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PROFITABILITY AND CONSTRAINTS OF AGRICULTURAL COMMERCIALIZATION AMONG SMALLHOLDER RICE FARMERS IN NASARAWA STATE, NIGERIA

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ABSTRACT

This study analysed the profitability of smallholder rice farmers in Nasarawa State, Nigeria. Multistage sampling technique was used to select 300 rice farmers for the study. The primary data utilized for the study were collected using structured questionnaires. The data were analysed using descriptive statistics and farm budgetary techniques. The result of the study revealed that rice production in the study area is profitable with gross margin of N103, 876.17/ha. The most important problems identified were inadequate supportive institutions, poor access to credit, and poor rural infrastructure. Based on the findings of the study, it was recommended that provision of adequate and improved agricultural supportive institutions such as research, financial and marketing as well as extension services should be strengthened in order to improve smallholder rice profitability in the study area.

Keywords: Profitability, Smallholders, Rice, Farmers, Costs, Return

INTRODUCTION

In developing nations, Agriculture is essential for livelihoods, jobs, income growth, food security, poverty reduction, socioeconomic development, and environmental sustainability (Gollin, 2010; Pingali, 2010). The fact that more than 70% of people live in rural areas (UNDESA, 2012) and that more than 75% of those people are impoverished rural smallholder farmers who rely primarily on agriculture for their livelihoods makes it even more crucial in low-income nations like those in Africa, including Nigeria, where Nasarawa State is situated (Gollin, 2010; Salami et al., 2010) .

This suggests that advancements and/or improvements in agriculture can directly benefit the lives of the impoverished in a significant way. But a lot of developing nations haven't made the most of agriculture's varied uses (Pingali, 2010). Similarly, because they primarily engage in consumption-oriented subsistence farming, which keeps them out of the formal market system and the associated income-mediated benefits, smallholder farmers—who make up the majority of the rural poor have also not fully benefited from agriculture's many purposes (Hazell et al., 2007; World Bank, 2008). For instance, Nigeria has abundant agricultural resources, but the country's agricultural sector has been expanding at a fairly slow pace. The immediate past Nigerian administration, led by President Muhammadu Buhari, implemented a variety of programs and policies to ensure self-sufficiency in rice production through agricultural commercialization, given the prominent place that rice holds among other food crops. Ojo (2023) defines agricultural commercialization as "the proportion of agricultural production that is marketed." This scholar reiterated that the goal of agricultural commercialization is to change production from being primarily focused on domestic consumption to being primarily focused on the market. Several government's pro-agricultural commercialization initiatives include the Anchor Borrowers' Program (ABP), enhanced input availability, and prohibitions on imported rice.

Given the current demand-supply imbalance in Nigeria's rice subsector, it is necessary to determine the profitability and constraints to agricultural commercialization in the study area. Nigerian government in achieving its goals of improving farmers' incomes, reducing poverty, and reducing food insecurity while also achieving self-sufficiency in rice production, commercialisation is inevitable.. It is against this background that this study was designed to analyse profitability and constraints to smallholder rice farmers in Nasarawa state.

MATERIALS AND METHODS

Study Area

The study was conducted in Nasarawa State, Nigeria. The State was created in 1996 and centrally located in the North-Central geographical zone of the country. The state lies between latitude 7° 45' and 9° 25' N of the equator and between longitude 7° and 9° 37' E of the Greenwich meridian. It shares boundary with Kaduna state in the North, Plateau State in the East, Taraba and Benue states in the south while Kogi and the Federal Capital Territory flanks it in the West. The state has a total land area of 26,875.59 square kilometers and a population of about 1,826,883, with a density of about 67 persons per square kilometer (National Population Census, 2006). Nasarawa State is made up of thirteen Local Government Areas.

