Constraining Factors and the profitability of rice production among members of agricultural cooperative societies in Niger State, Nigeria

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Abstract

This research assessed the constraining factors influencing profitability of rice production among members of agricultural cooperatives in Niger State, Nigeria. Specifically, the research. A sample size of 360 was randomly selected using Taro Yamane's formula on a population of 121,065 members from the eight Local Government Areas that made up the Agricultural Zone A of the State. Data were collected through a well-structured five-point Likert scale questionnaire capturing the questions raised in the research questions and hypotheses. The work was anchored on the Rational Choice Theory and the Cobb-Douglas Production Function. The data collected were analyzed using both descriptive analysis and regression analysis. Findings of this study revealed that rice output was significantly influenced by such production constraints such as inadequate capital, high cost of inputs/labour, persistence use of poor quality seeds, pests and diseases (F ratio of 2.876 was significant @ 0.001level). By implication, the constraints and challenges militating against increase in rice output and the resultant increase in rice profitability should be eliminated, through government and non-governmental provision of farm resources at a subsidized rate to motivate prospective cooperative farmers. We recommend that government should also revisit the policy framework pertaining access to credit and make necessary adjustments that will favour rice farmers' access to credit and promote the availability of capital for agricultural production.

Keywords: Rice Production, Profitability of Rice Production, Agricultural Cooperatives

1.0 Introduction

Rice is a staple food in many African homes and constitutes a bigger portion of the diet on a regular basis. In the last thirty years, rice showed constant increases in production and sales, and its rising significance reflects the strategic food security initiatives adopted by many nations (Merem, Ochai & Nwagboso, 2017). Aside from a handful of nations that enjoy self-sufficiency in rice cultivation, rice consumption surpasses production and a substantial amount of the crop is imported to sustain local demand at the expense of hard earned foreign currency reserves (Akande, 2003). Throughout the closing decades of the 20th century, Nigeria's rice output reached overwhelming high levels. From the rapid rise in farmland area devoted to rice during that era in Nigeria, the production and consumption increased enormously. However, the growing output has not been adequate enough to meet rising demand. Given the rising profile of rice as an essential element of Nigeria's food menu and the fact that imported rice accounts for a major portion of the nation's food imports, there is a growing desire among policy makers to boost rice production locally (Merem, Ochai & Nwagboso, 2017).

Increasing the production capacity of cooperative farmers particularly rice farmers to help bridge the food demand and supply gap has been a major issue confronting both the farmers and the government. Some of the critical impediments affecting cooperative farmers production capacity identified in the literature include the challenges of funding, inadequate and high cost of basic farm inputs such as improved seed varieties, planting materials, organic and inorganic fertilizers and agro-chemicals; lack of agricultural credit facilities, insufficient and high costs of agricultural equipment and machinery (Akatugba, Oniore & Akekere, 2017; Dimelu, Enwelu, Attah & Emodi, 2014; Tasie, 2013).

Low rice profitability is a problem which discourages the Nigerian teeming unemployed youths from embarking in rice farming business (Nwahia, 2020). The fact that individuals pool their resources together in agricultural cooperatives in order to engage in a profitable economic activity, tells us that being unprofitable would be worrisome. Profitability of the business of agricultural cooperative society is of paramount importance to members in achieving set objectives of forming the society; which among other things comprise of economic sustainability, Improve standard of living as well as better farming method. Various factors contributing to constraints in rice production, such as physical, biological, socio-economic, and institutional constraints, can be effectively improved through participatory research and government attention. (FAO, 2016). Pests and diseases, birds and reptiles can cause significant yield losses in rice crops and successful control is crucial to farmers' ability to produce rice profitably. Developing rice varieties that meet farmers' quality requirements, resistant to pests, diseases, that can tolerate stresses is a major challenge. New rice varieties that can perform well under constantly changing farming systems and environments such as; drought-prone environments and flooding) are needed to increase output (Onumadu & Sahon, 2014; Oko & Ugwu, 2011). The key biophysical constraints to rice production are the availability of water and nutrients; in some lowland areas. Lack of adequate drainage is also a major problem. In order to fulfill potential high yielding, modern rice varieties need good water management and an adequate supply of nutrients especially, nitrogen.

A number of studies have indicated that agricultural production in Nigeria is still characterized by small farm holders (Onugu, 2008; Obiyan, 2000; Ijere & Mbanasor, 2000), whose socio-economic characteristics have crucial ramifications on agricultural production. These smallholders apply a low-input strategy to agriculture, with minimum input requirements and

low output (International Fund for Agricultural Development [IFAD], 2009). The livelihood of these smallholder farmers have been constrained by a host of challenges: low productivity; paucity of opportunities for value addition; limited access to productive assets and inputs; inadequate support services (extension and research); inadequate market and rural infrastructure; post-harvest losses and a constrained enabling environment (IFAD, 2012).

