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Economic Analysis of Soybean (Glycine Max L) Production in Niger State, Nigeria

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A B S T R A C T

This study investigated the economic evaluation of soybean production in Niger State, Nigeria. The study focus on the socio-economic characteristics of soybean producers, profitability of soybean production, and identify the challenges encountered by soybean producers in the study area. Utilizing a structured questionnaire and analyzing responses from 160 soybean farmers, the study applies descriptive statistics and farm budgeting tools. The results showed that 57.5% of the respondents were > 41 years while 42.5% were between 21-41 years. Majority of respondents revealed that 83.13% had formal education while 16.87% were not educated; the study also revealed that 48.75% had access to credit while 51.25% did not have access credit, the study revealed that 18.75% of the respondents were members of cooperative while 81.25% do not belong to cooperative, Soybean production was found to be profitable as average gross margin of ₦3,778.1k was achieved. Major constraints encountered by the farmers were insufficient credit, pest and diseases, cost of transportation coupled with bad road from farm to market and the interest rate by most banks are serious challenges faced by soybean farmers in the study area

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INTRODUCTION

Soybean, a versatile legume scientifically known as (Glycine max L) thrives across tropical and temperate regions and was introduced to Africa by Chinese traders in the 19th century (IITA, 2015). Known for its high protein and oil content, soybean is an economical source of nutrition and a staple in various food products. Its by-products serve as valuable livestock feed, and the plant enriches soil through nitrogen fixation, helping to prevent erosion. Globally, soybean is a primary source of both protein and oil, with widespread uses in food, livestock feed, industry, and biofuel (Myaka et al., 2005). In Nigeria, soybean is crucial for addressing protein deficiency, as rising meat prices limit access to animal protein, and soybean provides a cheaper, protein-rich alternative (Dashiell, 1998).

Additionally, it has 20% non-cholesterol oil, and its fortified goods are significantly less expensive than those of other premium protein sources. With a total cultivated area of 117.7 million hectares and a total production of 308.4 million tons, it is the world's largest source of edible oil and the crop with the highest gross output of vegetable oil (FAOSTAT, 2015).

Despite its importance, there is limited economic research on soybean production in this region. This study aims to fill that gap by exploring the socio-economic factors, costs, returns, and challenges of soybean farming in Niger State. Findings from this study will offer insights for policymakers and industry stakeholders to strengthen the soybean sector, improve nutritional intake, and support rural economic growth.

It is a major crop worldwide and has been the leading oilseed since the 1960s (Smith and Huyser, 1987). According to Ugwu and Nnaji (2010), rapid population expansion, severe economic issues in several African nations, including Nigeria, and most recently, the global financial crisis, have lowered living standards and negatively impacted eating patterns, leading to widespread malnutrition.

The economic analysis of soybean production in the study areas has been the subject of little to no research, it was found. It is therefore necessary to obtain this research knowledge, which makes this study necessary. Increased use of soybeans will assist maintain a balance between people's protein intake and diet, which will benefit the Federal Government of Nigeria. As a result, people in the community will be less vulnerable to malnutrition and enjoy better health. The nation's workforce, or human capital, will grow as a result of improved health, fostering a productive economy and sustainable growth. It is hoped that the study's conclusions would benefit the government and processors alike by offering data that will be utilized to raise public welfare and income, which will ultimately increase agricultural output.

Since then, it has not been able to provide a sizable amount of foreign exchange, support agro-allied businesses, raise the standard of living for rural residents and agricultural households, or effectively create demand for industrial goods and services. However, increasing food production is essential for improving the nation's future food security because it is now a need rather than a point of contention. This requires a thorough understanding of the

efficiency or inefficiency that exists now in the crop production sub-sector as well as a critical analysis of the factors that influence the degree of efficiency or inefficiency.

LITERATURE REVIEW

Nigeria produced about 0.26% of the world's soy beans in 2012, down from an average of 0.28% in 2010 (FAOSTATS, 2015). According to research, the lack of high-yielding cultivars, a lack of knowledge about new production technologies, a shortage of basic farm inputs, and the usage of low-productive old technology are the main issues facing Nigerian small-scale agriculture. The following research questions are the result of these issues:

1. What are the socio economic characteristics of soybean producers in the study area?
2. What are the cost and return associated with soybean production in the study area?
3. What are the challenges encountered by soybean producers in the study area?