Sampling Procedure

The population for the study was made up of the total number of smallholder rice farmers in the study area. Multistage sampling technique was used for the study. In the first stage, five LGAs out of the thirteen in the state were purposively selected based on intensity and concentration of rice production. The selected LGAs were Lafia, Awe, Doma, Obi and Karu. At the second stage, three rice farming communities were purposively selected from each of the five LGAs based on the intensity of rice production in the area The selected farming communities were Kwandere, Aridi, Assakio, Borkono, Pantaki, Mahanga, Rukubi, Alangye, Iwashi, Angwatashi, Adudu, Obi, Panda, Gunduma and Karshi. Stage three a total of 1500 smallholder rice farmers were obtained through reconnaissance survey conducted in the study area using key informants who are also smallholder rice farmers. The 1500 farmers obtained served as sampling frame for the selection of the farmers that produced rice in the study area. The use of the key informants was to ensure accurate and updated number of rice farmers in the study area who are also smallholders. Stage four; twenty percent of

primary producers were randomly selected from each of the smallholder farming communities as respondents, making a total of 300 smallholder rice farmers as a sample size for the study.

Table 1: Sample Size of Smallholder Rice Farmers in Nasarawa State

S/N	L G As	Rice farming communities	Sample frame	Sample size (20%)
1	Awe	Borkono	76	15
		Pantaki	96	19
		Mahanga	110	22
2	Doma	Iwashi	114	23
		Alangye	132	26
		Rukubi	81	16
3	Karu	Karshi	61	12
		Gunduma	71	14
		Panda	82	16
4	Lafia	Assakio	205	41
		Aridi	96	19
		Kwandere	88	18
5	Obi	Adudu	105	21
		Anwatashi	95	19
		Obi	88	18
	Total		**1500**	**300**

Source: Reconnaissance survey, 2018

Methods of Data Collection and Analysis

Well-structured questionnaire was used to help collect the primary data with the assistance of qualified enumerators; the questionnaire was distributed to the chosen respondents. The questionnaire was designed to gather data on the inputs and outputs generated in the research area. The limitations faced by smallholder rice farmers in Nasarawa State were described using descriptive statistics including frequency and percentage, mean, and ranking. The profitability of smallholder rice farmers in Nasarawa State was examined using the Farm Budgetary Technique.

The model for Farm Budgetary Technique is specified as follows:

Farm budgetary analysis such as Gross Margin (GM), Gross Farm Income (GFI) and some financial ratios such as Gross Ratio (GR), Operating Ratio and Return to Naira Invested (RNI) were used to achieve objective of costs and return associated with rice production in the study area. Adeoye *et al*. (2011); Ademiluyi *et al.* (2011) and Yusuf *et al.* (2011) Gross margin can be used as a planning tool where fixed capital forms a negligible portion of the farming enterprise such as in subsistence agriculture. Gross Margin can be specified as:

$$GM = GFI - TVC \quad (1)$$

Where:

GM = Gross Margin, GFI = Gross Farm Income (value of total rice output in ₦).

TVC = Total Variable Cost of rice production, TVC can be expressed as:

$$TVC = P_1X_1 + P_2X_2 + P_3X_3 + P_4X_4 + P_5X_5 \quad (2)$$

Where:

P_1 = Unit price of labour for the production of Rice (₦).,

X_1 = Average quantity of labour used for Production of rice (man-day),

P_2 =Unit price of Seed input used for production of rice (₦),

X_2 = Average quantity of seed used for the production of rice (kg),

P_3 = Unit price of Fertilizer input used for the production of rice (₦),

X_3 = Average quantity of Fertilizer used for the production of rice (Kg),

P_4 = Unit price of Herbicides input used for the production of rice (₦),

X_4 = Average quantity of Herbicides used for the production of the rice (litre),

P_5 = Unit cost of Land used for the rice (₦) and

X_5= Average size of Land used for the rice (Ha).

$$GR = \frac{TC}{GFI} \quad (3)$$

Where:

GR= Gross Ratio for rice production,

TC= Total Cost for rice Production,

GFI= Gross Farm Incomefor rice Production (₦).

$$OR = \frac{TC}{GFI} \quad (4)$$

Where:

OR= Operating Ratio for rice production,

TVC = Total Variable Cost for rice Production,

GFI = Gross Farm Income for rice Production,

$$RNI = \frac{TC}{GFI} \quad (5)$$

Where:

RNI = Return to Naira Invested for rice production,

GFI = Gross Farm Income for rice production.