The activities of these small-scale farmers have not received significant motivation from government and financial institutions in time past (Okoruwa & Olusola, 2015). This has been one of the reasons for the poor levels of agricultural production in the rural areas thereby affecting the overall agricultural production in the sector. Lack of collateral security, lack of guarantor, high interest rate, inadequate credit information, delay in approval and disbursement of loan have been identified as constraints impeding rural farmers access to credit (Ololade & Olagunji, 2013). Credit was that input which helped the farmers to apply other inputs like fertilizers, improved seeds, irrigation and modern implements that could lead to increase production output. Credit contributes to improvements in net income through maintenance of adequate farm size, adjusting to changing economic conditions, meeting seasonal fluctuations in income and expenditure.

Finance has a significant role in increasing farm productivity because the cultivation of most agricultural products, for example, paddy (unprocessed rice) involves a high cash outlay for meeting operating costs during the cultivation and harvesting seasons. The financial constraint of rice farmers in Niger State has affected their production capacities and also affected their capabilities to economically engage in rice production activities that will enhance their performance, increase their level of output, and in turn lead to increased profitability. This is evident in case of widening gap in the demand and supply of rice and the attendant hike in the price of rice in the market. There is a growing desire among policy makers to increase rice production locally, in order to bridge the food supply and demand gap. This has led to increase in the number of rice farmers as well as increase in the output of rice that will bring about increase in rice profitability. Despite these efforts, the growing output has not been adequate enough to meet rising demand. To bridge such a deficit in the face of policy flaws, Nigeria resorted to the massive importation of rice at an unprecedented rate.

However, successive administrations have made concerted efforts to develop the agricultural sector through the formulation and implementation of various policies and programmes aimed at providing the various factors of production to farmers in order to boost their production capacities. The government and donor agencies have also partnered in various fronts to address the challenges of rice production by rice farmers with the aim of improving the production of rice, yet not much has been achieved as there are still public outcry about the rising cost of the food, rice and its affordability in the market by the common man. Despite these efforts put in place by the government, poor financing has constantly been fingered as one of the major problems militating against agricultural development in Nigeria. (Yakubu & Opaluwa, 2015). The issue of flooding and its effect in rice production as well as the problem of insecurity ravaging the state cannot be over emphasized. Insecurity has become one of the major reasons for poor yield in rice production as many rural farmers do not tend their rice farms as supposed for fear of invasion of bandits (Akanbi, Alarape & Olatunji, (2019).

The constraints affecting profitability of rice production, gross margin, gross ratio, operating ratio and return on capital invested on rice output are related to factor inputs and socio-

economic influences on rice outputs. Factor inputs involve availability of rice seeds for cultivation, timely supply and availability of fertilizers, access to credit and ability to take hold of sizable farm land suitable for rice cultivation as well as availability of labour. In spite of the myriads of problems identified which can jeopardize the potentials of filling the rice demand and supply gap, increasing the productivity and profitability of rice in Nigeria, this work was designed to assess that factors that will promote profitability of rice production. A number of research has been carried out in this study area but none of them have critically examined the profitability of rice production among rice farmers with respect to the cost/revenue relationship in rice production; the choice of rice variety on rice profitability; and effect of various challenges of rice production on rice profitability in Niger State. This study therefore, examined the factors constraining the profitability of rice production among members of Agricultural Cooperative Societies in Niger State.

1.1 Objective of the study

The objective of the study is to establish the effect of various constraints (inadequate capital, high cost labour/inputs, persistence use of low quality seeds, pest and diseases) to rice production on rice output.

2.0 Literature Review

2.1 Conceptual Issues

2.1.1 Constraints to Rice production and Farm Profitability

In Nigeria, the prevalence of various constraints to rice production and their impact on production efficiency has led to low production output on the farmers. Economics of agricultural production at the micro level is to attain the objective of profit maximization through efficient farm allocation of resources over a period of time or by either maximizing output from given resources or minimizing the resources required for producing a given level of output (Asogwa, Abu & Ocheche, 2014). Profitability here entails the financial gain or benefits derived from rice farming, which is calculated by comparing the income generated from rice sales against the costs incurred in production. This includes both direct costs (such as labor, seeds, fertilizers, irrigation, etc.) and indirect costs (like overheads and transportation). Profitability is often measured using metrics like return on asset, net farm income, return on investment (ROI), or return per unit of input (Moedu, Amahalu & Nworie, 2023; Nworie & Nwoye, 2023). A positive profitability outcome suggests that the income generated from rice production exceeds the costs, making it a financially viable and sustainable enterprise for farmers.

