

Profitability Analysis of Soybean Production (2024/2025 Production Season) in Funtua Agricultural Zone of Katsina State, Nigeria

Eleanya, Chidinma Martina; Beli Sanusi Abdullahi and Musa, Junaidu

Department of Agricultural Economics, Federal University Dutsin-Ma, Katsina, Nigeria.

Corresponding author: chidinmaeleanya@gmail.com

DOI: <https://doi.org/10.62154/ajasfr.2026.022.01023>

Abstract

The study analysed profitability of soybean in Funtua agricultural zone (KTARDA II) of Katsina state. Multi-stage sampling procedure was used to select 159 soybean farmers. Farmers' socio-economic characteristics, costs and returns of soybean production and constraints they faced were addressed. Structured questionnaire was used to collect data from the farmers. The data were analysed using descriptive statistics, Farm Budgeting Technique, depreciation methods, Benefit cost ratio and regression analysis. Majority (90.6%) of the farmers were male; their average age was 40.5 years. Most (99.4%) of the farmers had formal education. Their average household size, land size and soybean farming experience were 16 persons, 4.5ha and 10.7 years, respectively. Majority (86.16%) were not members of cooperative societies; 83.65% had no contact with extension agent. The average variable, fixed and total cost incurred by the farmers were ₦88,631.73/ha, ₦51,709.91/ha and ₦140,341.64/ha, respectively. The average gross margin, profit and Benefit Cost Ratio obtained by the farmers were ₦1,259,322.06/ha, ₦1,207,612.15/ha and 9.60/ha, respectively. The most critical constraints faced by the farmers were inadequate capital, insecurity, price fluctuations, and extension services as admitted by 91.8%, 90.6%, 81.1% and 55.3% respectively. Only 14.5% and 13.8% reported that they had problems of market gluts and government policies, respectively. It is concluded that soybean production in Funtua Zone is profitable. It is recommended that extension contacts, access to credit facilities and security issues should be improved; soybean farmers should organise themselves into strong cooperative societies.

Keywords: Soybean, Profitability, Production, Farm Budgeting, Katsina State, Smallholder Farmers.

Introduction

Soybean (*Glycine max*) is an important leguminous crop which originated from Eastern Asia (Shurtleff and Aoyagi, 2021). Soybean is one of the world's major crops and has been cultivated since nearly 5000 years because of its agronomic and nutritional value (Bingfu *et al.*, 2022). It is among the best sources of plant-based protein. It has an average protein content of 40% (Collombet, 2013) and is more protein-rich than any of the common vegetable or animal food sources. Soybeans are highly digestible and provide protein quality comparable to animal sources due to their balanced amino acid profile. Soybean is

among the major industrial and food crops grown in every continent (FAOSTAT, 2011). In the world, soybean is one of the most essential pulse crops. African soybean production was estimated to be around 3.5 million metric tons as of 2022 (FAO, 2022).

Soybean was introduced in Nigeria in 1908 in Benue State. It is widely cultivated in Nigeria for food, oil and feed purposes. It grows well in many states of the federation such as Benue, Taraba, Kaduna, Plateau, Niger, Nasarawa, Jigawa, Katsina, Kebbi, Sokoto, Zamfara, Kwara, Abuja, Bauchi and Borno. The Northern region of Nigeria has experienced an increase in number of industries especially oil mills, livestock feed mills, and cereal processing industries due to the availability of soybean produced in the region. In Nigeria, soybean production is gaining increasing importance with the crop now being cultivated in almost all ecologies, but with great potentials in Guinea Savannas where parts of Katsina State lies and where rainfall and soil conditions are suitable for soybean production.

Soybean production in Katsina state is majorly grown in Funtua agricultural zone. The state contributes to soybean production and export in Nigeria. A total of about nine (9) tons of soybean were initially exported from Nigeria in 1947 from cultivation in Benue, Zaria and Katsina (Shurtleff and Aoyagi, 2021). Soybean production in Katsina state as of 2022 was about 0.8 to 11 tons per hectare Samuel *et al.*, (2022). To boost soybean production in the state, the government came up with the initiative of 5,000 hectare of soybean production project in 2023. The project aimed at enhancing soybean cultivation, contributing to agricultural diversification and economic growth in the state (Katsina Investment Promotion Agency, 2023).

Over fifty products can be derived from soybean, as such it is a versatile source of food as it can be cooked, fermented, dried, and converted into products like milk, flour, tofu and more (Steve, 2017). In Nigeria today, soybean is processed into soy-ogi (fortified pap), soy liquid milk, soy flour, and soy fortified soup (Nwofoke *et al.*, 2025). In terms of its nutritional value, it can serve as a substitute for meat and to some extent for milk. Soybean is used for a variety of purposes including preparation of different kinds of soybean food in the household, such as soybean milk. In addition, the poultry industry uses soybean for feed production. The crop residues are also rich in protein and are good feed for livestock or form a good basis for compost manure N2Africa, (2014).

Statement of the Problem

Despite the importance of soybean in Nigeria's agricultural sector, the soybean production in Katsina state still faces numerous challenges, hindering its full potential. Soybean yields in the state are significantly lower than global averages due to inadequate farming practices, poor seed quality, and limited access to inputs (Ogunnaike *et al.*, 2020). Furthermore, Soybean produced in Katsina state often fail to meet international quality standards, limiting export opportunities (Ajewole *et al.*, 2019). In Katsina state, soybean production is also faced with the issue of insecurity which had greatly affected production. The World Bank (2020) reported that infrastructure deficits significantly impact agricultural productivity in Nigeria. Most of the soybean farmers are small holder farmers hence they

do not use modern agricultural technologies or practices thereby limiting their potential yields. Ukaoha *et al.*, (2022) reported that many constraints have been militating against soybean production in Nigeria.