TC = Total cost of rice production,

RESULTS AND DISCUSSION

Costs and Return Analysis of Smallholder Rice Production

The table below present components of costs and return to smallholder rice production in Nasarawa State. The Cost and returns of rice production was estimated using gross margin and net income analysis as presented in table 2. The result shows a total variable cost of ₦ 140811.94 and total fixed cost of ₦ 161236.94 per Ha. The average revenue generated was ₦ 244688.11 per ha with a gross margin of ₦ 103876.17 naira and a net income of ₦ 83451.17 naira. Therefore indicating that rice production in the study area is profitable.

The variables considered in the analysis were seed (kg/ha), fertilizer (kg/ha, herbicides (litre/ha) and labour (manday/ha). Labour constituted the highest percentage (70.31%) of the Total Variable Cost (Seeds planting constitute about 10.55% of the 132 mandays/ha, fertilizer application 7.05%, herbicides application was the least, 3.52% while other operations such as land preparation, weeding, harvesting, etc

constituted the remaining 81.90% of the 132 total mandays/ha). This was followed by Fertilizer 11.95% of the Total Variable Cost while seed constituted 10.78%. Herbicide was the least in terms of TVC in respect of rice production which constituted only 6.96%. The result further revealed an average rice yield of ₦ 2212.77 kg/ha with average price of ₦110.58/kg was realized.

The Profitability estimates shows that rice production in the study area is a worthwhile enterprise with a Benefit Cost ratio (BCR) estimated at 1.52, Since this was greater than 1, it means rice farming is profitable in the study area with little capital investment. Furthermore, it implies that for every one naira spent, the farmer expect a benefit of 1.52 naira. With this result, leaving the fixed cost unchanged, an increase in production with total variable cost will increase the total revenue. These findings are in agreement with those of Ben-Chendo et al, **(**2017) who got a BCR of 1.7 in their rice production analysis in Kaduna state. An estimated 0.52 ROI which is the measure of earning per naira was obtained for the study meaning that, for every ₦1 invested, 52 kobo was gained by the farmer. The operating ratio (OR) is a profitability indicator that measures the percentage of variable cost per ₦ 1 sale. In this study we estimated an (OR) of 0.57 i.e 57% of the cost involved was attributable to prices if of variable inputs. This indicator measures the solvency of the farm. According Olukosi and Erhabor (2005), a ratio of 1 implies break-even and a ratio grater that 1 implies loss while the lower the ratio the higher the profit.

Table 2: Average Costs and Return per hectare of Rice Production in Nasarawa State

Variable	Quantity	Values (N/ha)	% Cost
Variable Cost items			
Seeds(kg/ha)	71.65	15178.83	10.78
Fertilizers(kg/ha)	314.69	16825.63	11.95
Herbicides(Litre/ha)	9.77	9807.48	6.96
Labour (mandays/ha)	132	99000	70.31
Totak variable cost (TVC)		**140811.94**	100
Fixed Cost Items			
Rent on Land		4900.08	23.99
Interest on Loan		6053.64	29.64
Depreciation on implements/machines		9467.36	46.35
Total Fixed Cost (TFC)		**20425.00**	100
Total Cost (TC)		**161236.94**	
Returns			
Average yield (kg/ha)	2212.77		
Average price(N/kg)		110.58	
Total Revenue = TR		**244688.11**	
Net Income NI = (TR-TC)		**83451.17**	
Gross Margin **GM** (TR-TVC)		103876.17	
Benefit cost ratio (TR/TC)		1.52	
Expense structure ratio ESR		0.13	
Profitability index NI/TR		0.34	
Rate of returns on investment ROI (NI/TC)		0.52	
Operating Ratio (TVC/TR}		0.57	

Source: Field survey, 2018 n = 300

Constraints Confronting Rice Commercialization

Many problems were identified as constraints to rice commercialization in Nasarawa State. The problems are presented in Table 3.