A review of different challenges confronting the coooerativel farmers especially rice farmers indicates that over the years the rice farmers have been faced with the problems of inadequate credit and or lack of agricultural credit facilities, inadequate and high cost of basic farm inputs such as improved seeds/planting materials, organic and inorganic fertilizers and agro-chemicals; insufficient and high costs of agricultural equipment and machinery, Transportation problems, Lack of adequate knowledge on rice farming technologies amongst others.

Different farming households will have different needs for credit but a good sign that indicates some level of credit constraint is the gap between demand and supply of credit. Credit constraints can be defined as a wide gap between demand for credit and supply of credit (Okoruwa & Olusola, 2015).

A review of the Nigerian rice system revealed that the provision of credit for investment through public agencies especially under the Agricultural Credit Guarantee Scheme provided substantial credit capital for investment in grains production in general and rice in particular (Ajibefun & Abdulkadri, 2004).

Credit constraint to farm households in Nigeria imposed high cost on the society in terms of rural unemployment, rural poverty, distortion of production and liquidation of assets (Ajibefun & Abdulkadri, 2004). This problem of credit constraint was also aggravated by the absence of perfect information about the financial market among smallholder farmers which encouraged rationing of credit and rejection of loan applications of farmers by formal financial institutions to them. Given a subset of credit constrained and unconstrained rice farmers in Niger State using similar inputs to produce the same outputs. Okoruwa & Olusola (2015), attempted to substantiate the effect of credit constraint condition on the profit of the former group as against the unconstrained subset of farmers. The result of their findings showed that unconstrained rice farmers achieved more output than the constrained. This in turn, contributed to higher income.

A comparative study by Afolabi (2010), showed that beneficiaries of NACRDB smallholder loan scheme in Oyo State were better-off in terms of yield, income, and access to improved farm inputs than non-beneficiaries. The need for credit is more acute in the rural areas, because lack of access to financial resources is lowered by low productivity and widespread poverty of the rural farm sector.

Findings from the work of Ugwu, (2013) revealed that high cost of input (91.67) and high cost of labour (88.89%) were the major constraints militating against rice production by the credit users in the study area while, inadequate capital (83.33%) and high cost of input (91.67%) were the major constraints militating against rice production by the non-credit users amongst other factors in the study area. The finding is in conformity with that of Odoemenem and Inakwu (2011) who reported that inadequate capital, high cost of input, high cost of labour amongst others were the major constraints militating against rice production in the study area.

In the work of Daudu, Okwoche and Adegboye, (2009), on the problems faced by the youths in rice production. Sixty percent of the respondents considered low output prices as the major problem that militates against their ability to meet their optimum production needs. They lamented that the rice they produce is not usually sold for a good price, compared to imported ones. Forty-five percentages were of the opinion that high input cost was the main problem. About 69.2% of the respondents considered non-availability of credit facilities as a problem that militates against their ability to achieve their desired production level. This may result from the fact that personal savings is the major source of fund available to the youth farmers. About 37.5% of the youths complained of transportation problems. Their worries include the poor and non-motorable condition of the roads that lead to their farms. According to the respondents, the situation does not facilitate conveyance of their farm output to urban markets where they could have good prices for their output. Another major problem faced by the youths was that of inadequate knowledge on rice farming, as identified by 65.0% of the respondents. This might result from poor access to agricultural extension services by the youths. About 57.5% of the youths also complained of insufficient land for rice production. They reported that most of the land in the study area were owned and used by the aged in their communities.

The study concludes that rice production is a profitable enterprise and that is more profitable amongst farmers who accessed credit facilities. This conforms to the findings of Falola and Adewumi (2012). They therefore recommended that government, Policy makers and non-governmental organizations should create an enabling environment to boost the productivity and income of rice farmers through the provision of adequate credit facilities to the farmers, in order to increase the level of output and increase profitability.

2.2 Theoretical Framework

2.2.1 The Cobb-Douglas Production Function

The second theory on which this study is also built is the Cobb-Douglas production function. In economics, the Cobb-Douglas production function is widely used to represent the relationship of an output to inputs. It was proposed by Knut Wicksell (1851 – 1926), and tested against statistical evidence by Charles Cobb and Paul Douglas in 1928. Charles Cobb and Paul Douglas published a study in which they modeled the growth of the American economy during the period 1899 – 1922. They considered a simplified view of the economy in which production output is determined by the amount of labour involved and the amount of capital invested. While there are many other factors affecting economic performance, their model proved to be remarkably accurate.

The function they used to model production was of the form

$P(L,K) = bL\alpha\ K\beta$ Where:

P = total production (the monetary value of all goods produced in a year)

L = Labour input (the total number of persons-hours worked in a year)

K = Capital input (the monetary worth of all machinery, equipment and buildings).

b = total factor productivity

α and β are the output elasticities of labour and capital respectively. These values are constants determined by the available technology. Output elasticities measures the responsiveness of output to a change in levels of either labour or capital used in production, ceteris paribus. For example if $\alpha = 0.15$, a 1% increase in labour would lead to approximately 0.15% increase in output.

