

# An analysis of the efficiency of the marketing system for yams in Nigeria

---

**Asumugha, G.N.**, D. M. Lemka, M.E. Njoku\*, M. C. Ogbonna, B.C. Okoye, E. Dung, A. Amaefula and K.I. Nwosu,

National Root Crops Research Institute, Umudike, Abia State, Nigeria

\*Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

E-mail: [gnasumugha@nrcrri.org](mailto:gnasumugha@nrcrri.org), [gnasumugha@yahoo.com](mailto:gnasumugha@yahoo.com)

---

## Abstract

This study deals with an analysis of the level of pricing efficiency of yam marketing system in order to provide data for appropriate improvement policies for increased production and export. The broad objective is to determine the channels and level of efficiency of the marketing system for yam in Nigeria. Data were collected through farm and market level surveys conducted in 2008. A combination of analytical tools involving econometric and descriptive techniques was used. This includes the bivariate correlation coefficients in the estimation of yam prices in pairs of yam markets to determine how spatially integrated the yam markets were. The result shows that the yam market participants include the producers, rural assemblers, commissioned agents, urban and semi-urban wholesalers as well as retailers who abound mostly in urban areas. There is a low degree of spatial market integration for yam in Nigeria as indicated by 80 out of 171 pairs of markets. This implies therefore low level of market integration for yam throughout the country. The marketing system of yam in Nigeria is less competitive and therefore less efficient

## Introduction

### *Background and Justification*

Nigeria is the largest producer of yam in the world producing an average of 26.9 million metric tonnes per annum (FAO, 2002). In 1997 alone, Nigeria accounted for 75% of World production (Manyong et al, 2001). The annual growth rate for the same period was 6% for the yield and 10% for the area planted. Although Nigeria is the largest producer of yam in the world, the need arises for increasing production to satisfy domestic and export demand for yams. The major yam growing areas of Nigeria extend from the rain forest zone to the southern limit of the Northern Guinea Savannah. However, the marketing and export of yam has not received adequate attention in Nigeria. There is insufficient knowledge as to the efficiency of the yam marketing system.

Inefficiency in the yam marketing system may arise from high cost of transportation of yam between producing and consuming areas or points of sale. Transport cost may be high because of poor feeder road networks between producing and consuming areas leading to high transport cost such that transport costs may exceed price differences between markets.

Storage may pose a problem during the peak harvest period, since it is a tuber crop. The difficulty in storage raises the problems of farmers benefiting from the incidence of seasonal price increases for yam.

If the efficiency of the marketing system for yam is to be improved so as to facilitate its contribution to increased marketing and export, there is the need for better understanding of the level of pricing efficiency and integration of yam marketing system and the constraints to efficient marketing of the crop.

In this respect, certain questions are necessary. First, how highly organized is the marketing system for yam in Nigeria? What are the channels through which yam moves from producers to consumers? What is the relationship between prices of yam in different markets? What is the level of market integration in the yam trade? What are the major constraints to efficient marketing of yam? This study is designed to provide answers to the above questions.

Available information on yam marketing in Nigeria was on study conducted in southeastern Nigeria (Eluagu *et al*, 1990). Eluagu *et al* described the yam marketing channel as long, consisting of the farmers, agents/wholesalers, wholesaler-retailers, itinerant assemblers, retailers and consumers. In this case, the wholesaler-retailer controlled 75% of the yams flowing through the yam marketing channel. According to the authors, the flow of yam trade was in the North-South direction.

A structural analysis of yam trade flow into Abia State using total value of purchases as index of measurement of the market share was conducted in Abia State in Eastern Nigeria (Anuebunwa, 2002). According to the result, the northern states of Nigeria contributed 67.97% of total yams supplied to Abia State while the Southern States 32.03% of which Abia accounted for 2.7%. Correct decision making and planning in trade also depend on reliable information on market conditions (Shepherd, 2000). The above two studies were done in Eastern Nigeria. There is therefore need for comprehensive information on yam flow nationally. Comprehensive data on the volume of yam flow will guide policies on marketing, and export in Nigeria.

### ***Objectives of the study***

The broad objective of this study is to determine the channels and level of efficiency of the marketing system for yam in Nigeria. The specific objectives are to:

- describe the marketing system for yam;
- determine the relationship between yam prices in different markets;
- isolate the major constraints to efficient marketing of yam, and
- derive policy implications for improving the efficiency of the marketing system.

