JOURNAL OF AGRICULTURAL ECONOMICS, EXTENSION & SCIENCE ISSN (Print): 2545-5179, ISSN (Online): 2714-5018
Official Journal of the College of Agricultural Economics and Extension JAEES Vol. 6 No. 1 2020, Pages 167 - 175
www.jaees.org

FINANCIAL COMPETITIVENESS OF RICE PRODUCTION SYSTEMS: A COMPARATIVE ANALYSIS

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Abstract

In recent years, the Nigerian Government has increased the attention paid to rice production as one of the options in its drive to attain self-sufficiency in food production and reduce its huge import bills. This has led to the implementation of numerousprograms and projects that haveraised questionsabout whether the Government is achieving its goals. The Policy Analysis Matrix (PAM) methodology for private profitability is used in this study to ascertain the competitiveness of rice production systems in Kebbi State, Nigeria. Using primary data collected in 2018 for the 2017 cropping season, average data points were used in estimating the variables for the analysis. PAM indicators used include Private Profits (PP), andPrivate Cost Ratio (PCR).The values of the PP were found to be positive for all rice production systems which indicatecompetitiveness given current market prices and policy transfers.The study recommends policies that would reduce costs of domestic inputs such as land and those that would lead to increased level of output through provision of improved technology.

Keywords: Profitability, competitiveness, private prices, policies, production

Introduction

In recent years, the Nigerian Government has increased its attention to rice production as one of the major options in its drive to attain self-sufficiency in food production and reduce its huge import bills. This has led to the implementation of numerous programs and projects as well as structural changes along the rice value chain that have raised questions about whether the Government isachieving its goals. How agricultural prices affect farming profits is of primary importance to policy makers (Monke and Pearson, 1989). For the past couple of years, the Nigerian rice sector has gone through transformations to improve its competitiveness within a dynamic environment that is influenced by political, technical, economic, and international trade challenges. According to Goddard et al. (1993), agricultural policies influence the performance of the agricultural sector by enhancing the competitiveness and efficiency of the agricultural sector through the provision of incentives for capacity adjustment, and inefficient allocation of productive resources which artificially increase the profitability of the production activity relative to others.Competitiveness is most often measured using economic indicators and comparing the performance of farms (or farming systems) based on these measures (FAO, 2017). Profitability is the most important element of competitiveness and anything that would increase profitability, therefore, would improve competitiveness (Porter, 1990).

Kebbi State is one of the leading producers of rice in Nigeria (KSG, 2017).In addition to the Federal Government's support in input subsidies for rice production, Kebbi state government has also put in place several policies to enhance the competitiveness of rice production in the state. A major achievement is the provision of off takers for rice producers through a memorandum of understanding between the state and Lagos state to produce"Lake" rice. Under this arrangement, rice that is essentially cultivated in Kebbi will be milled and bagged in Lagos.

Agricultural price policies, whether direct or indirect (via an exchange rate policy) have an important influence on the prices farmers receive and prices consumers pay. Product and inputs prices levels affect profitability and, therefore, the amounts invested by producers among competing farm enterprises (Camara, 2000). One of the three principal issues addressed in the PAM is the impact of policy on competitiveness and farm-level profits. The determination of profit received by farmers is a straightforward and important initial result of the PAM analysis. The results from this analysis can be used to identify what kinds of farmers (categorized by either the commodities they grow, the technologies they use, or the agro climatic zones in which their farms are located) are competitive under current policies affecting crop and input prices and how their profits change as the policies are altered (Monke and Pearson, 1989). Consequently, the profitability analysis shows which farmers are currently competitive and how their profits might change if price policies were changed (Monke and Pearson, 1989).