The production function relates physical output of a production process to physical inputs or factors of production. The production function is one of the key concepts of mainstream neoclassical theories, used to define marginal product and to distinguish allocative efficiency, the defining focus of economics. The primary purpose of the production function is to address the allocative efficiency in the use of factor inputs in production and resulting distribution of income to those factors (Cohen & Harcourt, 2003; Daly, 1997). In agricultural production, efficient allocation of farm resources helps farmers to attain their objectives. It avails farmers the opportunity of improving their productivity and income. At the micro economic level, efficient allocation of farm resources (farm land, credit facilities, fertilizer, labour, among others) help farmers to contribute to food production, employment creation, industrial raw material and export product for foreign exchange earnings. According to Nosiru, Rahji, IIkp &

Adenegan (2014), agricultural productivity is synonymous with resource productivity which is the ratio of total output to the resource/inputs being considered. The production function could be expressed in different functional forms such as Cobb Douglas, linear, quadratic, polynomials and square root polynomials, semi log and exponential functions. However, the Cobb Douglas functional form is commonly used for its simplicity and flexibility coupled with the empirical support it has received from data for various industries and countries (Gujarati and Porter, 2009; Bao-Hong, 2008).

2.2.2 Relevance of the Theories to the Study

The Rational choice theory will enable a cooperative rice farmer to make a decision of which variety of rice to produce for optimal yield or of how much of his farm resources such as land, labour and capital should be used in cultivating rice as opposed to some other crops like maize. The approach to this problem is based on the fundamental premise that the farmer's choice would be based on those choices that would help him or her achieve his or her objective of maximizing profit and minimizing cost efficiently.

The Cobb-Douglas production function is relevant to this work because it explains the interrelated activities and factors that influence or determine the level of production output achieved by cooperative farmers. Most importantly, it explains the impact of various factors of production on small-scale rice farmers output. The theory is relevant to the study because it provides framework for understanding the allocative efficiency in the use of factor inputs in production and resulting distribution of income to those factors. In agricultural production, efficient allocation of farm resources helps farmers to attain their objectives of profit maximization. It avails farmers the opportunity of improving their productivity and income.

2.3 Empirical Review

Rahaman, Sarkar, Rashid, Reza, and Siddique (2022) conducted a study in Bangladesh on the profitability of paddy production across different seasons. They employed descriptive statistics and cost and return analysis. The study found that labor costs accounted for the largest share of gross operating expenses, followed by fertilizer, irrigation, tillage, insecticides, herbicides, and threshing costs. Despite these costs, the cost-benefit analysis indicated that rice farming remains profitable in the area.

Chigbo, Akonu, Onwumelu, and Umebali (2022) investigated the challenges faced by members of rice farmers' cooperative societies in Anambra State, Nigeria. They applied descriptive statistics and a linear regression model. Their findings revealed that funding, market participation, and environmental sustainability had a significant influence on the output of the cooperative society members.

Alabi and Anekwe (2022) examined the socio-economic factors affecting smallholder rice farmers' access to loan facilities in Abuja, Nigeria. Using statistical and econometric analyses, they found that factors such as age, farm size, household size, marital status, access to extension services, and membership in cooperative organizations were significant in influencing access to loans for smallholder rice farmers.

Nwahia (2022) analyzed the cost and returns of rice production among USAID-MARKETS II project participants and non-participants in Ebonyi State, Nigeria. Using Z-statistics, Net Farm

Income (NFI), and Returns Per Naira Invested (RNI), the study revealed that participants in the project achieved significantly higher profits from rice farming compared to non-participants, highlighting the benefits of the program.

Anoh (2022) conducted an economic analysis of rice production among smallholder farmers in Ogoja Local Government Area of Cross River State, Nigeria. By employing descriptive statistics, including percentages, averages, frequencies, significance tests, and regression analysis, the study found that both upland rice and swamp rice systems were profitable.

Abdulahi (2021) carried out a comparative economic analysis of adopters and non-adopters of improved rice varieties in Paikoro Local Area of Niger State, Nigeria. Using descriptive statistics, gross margin analysis, and production function analysis, the study revealed that farmers adopting improved rice varieties found them to be more profitable than the traditional local varieties.

Ademiluyi, Okeke-Agulu, and Folorunso (2021) examined the economics of rice production in Wase Local Government Area of Plateau State, Nigeria. The study utilized descriptive statistics, gross margin analysis, and multiple regression analysis. The results showed that rice production in the area is profitable, with gross margin analysis confirming its economic viability.