METHODOLOGY

The Study Area

The study was carried out in Niger State Nigeria. Niger State is located between Latitudes 8°20N and 11°30 N and Longitudes 3°30E and 7°20E. It covers about 8.6 million hectares which is about 9.3% of the total land area of Nigeria (Niger State GIS, 2007). The average temperature ranges between260°C and 360°C, and the mean annual rainfall varies from 1,100 mm in the north to 1,600 mm in the South (NSBS, 2012). The population of Niger State is about approximately 3,954,772 comprising 2,032725 males and 1.917,524 females which rank the State at 18th position in terms of population in the country (nigerstate.org.ng, 2021). At opposed to a national annual growth rate of 3.2%, Niger State is growing at 3.4% annually (nigerstate.org.ng, 2021) which projects the State to 5,971,706 as of the year 2021. It covers about 8.6 million hectares which is about 9.3% of the total land area of Nigeria (Niger State GIS, 2007). The state is divided into 3 Agricultural Zones namely; Zone 1 (Niger-South) Zone II (Niger- Central) and Zone III (Niger-East) (Niger State Bureau of Statistics (NSBS), 2012).

Sampling Technique and Sampling Size

A multi-stage sampling technique selected 160 farmers across four local government areas known for soybean farming (Mokwa, Agaie, Katcha, and Lapai). From each of these local governments, four villages were randomly selected, and 10 farmers were chosen per village. Data were collected using a pre-tested questionnaire focusing on socio-economic characteristics, production costs, and returns. Analysis methods included descriptive statistics for socio-economic data and farm budgeting for cost and return assessment.

Data collection

Data used for the study was obtained from primary sources through the use of pre tested structured and well validated questionnaires. Questionnaires

were administered to the farmers to elicit information from them about their production process which includes: Age, Sex, Marital Status Farm size, while secondary information was obtained from relevant journals, internet, bulletin articles monograph and review of the previous works.

Data Analysis

In order to accomplish the study's goals, the gathered data was examined utilizing a variety of analytical tools, including descriptive statistics and farm budgeting techniques. Using descriptive statistical tools like frequency distribution and percentages, the first and third objectives—which aim to characterize the socioeconomic characteristics of the respondents and the obstacles faced in the way of successful production—were examined. Farm budgeting was used to assess the second goal, which aims to ascertain the costs and returns associated with soybean production.

Farm Budgeting Techniques

The gap between gross farm income (GFI) and total variable costs (TVC) of production is known as the gross margin analysis. Analysis of gross margins is predicated on the idea that businesses share fixed costs. It displays how each business adds to the total farm profit. According to Olukosi and Erhabor (1998 and 2005), it is a helpful planning tool in circumstances like small-scale subsistence farming, when fixed expenditures are minimal. This was used to accomplish the study's goal (ii). Mathematically expressed as:

GM = TR –VC ...……1

Where:

GM = Gross Margin

TR = Total Revenue

VC = Variable cost

RESULT

Socio-economic Characteristics of Soybean Farmers in the Study Area

The socio-economic characteristics of the respondents are important attributes that play a significant role in soybean production. The variables include, gender, marital status, age, educational status, household size, education etc.

According to Table 1 findings, 90% of soybean growers were men and 10% were women. Additionally, it revealed that 21.25% of respondents were older than 41 and that 68.75% of respondents were married, compared to 13.13% who were single. This suggests that growing soybeans is mostly a married, male-dominated industry, supported by both young and seasoned farmers who are projected to raise living standards and incomes in the research area.

This is consistent with findings from Ukaoha et al. (2022), who found that approximately 82.4% of the population in the Federal Capital area of Abuja were male. This might be a way to get unpaid agricultural labor for the research area's production operations. This agreed with the report of Ukaoha et al., (2022) that majority of soybean farmers in FCT were married.

According to Table 1, 83.13% of people had formal education, whilst 16.87% did not. This suggests that the soybean farmers in the research region are highly literate. It is anticipated that this will increase their production

output. Additionally, it showed that 27.4% of respondents had a home size of 6–10 people, whilst 65% of respondents had a household size of 1–5. This result suggests that the majority of those surveyed had small families. The study also supports the findings of Girei Ohen and Filli (2018), who found that most soybean farmers in Nasarawa, Benue State, Nigeria, had high literacy levels in a related study.