Methodology

Study area

The study was conducted in Kebbi State, situated in the Northwestern region of Nigeria. Kebbi state was created out of the former Sokoto State in 1991 with its capital in Birnin Kebbi. It is bordered by Sokoto State to the north and east, Niger State to the south, Republic of Niger to the northwest and the Republic of Benin to the west. Kebbi State has a total land area of 37,698,685 square kilometers, and an estimated population of 4,629,880 (NPC, 2017 and KSG, 2017). The state is divided into 21 Local Government Areas (LGAs) with four emirate councils (Gwandu, Argungu, Yauri and Zuru) and 35 districts.

Kebbi State experiences a mean annual temperature of 23ºC and a maximum of about 40ºC. The ecology is divided into two zones; the Sudan Savanna and the Southern Guinea in the northern and southern parts respectively. This climate peculiarity supports the production of a wide range of arable crops. The total cultivable land in the state consists of 320,000 hectares (ha) upland and 170,000 ha of fadama land, with high potential of surface water and extractable shallow aquifer to support medium- and small-scale irrigation activities (KSG, 2017).The soils in Kebbi State range between sandy, loamy and clayey. The sandy soils are well drained and erodible while the clayey soils are common in the fadama areas. The major crops produced in Kebbi State are rice, millet, sorghum, maize, groundnut, cotton, wheat, sugar cane, sweet potatoes and cassava. Sesame, soya beans, bambara nuts and acha are grown as minor crops alongside vegetables such as tomato, onion, garlic, pepper, carrot and cabbage.

The Policy Analysis Matrix (PAM) Framework

The policy analysis matrix (PAM) is a computational framework developed by Monke and Pearson (1989) for measuring input use efficiency in production, comparative advantage and the degree of government interventions (Nelson and Panggabean, 1991). The PAM is a product of two accounting identities, the profitability identity, which defines profitability as the difference between revenues and costs, and the divergences identity, which measures the effects of divergences (distorting policies and market failures) as the difference between observed parameters and parameters that would exist if the divergences were removed. By completing the elements of the PAM for an agricultural system, it becomes possible to measure both the extent of transfers occasioned by the set of policies acting on the system and the inherent economic efficiency of the system (Monke and Pearson, 1989).

The construction of a PAM for an agricultural system allows one to calculate private profitability which is a measure of the competitiveness of the system at actual market prices. Similar analyses of other systems permit a ranking of the competitiveness of agricultural systems at market prices.

Table 1: The Policy Analysis Matrix (PAM) Framework

	Revenues	**Costs**		**Profit**
		Tradable Inputs	Domestic Factors	
Private Prices	**A**	**B**	**C**	**D**
Social Prices	E	F	G	H
Divergences	I	J	K	L

Source: Monke & Pearson (1989).

Table note: Private profits = D, Social profits = H, Output transfers = I

The calculation of private profitability or competitiveness is carried out in the first (top) row of the PAM matrix where actual market prices faced by farmers are used in assessing the competitiveness of the Production systems.For the purpose of this paper, only the first row of the matrix will be considered.

The term private refers to observed revenues and costs reflecting actual market prices received or paid by farmer in the agricultural system. The private profitability calculations as shown in the PAM give an indication of the competitiveness of the agricultural system, given current technologies, output values, input costs, and policy transfers. In the table,private profits, represented as D, are the difference between revenues (A) and costs (B + C). All four entries in this row are measured in observed market prices. Separate budgets were constructed for the four production systems found in the study area.

The cost of capital, defined as the pretax return that owners of capital require to maintain their investment in the system, is included in domestic costs (C); hence, profits (D) are excess profits-above-normal returns to producers. If private profits are negative (D < 0), producers are earning a subnormal rate of return and thus can be expected to exit from this activity unless something changes to increase profits to at least a normal level (D = 0). Alternatively, positive private profits (D > 0) are an indication of supernormal returns and should lead to future expansion of the system, unless the farming area cannot be expanded, or substitute crops are more privately profitable. Following the PAM Methodology, Private Profits, D = (A - B - C), indicate competitiveness under existing policies. However, direct inspection of the data for private profits is not enough. This is because the different systems do not use same units of inputs based on the topography, type of soil and availability of water. These peculiarities are adjusted for by constructing a private cost ratio (PCR) which is the ratio of domestic factor costs (C) to value added in private prices (A - B); that is, PCR = C (A - B).

