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ANALYSIS OF COWPEA MARKETING IN THREE STATES OF NORTH-WEST, NIGERIA: A MEASURE OF SPATIAL PRICE EFFICIENCY

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ABSTRACT

The study analyzed spatial price efficiency in relation to transportation and other transaction costs in three states of North West Nigeria. The study was carried out in Kano, Kaduna and Katsina States. The study used secondary data that covered monthly prices for 96 months (2007-2014). The secondary data were obtained from the Agricultural Development Project Office (ADPs) of the three selected states and National Agricultural Extension and Research Liaison Service (NAERLS), Ahmadu Bello Univeristy, Zaria, Nigeria. The objectives of the study were to examine the trend in cowpea marketing and to estimate inter market price efficiency in relation to transportation and other transaction costs. Data were analyzed using spatial price model. Seven markets known for food grain marketing; Dawanau (in Kano State), Giwa, Ikara, Pambeguwa (in Kaduna State) and Funtua, Dandume and Danja (in Katsina State) were purposively selected. Out of these seven markets, Dawanau market was used as the reference market while Giwa, Ikara, Pambeguwa, Funtua, Dandume and Danja markets were used as the supplying markets. The choice of Dawanau market as the reference market was based on large supply of food grains to Dawanau market from other States of Northern Nigeria. Analysis of inter-market price efficiency revealed price spread in excess of transfer costs in the study area, implying imperfections and inefficiency in the marketing system. The study recommends the intervention of government, with the involvement of community leaders, as well as local contractors to embark on planning, construction, rehabilitation and maintenance of rural infrastructures like rural roads to facilitate easy movement of cowpea grains to the market. This will allow for easy flow of food grains from the rural markets to urban markets where the demand is high and also minimize the price spread among different markets in the study areas. Also, accurate and timely dissemination of price information will assist in reducing price inefficiency in cowpea marketing.

Keywords: Cowpea marketing, spatial price efficiency, North-West Nigeria

INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp) is one of the most economically and nutritionally important indigenous African grain legumes produced throughout the tropical

and subtropical areas of the world (Lowenberg-DeBoer and Ibro, 2008). It play a key role in the agriculture and food supply of Nigeria It is a major source of dietary protein that nutritionally complements staple low-protein cereal and tuber crops, and is a valuable and dependable commodity that produces income for farmers and traders (Singh, 2002; Langyintuo *et al.,* 2003). It sustains the people who live on the very edge of existence and it thrives in hot, dry conditions. Cowpea is important for food security both as a major vegetable and as a grain. Also, in both forms it is sold to urban markets (Rusike *et al*., 2013). It is the most economically and nutritionally important indigenous African grain legume grown and utilized in the diet of man and animal.

Spatial price efficiency examines how prices in different markets over space are related, especially as a function of transportation cost. When spatial trade is efficient, food shortages in deficit regions are transmitted to surplus regions via prices and arbitrage triggers flow of food across space (Arndt *et al*., 1998; Nuhu *et al.,* 2009). Through efficient spatial arbitrage, the risk of crop failure in some regions is shared over a large market area, and prices are more stable and food shortage may be prevented. An important step toward improving the functioning of markets in this case is to understand the nature and effects of transaction costs facing input supplies, farmers, food wholesalers, food retailers, and/or consumers (Goetz, 1995). Instability in commodity prices among markets could be detrimental to the marketing system and the economy as a whole. It could cause inefficiency in resources allocation among sellers and consumers depending on the source of variability (that is, whether it is induce by supply or demand side or both). It could also increase poverty level among low income earners in the society (Polaski, 2008).

Despite the central position occupied by cowpea in addressing rural hunger, source of employment and income generation, the efforts of Nigerian government and other stakeholders in improving its production and marketing system has not yet yield the desired result. As a result of this, coupled with weak infrastructure, poor transportation and storage facilities and inefficient pricing system translate into low efficiency and renders the system malfunctioning and uncompetitive in the international world. Also, most speculative middlemen only believe in hoarding or buying food grains during harvest and sell when price rises, which might have adverse effect on the self- food sufficiency policy of the Federal Government of Nigeria. Very little is known to the wholesalers as regards whether it is profitable to buy and sell at the same time of the season across different locations due to insufficient market information. On the other hand, consumers pay different prices for the same commodity (cowpea) in different markets separated by few kilometers. This study therefore analyzed spatial price efficiency among different markets in three states of North-Western Nigeria.