The current insecurity situation in the state has become a critical constraint against soybean production. Most soybean studies did not address this important factor. Existing studies have not adequately examined how factors such as insecurity, inadequate capital, poor extension contact and fluctuation in soybean market prices, influence the profitability of soybean production in the area. Hence, there is not adequate information to guide the farmers, agricultural stakeholders and policymakers on the actual economic performance of soybean farming and the major constraints that limit its productivity and profitability in the study area. Thus, it is important to investigate and evaluate the current profitability status of soybean production in the state and how it can be improved for the betterment of its farmers, marketers and the society in general. The study also seeks to answer important questions regarding whether soybean production is profitable in the study area and the factors limiting its best performance.

Objectives of the Study

The broad objective of this study was to analyse the profitability of soybean production in Funtua Agricultural Zone of Katsina State, Nigeria during the 2024/2025 production season. While the specific objectives were to:

- examine the socio-economic characteristics of soybean farmers in the study area;
- determine the costs and returns associated with soybean production in the study area;
- analyse the profitability of soybean production in the study area; and
- identify the major constraints affecting soybean production in the study area.

Research Questions

The study seeks to provide answers to the following research questions:

- i. What are the socio-economic characteristics of soybean farmers in the study area?
- ii. What are the costs and returns associated with soybean production in the study area?
- iii. Is soybean production profitable in Funtua Agricultural Zone of Katsina State?
- iv. What are the major constraints affecting soybean production in the study area?

Theoretical Framework

This study stands on Profit Maximisation Theory and is supported by the Farm Household Theory. These frameworks provide a basis for understanding how the farmers make production decisions, allocate their resource, and the profitability outcomes in soybean production in Funtua Agricultural Zone of Katsina State.

Profit Maximisation Theory

The Profit Maximisation Theory is one of the major economic theories used in agricultural production and farm management studies. This theory assumes that farmers operate their farms with the main objective of maximising profit. According to the theory, farmers combine their available resources such as land, labour, seeds, herbicides, fertilizer, pesticides and capital in such a way that production costs are minimised while maximising output and returns. Profit is achieved when the difference between total revenue and total cost of production is positive and at its highest possible level.

In soybean production, the farmers make decisions that deals with the quantity and quality of inputs to use, farm size to cultivate, labour (family or hired), and marketing strategies based on returns expected. The profitability of soybean farming therefore depends on the relationship between production costs and output revenue. This theory guided the use of farm budgeting techniques, gross margin analysis, net farm income, and benefit-cost ratio in assessing the economic viability of soybean production in the study area. The theory also helped in the selection of variables used in the study, which include; variable and fixed costs, total revenue obtained from sales of soybean and profitability indicators such as gross margin, net profit, and benefit-cost ratio.

The theory proposes that farmers will continue producing as long as the revenue gotten from soybean production is greater than the associated production costs. The theory was relevant to this study because profitability analysis focuses on determining whether soybean production generates adequate returns relative to the costs incurred by farmers. The interpretation of the study findings was as well guided by the theory, as profitability was evaluated based on the ability of soybean farmers to produce returns that are above the production costs.

Mathematically this can be expressed as:

$$\text{Profit } (\pi) = \text{Total Revenue (TR)} - \text{Total Cost (TC)} \dots\dots\dots(i)$$

Where:

$$\text{TR} = \text{Price} \times \text{Output}$$

$$\text{TC} = \text{Fixed Cost} + \text{Variable Cost}$$

Farm Household Theory

This theory is also known as Agricultural Household model. This theory explains that farm production and household decisions are closely interrelated, especially among smallholder farmers in developing countries. It is an economic model that looks at farming household as a combination of two distinct economic entities: a profit-maximising firm as well as a utility-maximising household. The theory acknowledged that farmers' socio-economic characteristics has effects on their production behaviour, resource use, and income generation. Factors such as age, gender, level of education, household size, farming experience, access to extension services, and access to credit can impact farmers' efficiency and profitability. This framework guided the addition of socio-economic variables in the study to investigate how farmers' characteristics influence soybean production and

profitability. This theory also helped in understanding the various constraints soybean farmers faced in production, such as inadequate capital, poor extension services, insecurity, market price fluctuations and high cost of farm inputs.

Literature Review

Soybean production has greatly expanded globally over the past decades due to the high demand for plant protein, vegetable oil, livestock feed, and industrial raw materials. Globally, soybean remains one of the most important grain legumes. The world leading soybean producing countries are Brazil 163, United States 112, Argentina 48, China 20.5, India 11, Paraguay 10, Canada 6.7, Russia 6.0, Ukraine 4.8, Boliva 3.3 million Metric tons (The United States Department of Agriculture (USDA) 2023). It is one of the world's most important pulse crops with an annual worldwide production of about 396,850 million tons in 2023 USDA (2023).

Soybean was introduced to Nigeria in 1908 but extensive production only began in 1937 using the 'Malayan variety' found suitable in Benue State. The three major soybean producing states in Nigeria are; Benue, Kaduna and Taraba. Currently soybean production is expanding in other states of the federation. The expansion of soybean production in other states was accredited to its nutritional composition and economic importance (Nater *et al.*, 2021). Between 2010 and 2023, the soybean meal crop in the country increased in output, registering the highest growth in 2015, at about 46 percent compared to the preceding year (Dokua, 2023). Nigeria presently produces about 688,000 MT of soybean annually making it the largest cultivator of the crop on the African continent (Statista, 2024).

