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PRICE BEHAVIOUR ACROSS PLACE AND TIME: A CASE OF COCOYAM WHOLESALE MARKETING IN THE SOUTHEAST, NIGERIA

Chiekezie, Johnson Chimaobi[1], Nwankwo, Eucharia C[2], Chiekezie, Njideka Rita[1]

1.Anambra State Polytechnic, Mgbakwu, Anambra State, Nigeria
2.Department of Agricultural Extension, Chukwuemeka Odumegwu Ojukwu University, Igbariam, Anambra State, Nigeria

Corresponding Author:

ABSTRACT

Market prices across time and region are one of the key determinants of efficient food marketing system.Against this background, the study seeks to investigate the behaviour of market price in a period and as cocoyam moves from one place to the other. Multistage, purposive and random sampling techniques were used to select 216 respondents for the study. A well structured questionnaire was used to collect primary data for six months (time series data). Data obtained was analyzed using descriptive statistics and Co-integration analysis. The study revealed that inter market and seasonal prices of cocoyam showed a highest marketing margin (₦7,500) in Anambra State followed by Enugu State (₦6,100) and least in Imo State (₦4300) during the peak period. During the lean period, the highest marketing margin of₦6,200 was recorded in Anambra State, followed by Imo State (₦5,150) and least (₦4200) in Enugu State. The Southeast recorded grand mean marketing margins of ₦21,499.67 and ₦19,667 during peak and lean respectively. The result of co-integration analysis revealed that wholesale prices of cocoyam in rural and urban markets of Anambra and Enugu State showed evidence of integration while poor price transmission was observed in the rural and urban markets of Imo State.A breakthrough in this study will gear towards improving price transmission which forms thebedrock for marketing efficiency of cocoyam in the area.

Key Words: *Cocoyam, Wholesale, Inter-market, price spread, market integration*

INTRODUCTION

Agriculture is a key driver of economic growth of any country. In Nigeria, the sector plays a fundamental role in creation of income and employment opportunities, therefore considers as a crucial way to diversify the largely oil-based economy. The crop production is by far the largest sub sector in the agricultural sector, accounting for 92.05% nominal GDP (Khadijat, 2020). Agricultural production cannot be complete without efficient marketing. Markets are important determinants of food access and availability and an efficient market is a requisite for economic development. According to Ogbonna (2020), one of the determining factors as to how much an average poor Nigeria can consume the available food crop is market price. The persistent variations in the prices of agricultural food crops affect the consumer demands for food items and therefore hamper the efforts of attaining sustainable food security.

Cocoyam belongs to the crop sub-sector. It is an ancient staple food belonging to the family araceae. Cocoyam is an important staple food across many developing countries in Africa, Asia and the Pacific. In South East of Nigeria, cocoyam is widely grown and consumed. The National Bureau of Statistics (NBS) in 2006 identified 22 out of the 36 states of Nigeria with appreciable hectares planted with cocoyam which included all the five states of Southeast(Abia, Anambra, Ebonyi, Enugu and Imo). Accordingly, Onyeka, (2014) stated that cocoyam is an integral part of the farming system with area planted ranging from 13,760 to25, 270 hectares.The role of marketing in further enhancing the contribution of cocoyam to the economy, not just of the rural households but also of the whole country, cannot be over emphasized. Marketing of agricultural products, like cocoyam, involves everything that happens between the farm gate and the consumer such as buying, selling, processing, storing, transporting, grading and advertising (Nze, Akogwu, Ugwu and Nzeh, 2014). It takes place in homes, road sides, and local periodic market centres. It encompasses wholesale and retail types in both rural and urban markets (Nwauwa, 2011). Wholesale as a marketing channel plays critical role in the commercial status of the produce. As an intermediary, it serves as the focal point for supply and demand. It does only creates place utility by transferring cocoyam from surplus to deficit regions but, also, enhances the value of cocoyam in terms of form, time and possession utilities for consumers (Opata, 2012).