MATERIALS AND METHODS

Study Area

This study was conducted in Kaduna, Kano and Katsina States of the North West Nigeria.

Kaduna State: Kaduna State is located in the Northern Guinea Savanna ecological zone. It occupies almost the entire central portion of the Northern part of Nigeria and share common borders with Zamfara, Katsina, Kano, Bauchi, Nassarawa and Plateau states. To the southwest the state has a border with the Federal Capital territory, Abuja. The global

location of the State is between longitude 06°00 and 09°00 East of the Greenwich Meridian and also between latitude 09°00 and 11°30 North of the equator. The state occupies an area of about 48,473.2 square kilometer (FOS, 2006).

Kano State: Kano State is located between latitude 13^0N and 11^0N and longitude 8^0E and 10^0E. The state has a land mass of about 20760km^2 (NAERLS, 2011). The state is considered to be agrarian as more than 65% of the working adults are engaged in farming and related activities as a means of livelihood.

Katsina State: Katsina State covering an area of 23,938 square km is located between latitude $11.0^0 08^0$N and 13.0 22^0N and longitude 6.0 52'E and 9.0 20'E. The state is bounded by Niger Republic to the North, Jigawa and Kano to the east, Kaduna state to the South and Zamfara State to the west. Agriculture is the backbone of the state's economy as 75 per cent of its people are farmers. Katsina state is blessed with abundance agricultural land and a wide range of crops are grown.

Sampling and Data Collection

Secondary data were used for this sudy. Firstly, three (3) states were purposively selected, namely; Kano, Kaduna and Katsina States for their predominance in production of cowpea. Secondly, seven (7) markets were also purposively selected, which are Dawanau, Giwa, Ikara, Pambegua, Funtua, Dan-dume and Danja markets from Kano, Kaduna and Katsina States respectively based on their active participation in marketing of cowpea. Out of these seven markets, Dawanau market was used as the reference market while Giwa, Ikara, Pambeguwa, Funtua, Dan-dume and Danja markets were used as the supplying markets. The choice of Dawanau market as the reference market was based on large supply of food grains to Dawanau market from other States of the Northern Nigeria and also serves as an international market in Nigeria.

For these seven markets, monthly prices of cowpea was gathered for 96 months (from 2007 to 2014) using secondary data. The secondary data were obtained from the Agricultural Development Programme Office (ADPs) of the three selected states and National Agricultural Extension and Research Liaison Service (NAERLS), Ahmadu Bello Univeristy, Zaria, Nigeria.The prices gathered were wholesale prices which were measured in tonnes.

Data Analysis

The following tools of analysis were employed to achieve the stated objectives:
i. Descriptive statistics: This was used to achieve objective i of the study
ii. Spatial price model: This was used to achieve objective ii of the study.

Specification of Spatial Price Model for Cowpea

A model of spatial price relationship was developed by Hays and McCoy (1977). This model was used to look at price spread between different locations. Dawanau market was considered as the central market (a border town and consuming centre) while Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets were considered as rural supplying markets. Parity price or expected price was calculated at Dawanau Market.

The price spread was then computed as follows:

$$PP_{ij} = P_i - (HC_{ji} + TC_{ji} + AS_{ji}) \quad (1)$$

Where:

PP_{ij} = The calculated parity price of one tonne of grain from the i^{th}market (Urban Markets: i.e. Dawanau market) in relation to the j^{th} markets (Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets respectively).

P_i = The actual wholesale price of one tonne of grain at the i^{th}market.

HC_{ij}= Handling costs involved in moving one tonne of grain from the j^{th} to the i^{th} market.

TC_{ij} = Transport cost for moving one tonne of grain from the j^{th} the i^{th} Market.

AS_{ij}= The charge for the assemblers' service in moving one tonne of grain from thej^{th} to thei^{th} market.

The actual price spread between any two markets would be:

$$PS_{ij} = PP_{ij} - P_j \quad (2)$$

Where:

PS_{ij} = The price spread for one tonne of grain between the i^{th} and the j^{th} market.

PP_{ij} = The calculated parity price of one tonne of grain from the i^{th}market in relation to the j^{th} markets.

P_j = The actual wholesale price of one tonne grain in the j^{th} market

In a perfectly competitive market, where grain was moving from j^{th} to i^{th}market,PP_{ij}would always be equal to $P_j$and the price spread will be equal to zero (Hay and McCoy, 1977; Nuhu *et al.,* 2009).

