI)(%)	0.40 (40%)

Source: Field survey 2023

Efficiency of Resource Use

In determining the efficiency of the inputs used, the marginal value product and the marginal factor cost (MVP and MFC) were estimated. The marginal factor cost, which is the unit price for the variable inputs used for rice production in the study areas, was estimated as N7,500, N4,500, N4560, and N850 for seed, farm size, fertilizer, and chemical, respectively. This result is presented in Table 3.

Seed input is used below the economic optimum level, as indicated by its efficiency ratio of 244.35. It is therefore rational to increase the quantity of seed as this will bring about a corresponding increase in the total value product of approximately N1,832.60.

Fertilizer was also seen to be under-utilized, as shown by its efficiency ratio. This suggests that with other inputs held constant, increasing fertilizer by one kilogram would increase the total value product by N893.90. Other inputs were also observed to be currently under-utilized. Therefore, it is economical to increase the use of these inputs for optimal return on investment in the study area. Hence, resource use adjustment and an optimal combination of these parameters should be accepted by farmers in the study area.

Table 2: Gross margin and returns in investment/acre

Resource	MPP(Kg)	Unit price of input (N'000)	MVP(N)	MFC(N'000)	R=MVP/MFC
Seed	0.2618	7.50	1832.60	7.50	244.35
Farm Size	0.7888	45.00	5521.60	45.00	122.70
Fertilizer	0.1277	4.56	893.90	4.56	196.03
Chemical	0.0586	0.85	410.20	0.85	482.59

Source: Field survey 2023

Constraints Involved in Rice Production in the Study Area

The results in Table 4 show the constraints associated with rice farmers in the study area. The major constraints identified by the respondents were inadequate storage facilities and inadequate capital (87.5%) and (83.1%), access to land and high cost of transportation (76.9%), lack of a milling plant in the study area (56.3%), and poor road network (74.4%)

Table 4: Constraints Involved in Rice Production in The Study Area

Constraints of rice farmers	*Frequency	Percentage (%)	Rank
Inadequate capital	133	83.1	2
Access to land	123	76.9	3
Lack of milling plant	90	56.3	6
Inadequate storage facilities	140	87.5	1
Poor road network	119	74.4	5
High cost of transportation	123	76.9	3

Source: Field survey 2023

Conclusion

This study examined economic analyzes of rice farmers in Kebbi State. Primary data were used in the study and were obtained using a multi-stage sampling technique and through a questionnaire. The study revealed that 50% of the rice farmers were above productive ages and that rice production was mainly dominated by males with most farmers (84.4%) having the ability to read and write. The empirical result also revealed that rice production is more viable with about 40% return on investment for every N1 invested in the rice farming enterprise. Resource use efficiency in the study area showed underutilization of seed, farm size, fertilizer, and agrochemicals.

Rice production was found to be viable and profitable under efficient management. However, rice potential in terms of yield and quality of the product has not been fully exploited. Consequently, there is still a deficit in rice supply in the country. This could be attributed to the inaccessibility of farmers to appropriate modern technology and innovations such as improved seeds, fertilizer, adequate credit/funds, and adequate extension services. This poses a serious threat to the general food supply in the future if nothing is done to correct the imbalance in rice production.

Recommendations

i. Farmers in the study area should be provided with inputs such as seeds, fertilizer, agrochemicals, and the services of qualified extension workers. This will enable them to become more efficient in rice production and further guarantee food security.

ii. Improved technologies that can guarantee sustainable and continuous rice production throughout the year should be extended to farmers for adoption.

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