Adewuyi and Amurtiya (2021) analyzed the economic performance of smallholder women farmers in rice production in Adamawa State, Nigeria. The study employed descriptive statistics and a stochastic frontier function. It found that education and access to credit facilities were key factors influencing the technical and allocative efficiency of female rice farmers.

Okoh, Opata, Ibe, Onyenekwe, Ikubaiyeje, and Ettum (2021) explored the determinants of technical efficiency among lowland rice farmers in Enugu State, Nigeria. Using the Cobb-Douglas stochastic production frontier function, the study found that inefficiencies in input use were a major factor contributing to variations in output among the farmers in the region.

Nwahia (2020) assessed the cost and economic returns of rice production in Ebonyi State, Nigeria. The study used descriptive statistics, Net Rice Farming Income (NRFI), and Returns per US Dollar Invested (RUSDI). The results indicated that rice farming is profitable in the region, with a positive net income from the activity.

Cordelia and Edwin (2020) investigated factors influencing the productivity of rice farms in Ebonyi State, Nigeria. They applied descriptive statistics, including mean, standard deviation, percentage, Total Factor Productivity (TFP), and regression analysis. The study found that extension visits, household size, and farm size positively impacted productivity, while the farmer's age and herbicide usage negatively affected productivity, possibly due to improper application of the herbicide.

Ebido, Okoli, and Ugwumba (2020) studied the technical efficiency and profitability of rice production in Anambra State, Nigeria. The study used descriptive statistics, the Cobb-Douglas stochastic frontier production function, enterprise budgeting, and multiple regression analysis. It was concluded that rice production in the area is profitable, as indicated by the high mean technical efficiency score among farmers.

Hussaini, Oladimeji, Sanni, and Abdulrahman (2020) explored the determinants of rice farmers' investment in value addition and its effect on their poverty status in Kebbi State, Nigeria. They applied the Foster-Greek Thoerboeck (FGT) poverty index and logit regression technique. The study revealed that poverty levels were high among rice farmers, with labor costs, poor marketing information, and inadequate credit identified as the most significant constraints limiting value addition activities.

Imoka, Okoli, Nwike, and Ugwumba (2020) examined the costs and returns of improved versus local rice varieties in the Anambra Agricultural Zone of Anambra State, Nigeria. Using descriptive and parametric statistical tools, including enterprise budgeting, profit function, and multiple regression analysis, the study found that improved rice varieties were more profitable than local varieties, with farming experience and the per unit price of output influencing variable profits for both types of rice.

Offor, Amusa, and Udochukwu (2020) analyzed the economic aspects of rice production in Bende Local Government Area of Abia State, Nigeria. They employed descriptive statistics, cost and return formulas, and a regression model. Their analysis indicated that rice farming was economically viable in the area, with farm size, fertilizer usage, credit availability, and initial capital positively influencing rice production.

Oloyede, Muhammad, Amolegbe, Olaghere, and Joseph (2020) compared the profitability of different rice production systems in Kwara State, Nigeria. Using descriptive statistics and a multinomial logistic regression model, the study found that yields, profits, and income varied across production systems, with the combined systems yielding the highest return per hectare.

Omoare and Oyediran (2020) explored the factors affecting rice farming practices among rural farmers in Ogun and Niger States, Nigeria. The study used frequency distribution, percentages, mean, t-test, and regression analysis. It was found that there was an inverse relationship between factors influencing rice farming practices and rice production output, suggesting that these factors were key determinants of rice output in the study areas.

Uhuegbulem, Mejeha, Ukoha, and Uche (2020) compared the profitability of rice production between credit and non-credit users in Abakaliki Local Government Area of Ebonyi State, Nigeria. Using descriptive statistics, multiple regression analysis, net income models, and profitability indices, the study found that rice production was profitable in the area, with credit users achieving higher profitability than those who did not have access to credit.

Uche, Donatus, and Uchenwachi (2020) assessed the profitability of rice production in Afikpo North Local Government Area of Ebonyi State, Nigeria. By applying descriptive statistics, gross margin analysis, and a Likert scale, the study found that rice farming was highly profitable, with total revenue far exceeding total costs, according to the gross margin analysis.

Nwankwo and Chigbo (2019) examined the relationship between credit access and rice production among small-scale rice farmers in Niger State, Nigeria. Using descriptive and inferential statistics, including Pearson correlation and regression analyses, the study found positive and significant relationships between credit access and both rice output and profitability. As credit increased, so did the profitability, as measured by the gross margin of rice farming.

2.4 Gap in Literature

This study filled a gap by examining different constraints to rice production in a bid to suggest ways of averting these constraints in order to improve agricultural production and increase profitability. As explained above, the Rational Choice Theory considers the choice behaviour of farmers in choosing between alternatives. The farmer's choice would be based on those choices that would enable him to achieve his objective of maximizing profit and minimizing cost, given all other factors that are beyond control.