Table 1 further revealed that 57.5% of the respondents had Experience of between 11-30 years while 22.5% had experience of more than 31 years this shows that farmers in the study area have been into soybean production for long period of time. Majority (51.25%) of the respondent had no Access to Credit, either than relying solely on their personal savings for their Soybean production. Farm Size indicated that 71.88% of the respondents had farm size of 1.0 hectare while 8.12% had farm size of <1 hectare and 73.75% of the respondents acquired land through inheritance while 14.38 % and 12.5% acquired land through communal and purchase. Land is a crucial component of production, demonstrating that farmers should expand their sources of agricultural land for optimal yield and not rely on traditional inheritance.

This finding agreed with Girei Ohen and Filli (2018) who reported a small farm size among soybean farmers in Nasarawa State of Nigeria

Table 1. Distribution of Respondents According to Socio-Economic Characteristics (N=160)

Variables	Frequency	Percentage
Gender		
Male	144	90.00
Female	16	10.00
Marital status		
Single	21	13.13
Married	110	68.75
Widow	12	7.50
Divorced	17	10.62
Age		
21-30	34	21.25
31-40	34	21.25
41-50	54	33.75
>50	38	23.75
Level of education		
Primary	21	13.13
Secondary	80	50.00
Tertiary	14	8.750
Adult	18	11.25
None	27	16.87
Household size		
1-5	98	65.00
6-10	45	27.40
>10	17	7.60
Experience in farming		
<11	28	15.00
11-30	89	57.50
31-50	37	22.50
>50	6	5.00
Access to credit		
No	82	51.25
Yes	78	48.75
Farm size		
<1	13	8.12
1-2	115	71.88
>2	32	20.00
Land acquisition		
Inheritance	118	73.75
Purchase	20	12.50
Borrowing	10	6.25
Community owned	23	14.38

Source: Field Survey 2023

Cost and Return Analysis of Soybean Producers

The result of the cost and return of soybean farmers in the study area was presented in Table 2 showed that on average; the estimated total cost incurred was ₦142,667.18. The result indicated that variable cost accounted for a substantial percentage of 88.5% of the total cost of production. On the basis of cost component analysis, cost of hiring Herbicide recorded the highest cost incurred (33.27%) followed by cost of fertilizer (26.96%), transportation (16.96%) and cost of hired labour (8.73%).

Additionally, Table 2 showed that the average gross margin was ₦3,778.1 and the average return on investment was ₦1.02k. This means that for every Naira spent, ₦1.02k was made for each hectare of soybean enterprise during the previous cropping season. Indicating that the soybean business in the research area was lucrative and deserving of investment. This supported the findings of Umar et al. (2011), who reported that the average gross return for organic and inorganic fertilizer applied to the farms in Nassarawa State was ₦59.64k and ₦89.43k, respectively.

Table 2. Average Cost and Return on Soybean Production Per Ha

Items	Average Cost/ha	Percentage of total cost
A Total Revenue	**142,667.18**	
Variable cost		
Family labour	8,038.58	5.78
Hired labour	12,115.74	8.73
Transportation cost	23,568.61	16.96
Fertilizer	37,430.95	26.96
Herbicide	46,200.79	33.27
Soybean seed	11,534.41	8.30
B. Total Cost (TC)	**138,889.08**	**100**
Gross margin (A-B)	**3,778.1**	
Return on investment (ROI)	**1.02**	

Sources: Field Survey, 2023

Problems Confronting the Soybean Farmers in the Study Area

Problems are challenges that must be overcome in order for any business to succeed and reach its objectives. The issues that the soybean growers in the research region faced during the most recent cropping season were listed in Table 3. It revealed that roughly 25.625% of the respondents (ranked first) lacked access to credit, which had an impact on the size of their soybean fields and their ability to sponsor traditional soybean techniques, both of which had an impact on their overall output. Implying that the production of soybeans in the studied area is severely constrained by a lack of finance. Table 3 show that 21.875% of the respondents were challenged by the attack of pest and disease, (ranked 2nd) particularly during the flowering stage which also is a serious factor capable of causing economic loss in Soybean enterprise, it can also be associated with lack of credit, incapacitating the producers' ability to purchasing adequate quantity of insecticides for their proper control. Table 3 also have it that 18.75% of the farmers fell victim of rain shortage (rank 3rd) in

an attempt to avert the damages caused by flood in previous cropping season which some farmers loss their Soybean to. Connoting that most of the Soybean farmers in the study area were risk averters, which made them to fell victim of circumstance in the previous Soybean cropping season. The research also finds out that 12.5% of the respondents faced problems of theft (ranked 4th) by the thieves and mobs having realize the high price paid per unit of Soybean produce compare to other crop and resolved to go into stealing either than going to producing their selves. As a result, the majority of producers lose out on some of the potential profits. Poor access roads, which made it difficult and expensive to get to and from soybean farms, ranked as the fifth most important issue faced by the study area's soybean producers. This decreased their overall profit by raising their production costs.