Smallholder soybean farming in Nigeria can be profitable when the farmers have access to adequate capital, improved technologies, productive inputs, and efficient markets. Soybean production in Nigeria is profitable, although the level of profitability differs across regions due to differences in input use, farm management, and access to markets. Studies in profitability analyses conducted in northern Nigeria generally reported positive gross margins and favourable benefit-cost ratios among soybean farmers. These findings indicates that soybean production has strong potential to improve rural household income and livelihoods. In a recent empirical study by Anthony *et al.*, (2022), in the Federal Capital Territory. They revealed that soybean farmers achieved positive gross margins and significant profit efficiency using stochastic frontier analysis, indicating that most farmers were operating below optimal efficiency levels but still generating profit from production activities. This suggests that improved resource use efficiency could further advance profitability. Profitability among soybean farmers does not only depends on prices of the output but also on the efficient utilization of inputs such as improved seed varieties, fertilizer, labour and different agrochemicals used. Also access to agricultural credit, extension services and cooperative membership are important for improving productivity and reducing production inefficiencies. Farmers with better management capacity, good access to extension agents, and technical knowledge tend to achieve higher efficiency and better returns.

Soybean production faces numerous constraints, Ukaoha *et al.* (2022) in their study on the Profit Efficiency of Soybean Production in Federal Capital Territory, Nigeria identified many constraints militating against soybean production in Nigeria. They include; bad roads that linked the farms and the markets, government policy, outbreak of diseases, inadequate land for soybeans cultivation, lack of hired labour among others. In Kwara State, Oyenpemi *et al.*, (2023) confirmed that soybean production contributes significantly to rural household income and poverty reduction. However, they emphasized that production remains constrained by high input costs and limited access to improved technologies, which reduce net profitability despite favorable market demand. Olawuyi and Afolami (2023) found that inefficiency in soybean production is largely driven by inadequate access to credit, low education levels, and poor extension services.

Research Gap

Several studies have examined the profitability and efficiency of soybean production in Nigeria, most are concentrated in the North-Central and Middle Belt regions. Limited empirical information exists on soybean profitability under the rising security challenges in the North-West, particularly Katsina State. Although recent studies acknowledge insecurity as a major agricultural challenge, few studies have explicitly examined how insecurity interacts with other socio-economic and institutional factors to influence soybean profitability at the farm level. There is limited recent empirical research focusing specifically on the profitability of soybean production in Funtua Agricultural Zone of Katsina State during the 2024/2025 production season. Most existing studies are either conducted in other states, or focused broadly on northern Nigeria without location-specific analysis. This study therefore seeks to fill these gaps by providing updated profitability analysis of soybean production in Funtua Agricultural Zone of Katsina State under contemporary production conditions in 2024/2025 season. The study integrates socio-economic characteristics, farm budgeting analysis, benefit-cost ratio assessment, regression analysis and production constraints in order to provide a more comprehensive understanding of soybean profitability in the study area.

Materials and Method

Description of the Study Area

Funtua agricultural zone of Katsina state popularly known as Katsina State Agricultural and Rural Development Authority Zone II (KTARDA II), consists of nine local government areas (LGAs) that are located in the southern part of the state. The name Funtua means 'place of abundance' or fertile land' in the Hausa language. It is an important agricultural, commercial and industrial centre in the state.

The zone has a tropical savanna climate with distinctive wet and dry seasons. It has an average total rainfall of about 750 - 800mm per annum with rainfall duration of 5 to 6 months with August being the peak of the rain fall. The zone has an average temperature

of about 32°C and humidity of 44%. Evaporation is higher in the dry season and lower in the wet season (Adefila, 2014).

The zone is located within the northern Guinea savanna vegetation belt which have rich black soil suitable for large scale farming. Major crops grown in the zone are; maize, cotton, millet, groundnuts, soybeans and sorghum.

Sample Size and Sampling Technique

Multistage sampling procedure was used in selecting the sample size for this study. The first stage involved purposive selection of the major soybean producing zone in the state which is Funtua zone. After this, contact was made with *Katsina* State Agricultural and Rural Development Authority in which a list of soybean farmers was obtained from the zone. The second stage involved the selection of three LGAs (Funtua, Bakori and Dandume) from the list obtained purposively due to higher concentration of soybean farmers in the LGAs (the three LGAs had a total of 263 registered soybean farmers). The third stage was a random selection of three communities from each of the selected LGAs making a total of nine communities. Yamane formula was used to determine the number of soybean farmers interviewed as follows:

$$n = \frac{N}{1 + N(e)^2} = \frac{263}{1 + 263(0.05)^2} = 159 \quad \dots\dots\dots (ii)$$

Where;

n = sample size

N = total population size

e = precision level 5% (0.05)

The number of soybean farmers in the LGAs and communities were selected proportionately as can be seen in Table 1.

Table 1: Sampling procedure for the farmers

LGAs	Selected Communities	Total Number of Registered Soybean Farmers	Sample Size
Funtua	Makera	68	41
	Mai Gamji	81	49
	Masaka	19	11
	Total	168	101
Bakori	Kurami	57	34
	Yan Kwana	14	8
	Kabomo	1	1
	Total	72	43
Dandume	Mahuta	21	13
	Nasarawa	1	1
	Unguwar Jika	1	1
	Total	23	15
Total Number of Respondents Sampled			159

Source: Reconnaissance Survey, 2024

Data Collection

Primary data was used for this research. Data was collected from the respondents through the use of questionnaires. Questionnaires were administered to the farmers to get information from them about their production activities.