The empirical literature above: Anoh (2022); Nwahia (2022); Alabi and Anekwe (2022); Adewuyi and Amurtiya (2021); Nwahia (2020); Ebido, Okoli and Ugwumba (2020); Iliyasu, Orifah and Ahungwa (2017); Iniovorua, Nwaiwu and Ogbonna (2016); Uzondu and Umebali (2016); Igboji, Anozie and Nneji (2015); Okoruwa and Olusola (2015), Ominu (2014), are common with varying literary perspectives on profitability of rice production and determining factors. Although some of them mentioned those constraints faced by small-scale farmers in rice production, none of the literature reviewed examined;

1. The effect of choice of rice varieties on profitability of rice production.
2. The effect of various farm inputs on rice output.
3. Influence of socio-economic characteristics of farmers on rice profitability.

These above, as well as constraints to rice production on rice profitability, and ways to avert these constraints impeding Agricultural Cooperative farmers in Niger State from achieving optimal yield and higher profit, were gaps that were filled by the study.

3.0 Methodology

The research design used in this study was survey. Data were gathered from a large number of respondents who constituted the sample to be the representative of the population of interest. In gathering the data, a cross-sectional research design was employed whereby a one-time observation was made on the elements of the sample on those variables that were relevant to the research (Nworie & Odah, 2024). The total population of the study consist of all the members of rice farmers' cooperative societies in Niger State. There are a total of 11,715 registered Farmer's cooperatives with membership strength of 493,325 famers in Niger State as shown in Table 3.1. Table 3.1 also showed that Zone A (Niger South) Agricultural Zone have a total of 3,460 registered farmers cooperatives with membership strength of 121,065 farmers. (Ministry of Investment, Commerce and Cooperatives Minna, Niger State, 2022). A total of four hundred (400) rice-producing households (farmers) in the eight Local Government Areas and forty villages were randomly selected to be the representative of the population of interest. Table 3.1 displayed the list of registered Farmers' Cooperatives in Niger State, Nigeria.

Table 3.1 List of registered Farmers' Cooperatives in Niger State, Nigeria.

S/N	Local Government Areas	No. of Registered Farmers' Cooperatives	Membership strength	Sample size selected	Membership strength of selected sample
1.	Agaie	519	31,140	519	31,140
2.	Agwara	141	5,640		
3.	Bida	579	34,265	579	34,265
4.	Borgu	348	12,180		
5.	Bosso	577	17,310		
6.	Chanchaga	2,203	168,120		
7.	Edati	136	4,080	136	4080
8.	Gbako	339	1,450	339	1,450
9.	Gurara	60	10,170		
10.	Katcha	379	7,595	379	7,595
11.	Kontagora	1,048	36,905		
12.	Lapai	523	15,690	523	15,690
13.	Lavun	541	13,525	541	13,525
14.	Magama	419	8,380		
15.	Mariga	364	9,100		
16.	Mashegun	250	6,250		
17.	Mokwa	444	13,320	444	13,320
18.	Munya	170	4,760		
19.	Paikoro	474	14,220		
20.	Rafi	384	20,220		
21.	Rijau	219	4,385		
22.	Shiroro	674	22,925		
23.	Suleja	655	26,200		
24.	Tafa	33	500		
25.	Wushishi	236	4,995		
	Total	**11,715**	**493,325**	**3,460**	**121,065**

Source: *Ministry of Investment, Commerce and Cooperatives Minna, Niger State (March, 2022).*

The population of this study was 121,065 farmers according to Ministry of Investment, Commerce and Cooperatives Niger State (2022). To determine the sample size, Taro Yamane (1964) formula was applied to the population size.

The formula is stated as follows;

$$n = \frac{N}{1+N(e)^2}$$

$$n = 121065$$

$$1+121065(0.05)^2$$

$$n = 121065$$

$$1+302.6625$$

$$n = 121065$$

$$303.6625$$

$$= 399.68$$ approximately 400.

For the purpose of allocation of sample strata, the researcher adopted a multi-stage sampling technique in three stages:

Stage 1: Three agricultural zones from which Zone A that has 8 Local Government Areas was selected.

Stage 2: From each of the 8 LGAs, 5 rice producing villages were selected, making a total of 40 villages.

Stage 3: Subsequently, from each of these 40 villages, 10 cooperative rice farmers were selected, giving a total of 400.