Value added is the difference between the value of output and the costs of tradable inputs; it shows how much the system can afford to pay domestic factors (including a normal return to capital) and still remain competitive-that is, break even, where (A - B - C) = D = 0. The entrepreneurs in the system prefer to earn excess profits (D > 0), and they can achieve this result if their private factor costs (C) are less than their value added in private prices (A - B). Thus, they try to minimize the private cost ratio by holding down factor and tradable input costs in order to maximize excess profits.

Purchase and Sale-equivalent price of output

All paddy rice farmers (small scale) were found to be surplus producers. The data revealed that on the average, they consume about 21% of the rice they produce and sell the remaining

79% to earn income for their livelihood. Therefore, in estimating the price of tradable output, that is paddy,purchase equivalent price of rice will be used for the 21% of rice which would have been bought by the farmer, while sale-equivalent price will be used for the remaining 69% of paddy that is sold in the market.

Purchase-equivalent Price of Output: PE = FP + TC

Sale-equivalent Price of Output: SE = FP - TC

Where PE = Purchase Equivalent price of output (rice)

SE = Sale Equivalent price of output (rice)

FP = Financial price of output (iice)

TC = Transportation cost to Market

Depreciation for Farm Equipment

The straight-line depreciation method was used to estimate the cost of farm equipment for the period under review. These include Water pump, Handheld hoes, Sickle, Cutlass, Axe, and Knap sack sprayer.

Types of Production Systems and Rice yield

Four different types of rice production ecologies (systems) were identified in the study area. These include Upland rain fed, Lowland rain fed, Irrigation systems and the Fadama system.

a. Rain-fed Up-Land System

This is the dominant rice system found in Nigeria. It is found in all agro-ecological zones of the country. In this ecology, crops depend strictly on rain for growth and productivity (Imolehin and Wada, 1999). The system accounts for about 30% of share of area cultivated to rice and 17% share of domestic production. However, it is characterized with average low yields of 1.7 tons/ha (Singh et al., 1997; Kebbeh et al., 2003). Heavy rainfall can lead to soil erosion, leaching of plant nutrients and possible flooding. The risk of poor grain filling due to drought is also high.

b. Rain-fed Low-Land System

Here, rice is produced in low land wet soils zone and it is the most favored ecology in the country given its resistance to drought (Kebbeh et al., 2003). An estimated 47% area is cultivated to lowland rice and it accounts for 57% of domestic production and an average yield of 2 tonnes/ha (Singh et al., 1997; Kebbeh et al., 2003).

c. Irrigated Rice System

This ecology is the most recently developed ecology in Nigeria (Imolehin and Wada, 1999). It is mostly found in the northern part of the country. This ecology accounts for about 17% of area share of rice production and 27% of domestic production. It is characterized by average yields of 3.5 tons/ha but has high yields potentials of about 5-6 tons (Kebbeh et al., 2003).

The concept of irrigation connotes the science of economical utilization of water to supplement natural rainfall for the production of crop (Dennis, 1983).Traditional irrigated farming was known to be in practice by the people of Kebbi State through the shadoof and calabash/bucket methods (Yahaya and Ango, 2003).

d. Fadama System

This refers to inland rain-fed rice grown on soils with medium to deep water tables. Water covers the soil completely at some stage during the cropping season. These are also called floodplains or shallow swamps. This ecology covers about 5% of rice production area in Nigeria about 3% domestic share of rice and yields of about 1.3 tons/ha (Singh et al., 1997; Kebbeh et al., 2003).Rice production in the Fadama lands in Kebbi state has traditionally depended on rainfall in the wet season and on residual soil moisture after flood recession in the dry season.

