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Appraisal of rice production in Nigeria: A case study of north central states of Nigeria

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The study was carried out in order to determine the level of contribution of North Central States of Nigeria in rice production to the total output of rice in Nigeria. Secondary data were collected from National Bureau of Statistics. The data include land area used for rice cultivation and output of rice from the period of 1994/1995 to 2005/2006 cropping season. For the area of land used for rice cultivation, the regression model was tried under the four basic functional forms and the double log function was chosen as the lead equation. This was based on the value of coefficient of multiple determination (R^2) of 0.625 and the significant variables in conformity with a priori expectations. For rice output, the double log function was chosen as the lead equation with R^2 value of 0.542 and explanatory variables significantly affecting total output of rice in Nigeria in consonance with a priori expectations. All explanatory variables had positive influence on rice output. It is therefore, recommended that the only sustainable and socially acceptable way forward is to enhance the competitiveness of local rice against imported rice, both in terms of quality and price. This calls for improving quality management and increasing efficiency along the entire marketing chain.

Key words: Nigeria, North Central, appraisal, rice production.

INTRODUCTION

The 20th century saw the most dramatic agricultural transformation in human history. Science-based agriculture brought about rapid changes on the farm and sped the transformation from subsistence agriculture to a more productive and profitable modern agriculture. As agricultural production improved and farmers succeeded, some began to specialize in certain crops or products. This resulted in the growth of farmer-led private enterprises and the building of non-farm private sectors in rural areas. Technological change in agriculture however, requires a constant flow of new technologies to farmers and a wide range of options (Plucknett et al., 2000). Government policies affecting rice production have been directed at protecting the local industry through tariffs and providing extension support to rice farmers. The import tariff on value-added rice was 100% in 1995, 50% in 1996 through 2000 and 85% in 2001 (Akande, 2003).

With effect from May 2008, rice imports into Nigeria were declared free from all duties and charges, including customs duty, 7% surcharge, value-added tax and levies. However, by March 2009, a 50% rice levy was instituted (Nigerian Custom Service, 2009). With this tariff level, local production of rice is expected to be expanded through increased production of paddy by farmers responding to higher paddy price. Local processors are expected to increase capacity utilization and use improved processing equipment.

The continuous increase in rice production and processing will depend on the international competitiveness and effects of policy intervention. The removal of all forms of tariffs as the government did in 2008 will change the structure of economic incentives. This, in turn, will cause major adjustments in the pattern of production, allocation of resources and trade flows. The analysis of competitiveness and comparative advantage will provide an indication of the effects of policy. Comparative advantage of a country in a commodity usually results from relative superiority in

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Table 1. Rice production trends in Nigeria (1961–2000).

Period (ha)	Average area cultivated (tons)	Average out (tons/ha)	Average yield
1961-1965	179,200	207,200	1.147
1966-1970	234,000	321,000	1.360
1971-1975	288,800	470,200	1.670
1976-1980	332,000	596,200	1.710
1981-1985	630,000	1, 300,200	2.063
1986-1990	1,06,200	2,216,064	2.090
1991-1995	1,678,000	2,979,600	1.783
1996-2000	1,742,582	3,011,028	1.733

PCU, FMARD, Nigeria (2002).

resource endowments required by the commodity. It puts the country in a vantage position to specialize in the production of the commodity. Competitive advantage is created through appropriate combination of knowledge and other critical resources to gain significant share of the world market for a particular commodity. Competitive environment and the capability of firms in the industry to innovate and improve their technologies contribute to the achievement of competitive advantage. The use of comparative advantage analysis covers not only on-farm production but incorporates downstream collection, processing and wholesaling activities as they relate to a particular commodity (Salinger, 2010).

Nigeria, Cote d'Ivoire, Zaire and Madagascar are among the biggest producers of all types of rice in Africa (Baksh, 2003). Consumers in these countries require that the domestically produced rice should satisfy minimum level of quality, health and food security standards. Generally, besides the lag in rice production, much of the food produced locally is distributed under poor marketing structure which hinders the flow of resources and virtues in the industry. Nigeria is becoming one of the major rice importers on the world market for the last five years, thus, being an important outlet for rice exporting countries. Beyond its large volume, the Nigerian rice market is even more attractive than other West African markets because Nigeria imports rice of high value (parboiled rice) against rice of lower quality in the other countries of the sub-region (WARDA, 2003). Table 1 shows the production trend of rice production in Nigeria which dictates that there is increase in the production. The macroeconomic conditions under which Nigerian rice is produced are partly responsible for the sector's lack of competitiveness. Some of the issues include high inputs costs such as cost of credit, and imported equipment and agrochemicals due to taxes (legal and illegal), tariffs and duties. There is also the problem of policy instability (ban, unban, tariffs) that makes decision-making and planning highly uncertain and puts investments at great risk. All these factors combine with discriminatory policies against agriculture to make the environment for agricultural production and agribusiness unfavorable and