Table 3 also showed that 6.25% of the soybean farmers in the study area had to deal with poor storage facilities, which came in at number six in the table. They also had to deal with mold, insects, and rats causing harm to their crops due to wet or cold storage conditions. As a result, they were paid less for each unit (sack) of the soybean yield. Due to the large distances traveled on a subpar road network, Table 3 also showed that 5% of the soybean producers in the research area experienced unsatisfactory prices (ranked seventh) from rural purchasers. This suggests that just 1.25% of the respondents faced drought as a result of a lack of rain at the end of the season, and that soybean producers in remote areas were paid less than those whose locations were closer to the market with reasonably motor able road networks. Their soybean farmers were forced to broadcast twice as a result. Demonstrating that they had to pay more for labor and planting supplies

Table 3. Problems Confronting Soybean Farmers in the Study Area

Problems	**Frequency**	**Percentage**	**Rank**
Lack of access to credit	41	25.63	1
Pest &diseases	35	21.88	2
Insufficient rainfall	30	18.75	3
Pilfering & theft	20	12.50	4
Poor access road & transport	14	8.75	5
In adequate storage facility	10	6.25	6
Poor price	8	5.00	7
Adverse climate condition	2	1.25	8
Total	**160**	**100**	

Source: Field Survey 2023

DISCUSSION

The study focused on the economic analysis of soybean production in a selected Local Government Area in Niger State, Nigeria. This study provides a detailed description of the socioeconomic characteristics of soybean growers, the costs and benefits of soybean production, and the challenges facing soybean cultivation in the study area. 160 respondents were randomly chosen from 16 villages spread throughout four Local Government areas, proportionate to the

sample frame of each village, in order to collect primary data using a structured questionnaire. The data was analyzed using descriptive statistics and farm budgeting.

The findings of the socioeconomic characteristics analysis showed that 42.5% of the population was between the ages of 21 and 40, suggesting that there is labor available to boost soybean output and that young people in the research area who are economically engaged are willing to embrace and implement new production concepts. Approximately 10% of respondents were women, 57.5% of respondents had 11–30 years of experience in the soybean industry, and 50% of respondents had a secondary school diploma and accepted soybean cultivation for its high return to fund their educational endeavors. For every naira invested, ₦1.02K was realized per hectare of soybean farm in the study area, according to the results of the cost, return, and profitability analysis. The average gross farm income (GFI) was ₦14266718k per hectare, the average gross margin (GM) was ₦3,778.1k, and the average rate of return per hectare realized was 1.02. Indicating that soybean businesses in the research sector were lucrative and deserving of investment.

CONCLUSIONS

Based on the findings of this study, it was concluded that majority of the respondents were males, married and in their active age. Also, the respondents had better experience in soybean production and acquired land through inheritance. The gross margin analysis showed that soybean is a profitable business in the study area. The major challenges encountered by soybean farmers were lack of access to credit, pest and disease, high cost of transportation, interest rate.

Based on the findings of this study, the following recommendations were made with a view to make the soybean producers more efficient profitably;

1. Feeder roads should be constructed by government in order to ease the problem faced by farmers in moving their goods.
2. Soybean producers in the study area are hereby encourage to join and participate actively in the cooperative membership to enable them pool resources together to help in financing of their farming business and also to apply for loan from financial institution as more emphasis are paid to assisting association than individual.
3. The government should provide the farmers with the adequate production inputs particularly fertilizer and tractor services at the appropriate time through a direct supply at a subsidize rate in order to boost their output for the realization of super normal profit in soybean enterprise in the study area.
4. Farmers should be informed about new and improved inventions by the extension agents. To reduce losses brought on by weather and climatic changes in the research area, give them accurate weather forecast interpretation.

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