Data Analysis

The data collected was analysed using descriptive statistics, farm budgeting technique, depreciation method, benefit cost ratio and regression analysis.

Model Specification

Farm Budgeting Technique

This is specified as:

$$NFI = TR - TC (TVC + TFC) \dots\dots\dots (iii)$$

Where:

NFI = Net Farm Income (naira/ha)

TR = Total Revenue (naira/ha)

TC = Total Cost (naira/ha)

TVC = Total Variable Cost (naira/ha)

TFC = Total Fixed Cost (naira/ha)

Depreciation Method

This is expressed as:

$$Depreciation = \frac{P-S}{n} \dots\dots\dots (iv)$$

Where:

P = Purchase price (naira)

S = Salvage value

n = Useful life

Benefit Cost Ratio

This is specified as:

$$BCR = \frac{TR}{TC} \dots\dots\dots (v)$$

Where;

BCR = Benefit cost ratio

TR = Total revenue

TC = Total cost

Regression model

To analyse factors influencing profitability, an implicit functional model is specified as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + U_i \dots\dots (vi)$$

Where;

Y = Profitability of soybean production (N)
 X_1 = Age (years)
 X_2 = gender (1 = male, 0 = female)
 X_3 = Household Size (number of persons)
 X_4 = Marital status (1 = Single, 0 = married)
 X_5 = level of education (number of years)
 X_6 = Years of Experience in soybean production (number of years)
 X_7 = Farm size (ha)
 X_8 = Contacts with extension agents (number of visits monthly)
 X_9 = Access to credit
 α = constant term
 $\beta_1 - \beta_9$ = parameters to be estimated
 U_i = error term

Results and Discussions

Socio-economic Characteristics of the Soybean Farmers

The results in Table 2 show that majority of the soybean producers were male (90.6%). This indicates a strong male dominance in soybean farming in the study area, which is common in many Nigerian agricultural settings, perhaps due to cultural norms and gender roles. This gender differences suggests that soybeans production in the study area is primarily a male activity. This is in line with a study by Abdullahi *et al.* (2023) who reported that male farmers (75.2%) dominated soybean production in Gombe State.

Findings from Table 2 revealed that a major proportion (32.1%) of the farmers are within age range of 41–50 years, with a mean age of 40.5 years. This is in line with the work of Amadu *et al.* (2024) who reported that average age of the soybean's farmers was 47 for the male and 48 for the females. This implies that soybean farming is dominated by middle-aged and older adults, which could influence the adoption of new technologies and farming practices.

The data in Table 2 also showed that almost half (46.5%) of the farmers had primary education, while 32.1% had secondary education, and 20.8% obtained tertiary education. This educational acquisition can influence farmers' ability to understand and implement improved agricultural practices.

Table 2: Socio-economic characteristics of soybeans producers (farmers)

Variable	Categories	Frequency	Percentage	Mean
Gender	Male	144	90.56	
	Female	15	9.43	
Age	11 – 20	2	1.26	40.5
	21 – 30	30	18.86	
	31 – 40	25	15.72	
	41 – 50	51	32.08	
	51 – 60	49	30.82	

Variable	Categories	Frequency	Percentage	Mean
Educational Level	61 – 70	2	1.26	
	Informal Education	1	0.63	
	Primary	74	46.54	
	Secondary	51	32.08	
	Tertiary	33	20.75	
Marital Status	Single	31	19.50	
	Married	128	80.50	
House Hold size	1 – 10	59	37.10	16.3
	11 – 20	47	29.56	
	21 – 30	34	21.38	
	31 – 40	12	7.55	
	41 – 50	5	3.14	
	51 – 60	2	1.26	
Farm Size	1 – 2	63	39.62	4.5
	3 – 4	72	45.28	
	5 – 6	22	13.84	
	7 – 8	2	1.26	
Years of Soybeans Farming Experience	1 – 10	94	59.12	10.7
	11 – 20	59	37.11	
	21 – 30	5	3.14	
	31 – 40	1	0.63	
System of Farming	Subsistence	31	19.50	
	Commercial	128	80.50	
Source of Capital	Personal savings	123	77.36	
	Banks	5	3.14	
	Cooperative society	6	3.77	
	Friends and family	5	3.14	
	Self, Cooperative society and friends and family	2	1.26	
	Self and friends and family	18	11.32	
Member of Cooperative Society	Yes	22	13.83	
	No	137	86.16	
Contact with Extension Agent	Yes	26	16.35	
	No	133	83.65	
Variety of Soybean Grown	Improved	14	8.81	
	Local	145	91.19	
Source of Soybeans Seeds	Own seed	36	22.64	

Variable	Categories	Frequency	Percentage	Mean
	Other farmers	2	1.26	
	Market	74	46.54	
	KTARDA	5	3.15	
	Own seed and market	38	23.90	
	Market and KTARDA	3	1.89	
	Other Farmers and market	1	0.63	
Total respondent		159		

Source: Field survey, 2025.

As shown in Table 2 majority (80.5%) of the producers were married, which implies that the farmers could have household members that could offer assistance in carrying out farm activities. This agrees with the study by Mohammad *et al.* (2022) who reported that 80.0% of the farmers they sampled were married.