However, its market, like every other market for agricultural products is not perfectly competitive and efficient. The level of efficiency of market and marketing functions are important for sustainable marketing of agricultural products like cocoyam. Efficient marketing system ensures that goods which are seasonal are made available all year round, with little variation in prices, which can be attributed to cost of marketing functions like storage, processing, and transportation (Nwaru, Nwosu and Agommuo, 2011). Additionally efficient wholesale marketing activities tend to add spatial and possession utility to food products like cocoyam. To this extent, timely information across spatially separated markets are imperative for market and economic development, so that shocks arising in rural areas (the source of agricultural produce), where there are always surpluses, can be transmitted to urban deficit areas. This is possible when markets are integrated. Otherwise, there will be distortions in the market and eventual inefficiency in the marketing system.

Market integration is used to refer to the phenomenon of synchronous movement of prices of a commodity or a group of commodities (e.g., foodstuffs) over time in spatially differentiated markets. According to Zewdie (2017) it is used to identify a phenomenon in which markets of goods and services that are somehow related to one another begin to experience similar patterns of increase or decrease in terms of the prices of those products. Thus, World Food Programme (2007) defined integrated markets as markets in which prices for comparable goods do not behave independently. Instead the prices are determined interdependently; which is assumed to mean that price change in one market will be fully passed on to the others. It is thus the prevalence of stable price spreads among markets. Markets differ in the extent of integration. The behaviour of a highly integrated market is different from that of a disintegrated market. The extent of integration influences the conduct of the firms and consequently their marketing efficiency. According to World Food Programme (2007), if markets are well integrated, it can be assumed that market forces are working properly so that food will flow from surplus to deficit areas - and imports will flow from port and border areas into the hinterland. High prices in deficit areas provide the incentive to traders to bring food from surplus to deficit areas, making food available. As a result of these flows, prices should decline in deficit areas, making food more accessible to households

Dolungu, et al (2014), citing Bopape and Christy (2002), identified three forms of market integration:

i. integration across space. Markets are integrated across space if trade takes place between them. Here price in the exporting market equals price in importing, plus transportation and other costs of moving the product between the two markets;
ii. integration across product. Markets are integrated across product forms, when price differentials between two related commodities do not exceed transportation and processing costs; and
iii. integration across time. Markets are said to be integrated across time (inter-temporally integrated) when the expected price differential does not exceed storage costs.

With respect to marketing of cocoyam, the level of spatial integration among markets is relevant in understanding the movement of the commodity from the region of plenty to the region of scarcity. In a competitive market, prices are flexible and are thought to be responsible for efficient resource allocations and price transmission. This is very useful in integrating markets both vertically and spatially. Without spatial integration of markets, price signals may not be transmitted from urban food deficit to rural food surplus areas, thereby leading to increased price volatility. According to Basu (2006), if

markets are not integrated, the correct price signals will not be transmitted through the marketing channels, the farmers will not be able to specialise according to long-term comparative advantage and the gains from trade will not be realised. Thus unless agricultural product markets are spatially integrated, producers and consumers will not realize the gains from trade liberalization. He further observed that an integrated market is synonymous with pricing efficiency, as it always reflects all information. As earlier noted, an efficient market is a market that incorporates all available information when determining price.

PROBLEM STATEMENT:

Cocoyam production, marketing and consumption are interwoven enterprises that sustain especially many rural dwellers, and have the potential to contribute significantly to the economic growth of Nigeria. This notwithstanding, scientific works done on cocoyam are very few when compared with those on yam, cassava, maize and rice (Ajie, 2014). Little efforts on cocoyam such as those by Adepoju and Awodunmuyila,(2008); Ogunniyi, (2008); Baruwa and Oke, (2012) have been limited mainly to production research. The few studies on cocoyam marketing were by Opata and Adeosun (2016) on the performance of cocoyam market chain in South East Nigeria;Fadipe, Adenuga, and Raji (2015) on marketing of cocoyam in Shagamu LGA; Ajie and Onoja (2014), on distribution of cocoyam in Rivers State of Nigeria;. Nze, Akogwu, Ugwu and Nzeh (2014) on the marketing of cocoyam in Nsukka agricultural zone, Enugu State, Nigeria and Opata (2012) on economic study of cocoyam marketing in Southeast Nigeria. Opata's work encompassed the whole gamut of production, processing and marketing of cocoyam in the study area compared the net income of the producers, retailers and wholesalers.