## **Methodology**

### ***Study location***

The primary study locations were three major yam producing and marketing States of Benue, Nasarawa, and Southern Plateau (in the North), and four States in the South (Delta, Ebonyi, Ondo and Abia) The choice of the study locations was based on some criteria. First the areas were major yam producing and marketing areas. The second was that the markets chosen in these locations were markets where yam is traded (both bulking and bulk-breaking markets).

### ***Sample selection***

Urban and rural markets in the selected States were studied. Four spatially separated markets in each State as mentioned above were selected purposively to permit spatial pricing efficiency analysis. With respect to traders, five yam traders were randomly selected from each of the study markets giving a total of 140 traders (wholesalers and retailers) in the spatially separated markets in Nigeria. Also 140 rural producers who sell the commodity either by themselves or through members of their families were interviewed in the study areas. In addition, some yam transporters responsible for the movement of yam between the different States were interviewed.

### ***Data collection***

There were two major sources of data. These were primary and secondary data. Primary data were collected from yam traders, yam farmers, key informants and yam transporters. Structured questionnaires were used to undertake personal interview of the respondents. Before data collection began, questionnaires were pre-tested in a major market using randomly selected respondents. Interviews were conducted by the investigators themselves. In addition to questionnaire interviews, observations of marketing activities were made.

Data collected from traders include sources of yam supply, yam varieties purchased, quantity bought and frequency of visits to source markets, mode of transportation, distance covered, markets and market prices, number of markets covered and distributional channels, other disposal outlets, Also elicited were the costs of transportation and handling, source of market information, trading experience and marketing problems. Others include levies/taxes paid.

From the farmers, information were elicited on frequency and quantity of yams sold in the different village markets, means of transportation used and the transportation cost, agent used for the disposal of yam, marketing function performed, other locations where yams were sold, and membership of social organizations.

The transporters were interviewed on the cost of transportation and factors affecting it, regular markets visited, origin and destination of goods carried, membership of transporters union and influence of the unions on the transporters.

Data collected also include nature of roads, market distribution, bulking and type of competition, availability of marketing facilities, seasonal pattern of yam supplies from different areas, major supply areas to consumer preferences for different varieties, and problems of yam marketing.

These data collection from the traders was approached from three perspectives:

- The purchase transactions,
- The sales transactions
- The cost structure

### ***Analysis of data***

Econometric and statistical techniques were used in data analysis.

**Specification of the empirical model.** In testing pricing efficiency, the bivariate correlation coefficients between yam prices for the spatially separated markets were computed following the pattern of Trotter (1992), Mendoza and Rosegrant (1993) and Diavosavvas (1995). Bivariate correlation still remains a useful starting point for testing integration of spatially integrated markets and remains the most commonly used approach in agricultural marketing (Dahlgran and Blank 1992).

This model is specified generally as:

$$\begin{array}{l}
 P_{ij}, P_{ik} \dots\dots\dots P_{im} \\
 P_{2j}, P_{2k} \dots\dots\dots P_{2m} \\
 \cdot \\
 P_{nj}, P_{nk} \dots\dots\dots P_{nm} \quad (1) \\
 \text{where} \\
 P_i = \text{average price in period } i \\
 J = 1 \dots m = \text{location of the market}
 \end{array}$$

A more simplified form of the above equation can be re-written as:

$$\begin{array}{l}
 P_{ij} = b_0 + b_i P_{ik} + e \quad \text{where} \\
 P_{ij} = \text{price series of market } j; \\
 P_{ik} = \text{price series of market } k; \\
 b_0, b_i = \text{coefficients, } e = \text{error term.}
 \end{array}$$

This equation is estimated for pairs of yam markets. The closer  $b_i$  to unity, the more spatially integrated the yam markets. The size of this coefficient and its significance shows the level of the intermarket dependence.

**Testing hypothesized pricing behaviour.** Based on equation (1), three behavioural pricing relationships were tested:

- Hypothesis 1: Market Independence  
 $H_0 : B_0 = 0$
- Hypothesis II: Perfect and Cooperative Pricing  
 $H_0 : B_0 = +0.99$

In the first hypothesis, prices in market j do not affect prices in market k. Accepting this hypothesis suggests that yam traders exercise a form of spatial price discrimination. The alternative hypothesis is that some -ve or +ve correlation exists. Hypothesis II indicates an organized, collusive pricing arrangements between yam marketing agents. Such collusive pricing behaviour has been reported to be an effective marketing strategy in maintaining a secured share in the market (Mendoza and Rosegrant 1993).