Table 3: Distribution of Smallholder Rice Farmers According to Commercialization Constraints in Nasarawa State

S/N	Constraints	Frequency	Percentage	Ranking
1	Inadequate extension services	234	78	1st
7	Poor access to credit facilities	232	77.3	2nd
4	Poor rural infrastructure	195	65	3rd
4	High cost of transportation	185	61.7	4th
5	Inadequate cooperative society	161	53.7	5th
3	Inadequate market information	144	48	6th
6	Lack of standard measure	116	38.7	7th

Source: Field Survey, 2016 *Multiple Responses n=300

Table 3 revealed that a number of problems were identified as constrains to rice commercialization in the study area. Among the various problems identified, inadequate supportive institutions ranked first (78%). This was followed by poor access to credit facilities (77.3%), poor rural infrastructure (65%), high cost of transportation (61.7%), inadequate cooperative societies (53.7%), inadequate market information (48%), and lack of standard measures ranked least (38.7%) among the constraints affecting the rice commercialization in the study area.

Inadequate Extension Services: Larger percentage (78%) of the smallholder rice farmers decried the problem of inadequate extension services. The smallholder rice farmers considered inadequate extension services as the most serious

constraint affecting the rice production because of its importance in terms of skill acquisition and adoption of modern technology among other things. This also corroborates the work of Lerman (2004) who stated that supportive institutions are expected to enhance farmer's skills and knowledge, link farmers with modern technology and markets, and ease liquidity and input supply constraints, The rice farmers also reasoned the same way with Lerman (2004), who reported that the distributional benefits of agricultural, access to production opportunities, and sharing of risks are functions of institutional arrangements.

Poor Access to Credit Facilities: Poor access to credits facilities had been predominantly identified by most (77%) of the smallholder rice farmers as one of the major constraints militating against agricultural production and commercialization among the farmers in the study area. Large percentage of the producers of rice complained of inadequate loan and credit facilities by the lending agencies, both government and private sector. The farmers reported that their efforts to attract formal loans from the government or private (commercial banks) agencies were always frustrated by the stringent conditions laid down by the banks. According to Agwu et al. (2012); Martey et al. (2012), credits are expected to enhance farmer skills and knowledge, link farmers with modern technology through the purchase of inputs (improved seed, fertilizer and agro-chemicals), pay wages, invest in farm machinery, or to smooth consumption as well as markets, ease liquidity and input supply constraints, and thus, leading to increase agricultural productivity, induce market orientation and participation and greater commercialization and poverty reduction.

Poor Rural Infrastructure: Table 3 also revealed that majority (65%) of the rice farmers lamented about poor infrastructure as one of the major problems militating against rice production in the study area. Infrastructure in this instance includes physical infrastructure, such as roads and railway system, social services such as educational, health facilities, potable water and electricity and communication system. Agricultural performance in Nigeria is greatly impaired by the low level of development of infrastructure. In the rural areas where majority of the smallholders operate, inadequate infrastructure constitutes a major constraint to agricultural investment, production. In many parts of the country physical and marketing infrastructure is poorly developed, storage facilities are rudimentary and access to information and markets is highly restricted. The situation represents the urban bias in the pattern of development in the country. Inadequate rural infrastructure is evidenced by restricted access to the markets, which limit the availability of agricultural products in many areas, and reduces farmers' level of income. According to Oni (2013), the rural infrastructure constraint has persisted due to government neglect, poor governance, poor political will, poor maintenance culture and poor funding. In terms of road facilities, the efforts of the Agricultural Development Programmes, the Directorate of Foods, Roads and Rural Infrastructure, the National Agricultural Land Development Authority and the Petroleum Trust Fund have not been sustained to ensure good road networks in the rural areas where the bulk of agricultural activities take place.

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High Cost of Transportation: According to Jabbar *et al*.(2008). Participation in market exchange is a core element in smallholder commercialization. However, transactions in markets are not frictionless and without cost. There are physical marketing costs like transport and storage costs and, also importantly, transaction costs related to searching and processing information, negotiating contracts, monitoring agents, and enforcing contracts.

Result in Table 3 revealed that high cost of transportation which affected many (62%) of the smallholder rice farmers ranked 4th among the major commercialization constraints in the study area. Transportation is a vital component of commercialization of agricultural products, most of the smallholder rice farmers suffer from the problem of high cost of transporting their commodities to the markets this has implication on their profit and rate of production.