The rule of thumb is that:

i. If the price spread is positive, the traders are making more than normal profit.
ii. If the price spread is zero, the traders are making just normal profit, which can only exist for perfect and efficient market.
iii. If the price spread is negative, the traders are making a loss.

RESULTS AND DISCUSSION

Trend in the Price of Cowpea in some Selected Markets in the Study States

The trend in the price of cowpea showed a consistent increase and fluctuations in the price of cowpea from 2007 to 2014. The price was lowest in 2007 which rises sharply and peak at the second quarter of 2008 across all the seven markets. The general rise in the price across all the markets may be attributed to inflation. The price was highest in Giwa, followed by Dawanau and followed by Ikara (₦390,500, ₦378,750 and ₦361,750 respectively) in the second quarter of 2008. This gradually falls to as low as 330,000, 287,038 and 287,000 in Giwa, Dawanau and Ikara in the the first quarter of 2009. The sudden fall in in the price in the first quarter may be attributed to government policy during the period.

From 2009, there were series of fluctuations in the price across all the seven markets up till 2011. From 2011, there was sudden increase again which peaked in the third quarter of 2011 at ₦432,750 in Dawanau, ₦412,240 in Giwa and Ikara and ₦397,996 in Funtua. From here, there was gradual falls and fluctuations in the price of cowpea until first quarter of 2013. From here, there was sharp increase in the trend between 2013 and peaked again in the fourth quarter of 2014 as shown in Figure 1.

The general fluctuations in the price of cowpea across all the seven markets may be attributed to seasonality of cowpea production in which the price is lowest at harvest and highest between planting and harvesting season. Also, unstable government and government policies may also be a contributing factor. The continuous increase and sharp increase in the price of cowpea in some years may be attributed to inflation.

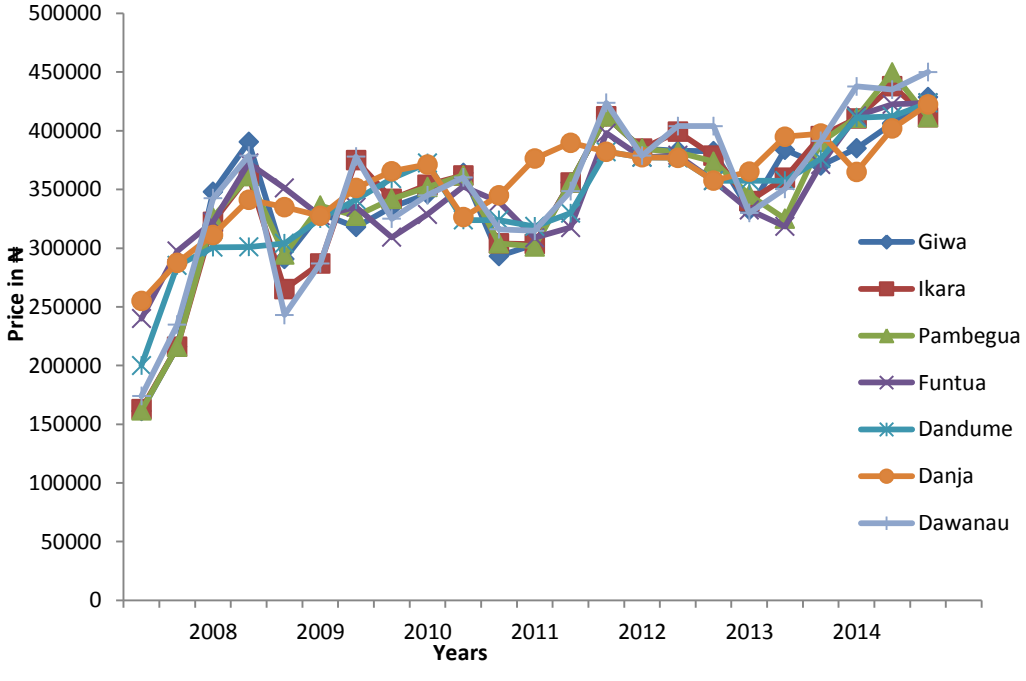

Figure 1: Trend in the price of cowpea in some selected markets in Kano, Kaduna and Katsina States (2007 - 2014)