Results and Discussion

Rice Yield for different Production Systems

Yield has a direct effect on the profitability of production (FAO, 2017). Table 2 indicates that farmers in the upland rain fed ecology recorded an average yield of 4.58 tons/ha which is about 169% above the average of 1.7tons/ha observed by Kebbeh et al. (2003). An average of 4.13tons/ha was recorded by lowland rain-fed farmers (106% above the average of 2tons/ha) while 5.03tons/ha was recorded by farmers practicing irrigation technologies (44% above estimated average of 3.5tonnes/ha). Even though farmers in the Fadama areas recorded the lowest average yield of 3.68tons/ha, they had the highest yield improvement of about 183% above the estimated average yield of 1.3tonnes/ha at the baseline. This high rise in yield could be attributed to the adoption of improved rice variety in recent times. Irrigation system was the most recently introduced system hence improved varieties were available right from the onset.

Table 2: Average Yield for Each of the Production Systems

	Upland Rain fed	**Lowland Rain fed**	**Irrigation**	**Fadama**
Current yield (ton/ha)	4.58	4.13	5.03	3.68
Base yield (ton/ha)	1.70	2.00	3.50	1.30
% Yield increase	169.12	106.25	43.57	182.69

Source: Current yield from researcher’s survey data while baseline yield from Kebbeh et al. (2003)

Competitiveness of Rice Production Systems

The main PAM indicators employed for this study are the Private Profits (PP), Private Cost Ratio (PCR), and Private Cost Benefit Ratio. Budgets were constructed using actual market prices for input and output faced by farmers and consumers. The results in table 3 indicate that all production systems were profitable given the positive values of their private profits. This implies all systems are competitive under the current market prices and policy transfers. The irrigation system was the most profitable with a record of about ₦330,078/ha, followed by the upland rain fed system with ₦313,413/ha. The least profitable was the Fadama system with a profit of ₦205,485/ha. A previous study by Ugochukwu and Ezedinma (2011), also showed that upland; lowland and double rice cropping systems in southeastern Nigeria were financially competitive. Government investment in intensifying rice production had a positive impact on the output of local rice production.

The Private Cost Ratio (PCR) is used in assessing the private efficiency of the farmers. It is an indication of how much a producer can afford to pay domestic factors and still remain competitive (Monke, Pearson, 1989). It is a ratio of factor prices to value added at private prices. A PCR value of less than one indicates that spending on domestic factors is less than value added, and therefore the rest of the ratio represents profits for producers. The values of the PCR for all the production systems is less than one. This is an indication of having competitive advantage in the production of rice. Unlike with the private profits, the Upland, lowland and irrigation production systems are equally competitive with PCR of 0.24. The fadama system maintains its position of being the least competitive with a PCR value of 0.36. Ogbe et. al. (2011), in his assessment of the competitiveness of Nigerian rice and maize production ecologies affirmed a strong competitiveness of the irrigated rice and upland rice at the farm level.

Table 3: PAM Indicators of Competitiveness of Rice Production Systems

Production Systems	**Private profits (PP)** **D = A - (B + C)**	**Private Cost Ratio (PCR)** **PCR = C/(A-B)**
Upland rain-fed	313,412.62	0.24
lowland rain-fed	284,168.16	0.24
Irrigation	330,078.13	0.24
Fadama	205,485.33	0.36

Conclusion and Recommendation

The values of the private profitability for the production systems indicate they are competitive given current technologies, output values, input costs, and policy transfers. Financial budgets were constructed using market prices of inputs devoid of subsidies as reported by the farmers. Even at the unsubsidized market prices, all production systems were found to be financially competitive. The finding therefore suggest that government policies should focus more on encouraging structural changes in the value chain to improve the competitiveness of Nigerian rice relative to imported rice. Yield has a direct effect on the profitability of production hence attention should also be paid to improved technology such as improved rice seeds and production practices to keep the systems competitive through improved productivity.

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