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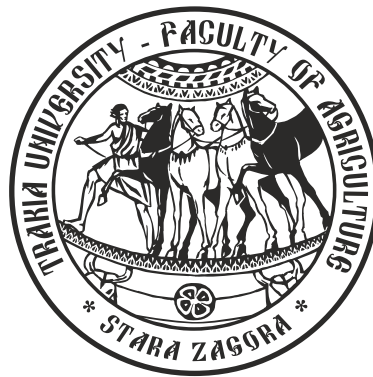
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Analysis of structure and performance of paddy rice marketing in Adamawa state, Nigeria

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Abstract. Many factors such as inadequate capital, poor infrastructure, poor price information could bring about distortion in the structure and performance of the market process resulting to the reduction in profit margin of marketers and a disincentive to present and prospective marketers of paddy rice. This study was conducted to analyze the structure and performance of paddy rice marketing in Adamawa State, Nigeria. The specific objectives were to examine the structure of rice market and to evaluate the performance of the market participants in the study area. Data were collected from 204 rice marketers using multi stage sampling technique. Herfindahl-Hirschman Index (HHI) was used to determine structure of the market, while Marketing Efficiency measure was applied in analyzing the market performance of the market participants. The HHI pooled results for year 2013, 2014 and 2015 revealed that paddy rice marketing in Adamawa State has a highly competitive market structure (11.38 and 71) with low (42% and 24%) marketing performance for retailers and wholesalers, respectively. To improve the performance of market participants, it is recommended that government should open up and rehabilitate the road network in the hinterlands to facilitate easy evacuation of agricultural inputs and commodities in and out of the market. Financial support and formation of unions would enable the marketers benefit from scale operation and enroll for training on entrepreneurship.

Keywords: rice, marketing, market structure, market concentration, performance

Introduction

Rice (*Oryza sativa* L.) which belongs to the family "Gramineae" and genus "Oryza," is one of the main staple foods for 70% of the population of the world. The total rice under cultivation is globally estimated to be 150 million hectares, with annual production averaging 500 million metric tonnes (Onyango, 2014). This represents 29% of the total output of grain crops worldwide. Rice is one of the most important food crops depended on by over 50% of the world population for about 80% of their food need, especially in Asia and in West and Central Africa (Conteh et al., 2012). Due to the growing importance of the crop and increasing challenges of the attainment of food security, it has been estimated that the annual rice production needs to increase from 586 million metric tonnes in 2001 to meet the projected global demand of about 756 million metric tonnes by 2030 (Keuneman, 2006).

In sub-Saharan Africa, rice is one of the commodities whose demand is rapidly growing, mainly driven by urbanization. With the population of Africans living in urban areas expected to increase from current 38% to 48% by 2030, rice consumption in Africa is expected to increase tremendously (Africa Rice Center, 2013). The global trend in rice industry shows that there is a growing import of the commodity in Africa. In 2006, Africa's global rice imports accounted for 32% (Awodite et al., 2012). In 2009 rice import into Sub-Saharan Africa was 9.68 million metric tonnes, worth more than \$5 billion. Due to population growth (4% per annum), rising incomes and a shift in consumer preferences in favour of rice, especially in urban areas, the relative growth in demand for rice is faster in this region than anywhere in the world (Timmer, 2004). Rice occupies an important place in Nigeria; it is one of the major staples which can provide the nation's population with the nationally required food

security minimum of 2,400 calories per day (Bamidele et al., 2010). In 2010, the total demand for milled rice in Nigeria was estimated to be 5 million metric tonnes out of which 3.2 million metric tonnes was produced locally and the deficit was bridged by importation (Inuwa et al., 2011). The main actors in the rice chain in Nigeria are farmers, paddy traders, millers, rice traders and retailers, and the main value adding activities include production, harvesting, storage and paddy aggregation at traders' level, parboiling, milling, wholesaling and retailing (FAO, 2013). In spite of the fact that rice is cultivated in virtually all the agro-ecological zones in Nigeria, the area under rice cultivation remained small, yield remained the lowest in the region and quality of paddy remained poor due to presence of stones, mixed varieties and broken seeds (NRDS, 2009). Beyond the farm gate, there are several issues that retard the downstream activities which are also constraining local supply of the commodity. These include issues such as the absence of standard measures in the marketing of rice, poor transportation services and lack of proper packaging materials and poor linkages to processing industries. Rice milling in Nigeria is at the cottage industry level. The milling capacity varies from 50 kg to 5000 kg rice per hour. The most frequent type of mill encountered is the 'medium size' (150 to 300 kg/h), which represents half of the sample, followed by the 'small size', the less frequent type of mills being the 'big size' and 'large size' (Lançon et al., 2003). These combined with large number of participants in the value chain coupled with on-farm constraints add up to undermine the competitiveness of rice industry in Nigeria (Daramola, 2005).