However, despite the importance of price transmission to policy formulation and market development, little or no research effort was directed towards cocoyam price transmission between markets and seasons. It becomes, therefore, pertinent to analyse the movement of cocoyam prices in the rural and urban markets in the South-eastern part of the country. Such detailed study would improve distribution efficiency; promote better price formation that would increase production so as to maximize the opportunity of the crop to acquire high commercial status for economic empowerment. It is against this background that this study tends to

OBJECTIVES OF THE STUDY:

i. examine the inter market and seasonal price spread in the wholesale marketing of cocoyam in the study area;
ii. establish the integration of rural and urban wholesale market prices of cocoyam
iii. challenges facing cocoyam wholesalers in the area

LITERATURE REVIEW:
THEORETICAL AND EMPIRICAL EVIDENCE

Law of one price is an economic theory that addresses the cost of identical goods in separate markets. The law states that identical goods being sold in different markets at the same time will sell for the same price on the condition of fair and open competition, absence of trade restriction, flexibility of price and homogeneous currency. That is to say that the law of one price operates on frictionless markets where there are no transaction costs and legal restrictions and identical goods selling the same price when expressed in a common currency. The law argued that if prices vary across markets, individual will purchase the goods in the market with lower price and sell it in the other market at higher price. The lower price-market experiences higher demand, pushing up the price at the current level of supply. The higher –priced market experiences increased supply, thus lowering demand and price accordingly. The practices of buying and selling at different prices across markets is called ``Arbitrage``. Eventually the market will reach equilibrium and arrive at same price for the good. However, it is important to understand that law of one price does not always hold true. This is because some restriction such as transaction costs, legal and trade barriers tend to violate what the law stands for.

Contrary to the law of one price, Transaction costs Theory, which is a latter development in neoclassical theory assumed a different position. It anchored its argument on the availability of perfect information across spatially separated markets, such that traders in each market have perfect knowledge of the situation in all other markets. This to relative extent responsible for inter market price differentials between concerned markets. This situation is imperative for market and economic development; so that shocks arising in rural areas (the source of agricultural produce) where there are always surpluses can be transmitted to urban deficit areas. This theory takes into accounts, a number of costs variables that can influence market prices. As affirmed by Opata (2013), commercial activities do not occur in a functionless economic environment, certain costs are incurred – costs of purchase of products and transaction costs. The transaction costs even assumed to be increased with distance, market concentration and so on, thus violating the law of one price.

Cobweb model is another Model that tends to explain why prices might be subjected to periodic fluctuations in certain type of markets. It describes cyclical supply and demand in a market where the amount produced must be chosen before prices are observed. Kaldor (1934) analyzed the model using agricultural market where it mostly applicable to because of existence of lag between planting and harvesting periods of agricultural produce. According to Ejionueme and Nebo (2014), that biological nature of agricultural production gives rise to production cycles, and production cycles leads to price cycle. Additionally the model explained that price runs counter to production cycles, when supplies increase, price fall, when supplies decrease, price rise. Price changes are much more with perishable product, such as cocoyam that takes

one time period to produce and greater in magnitude than its production changes, because of inelastic nature of demand and supply of farm products. Cobweb model is based on a time lag between supply and demand decisions. Suppose for example that as a result of unexpectedly bad weather, farmers go to market with an unusual small quantity of cocoyam. This shortage results in high prices. If farmers expect this high price condition to continue, then in the following year, they will raise their production of cocoyam relative to other crops. Therefore when they go to markets, the supply will be high resulting in low prices. If they then expect low prices to continue, they will decrease their production of other food crops the next year resulting in high prices again. This process will continue until equilibrium is established.