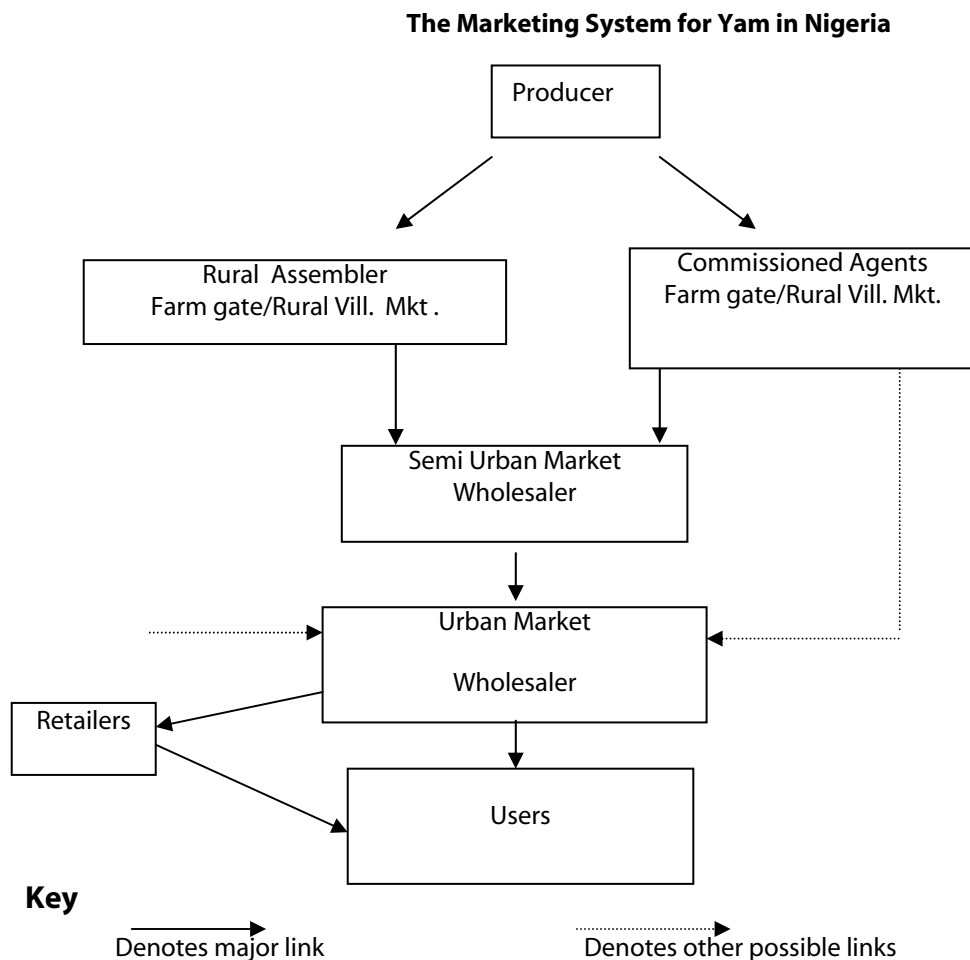
It is customary, following other studies, to use a level of greater than +0.9 as evidence of strong association and by implication the region of acceptance of spatial integration.

## Results and discussion

### *Market chains and distribution channels*

With respect to yam, the identified categories of market participants include the farmer, rural assemblers and commission agents, urban and semi-urban wholesalers and retailers as shown in Figure 1. There are eight possible flow channels for yam. These are numbered as distribution channels in Fig. 1. The movement of yam gets through these distribution channels to complete the marketing chain. In the northern study areas, it was observed that yams move from Middle Belt to Urban markets in the North, East and South.

The producer usually retains some seed yam for planting in the next season. The rest is supplied to the markets or sold through one of the intermediaries. The quantity exchanged here is usually substantial. It is either sold to the rural assembler at the farm gate or in the rural village market.



**Figure 1. Marketing Channels for yam in Nigeria**

Yam could also be sold by the producer to a commission agent at the farmgate or village market. This commissioned agent is usually paid by the semi urban based wholesaler to purchase yam. The commission fee ranged from N50 - N100. Sometimes, the agent may operate under the rural assembler or the urban market wholesalers. The latter are based in towns. Some of the urban wholesalers from Lagos, Ibadan, Abia, Uyo, and Port Hacourt are known to go to the village markets to purchase yam. The wholesalers usually have better access to price information in terms of normal or expected price of yam at any time. At the village markets, therefore, they fix the price level below the expected price, while at the wholesale/retail levels they force prices above the expected levels. This is the point where the efficiency of the price mechanism is undermined.