The rice marketing system in Nigeria is characterized by inadequate knowledge of postharvest handling, processing and marketing, harvesting skills, poor means of transportation, and lack of industrial drive. Others are poor government policy and high

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production cost, poor market information and inadequate credit facilities. These coupled with poor market conduct and structure translate to poor market performance in the Nigerian rice industry (Ajala and Gana, 2015). According to Tiarniyu et al. (2014) the general trend of rice marketing in Nigeria shows an upward movement in price every year, and the trend line for its consumption has been on the increase from 1960, which could be attributed to population growth, increase in income and increased availability of the product. The study had as objective to analyze the structure and performance of rice markets in Adamawa state, Nigeria.

Material and methods

Study Area

Adamawa State is located at the North-Eastern part of Nigeria; it lies between latitude 7° and 11°N of the equator and longitude 11° and 14°E of the Greenwich Meridian. It shares boundary with Taraba State in the South and West, Gombe in the North-West and Borno to the North (Adebayo, 1999). Adamawa State has an international boundary with the Cameroon Republic along its eastern border. The State has a land area of about 38.741km² with a population of 3860023 people (projected from NPC, 2006 using 2.5% growth rate).

Source of Data and Sampling Procedures

Data for this study were from primary sources and were collected from 204 respondents. Multi stage sampling techniques were employed in selecting the respondents. In the first stage, all the four Agricultural zones of Adamawa State were considered, which include:

Zone 1: Madagali, Michika, Mubi North, Mubi South and Maiha.

Zone 2: Hong, Gombi, Song and Girei.

Zone 3: Fufore, Ganye, Jada, Mayo-Belwa, Tongo, Yola North and Yola South.

Zone 4: Demsa, Guyuk, Lamurde, Numan, and Shelleng.

The second stage involved the purposeful selection of ten rice markets in the State. The third stage involved the categorization of the respondents into wholesalers and retailers. The number of wholesalers and retailers were obtained from "Sarkin Kasuwa" and they classified the rice marketers as those that sell in bags (wholesalers) and those that sale in different units of small measures as retailers. The final stage was the random selection of 60 wholesalers and 144 retailers proportionate to the number (40%) of respondents in each market.

Analytical Techniques

The analytical tools employed included Herfindahl-Hirschman Index (HHI) and Marketing Efficiency measure.

The HHI technique was used to determine the structure of rice marketing in Adamawa State. The study adopted the HHI model used by Naldi and Flamini (2014) where HHI was described as a positive figure and market shares were expressed as fractions of the whole. The HHI is mathematically expressed as:

$$HHI = \sum_{i=1}^n S_i^2$$

where: HHI= Herfindahl-Hirschman Index; S_i= market share of the ith firm; Σ= summation sign; n= number of marketers.

According to the United States Department of Justice (2010), the value of HHI can be interpreted as follows:

- HHI of less than 0.01 or 100 indicates a highly competitive industry;
- HHI of bellow 0.15 or 1500 indicates an unconcentrated industry;
- HHI of between 0.15-0.25 or 1, 500-2500 indicates high concentration.

Marketing Efficiency

Marketing efficiency (ME) is a measure of the market performance. Awotide and Ajala (2007) stated that the overall marketing performance/economic performance (ME) can be determined by the formula:

$$ME = \frac{\text{Net margin}}{\text{Marketing cost}} \times 100$$

The net margin accruing to the wholesaler or the retailer is the difference between the marketing revenue and marketing cost. Marketing cost is the sum of transportation cost, storage cost and other costs. If the marketing efficiency = 1 (highly efficient), it implies that abnormal profit is being made in the trade and some elements are unduly reaping from the efforts of others. Again, when ME < 1 (under efficient) it implies that a sizeable loss is being recorded in the trade.