Dolungu, Ekere, Bisikwa, Kawooya, Kalule and Biruma (2014), in their study of marketing and market integration of cowpea in Uganda, stated that the result of co-integration tested at1% and 5% levels of confidence showed that t-values for integration were greater than the ADF critical values, implying that these markets were integrated. Ohen, Abang and Idiong (2007), in their study of price transmission and market integration vertical and horizontal price linkages for live catfish in Nigeria, employed Johnsen co-integration to test for relationship between the prices. The results indicated that the producer and export prices are co-integrated with one co-integrating vector. The null hypothesis of no co-integrating vector ($r = 0$) was rejected at $P < 0.05$. This provided evidence that the producer prices and export prices of live catfish prices form part of a system of live catfish prices that may vary independently in the short-run, but in the long-run, they will vary simultaneously as part of a single market.

Adebayo and Coker (2016) analyzed rural and urban rice market integration in Niger state, Nigeria using Error Correlation model Approach. The results revealed that the unit root in the price series was eliminated after the first differencing and that there was a stable long-run equilibrium relationship among the markets. The vector error correction estimates shows that most of the markets were not well integrated in the short –run, and finally, the causality test revealed that no single market dominated the price formation either in the rural (A) or urban (B) markets in the study area.

Opata and Adeossun (2016), in their study of performance of cocoyam market chain in Southeast, marketing margin was deployed to determine the inter market and price spread of cocoyam market price in the study area. It was revealed that cocoyam producers received maximum price of ₦40,000 (100Kg) during the late season between July and October and a minimum price of ₦16,000 at the early season between November and February. The wholesale price was ₦42,000 while the retail price was ₦45,000 per 100Kg of cocoyam throughout the whole season. There is a similar pattern for farmers, wholesalers and retailers and it can be concluded that all agencies received highest price at the late season. It was equally reported that price spread from producer to wholesalers and retailers were ₦27,000, ₦15,000, and ₦3,000 respectively. The retail prices for cocoyam were reported to be ₦27,000, ₦40,000 and ₦68,000 per 100kg bag of cocoyam in early, mid and late seasons respectively. Generally the price of cocoyam was very high in all seasons due to the incidence of leaf blight and highest during the late season as a result of storage losses, storage costs, transportation and accommodation. Robert, Fred, John-Eudes, et al (2012) in their study of estimation of margins and efficiency in the Ghanaian yam marketing, reported wholesale yam price spread in the major cities of Ghana. The margins obtained by wholesalers by handling 100 tubers of yams. It was reported that that after comparing the purchase prices with the selling prices, a wholesaler obtained about GH¢45.00 as gross margin per 100 tubers of yam sold.Gross revenue obtained by wholesalers was highest in Nkwanta was the highest (GH¢46.70), followed by Eura (GH¢22.33), and Techiman was the smallest (GH¢21.54).Also the net marketing margin per 100 tubers of yam was estimated at GH¢27.39. The highest margin was obtained by wholesalers operating in Nkwanta and the lowest was received in Atebubu. Net marketing margin formed between 41% and 72% of gross margins across study districts. This implies that a Cedi invested in yam wholesale business earned a net margin of at least GH¢0.41.

Ozor, Ugwumba and Nwankwo (2019) in their analysis of inter-market and seasonal price spread, revealed that the mean marketing margin realized by Wholesalers of yellow maize in Imo State was (₦2,620), followed by Enugu State (₦2180) and least in Anambra (₦596). The same could be noticed of wholesalers of white maize in States who realized the highest margin in Imo State (₦1,580), followed by Enugu State (₦1,412) and then Anambra State (₦1,000) during the peak period. On the other hand, the lean wholesale marketing margin was higher in Imo State (₦2,780), followed by Anambra State (₦2,100) and least Enugu (₦1,810) for white maize. Similarly, the average marketing margin for white maize was highest (₦2,250) in Imo State, followed by Anambra State (₦660) and last Enugu (₦590). The difference in average marketing margin was attributed to marketing costs incurred by the traders and preferences due to colour.