The results displayed in Table 2 revealed that the farmers had an average household size of 16 members and most of the households fall within 1–10 members (37.1%) and 11–20 members (29.6%) categories, indicating large families. Large household sizes may provide labour for farming operations but could also indicate high dependency ratios.

It can be seen from the results in Table 2 that 45.28% of the farmers had farm land size between 3 - 4 hectares, with an average farm size of 4.5 hectares. This indicates smallholder farming operation which may limit mechanization.

The data in Table 2 showed that majority (59.1%) of the farmers had 1 – 10 years of farming experience while 37.1% had 11 – 20 years of farming experience. It can also be noticed from the results that majority of the farmers 80.5% are involved in commercial farming while only 19.5% are engaged in subsistence farming. This suggests potential for income generation from soybean production and increased profitability.

Most farmers (77.4%) as can be observed from the results in Table 2 rely on personal savings for their soybeans farming activities. This implies they have limited access of funds from banks, cooperatives, and friends and families. This dependence on personal funds may limit production and expansion. This is in line with the study Ogbanje (2023) who revealed that majority of the soybean farmers (60.50%) lacked access to credit facilities. Findings from Table 2 depicted that only 13.8% of the soybean farmers belong to cooperative societies, this may limit access to inputs, credit, farm machineries, market information and other benefits. The results also revealed that only 16.4% of the farmers had contact with extension agents. This could negatively affect the dissemination of important farming information and innovations among other benefits.

It can be seen from the results in Table 2 that majority (91.2%) farmers cultivate local varieties of soybeans. This shows low adoption of improved seeds which might result in lower productivity and hence, reduced profitability. This has important implications for long-term productivity, sustainability as well as food security. The farmers may have preferred local varieties due to their affordability, ability to adapt to local conditions, and ease of getting the seeds. The use of improved soybean varieties is often associated with

higher yields, better resistance to pests and diseases and shorter maturity periods. Hence, low adoption suggests that many farmers may not be benefiting from technological advancements capable of improving production efficiency and farm resilience. In the long term, as the farmers continues to depend on local varieties it may lead to stagnant or declining productivity, especially under increasing pressure from degradation of the soil, climate change, and also rising costs of production. Lower-yielding varieties can reduce the quantity of soybean available for consumption, processing, and market supply, hence affecting income generation and food availability. Also, this low adoption of improved varieties may hinder national and regional food security goals, especially as soybean plays a vital role in household nutrition, livestock feed, and industrial raw materials.

The results also showed that 46.5% of the farmers obtained seeds from markets, while 23.9% from a combination of own seed and market, whereas 22.6% used their own saved seeds. Only 3.1% accessed seeds from KTARDA. This may affect seed quality and productivity as the viability of the seeds obtained from the market might not be known.

Costs and Returns of Soybean Production

Table 3 presents the costs and returns analysis of soybean production. It revealed that average Total Variable Cost (TVC) incurred by the farmers was ₦ 88,631.73/ha while the average Total Fixed Cost (TFC) was ₦ 51,709.91/ha. The average Total Cost (TC) was ₦ 140,341.64/ha. It can be seen from the results that the land rent has the highest proportion among the cost outlays accounting for 35.63% of the total cost. This implies that farm land is a very valuable asset in KTARDA II. It is also an indication that there was difficulty in obtaining land for soybean production. Family accounts for only 0.80% of the total cost implying that the farmers mostly relied on hired labour for their production activities. This might be that most of the family members were engaged in other activities such as schooling, off-farm activities, among others. It might be that some of the members were too young to carry out farm activities. This might be possibly the reason why hired labour occupied the major proportion (24.07%) of the total variable cost.

The data in Table 3 showed that the Total Revenue (TR) obtained by the soybean farmers was ₦1,347,953.79/ha and a Gross Margin (GM) of ₦1,259,322.06/ha. The farmers obtained a profit (net farm income) of ₦1,207,612.15/ha. This indicated that soybean production is highly profitable in KTARDA II. The farmers had a Benefit-Cost Ratio (BCR) of 9.60 indicating that for every ₦1 invested in soybean production, farmers earned ₦9.60; the high profit and benefit cost ratio is substantially higher than the findings of previous studies within Nigeria and other developing nations. It was accounted for the appreciable prices of soybean products enjoyed by the producers during the season (2024/2025). This finding differed from those of Rasaki, *et al.* (2020), who reported that soybean farmers in Ibarapa zone of Oyo state obtained a profit of ₦ 230,530.11 and BCR of 1.63.

The substantial difference between the present study and earlier findings suggests that soybean production conditions in the study area during the 2024/2025 production season may have been influenced by certain unique condition. The discrepancy might be due to

the differences in price enjoyed by the farmer, costs of production and climatic conditions of the two areas. Other possible explanation for this unusually high BCR is the prevailing commodity price conditions during the 2024/2025 marketing season. Nigeria experienced persistent food inflation, currency depreciation, and increased demand for foods that are rich in protein and industrial raw materials, all of which contributed to higher soybean market prices. In this circumstance, the observed BCR may partly reflect favorable short-term market conditions rather than a permanently stable profitability structure.