Results and discussion

Market Structure

Market Concentration level derived from the analysis of Herfindahl-Hirschman Index (HHI) is presented in Table 1. From the table the HHI for retailers are 10.85, 9.66, 37.62 and 11.38 for 2013, 2014, 2015 and pooled values, respectively. This results show that the HHI values in years 2013, 2014, 2015 and the pooled is less than 100, indicating that the markets have highly competitive structure among the retailers. The result suggests that retail rice marketing in the study area is characterized by a large number of sellers highly competing with each other to satisfy the wants and needs of larger consumers, and no seller or group of sellers, or consumer or group of consumers dictated how the market operated. The results also revealed that the HHI values in the wholesale category were 72.34, 280.12, 60.79 and 71.24 for 2013, 2014, and 2015 and pooled, respectively. This means that in years 2013 and 2015 rice marketing was highly competitive among the wholesalers but moderately competitive in year 2014. Relatively among the whole category, rice market in 2013 and 2015 had a lower index value, than in 2014. This implies that rice market was more competitive in 2013 and 2015 than 2014 in the study area. The reason behind moderate market structure in year 2014 might be attributed to high level of insurgency attack during the period which caused some market participants not to be involved in marketing activities. The pooled index has a value less than 100 meaning that in Adamawa State, rice has a highly competitive market structure, hence, high motivation for sellers to be more efficient. This result contrasts Bassey et al. (2013) which stated that a rice market in Nigeria is highly concentrated, implying that rice trade is in the hands of relatively few traders. The implication of the result of this study is that rice is one of the major staples produced by many farmers and is readily available for sale to consumers. Also, there is a prospect of high market performance because the markets are characterized by a large number of sellers highly competing with each other to satisfy the wants and needs of a larger consumer.

Table 1. Market concentration of respondents using Herfindahl-Hirschman Index (HHI)

Year	Retailer		Wholesaler	
	HHI Value	Concentration level	HHI Value	Concentration level
2013	10.85	Highly competitive	72.34	Highly competitive
2014	9.66	Highly competitive	280.12	Moderately competitive
2015	37.62	Highly competitive	60.79	Highly competitive
Pooled	11.38	Highly competitive	71.24	Highly competitive

Source: Output from E-View

Market Performance

Market performance refers to the efficiency of a marketer in utilizing scarce resources to meet consumer's demand for goods and services; that is how well a market has contributed to the optimization of economic welfare. Analysis of the results in Table 2 for marketing efficiency of rice marketing was determined. The finding shows marketing efficiency of 42% and 24% for retailer and wholesaler, respectively. This means that 42% was accrued to retail marketers as average profit and 24% was accrued to wholesale marketers as average profit. This indicates low marketing efficiency among all categories of marketers in the entire markets. The low performance of marketers might be attributed to their inability to employ technically new cost-cutting strategies in the distribution of a new superior product over time. This contrasts the finding of Abah et al. (2015) that rice marketing in Nigeria is highly efficient. The

Table 2. Estimation of Efficiency of Rice Marketing

Variables	Retailers (Value \$)	Wholesalers (Value \$)
Price received by farmers (FP)	190749.24	445081.54
Marketing cost (MC)	47246.29	87743.13
Total sales	596588.82	2244310.3
Marketing margin (MM)[SP-FP]	405839.58	1799228.8
Technical Efficiency [FP/(MC+MM)]	0.42	0.24

Source: Field survey, 2015

implication of this low performance is that the outcome of the market did not reflect the desires of the larger society in terms of price levels and price stability in long and short term, profit levels, cost efficiency and quantities and quality of paddy rice.

Conclusion

The study concluded that Adamawa State rice markets have highly competitive structure with low performance among participants in the markets. Thus, policies that will positively influence the performance of market participants must be attended to achieve high performance in rice marketing in that region of Nigeria.

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