Analysis of Inter -Market Price Efficiency for Cowpea in Relation to Transport and Other Transaction Costs

The results of the spatial price relationship or the ability of the marketing system to allocate grain over space from the selected supplying markets to Dawanau market for cowpea was presented in Table 1. The value of negative price spreads for cowpea across the markets studied was lowest in Ikara (- ₦16990) and highest in Dandume (₦17,350). The study also revealed that both the negative and the positive values of price spreads from the lowest to highest value ranged from −₦16,740 (28th and 37th months) to ₦16,670 (30thand 37th months), −₦16,990 (37th month) to ₦16,350 (85th and 87th months), −₦16,940 to ₦13,950 (37th and 96th month), – ₦8,150 to ₦13,950 (48th and 82th month),

– ₦16,000 to ₦17,350 (11th and 59th month) and −₦16,600 (72th and 78th months) to ₦16,650 (59th month) in Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets respectively. The average positive spreads stood from the lowest value of (−₦77.30) in Giwa market to the highest value of (₦4342) in Funtua market.

The positive spread implies that marketers were making more than normal profit while the negative spreads implies that marketers were incurring losses, for example. The return from marketing is less than transportation and other transaction costs. Both positive and negative spreads in the price of cowpea is a sign of inefficiency in the marketing system of cowpea. In microeconomic study, the price of a commodity should be a reflection of transportation and other transaction cost in addition to the price the commodity was purchased.

It is also assumed that perfect information is one of the conditions for perfect competition among others; hence, poor market information was one of the main factors responsible for wide differences in the price spread of cowpea in the study area. Also, transferred costs such as loading and offloading, poor rural infrastructure like bad roads and transportation cost between regions can as well be responsible for this price spread between the central market and the supplying markets. These findings are in line with the work of Nuhu *et al.* (2009) in their studies of food grain marketing in North East Nigeria: a study of spatial and temporal price efficiency, who found that imperfect information was one of the reasons for inefficiency in the price of food grains in the North Eastern Nigeria.

Table 1: Price spread (₦/ tonne) between each of the supplying market and Dawanau market for cowpea

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	CP	CP	CP	CP	CP	CP
2007	1	-2800	3660	-2350	-50	0	50
	2	700	2950	1150	-550	4500	-450
	3	-4300	-7050	-3850	-1550	3500	-1450
	4	-3800	-10550	-3350	-6050	4000	-5950
	5	-6800	-8550	-6350	9950	0	-4950
	6	1200	1450	1650	-50	0	50
	7	14200	9450	9650	9950	0	50
	8	200	4450	-5350	9950	-5000	50
	9	7000	7250	7450	9950	0	50
	10	4200	4450	4650	4950	-5000	-4950
	11	3200	3450	3650	9950	-16000	50
	12	7200	7450	7650	9950	11000	10050
2008	13	4200	-550	-350	9950	13000	10050
	14	4200	4450	4650	4950	15000	10050
	15	9200	-10550	9650	5050	10000	10050
	16	-800	-2450	4650	50	15000	5050

	17	4200	-13450	4650	5050	15000	5090
	18	3700	-450	9650	5050	15000	90
	19	4200	-450	-350	-5400	9000	-4910
	20	9200	4550	9650	4600	15000	10090
	21	700	0	9650	4750	5000	-9910
	22	-11800	-450	-350	4750	10000	90
	23	-12000	2550	4650	9750	15100	10090
	24	-5800	3050	150	4750	4100	90
2009	25	-650	-450	-350	9750	100	90
	26	410	9550	9650	9750	-13840	90
	27	2400	9550	4650	9950	-6850	5090
	28	-16740	-450	4650	4950	11810	1300
	29	-10450	-450	4650	-50	-400	-410
	30	16670	1600	9650	-50	4600	9590
	31	-1450	4600	-350	4950	14600	14600
	32	-13310	5100	-350	7090	1740	1740
	33	-2340	4600	650	6160	-11290	-11290
	34	300	350	400	4450	-4650	-4650
	35	-13750	-5400	-8350	650	-400	-10400
	36	-10410	-10360	-10310	-5010	4600	-15400

Table 1continued: Price spread (₦/ tonne) between each of the supplying market and Dawanau market for cowpea