uncompetitive. Other unattractive conditions include a low technology base (mechanization), decaying infrastructure, high interest rates, weak institutions (such as poorly-funded research institutes, distribution system and low rice imports increased from 1.25 for 2000/2001 to 1.8 million tons in 2001/2002 respectively (Kormawa and Akande, 2010). Therefore, the development of rice production in the country can contribute substantially to poverty alleviation, especially, for resource constrained households and can increase household food security. Encouraging the production of rice locally will lead to high reduction in dependence on imported rice. It is therefore, necessary to carry out a study of production trends of rice in the country, especially, in the North central geo-political zone of Nigeria where local production is well pronounced.

METHODOLOGY

Nigeria is divided into six geo-political zones with 36 states and the Federal Capital Territory. The six geo-political zones are South-south, South-east, South-west, North Central, North-west and North-east. The study was carried out in North central part of Nigeria. This comprises of Benue, Niger, Kwara, Kogi, Nassarawa and Plateau states. The area was purposively chosen because it was well known for rice production in Nigeria. Secondary data used for the study were obtained from National Bureau of Statistics, Abuja, via their data base on internet. The data covered the area in hectare of rice grown in the chosen area of study, and the quantities of rice harvested in tones from 1994/1995 growing season to 2005/2006. The data were subjected to statistical analysis using multiple regression models. The model is implicitly specified as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, e)$$

Where: Y= Total land area for rice production in Nigeria (ha); X_1= land area for rice production in Benue (ha); X_2 = land area for rice production in Kogi (ha); X_3 = land area for rice production in Kwara (ha); X_4 = land area for rice production in Nassarawa (ha); X_5 = land area for rice production in Niger (ha); X_6 = land area for rice production in Plateau (ha) and e = error term.

For total output of rice production in thousand metric tons the model is implicitly specified as follows:

Table 2. Regression estimate of area of land for cultivation of rice.

Variable	Parameter	Linear	Double log	Semi log	Exponential
Constant	B_0	581.757 (536.332)	2.097 (0.621)	-2154.620 (2153.393)	2.905 (0.155)
Benue	B_1	0.198 (2.401)	0.221 (0.206)	0.220 (713.783)	0.198 (0.001)
Kogi	B_2	0.745 (7.095)	0.719 (0.189)	0.718 (655.44)	0.746 (0.002)
Kwara	B_3	0.284 (3.251)	0.422 (0.050)	0.412 (172.053)	0.290 (0.001)
Nassarawa	B_4	0.069 (2.782)	-0.002 (0.112)	-0.020 (387.836)	0.091 (0.001)
Niger	B_5	0.130 (0.462)	0.134 (0.078)	0.136 (271.800)	0.132 (0.000)
Plateau	B_6	0.082 (5.242)	0.061 (0.107)	0.069 (372.818)	0.072 (0.002)
R^2		0.563	0.625	0.613	0.573
Adjusted R^2		0.039	0.175	0.149	0.060
F-ratio		1.074	1.390	1.322	1.117
Durbin Watson		1.123	1.261	1.281	1.106

Computed from data from National Bureau of Statistics, Abuja.

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, e)$

Where: Y = total national rice production (t/ha), X_1= rice production from Benue (t/ha), X_2 = rice production from Kogi (t/ha), X_3 = rice production from Kwara (t/ha), X_4 = rice production from Nassarawa (t/ha), X_5 = rice production from Niger (t/ha), X_6 = rice production from Plateau (t/ha) and e = error term.

Four functional forms of the model namely, linear, semi-log, double-log and exponential was used out to determine the functions forms that best describe the data on the basis of econometric and statistical criteria.