Fadipe et al (2015) identified the prominent constraints to marketing of cocoyam as inadequate capital (90.4%), lack of credit (88.5%) for wholesalers and retailers (92.6%). Others included, lack of storage facilities, high transport cost and long distance to the market. Nzeh et al (2014) stated that 10.8% of their respondents encountered the problem of storage, large number of intermediaries (8.9%), problems of poor road (6.5%), while 6.5% encountered the problem of storage, 8.9% large number of intermediaries 6.5%, problem of roads 6.5%, while another 6.5% encountered the problem of high cost of cocoyam. Only 10.8% of them encountered the problem of credit. The result equally showed that 8.2% of the respondents had the problem of price fluctuation, and 6.7% only encountered the problems of handling and 1.5%, had lack of grading as marketing problem.

Opata (2016), in the study of cocoyam marketing chain in the southeast, and Ajie (2014) identified similar problems of cocoyam marketing encountered by the respondents. These were lack of uniform or standardized units of measures in

selling of commodities (40%), long chain of distributors (34%) and seasonality of product (20%).On storage problems, 60% percent of the marketers noted attack by pests while 43 percent noted high storage losses. Opata attributed this to the perishable nature of the product especially when humidity and temperature were very high.
Babatunde and Oyotoye (2013) in their study on food security and marketing problems in Nigeria, analysed the problem as follows: transportation problem 86%, inadequate market infrastructure 70.5%, inadequate funding for food marketing 63.0%, shortage of processing facilities 47.5%, seasonality and perishability of food produce 41.5% and lack of uniform measure, long chain of distributors 21.5%

METHODOLOGY

The study area is the five Southeast of Nigeria of Abia, Anambra, Ebonyi, Enugu and Imo with an estimated population of 21162710 million (NPC, 2006). The warm temperature of the area, its humidity with long wet season and high annual rainfall are favourable ecological conditions for cocoyam (Balami et al., 2012). Cocoyam cultivation is not only majorly concentrated in the area due to this favourable ecological conditions, it is also widely sold in the area and generally represents a prime mover of socioeconomic development and activities in the most rural households, where it is produced for food and/or market.

SAMPLE SIZE AND SAMPLING TECHNIQUE

The study population comprises of all wholesale Cocoyam marketers in the five states of Eastern part of Nigeria namely –Abia, Anambra, Ebonyi Enugu and Imo states Multi-stage, involving purposive and random sampling methods will be used to select respondents. Three States of Anambra, Enugu and Imo will be purposively selected from the five States in the Southeast geopolitical zone. The selection is based on the States majorly known for cocoyam marketing and consumption, evidence from pre-survey study. The familiarity of the researcher with the terrains of the selected states is also considered. Six (i.e. 3 urban and 3 rural) spatially separated markets were purposively selected from each of the selected States to arrive at a total of 18 markets. The selection is based on the concentration of the cocoyam wholesalers. In the final stage, 12 wholesalers will be randomly selected from each of the Markets. This will give a total of 216 respondents for the study. Well-structured and pre-tested questionnaire will be administered to selected 216 respondents to obtain information on the relevant information

METHOD OF DATA COLLECTION

Primary data was used for the study with trained enumerators. A set of well-structured and pre-tested questionnaire was administered to 216 respondents to obtain information on how price of cocoyam vary across markets (inter market variation) and prices vary within the year (seasonal variation). Also for co-integration analysis: time series data was collected on price related variables from six markets in each state (three rural markets and three urban markets). Four-days rural and urban markets prices for cocoyam was collected for a period of six months. The reason for using four- day periodic markets (Eke, Oye, Afor, Nkwo) is because, price data are often not available particularly in the rural areas (Aggarwal et al (2018) and also local food prices are the key indicators of food security and market condition.

DATA ANALYSIS

Data collected wasanalysed using descriptive statistics and co-integration analysis.