Table 3: Costs and returns analysis of soybean production

Items	Cost/ha (N)	Percentage of Total Cost
Variable Inputs		
Seeds	13,613.45	9.68
Fertilizers	23,676.47	16.87
Herbicides	1,500.00	1.07
Pesticides	3,577.73	2.55
Labour		
Hired labour	33,788.45	24.07
Family labour	1,157.98	0.80
Transportation	2,437.61	1.74
Ridging	3,202.73	2.28
Tractor hire	3,105.04	2.21
Bagging cost (pieces)	2,572.27	1.83
Total Variable Cost	88,631.73	63.15
Fixed Costs		
Land rent	50,000.00	35.63
Store rent	630.25	0.45
Hoe	244.64	0.20
Cutlass	223.21	0.16
Knapsack sprayer	611.81	0.41
Total Fixed Cost	51,709.91	36.85
Total cost	140,341.64	100.00
Total Revenue	1,347,953.79	
Gross Margin	1,259,322.06	
Profit	1,207,612.15	
Benefit–Cost Ratio	9.60	

Source: Field survey, 2025

Constraints Faced by the Soybean Farmers

The constraints faced by the soybean farmers are presented in Table 4. The results revealed that soybean farmers faced numerous challenges which could lead to reduction in soybean productivity. The major constraint faced by the farmers is inadequate capital. This was pointed out by 91.8% of the farmers. They pointed out that they do not have good access to credit facilities, hence they have to rely on personal savings to finance the cost of

production which is often inadequate. Mohammed, Alhassan and Jatoe (2018) pointed out that inadequate farm credit was a major constraint to soybean production. Also, Alabi *et al.* (2024) stated that lack of credit was one of the major constraints faced by soybean farmers in north west, Nigeria. The second major constraint was insecurity, which was admitted by 90.6% of the farmers. They complained that insecurity is a serious threat that is affecting their production. They asserted that some farmers had abandoned their farm land while others had fled their homes to save their lives. This has greatly influenced soybean yield in the study area. The third critical constraint was price fluctuations. The price of soybean fluctuates over time and this plays a major role in determining their farm incomes and what can be produced by the farmers.

Other constraints admitted by the farmers include; inadequate extension services (55.3%), high cost of farm inputs (52.2%), high cost of transportation (42.1%) and inadequate supply of farm inputs (41.5%). However, the study does not agree with a study by Ukaoha *et al.* (2022), who pointed out that government policy and outbreak of diseases were the major constraints faced in soybean production in Federal Capital Territory, Nigeria.

The findings in Table 4 revealed that only 26.4%, 14.5% and 13.8% admitted that they had problem of bad roads, market gluts and government policies. This implies the demand of soybean products in Katsina State is appreciable and the government is doing its best in providing good roads and agricultural policies.

Table 4: Distribution of respondents according to constraints faced

Constraints	Frequency	Percentage	Ranking
Inadequate capital	146	91.8	1 st
Insecurity	144	90.6	2 nd
Price fluctuations	129	81.1	3 rd
Inadequate extension services	88	55.3	4 th
High cost of farm inputs	83	52.2	5 th
High cost of transportation	67	42.1	6 th
Inadequate supply of farm inputs	66	41.5	7 th
High cost of labour	57	35.8	8 th
Inadequate storage facilities	56	35.2	9 th
Low yielding variety	48	30.2	10 th
Problem of pest and diseases	44	27.7	11 th
Bad road	42	26.4	12 th
Marketing gluts	23	14.5	13 th
Government policies	22	13.8	14 th

Source: Field survey, 2025.

Factors Influencing Soybean Profitability

Data in Table 5 revealed that sex was significant at the 5% level. This indicates that male farmers earned approximately ₦4,050.20 more profit per hectare than female farmers. The

result suggests that gender plays a vital role in soybean profitability. Male farmers may have better access to land, farm inputs and production resources when compared to female farmers. The result is in line with the findings of Kamara *et al.*, (2022), who observed that male soybean farmers recorded higher profits than female farmers. The net revenue of the female farmers was lower by about 20% as compared to the male farmers.

As indicated in Table 5, marital status was negative but significant at the 5% level. This implies that married farmers earned about ₦3,191.85 lower profit per hectare compared to unmarried ones. This negative outcome may be related to increased household responsibilities and financial commitments among married people which reduce the amount of farm income available as profit.

Results displayed in Table 5 revealed that level of education was negatively significant at the 10% level. This means that for each additional increase in educational level was reduction in profit per hectare by approximately ₦1,512.43. The negative relationship may indicate that more educated farmers tend to diversify into non-farm activities, hence reducing their level of involvement in soybean production. This result disagrees with the findings of Rasaki *et al.* (2021), who observed that higher educational attainment increases soybean output, hence, more profit.

From the results in Table 5, it shows that farm size had a positive coefficient and was highly significant at the 1% level. The result shows that each one-hectare increase in farm size resulted in increased profit per hectare by approximately ₦3,395.88. This suggests that larger farms benefit from economies of scale and higher production output. The result is in line with the findings of Mairabo *et al.*, (2023), who reported a positive relationship between farm size and output of soybean in Mariga and Rafi local government areas of Niger State.

Table 5: Factors influencing soybean profitability

Variables	Coefficients	Std. Err.	t-value	P>t
Sex	4050.204**	1786.018	2.27	0.025
Age	75.80996	68.6524	1.10	0.271
Level of Education	-1512.428*	807.385	-1.87	0.063
Marital Status	-3191.845**	1589.565	-2.01	0.046
Household Size	84.66888	60.90712	1.39	0.167
Farm Size	3395.883***	372.443	9.12	0.000
Soybean Farming Experience	-157.3162	100.2556	-1.57	0.119
Extension Contact	1606.734	1481.445	1.08	0.280
Access to creidt	2077.163	1846.396	1.12	0.262
Constant	-1296.129	4073.772	-0.32	0.751

Source: Field Survey, 2025

N = 159, R² = 0.4657, F-statistic = 14.43, ***, **, * are significant levels at 1%, 5% and 10%, respectively.