Table 3.2 Distribution table for eight (8) Local Government Areas of zone A (Niger South) Agricultural zone, their headquarters and villages sampled for the study.

lga	Head-Quarters	Number of villages	Land area (sq km)	Number of Registered Farmers' Cooperatives	Membership Strength
Agaie	Agaie	1. Baro 2. Boku 3. Ekobadeggi 4. Etsugaie 5. Ekossa 6. Ekowugi 7. Ekowun 8. Magaji 9. Kutiriko 10. Ewugi 11. Tagagi	1,972.6	519	31,140
Bida	Bida	1. Bariki 2. Ceniyan 3. Dokodza 4. Kyari 5. Landzu 6. Masaba 7. Masaga 8. Maiyaki 9. Nasarafu 10. Wadata	50.0	579	34,265
Edati	Enagi	1. Rokota	759.7	136	4,080

		2. Gazhe 3. Gonagi 4. Enagi 5. Sakpe 6. Guzzan 7. Etsu-Tasha 8. Fazhi 9. Gbagban			
Gbako	Lemu	1. Batako 2. Edozhigi 3. Etsu-Audu 4. Gbadafu 5. Edokota 6. Gogata 7. Lemu 8. Nuwanko 9. Sommaji 10. Batagi	1,912.7	339	1,450
Katcha	Katcha	1. Bisanti 2. Badeggi 3. Essa 4. Kataeregi 5. Sidi-Saba 6. Dzwafu 7. Bakeko 8. Gbakogi 9. Edotsu 10. Katcha	1,686.1	379	7,595
Lapai	Lapai	1. Gupa 2. Muye 3. Kudu 4. Arewa 5. Evuti 6. Birni-Maza 7. Takuti 8. Ebbo 9. Duma 10. Gulu	3,265.5	523	15,690
Lavun	Kutigi	1. Busu 2. Batati 3. Dassun 4. Doko 5. Dabban 6. Egbako 7. Gaba 8. Jima	4,218.5	541	13,525

		9. Kutigi 10. Kusotachi			
Mokwa	Mokwa	1. Bokani 2. Muwo 3. Gbajibo 4. Gbara 5. Ja'agi 6. Jebba 7. Kpaki 8. Kudu 9. Labozhi 10. Mokwa 11. Muregi 12. Ndayako	4,478.4	444	13,320
Total	**8**	**85**	**18,343.5**	**3,460**	**121,065**

Source: *Ministry of Investment, Commerce and Cooperatives Minna, Niger State (March, 2022)*

The primary data used in the study was generated through the use of structured questionnaires administered to selected farmers in the study area. The data provided detailed and representative information on agricultural cooperative rice-based farmers. Information on the socio-economic characteristics of rice farmers in zone A agricultural zone of Niger State, experience in cultivation of lowland rice, as well as expenditure on inputs used for rice production such as land area, labour, seeds, fertilizers, pesticides and herbicides. Others were on output of rice, income generated from rice, sources of credit and amount of credit obtained by the rice farming households, as well as constraints to rice production in the study area. The regression model of the Ordinary Least Square (OLS) was used to test the hypotheses of the study and the overall fitness of the model. Rejection and acceptance of the formulated hypotheses were based on the significance of the estimated t-statistics. The tests of hypotheses were done at 1% level of significance.

Model Specification

The expected model is defined below:

$$Y = a + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_{8+} \beta_9X_{9+} \beta_{10}X_{10+} e$$

Where:

Y = Rice Profitability

X_1 = Inadequate improved varieties of seed

X_3 = High costs of farm inputs

X_4 = Inadequate capital

X_5 = Nature of land ownership

X_6 = Pest and diseases

X_7 = Instability of product prices

X_9 = High cost of transportation

X_{10} = Lack of irrigation facilities

X_{11} = Inadequate credit facilities

X_{13} = Lack of processing facilities

A = Constant

β = Regression coefficient

e = Error term

Decision Rule: Acceptance or rejection of each hypothesis was based on the values of estimates of the t statistics and the F ratios as the case may be. Five percent significance level was the threshold of acceptance or rejection of any of the formulated hypotheses.

4.0 Data Analysis

4.1 Descriptive Analysis

Table 4.1 Constraints to rice production

Constraints	Sum	Mean	Standard Deviation	Decision
Inadequate capital	1353.00	3.4325	0.66449	Agree
Land tenure act	1197.00	2.2925	0.55922	Disagree
High cost of input/labour	1391.00	3.9275	0.92161	Agree
High cost of transportation	1385.00	3.6785	0.72612	Agree
Inappropriate farm management	1149.00	2.5475	0.80644	Disagree
Pest and disease	1374.00	3.7375	0.85906	Agree
Persistence use of poor quality seeds	1323.00	3.3050	0.72812	Agree
Poor research and extension support	1019.00	2.5475	0.95132	Disagree
Grand mean	1356.57	3.6414	0.43340	Agree