MODEL SPECIFICATION

Calculation of price spread

The following formula was used to compute the price spread of the market intermediary (wholesale) in the marketing of cocoyam.
Price spread of cocoyam sellers (PS) = SP – CP
Where,
PS = Price spread of a wholesaler
SP = Sale price of the wholesaler
CP = Cost price of the wholesaler
Thus the price spread for the marketers = Wholesaler price – costs of purchase

CO-INTEGRATION ANALYSIS

Co-integration analysis was used to determine whether wholesale marketing of cocoyam in the southeast are integrated. The analysis was carried out in two stages. Firstly, Augmented DickyFuller (ADF) statistic was used to confirm the stationary status of the variables. The model was specified as:

Augmented Dickey–Fuller (ADF) test for stationarity

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha i \sum_{i=1}^{m} \sum \Delta Y_{t-1} + \varepsilon_t \quad \text{-----(3.1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.6$$

Where:

Y_t = prices of cocoyam in market Y during period t,

ΔY_t = first difference series in Y, i.e. $Y_t - Y_{t-1}$

t = trend variable (1, 2, 3…., n), n being the length of data series in years.

m = number of lag differences (based on modified Akaike Information Criterion),
ε_t = error term, and
β_1, β_2, and α = parameters to be estimated
The calculated value of ADF test statistic was compared with the critical values for ADF_t. If the statistic is greater than the critical value at 5% level of significance, then no unit root was found present. But if unit roots is found, differencing will continue until there is absence of unit root in the price series and when this happens, the test for co-integration proper would take place. The model was specified as:

$$P_{Rt} = \alpha + \beta \text{In } P_{Ut} + \gamma \text{In } P_{Rt-1} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots 3.7$$

Where:
P_{Ut} = the price of cocoyam in urban market on t^{th} month,
P_{Rt-1} = the price of cocoyam in rural market on $t-1^{th}$ month,
α = a constant term (the log proportionality coefficient) that captures transportation costs and quality differences

Short-run changes in co-integrated price series was determined by using the formula:

$$\Delta Y_t = \propto_o + \alpha_1 \Delta X_t + a_2 U_{t-1} + \varepsilon_t \ldots \quad (3.3)$$

Where: 3.8
Δ = first difference operator,
Y_t and X_t = price series,
U_{t-1} = equilibrium error term, and
ε_t = random error term

This shows the impact of short-term changes of the independent price series and the equilibrium error term lagged one period on the short run changes of the dependent price series.
Constraints to wholesale marketing of cocoyam: The respondents will be asked to mention the problems they face in wholesale marketing of cocoyam, from the list of problems compiled by the researcher. A 4 point-Likert type scale will be used in determining the degree of seriousness of the problems. The responses from the respondents will be ranked as follows:
Very Serious = 4
Serious = 3
Moderatly Serious = 2
Not Serious = 1

$$\text{Cut-off point} = \frac{4 + 3 + 2 + 1}{4}$$

$$= \frac{10}{4}$$

$$= 2.5$$

RESULTS (EXPECTED OUTPUTS / RESULTS):

This research is expected to deliver the following:
Discover how inter-market and seasonal price differentials affect availability of not just cocoyam but other agricultural produce/products.
Revealed how integrated cocoyam wholesale marketing in the southeast is, which ensure its marketing efficiency and its availability round the year.

RESULT DISCUSSION

Inter market and seasonal price spread amongwholesalemarketing of cocoyam

Peak season, wholesale marketing of cocoyam

Like every other agricultural product, cocoyam abundance is generally seasonal stretching from August/September to March/April (peak period) and April to August (lean period). There are a lot of price differentials received by marketers in various markets. These are attributed to transaction costs, market information and bargaining powers of individual marketers (Opata, 2016). During the peak season, the price of cocoyam generally drops due to the presence of large quantity of the product in the market, and only to rise again at the expiration of the peak season.