RESULTS AND DISCUSSION

Land area for rice production from 1994/1995 to 2005/2006 at North central states of Nigeria

Table 2 shows the land area devoted to the cultivation of rice in the North Central States of Nigeria as regressed against total land area devoted for rice cultivation in Nigeria from 1994/1995 to 2005/2006 (PCU, 2002; FMARD, 2003; NBS, 2006). Multiple regression was used to ascertain the relationship between land area for rice cultivation in North Central and that of Nigeria as a whole. The regression model was tried under the four basic functional forms and the double log function was chosen as the lead equation. This was based on the value of coefficient of multiple determination (R^2) of 0.625 and the significant variables in conformity with *a priori* expectations. The economic estimate is presented in Table 2. The regression estimates indicated that all the variables (land area in the states) showed positive relationship. None of the states show significant contribution at $P> 0.05$. This coefficient of multiple determination (R^2) was 0.625, indicating that 62.5% of land area in Nigeria for rice production was from North Central states of Nigeria. The positive sign indicates that as the land area for rice cultivation in Nigeria increases that of the states in North Central also increases.

Total output of cassava production from 1994/1995 to 2005/2006

Table 3 shows the regression analysis of total rice production from 1994/1995 to 2005/2006 in North Central states of Nigeria as regressed against total output in Nigeria for the period under consideration. The double log function was chosen as the lead equation with R^2 value of 0.542 and explanatory variables significantly affecting total output of rice in Nigeria in consonance with *a priori* expectations. All explanatory variables had positive influence in rice output. This implies that the larger the output of rice in North Central states the larger the total output in Nigeria. This influence of North Central states on total output of rice in Nigeria may be due to the presence of fertile and suitable soil for rice cultivation, labour, contribution of household members in cultivating rice as well as in processing, distribution and marketing of rice products in the area.

The lead equation (double log) form was based on the normal economic, econometric and statistical criteria and was used for further analysis. The coefficient of determination of 0.542 implies that 54.2% of the variation in total rice production in Nigeria (Y) is explained by variables X_1 - X_6 (the North Central states) included in the model while the remaining 45.8% is as a result of non-inclusion of other rice cultivating states as well as, error in estimation. The explanatory variables adequately explained the model. In 2008, rice imports were 1.6 million tonnes and were estimated to remain at this level per annum up to 2010 (Childs and Baldwin, 2009). The current level of protection of the domestic rice sector in Nigeria ensures that local rice still has a significant market share, despite the lower quality and high costs. In an opening economy, the quality of the local rice will be a critical component to ensure its competitiveness and to guarantee rewards to investments in productivity improvement.

Table 3. Regression estimate of rice cultivation output in North central states on Nigeria.

Variable	Parameter	Linear	Double log	Semi log	Exponential
Constant	B_0	1834.847 (1708.088)	2.276 (1.172)	-5457.016 (7808.734)	3.321 (0.264)
Benue	B_1	0.271 (5.112)	0.270 (0.393)	0.315 (2616.718)	0.238 (0.001)
Kogi	B_2	-0.157 (10.515)	-0.129 (0.288)	-0.110 (1915.252)	-0.195 (0.002)
Kwara	B_3	0.281 (10.484)	0.265 (0.110)	0.299 (732.992)	0.240 (0.002)
Nassarawa	B_4	0.-0.554 (09.048)	-0.379 (0.246)	-0.383 (1635.253)	-0.550 (0.001)
Niger	B_5	0.856 (0.965)	0.861 (0.074)	0.801 (491.679)	0.935 (0.000)
Plateau	B_6	0.274 (12.367)	0.316 (0.222)	0.383 (1475.935)	0.210 (0.002)
R^2		0.639	0.792	0.745	0.689
Adjusted R^2		0.206	0.542	0.439	0.316
F-ratio		1.474	3.168	2.432	1.845
Durbin Watson		1.060	1.142	1.081	1.150

Computed from data from National Bureau of Statistics, Abuja.

Conclusion

There are considerable opportunities to revitalize the Nigerian rice sector. The current level of protection of the domestic rice sector provides an opportunity for such development. However, such a protection comes at a considerable social cost and therefore, should be seen as a temporary transient measure. It therefore recommended that the only sustainable and socially acceptable way forward is to enhance the competitiveness of local rice against imported rice, both in terms of quality and price. This calls for improving quality management and increasing efficiency along the entire marketing chain. The proposed strategy can be successful, but implies changing business as usual and calls for some innovative approaches and partnerships and an overall enabling environment for such an investment and adjustment to occur.

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