In all the markets visited in the northern States, yams were sold in heap of 100 tubers and prices fixed based on tuber sizes. The tuber sizes were classified into small ( $\leq 1.5\text{kg}$ ) (sometimes seed tuber), medium ( $\leq 3.2\text{kg}$ ) and large ( $\leq 5.9\text{kg}$ ). This period of survey coincides with lean period in the markets.

The urban wholesalers transport yam purchased using hired vehicles to their different locations and sell to retailers as is the case in most of the southern states of the country.

Whether the producer markets straight to wholesalers or relies on the assemblers sometimes depends on how far the producer is located from the market and whether he has means of transportation. Sometimes, the middlemen especially the semi-urban wholesalers go from village to village to buy yam using pickups. This is prevalent in the major producing areas of the northern States.

### ***The rural-urban link for yam:***

**The yam rural assembler.** According to Hays (1973), the rural assembler is an individual residing either in a rural or urban area who moves around the rural areas purchasing a commodity from village retailers at rural markets and occasionally directly from farmers. In the case of yam, the rural assembler limits his purchases to accessible rural markets and transport yam purchased using pick-up vans. In other instances, the rural assembler at the rural village market buys from the farmer on the spot and sells to available semi-urban and urban market wholesalers at a mark-up on buying price. The rural assembler is characterized by a large geographical area covered, as well as the size of his purchase. Also an average of about 20 km is covered. The capital for this business is sometimes provided by the wholesaler. The assembler rarely stores before disposal.

**The yam wholesaler.** The yam wholesaler handles bulky quantities of yam. These wholesalers come to the village markets weekly or every market day and meet the assemblers for supply of yam. The wholesalers come mostly between October and February - the period of harvest and hence peak period of sale for yam. They either come with trucks (trailers and lorries) or hire one to convey their purchases. Each wholesaler has about 5 or more assemblers supplying yam to him. There is Sarki Kazua (Chief of Market) in the northern markets at the helm of affairs in these markets.

**The yam retailer.** The yam retailers comprise of individuals based and selling in the urban markets in small quantities to the consumers. The retailer normally purchases from the wholesaler who travels to these village markets. Sometimes, the retailers have direct supply from the more adventurous rural assemblers.

These retailers display the yam and sell to the consumers. The peak period of sale is usually during the harvest time during the dry season.

On market information on yam prices, the wholesalers however have fair knowledge of yam prices in other markets. Their source of information about prices in these markets were mainly due to the fact that they sometimes travel to these markets to purchase yam, or their colleagues (other traders) kept them abreast of prices.

### ***Efficiency of the marketing system for yam in Nigeria***

Bivariate Correlation Coefficients for Prices of Yam between different Yam Markets in Nigeria were estimated.

This table shows a matrix of correlation coefficients for yam prices in markets in Nigeria. The essence is to determine how well information on prices is communicated among these markets and how freely the traders move between the markets (Asumugha, 1999).

The results indicated that only 54 pairs of yam markets out of 171 yam pairs showed a strong correlation with r-values ranging from 0.805-1.000 while 26 market pairs showed a moderate correlation with r-values of 0.613-0.799 (Table 1.). This implies that only 80 market pairs were integrated out of 171 pairs. There is therefore low level of market integration.

Most yam markets pairs had very weak correlation with r-values ranging from 0.012-0.592. It could be deduced from this analysis that the marketing system of yam in Nigeria is less competitive and therefore less efficient.

### ***Constraints in yam marketing***

Transportation and lack of good motorable road networks constitute the major problem.

The traders complained of too many check-points and extortion as yam is moved from one market to the other.

### **Acknowledgement**

The Authors are grateful to International Fund for Agricultural Development (IFAD)/West and Central African Research Development (WECARD) /IITA sub-regional project on yams for providing the fund as part of the study in *Improving Livelihoods in Rural West and Central Africa through Productive and Competitive Yam Systems*. The assistance of the Regional coordinator, Dr. Guy Blaise Nkamleu and the Project Leader, Dr. Robert Asiedu are fully acknowledged. NRCRI Umudike provided Vehicle, Computer Services and support staff for this study, It also provided other research facilities, scientists as well as logistics to further the objectives of the IITA/IFAD TAG project.