Source: Field survey 2023

Table 4.11 sought the views of the respondents on the various constraints that confront them in rice production. The Table shows that there is commonality of agreement in five out of the eight indicated constraints. Inadequate capital (3.4); High cost of input/labour, High cost of input/labour (3.9); High cost of transportation (3.6); inappropriate farm management (3.5); pests and diseases (3.7) and persistence use of poor quality seeds (3.3). The other two responses, Land Tenure Act (2.3) and poor research and extension support (2.5) had mean ratings of less than 3.0. The Grand mean however, had mean rating of 3.6. Furthermore, the relative importance of the items could also be assessed from the magnitude of their individual

mean scores. Thus, the most important item of influence was High cost of input/labour (3.9). This was followed by pests and diseases (3.7). The implication of the above is that the constraints as indicated could have a substantial influence on rice production in the study area

4.2 Test of Hypothesis

***H*1** Rice output is not significantly influenced by such constraints as high labour cost, inadequacy of capital, high cost of transportation, persistence use of poor quality seeds, pests and diseases.
H2 Rice output is significantly influenced by such constraints as high labour cost, inadequacy of capital, high cost of transportation, persistence use of poor quality seeds, pests and diseases.
Table 4.2: Influence of constraints on rice output (Regression Estimates).

Model	Coefficient Estimates	t-Value	Significance
(CONSTANT)	2.332	4.402	.000
Inadequate capital	2.256	4.247	.000
Land tenure act	.067	.486	.627
High cost of input/labour	1.097	2.548	.001
High cost of transportation	2.107	3.692	.000
Inappropriate farm management	.165	.845	.266
Pest and disease	-1.083	-3.815	.005
Persistence use of poor quality seeds	-1194	-2.135	.001
Poor research and extension support	.160	.205	.846
R^2	0.049		
Adj R^2	0.032		
F	2.876 (Sig. @ 0.000)		

Dependent Variable: Rice output

The coefficient of multiple determination, R^2, was 0.049, while the adjusted R^2 was 0.032. Thus, more than 70% of the variations in rice output was explained by the constrained variables indicated in the model. The F ratio of 2.876 was significant at 0.000 level of significance. Table 4.2 also shows that five out of the indicated constraints were significant at the conventional 5% level and had inverse relationships with rice output. The significance of these variables suggest that each unit of response of the variables (Inadequate capital, High cost of input/labour, High cost of transportation, pests and diseases, persistence use of poor quality seeds) is in reduction of rice output by 2.256, 1.097, 2.107,1.083 and 1.191 respectively.

Decision: From the regression analysis in Table 4.2, F ratio value of 2.876 was significant at less than 1% level of significance. Based on this, the null hypothesis which stated that rice output is not significantly influenced by such constraints as high labour cost, inadequacy of capital, high cost of transportation, persistence use of poor quality seeds, pests and diseases is rejected, and the alternative is accepted. Thus, we conclude that rice output is significantly influenced by such production constraints as high labour cost, inadequacy of capital, high cost of transportation, persistence use of poor quality seeds, pests and diseases.

4.3 Discussion of Findings

While ascertaining the influence of constraints to rice production on rice output, it was revealed that more than 70% of the variations in rice output was explained by the constrained variables indicated in the model. Five out of the indicated constraints were significant at the conventional 1% level of analysis and had inverse relationships with rice output. Thus, indicating that rice output is significantly influenced by such production constraints as high labour cost, inadequacy of capital, high cost of transportation, persistence use of poor quality seeds, pests and diseases. Thus, in consonance with the Coob-Douglas Production Function which states that production output is determined by the amount of labour involved and the amount of capital invested. Findings from the work of Ugwu, (2013) also revealed that high cost of input, high cost of labour, inadequate capital, high cost of transportation, pests and diseases were the major constraints militating against rice production. The finding is in conformity with that of Odoemenem and Inakwu (2011) who reported that inadequate capital, high cost of input, high cost of labour amongst others were the major constraints militating against rice production in their study areas.

5.0 Conclusion and Recommendation

This research investigated the Constraining Factors Influencing the Profitability of Rice Production among members of Agricultural Cooperatives in Niger State, Nigeria. From the findings, it was revealed that several constraints were faced by members of Agricultural Cooperatives in rice production. Many cooperative members face challenges in securing financial support, which hinders their ability to invest in quality inputs like seeds, fertilizers, and irrigation systems. Additionally, poor infrastructure such as inadequate road networks and lack of storage facilities leads to high post-harvest losses, further reducing profitability. Indeed, an analysis of the effect of some of these constraints showed that they constituted significant bottleneck in rice production in the study area. Thus, we recommend that government should revisit the policy framework pertaining access to credit and make necessary adjustments that will favour rice farmers' access to credit and promote the availability of capital for agricultural production.

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