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	CP	CP	CP	CP	CP	CP
2010	37	-16740	-16990	-16940	4950	-5400	-5400
	38	5850	5600	5650	9950	-5400	-5400
	39	290	0	140	4950	2040	2040
	40	4850	4500	4700	5350	9850	14600
	41	5400	5050	4850	5350	9850	9600
	42	1850	1500	1300	350	950	700
	43	-12450	-12400	-12700	350	-150	-400
	44	10140	1390	9790	-150	4850	-5900
	45	2200	3590	1850	4850	-6600	-7350

	46	-850	6350	-1200	9850	-150	-650
	47	9150	9100	8800	-150	50	4350
	48	1650	1600	1300	-8150	-7950	-650
2011	49	9650	9850	11300	4850	2050	4350
	50	9350	9300	9000	2550	-250	6850
	51	-5290	-5340	-5640	-2090	-4890	5350
	52	-14570	-14420	-14720	830	-1970	5350
	53	-5210	-5060	-5360	8190	3390	4350
	54	6450	6600	6300	4850	50	9350
	55	-9220	-9070	-9370	1180	880	8850
	56	-5550	-5400	-5700	4850	-4450	-5150
	57	-5550	-5400	-5700	5850	5550	4850
	58	5450	5600	5300	8850	15050	14350
	59	7950	8100	7800	8350	17350	16650
	60	7450	7600	7300	8860	8560	7860
2012	61	550	950	300	4350	4050	3350
	62	-450	-650	-700	2900	2550	1850
	63	-7950	-7650	-7600	-6100	-6450	-7150
	64	-950	-650	-600	-600	-950	-1650
	65	6050	6350	6400	4500	4150	3500
	66	8050	8350	8400	9900	11550	10900
	67	-10950	4350	4400	8950	8550	7900
	68	-5950	-650	4400	5450	5050	4400
	69	-950	-5650	-600	4950	4550	3900
	70	-5950	-5650	-5600	-50	-450	-1100
	71	-950	-650	4400	9950	9550	8900
	72	-10950	-5650	-10600	-5050	-5400	-6100

Table 1 continued: Price spread (₦/ tonne) between each of the supplying market and Dawanau market for cowpea

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	SB	SB	SB	SB	SB	SB
2013	73	-5950	-650	-600	-5050	-5400	-6100
	74	-5800	-600	-10600	-50	-400	-3600
	75	-800	-600	-6050	1950	4600	1400
	76	-1300	-10600	-550	1950	4600	-11600
	77	-1300	-10600	4450	6950	4600	-16600
	78	-2300	-11600	8450	10950	4600	-16600
	79	-7300	-11600	7450	10950	4600	-11500
	80	-11300	-5800	8450	10950	-400	-11500
	81	-6300	9200	-1550	3950	9600	-1400
	82	-6300	4200	3450	13950	4600	-11400
	83	3700	4200	3450	-1050	-1400	-1400
	84	1700	2200	1450	-1050	-1400	13600
2014	85	12700	16350	12450	5950	5600	8600
	86	9100	14350	8450	8950	8600	3600
	87	1200	16350	450	5950	5600	8600
	88	4200	14350	950	3950	8600	3600
	89	-800	9350	-2150	3950	8600	8600
	90	-5800	4350	-7550	-1050	3600	3600
	91	-800	9350	3450	3950	3600	8100
	92	7200	14350	6450	8950	9600	12900
	93	6200	9350	5450	8950	8600	9900
	94	13800	9350	8050	8950	8600	8600
	95	12200	-650	11450	3950	3600	3600
	96	14700	4350	13950	3950	3600	3600

Note : CP= Cowpea, GW= Giwa, IKR=Ikara, PG= Pambegua, FTU=Funtua, DD=Dandume and DJA= Danja

CONCLUSION

The study concludes that the analysis of spatial price efficiency revealed that there were fluctuations in the price of cowpea across the seven markets surveyed. Also, the price

spreads of cowpea among the seven markets showed positive and negative spreads. The appearance of many positive and negative spreads is an indication of inefficiency in cowpea marketing system.

The study recommends that the government, in conjunction with community leaders, as well as local contractors should embark on planning, construction, rehabilitation and maintenance of rural feeder roads. This will minimise problems faced by marketers and allow for easy flow of cowpea from the rural markets to urban markets where the demand is high. Also, poor market information was one of the factors that could be responsible for price inefficiency in cowpea marketing; it is therefore, recommended that there should be accurate and timely market price information on cowpea to both farmers and marketers by all arms of governments, ADPs and non-governmental organizations.

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