Conclusion and Recommendations

Conclusion

Soybean production in Funtua Zone (KTARDA II) of Katsina State, even though dominated by male who are relatively young, and well educated, with an average farming experience of 10.7 years and an average farm size of 4.5 hectares was profitable. However, there was weak institutional support which was evident due to low extension contact and limited cooperative membership.

The cost and return analysis showed that soybean production is highly profitable, with a positive net farm income and a benefit-cost ratio (BCR) of 9.60. The high BCR indicated both production efficiency and favourable market conditions. It also indicates strong economic viability under the 2024/2025 production conditions.

There were different types of constraints faced by the farmers, the major constraints identified include inadequate access to capital, insecurity, high input prices, and weak extension services, these constraints significantly affect production efficiency and long-term sustainability. If addressed appropriately could help to improve the production level and net farm incomes of the farmers, which can in turn help in the improvement of their living standard.

The limitation of this study is that it was based on cross-sectional data which was collected from a single production season (2024/2025). This limits the ability to generalise the findings across multiple seasons, this is because agricultural profitability is highly sensitive to inter-annual variations in weather conditions, input prices, and output market dynamics. Also, the high benefit-cost ratio of 9.60 observed may partly reflect a typically favourable commodity price environment during the 2024/2025 season which could be influenced by strong demand of soybean from agro-processing industries and supply disruptions linked to insecurity in parts of northern Nigeria.

Recommendations

Based on the outcomes of the study the following recommendations were made:

- i. The study identified that there was limited access to credit by the farmers. Thus, there is need for government agencies and financial institutions such as bank of agriculture to develop accessible and affordable credit facilities tailored to the needs of the soybean farmers to facilitate production expansion and technology adoption.
- ii. The study revealed that the level of extension contacts between the soybean farmers and extension agents was very low. Thus, the government should put more effort to improve contacts among the farmers by increasing the extension agent-to-farmer ratio through targeted recruitment and deployment of additional extension officers in soybean-producing communities. As well as establishing block farming extension clusters, where each extension officer is assigned a clearly defined number of villages for regular visits and monitoring.

- iii. The study also revealed that majority of the soybean farmers were not members of cooperative societies. Thus, the farmers should form strong cooperative associations as this will enable them to access loans from different sources, government and NGOs assistance, among other numerous benefits.
- iv. It was observed that there was low adoption of improved soybean varieties among the farmers. Thus, agricultural development agencies should subsidise distribution of certified improved soybean seeds through accredited agro-dealers and cooperative societies. They should as well carryout demonstration plots and yield comparison trials in farming communities to visibly demonstrate to the farmers the yield advantage of improved varieties.
- v. The study also identified that the issue of insecurity is a threat to the farmers' productions activities. It is recommended that government should collaborate with reliable security agencies to create a safe environment for production and marketing activities of soybean products.

References

- Abdullahi, S. B., Mohammed, B., & Yakubu, S., (2023). Determinants of adoption of soybean production technologies among small scale farmers in the central agricultural zone of Gombe state, Nigeria. *Journal of Agripreneurship and Sustainable Development*. 10.59331/jasd.v6i1.388.
- Alabi, O. O., Maharazu, I., Aluwong, J. S., Atteh, P. A., & Obida, A., (2024). Socio-economic evaluation and technical efficiency of soybean (*Glycine max*) production in north west, Nigeria: A parametric approach. *SUV – International Journal of Agricultural Sciences*. 6(3), 36 – 46. Doi:10.21608/svuijas.2024.287999.1368
- Adefila, J. O. (2014). Pattern of agricultural development in southern parts of Katsina state, Nigeria: Notion for rational planning. *IOSR Journal of Agriculture and Veterinary Science*, 7(1), 14–20. DOI:10.9790/2380-07131420
- Ajewole, O. C., Raji, M. O., Agbola, O. O., & Babarinde, Y. A. (2019). Quality characteristics of soybean in Nigeria. *Journal of Food Science and Technology*, 16(3), 1–9.
- Amadu, Y. K., Kamsang, L. S., Mustapha, A., Alpha, Y. K., Adetomiwa, K., & Nkeki, K. (2024). Gender disparities in the adoption of improved management practices for soybean cultivation in North East Nigeria. *Journal of Agriculture and Food Research*, 22(9):102032. DOI:10.1016/j.jafr.2025.102032
- Anthony, L., Ukaoha, C. A., Alabi, O. O., Oluleye, O. D., Ajibare, D. B., & Njoku, V. O. (2022). Profit efficiency of soybean production in Federal Capital Territory, Nigeria. *European Journal of Agriculture and Food Sciences*, 4(5), 28–37. <https://doi.org/10.24018/ejfood.2022.4.5.530>
- Bingfu, G., Liping, S., Siqi, J., Honglei, R., Rujian, S., Zhongyan, W., Huilong, H., Xiaoyan, L., Jun, W., Xiaobo, W., Donghe, X., Wenbin, L., Changhong, G., & Li-Juan, Q. (2022). Soybean genetic resources contributing to sustainable protein production. *Theoretical and Applied Genetics* 135, 4095–4121. <https://doi.org/10.1007/s00122-022-04222-9> <https://pubmed.ncbi.nlm.nih.gov/36239765/>
- Collombet, R. N. (2013). Investigating soybean market situation in Western Kenya: Constraints and opportunities for smallholder producers (Master's thesis). Wageningen University.
- Dokua, D. S; (2023) Production of Soybean Meal in Nigeria 2010-2023. <https://www.statista.com/statistics/1134500/production-of-soybean-meal-in-nigeria/>
- Food and Agriculture Organization. (2011). FAOSTAT database. <http://faostat3.fao.org/faostat-gateway/go/to/download/Q/QC/E>
- Food and Agriculture Organization. (2022). FAO statistics. <https://www.fao.org/faostat/en/#data/FS>