According to Obisesan, (2017) and Ojo,(2023) farmers that experienced lower cost of transportation per ton to transport their produce to main market are more likely to commercialize and increase their intensity of commercialization compared to those that sustained higher costs therefore, if the profit margin. A rational and profit margin is to be raised a rational profit– maximizing producer would produce and increase his intensity of production if the difference between his revenue and average cost of transportation increases. Obisesan (2017), found that low transaction cost is positively associated with high intensity of production output and vice versa.

Furthermore, considering the areas that these commodities are produced in their bulky nature, there is definitely a problem in transporting these commodities. The roads were dilapidated and the vehicles were very old. The implication of this problem could be that the produce may not be reaching the markets from the production sites within the stipulated period of time and the delay may lead to reduction in price, post-harvest losses, quality reduction and increase in cost of transportation. Alene *et al*. 2008 who reported that access to markets and roads and ownership of transportation trucks are expected to reduce marketing costs, thus encourage commercialization (market orientation) and market participation.

***Inadequate Cooperative Societies*:** Many (54%) of the smallholder rice farmers were discouraged about the commercialization due to inadequate cooperative societies in the study area. According to the farmers, they can only perform a basic function of aggregation of output through the cooperatives which is instrumental for the commercialization of smallholder agriculture. They went further to explain that for most of the least developed countries, cooperative organizations offer the best chance for a quick transition from subsistence to commercial agriculture. The rice farmers also believed that to capture the full potential of commercialization, an institutional innovation that creates a platform for collective activities of sellers and buyers to transact face to face for commodity exchange is required. There by the problem of commercialization would be drastically reduced because with a commodity exchange the process of price determination is transparent. Risks and uncertainties could also be minimized through real-time information in different locations, while the constraints of spot markets can be substantially lifted through forward and futures market.

Inadequate Market Information: A good commercialization (market orientation) system requires a functioning, adequate

and dynamic information system in which both the buyers and sellers are linked together. Regrettably, the state of development of market information in the country is still primitive. Table 3 above shows that some (48%) of the rice farmers indicated inadequate market information as one of the problems affecting commercialization in the study area and it has a direct impact on transaction costs. According to the farmers, for instance, prices of food crops and cash crops vary within a season, between seasons and between locations. However, obtaining real-time price information at a primary market is extremely difficult for the farmer and the same thing for the trader/agent who would need to be informed about prices in several primary markets. Similarly, they decried for inadequate information on quality as another problem faced by both buyers and sellers. The smallholder rice farmer cannot be compensated for quality, as the trader who buys from the primary market would have to sell his supply in terms of the average standard of his stock. Therefore, neither the farmer nor the trader has an incentive to improve standards.

Lack of Standard Unit of Measures: There were no uniform standard measures and grades commonly accepted throughout the study area, still only different types of primitive measures are used. This lack of uniform standard unit of measure for measuring agriculture produce in the study area is worrisome and this is what is being experienced in the whole country. Measures, scales and weights are usually manipulated against the sellers/farmers and the buyer/consumer. This leads to high rate of exploitation of farmers by traders across various local markets in the country. Many farmers in the study area have little knowledge about grading their produce; they mixed up both good and bad produce into the same lot which leads to a lower price. Therefore, there were greater opportunities for cheating the farmers and the consumers and unscrupulous dealers or traders readily avail the opportunities. Thus, using different types of weights and measures make supervision difficult and create greater opportunities for cheating both the farmers and the consumers. As a result of this lack of uniform and standard unit of measure, deliberate malpractices, ignorance and carelessness have all combined to make the produce get relatively lower price and consumer unnecessarily pay for higher price for the commodity.

CONCLUSION

The Costs and return analysis revealed that rice production is a profitable venture in the area. Therefore, with better farming practices there is room for improvement. Problems relating to rural inaccessibility were major constrains to a broader extent on rice production profitability in the study area. It is on this note that the study recommended that provision of adequate and improved infrastructure in form of good roads by government and other stake holders with intent to improve the transportation system especially road network which is the main and the most popular mode of transportation in the area and the country at large. Furthermore, agricultural extension services should be strengthened in order to improve smallholder rice farmers capacity for higher returns on investment in the area.

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