Table 1 shows the peak season of cocoyam wholesale price margins in the selected rural and urban markets in southeast. In Anambra state, an average of 100kg of cocoyam mean marketing margin realized by marketers was highest in Nkwo Nnewi market (₦7,500) followed by Ose okwaodu (₦5,800), Eke Awka (₦4,500), Oye Nimo (₦3,000), Otu-ochaAguleri (₦2,900) and Afo Ufuma (₦2,000).

In Enugu State, the mean marketing margin realized by marketers was highest in Ogbaete main market (₦6,100). This was followed by Kenyeta main market (₦5,500), Eke Achi (₦3,200), Timbershed/Nsukka main market (₦2,900), Oye-Agwu (₦2,700) and Afo Ugwuoba (₦2,500). In Imo State, the mean marketing margin was highest in Relief market (₦4,300), followed by Nkwo Orji (₦3,600), New market (₦3,000), Orie Umunna (₦1,900), Eke-ututu (₦1,600) and Orsu Ihite-Ukwa (₦1,500).

The observed differences in the marketing margins across the selected markets were as a result of selling price differentials arising from differences in marketing costs incurred by the marketers. It was equally observed that during the peak period, the majority of the prevailing cocoyam in the markets in the Southeast was imported from Edo in old Bendel State, hence the name` Bendel cocoyam`. This contributed to high cost of transportation as can be observed in table 4.4.Though there were availability of locally cultivated ones but Bendel cocoyam dominated the markets.

Table 1: Peak season, wholesale marketing margin of cocoyam (N/100kg bag)

STATE	MARKETS	MPP	MSP	MMM
Anambra	Ose okwaodu	6,500	12,300	5,800
	Nkwo Nnewi	7,000	14,500	7,500
	Eke Awka	6,500	11,000	4,500
	OtuochaAguleri	2,500	5,000	2,500
	Afo Ufoma	4,500	6,500	2,000
	Oye Nimo	6,500	9,500	3,000
Enugu	Ogbaete main market	5,500	11,300	6,100
	Timber shed/Nsukka main market	3,500	6,400	2,900
	Kanyeta main market	6000	11,500	5,500
	Eke Achi	5,800	9,000	3,200
	Afo Ugwuoba	6,500	9,000	2,500
	OyeOgwu	4,500	7,200	2,700
Imo	Relief market	6,200	10,500	4,300
	New market	6,500	9,500	3,000
	Nkwoorji	5,200	8,800	3,600
	Orie Umunna	5,300	7,200	1,900
	Orsu lhite-ukwa	6,000	7,500	1,500
	Eke ututu	6,200	7,800	1,600
	South east	33,567	55,066	21,499

Source: Field survey, 2023. Note: MPP- mean purchase price, MSP- mean selling price andMMM - mean marketing margin.

Lean season, wholesale marketing of cocoyam

The lean season marketing margin realized by the wholesale marketers operating in the southeast are shown in Table 2. The mean marketing margin was highest in Anambra state atNkwo Nnewi (₦6,100), followed by Ose-Okwaodu market (₦6,000) and the lowest marketing margin was Oye Nimo (₦3100). In Enugu state, the highest mean marketing margin was Timbershed/Nsukka main market (₦4,200) followed by Afo-Ugwuoba (₦4,000). The lowest marketing margin was Ogbete main market (₦3,300). In Imo State, the highest mean marketing margin was Orsu Ihiteukwa (₦3,550), followed by Orie Umunna (₦3,050) and the lowest margin appeared to be Nkwo Orji (₦2,100).