- Kamara, A., Oyinbo, O., Manda, J., Kamsang, L. & Kamai, N. (2022). Adoption of improved soybean and gender differential productivity and revenue impacts: evidence from Nigeria. *Food and Energy Security*, e385,1-25. DOI <https://doi.org/10.1002/fes3.385>. <https://hdl.handle.net/10568/120498>
- Katsina Investment Promotion Agency. (2023). *Soybean production investment initiative report*. Retrieved May 8, 2026, from <https://www.katsinainvestment.gov.ng>
- Mairabo, A., Jibrin, S., Audu, H., Salihu, M. Y. & Elisha, Y. (2023). Technical Efficiency of Soybean Production in Niger State, Nigeria. *FUDMA Journal of Sciences (FJS)* ISSN online: 2616 -1370. 7(1): 201 - 206. DOI: <https://doi.org/10.33003/fjs-2023-0701-1286>
- Mohammed, N., Abubakar, M. I., Abdulaziz, M. A., Kolo, M. K., & Saje, A. B. (2022). Assessment of socioeconomic factors on the adoption of improved cowpea production technologies among farmers in Damaturu Local Government Area, Yobe State, Nigeria. *International Journal of Scientific and Research Publications*, 12(1), 321–330. <https://doi.org/10.29322/IJSRP.12.01.2022.p12142>
- Mohammed, A. R. S., Al-hassan, S., & Jatoe, J. B. D. (2018). An overview of constraints to soybean production in Northern Ghana. *UDS International Journal of Development*, 5(1), 32–40.
- Nater, I., Osabuohein, O.L., Sesugh, U.M., and Chibuike, E.G., Peter, O. (2021). Effects of Inter-row Spacing on Growth, Seed Yield and Yield Components of Soybean (*Glycine max*) in Makurdi, Benue State- Nigeria. *International Journal of Agricultural Sciences and Veterinary Medicine*. 9(2), 18-24.
- N2Africa (2014). Better soybean through good agricultural practices. www.N2Africa.org.
- Nwofoke, C., Umeonuora, T.G., Preye, J.S., Okonkwo, A.N., & Nwibo, S.U. (2025). Analysis of soybean products utilization in Abakaliki Metropolis of Ebonyi State, Nigeria. *NL Journal of Agriculture and Biotechnology* 2(6):03-12. DOI:10.71168/NAB.02.06.132
- Ogbanje, C., (2023). Financial performance of soybean farmers in Vandeikya local government area of Benue state. *Journal of Agricylture and Food Sciences* 21(1): 128 -146. Doi:10.4314/jafs.v21i19.
- Ogunnaike, M. O., Shittu, A. M., & Kehinde, M. O. (2020). Productivity and efficiency of soybean farmers in Nigeria. *Journal of Agricultural Economics*, 21(1), 1–12.
- Olawuyi, T. O., & Afolami, C. A. (2023). Determinants of profit inefficiency in soybean production in Nigeria. *BADEGGI Journal of Agricultural Research and Environment*. 5(3):67-75. DOI:10.35849/BJARE202303/133/009
- Oyenpemi, L., Solaja, S., Fadeyi, B. O., & Awe, T. E. (2023). Economic performance of smallholder soya bean production in Kwara State, Nigeria. *Open Agriculture*, 8(1) 1–12. <https://doi.org/10.1515/opag-2022-0100>
- Rasaki, N. A., Olojede, M. O., Omotoso, A. B., & Sulaimon, I. O. (2020). Economic analysis of soybean production in Ibarapa Zone of Oyo State, Nigeria. *Journal of Underutilized Legumes*, 2(1), 33–42.
- Samuel, A. F., Ji-Min, K., & Sungtaeg, K. (2022). Current status of soybean production in Nigeria: Constraints and prospects. Dankook University, Department of Crop Science & Biotechnology.
- Shurtleff, W., & Aoyagi, A. (2021). History of international trade in soybeans, soy oil, and soybean meal (1859–2021): Extensively annotated bibliography and sourcebook. Soyinfo Center.
- Statista (2024), Production of Soybean Meal in Nigeria from 2010 to 2021(in 1,000 metric tons) <https://www.statista.com/statistics/1134500/production-of-soybean-meal-in-nigeria/>
- Steve, O. C. (2017). Soybean farming in Nigeria: How to start and make money. Africa Business Classroom. https://africa5756.rssing.com/chan65060637/all_p3.html
- Ukaoha, C., Anthony, L., Omotayo, A. O., & Njoku, V. O., (2022). Profit efficiency of soybean production in Federal Capital Territory, Nigeria. <https://www.researchgate.net/publication/364476352>
- United States Department of Agriculture. (2023). Production: Soybeans. Foreign Agricultural Service. <https://fas.usda.gov/data/production/commodity/2222000>
- World Bank (2020). Nigeria's Agricultural Sector: Challenges and Opportunities.