### **References**

- Anuebunwa, F. O.(2002), A structural analysis of yam trade flows into Abia State of Nigeria. *Nigerian Agric. J.* 33 (2002): 17-22
- Asumugha, G.N. (1999), Efficiency of the marketing system for Ginger in Nigeria. PhD Thesis, Federal University of Technology, Owerri.
- Diakosavvas, D. (1995), "How integrated are World Beef Markets?".The case of Australian and US beef markets *Agricultural Economics* 12: 37 – 53.
- Dahlgran, A. and Blank, S.C. (1992). Evaluating the integration of contiguous discontinuous markets.
- Eluagu, L.S. Ijere, M.O., Okereke, O. and Nweke, F.I. (1990), Inter State Trade on Yams in Southeastern Nigeria" *Nigerian Journal of Agric Science* 5 (1) 1990, pp 8 – 14 FAO, 2002. FAOStat. FAO, Rome
- Manyong, V.M., R. Asiedu, and G.O. Olaniyan (2001), "Farmers' perception of and actions on resource management constraints in the yam based systems of western Nigeria" In: M.O. Akoroda and J.M. Ngeve , *Root Crops in the 21 Century*, Proc 7<sup>th</sup> Triennial Symp. ISTRC-AB, Cotonou, Benin Republic, 11-17 October 1998, pp 156-167.
- Mendoza, M.S. and Rosegrant, M.W. (1995), "Pricing Conduct of Spatially Differentiated Markets" Reprinted from prices, products and people: Analyzing Agricultural Markets in Developing Countries; Scott, G.J. (ed), International Food Policy Research Institute, Reprint No. 318.
- Shepherd, A.W. 2000. Understanding and using market information. Marketing Extension Guide No.2. FAO, Rome.
- Trotter, B.W. (1992) "Applying Price Analysis to Marketing Systems: Methods and Examples from the Indonesian Rice Market". Marketing Series 3. Chatham: Natural Resources Institute, ODA, 60p.

### Bivariate Correlation Coefficients for Prices of Yam between different Yam Markets in Nigeria

	Camp	Orome	Tsekighi	Tor-donga	Zakibiam	Wukari	Namu	Lafia	Igboho	Kishi	Dawanua	Iziogo	Iboko	Mile 12	Boni	Jalingo	Niger	Zaria	Ikwm
Camp, Delta	1																		
Orome	-0.965	1																	
Tsekighi	0.798	-0.613	1																
Tor donga	-0.420	0.642	0.212	1															
Zakibiam	0.824	-0.998	0.667	-0.587	1														
Wukari	-0.937	0.898	-0.898	0.239	-0.928	1													
Namu	1.000	-0.970	0.785	-0.438	0.985	-0.978	1												
Lafia	0.451	-0.308	0.941	0.531	0.184	-0.43	0.529	1											
Igboho	-0.940	0.818	-0.956	0.085	-0.857	0.988	-0.933	-0.799	1										
Kishi	-0.391	0.128	-0.862	-0.678	-0.294	0.491	-0.364	-0.928	0.675	1									
Dawanua	0.730	-0.875	0.153	-0.933	0.116	-0.350	0.732	-0.197	-0.438	-0.039	1								
Iziogo	-0.117	0.497	0.381	0.984	-0.084	0.031	-0.273	0.428	-0.092	-0.682	-0.176	1							
Iboko	-0.513	0.998	-0.568	0.684	-0.534	0.520	-0.955	-0.020	0.785	0.078	-0.544	0.633	1						
Mile 12	0.934	-0.849	0.938	-0.141	-0.258	0.238	0.952	0.194	-0.998	-0.116	-0.202	0.321	0.822	1					
Boni	0.454	-0.562	0.998	0.273	-0.075	-0.295	0.745	0.904	-0.935	-0.717	-0.263	0.188	-0.661	0.378	1				
Jalingo	-0.277	0.518	0.359	0.988	-0.457	0.088	-0.296	0.654	-0.064	-0.782	-0.867	1.000	0.565	0.012	0.416	1			
Niger	-0.550	0.442	-0.980	-0.404	-0.849	0.805	-0.646	-0.231	0.877	0.468	-0.570	-0.517	-0.434	-0.791	0.119	0.539	1		
Zaria	0.630	-0.405	0.971	0.441	0.468	-0.766	0.614	0.995	-0.857	-0.959	-0.089	0.592	-0.353	0.837	0.984	0.573	0.999	1	
Ikwm	0.180	0.208	0.645	0.883	0.247	-0.424	0.034	0.705	-0.392	-0.896	-0.198	0.956	0.440	0.484	0.337	0.945	-0.663	0.810	1

**Source:** Field Survey Date, 2007

R > 0.8 = strong correlation

R 0.6 – 0.8 = moderate correlation

R < 0.6 = weak correlation

**Source:** Koutsoyanis (1985)