Table 2: Lean season, wholesale marketing margin of cocoyam (N/100kg)

STATES	MARKETS	MPP	MSP	MMM
Anambra	Ose Okwaodu	36,000	42,000	6,000
	Nkwo Nnewi	36,100	42,200	6,100
	Eke Awka	36,000	39,100	3,100
	Oye Nimo	36,000	39,200	3,200
	Afo Ufuma	35,200	39,800	4,600
	OtuochaAguleri	36,000	39,500	3,500
Enugu	Ogbete main market	36,100	39,400	3,300
	Timber shed/Nsukka main market	32,000	36,200	4,200
	Kanyeta main market	35,000	38,200	3,200
	Eke Achi	35,600	39,000	3,400
	Afo Ugwuoba	36,000	37,000	1,000
	OyeOgwu	36,000	38,900	2,900
Imo	Relief market	36,100	39,000	2,900

New market	36,000	39,200	3,200
Nkwo Orji	36,000	38,100	2,100
Orie Umunna	34,000	39,150	5,150
Osu Ihiteukwa	35,600	39,150	3,550
Eke ututuorsu	37,000	38,700	1,700
South east	213,600	233,267	19,667

Source: Field survey, 2023. Note: MPP- mean purchase price, MSP- mean selling price and MMM- mean marketing margin.

On the whole, however, the comparative analysis of marketing margins obtained by marketers in the three States of Southeast revealed a realization of highest mean marketing margin in Anambra (₦7,500), followed by Enugu (₦6,100) and Imo (₦4,300) during the peak season. The same applied in the lean period, Anambra having the highest mean marketing margin of ₦6100, followed by Enugu (₦4,200) and Imo (₦3,500). This can be attributed to higher population figure of the State, associated with higher consumer demand. In the case of Imo, having the least mean marketing margins, both in the peak and lean seasons, may not be attributable to population figure but on the low level of consumption of the product in the state. This also could be linked to improper price transmission and market integration. For the Southeast (ie pooled data) the margin was higher during peak period (₦21,499) than in the lean period (₦19,667). This could be attributed to the availability of locally cultivated cocoyam which reduces some travelling costs. The study also revealed that communities in the Southeast have different periods for cocoyam harvest. This determines its abundance in a particular area. Therefore, during lean period (Table 4.7) a uniform purchase price was observed. This is because the marketers had to travel down to Nsukka for 'ede- Nsukka', which was in abundance when other areas were experiencing scarcity. Despite the fact that means marketing margin was lower during lean period, however, marketers realized higher profit than in the peak period. This is attributed to shorter distance and less transportation cost.

Analysis of spatial price relationship in wholesale marketing of cocoyam.

Unit root test result

The unit root test result of logged six months (4-native-market-day-price points) price series of wholesale cocoyam markets in South East at levels and at first differences using Augmented Dickey Fuller (ADF) Test are presented in Table 3. As can be taken from the table, at levels, cocoyam price series were non-stationary at 5% levels of significance, ADF criticalvalues for Anambra rural (ANR), Anambra urban (ANU),Enugu rural (ENR), Enugu urban (ENU), Imo rural (IMR) andImo urban (IMU)weregreater than their ADF t –statistics, indicating presence of unit root in all, hence non-stationary, that is 1(0). Thus null hypothesis of presence of unit root at 5% cannot be rejected. This necessitated for test of stationarity at first difference. The result of first differencing showed that price series attained stationarty. The ADF t-statistics for all the price series were greater than their ADF critical values at 5% levels of significance, indicating stationarity. The null hypothesis of the presence of unit root was rejected and concluded that variables were integrated of order one that is I (1).This findings concur with the findings of Okoroafor *et.al.* (2010) and Nwankwo (2018) that food commodity price series are mostly stationary after first difference I(1).

Table 3: Augmented Dickey-Fuller test for stationarity

Variables	ADF statistics At Level	Critical value	1st difference ADF Statistics	1st difference Critical value	Order of integration
ANR	-2.05	-3.63	-5.57*	-3.66	I(1)
ANU	-1.45	-3.62	-5.71*	-3.67	I(1)
ENR	-2.92	-3.63	-4.86*	-3.67	I(1)
ENU	-2.22	-3.63	-9.52*	-3.64	I(1)
IMR	-2.25	-3.63	-6.27*	-3.63	I(1)
IMU	-2.06	-3.63	-10.67*	-3.63	I(1)

Source: Field survey, 2023E- View ADF Unit root Test Result,*Significant at 5%

Augmented Engle Granger (AEG) co-integration

The results of the Engle-Granger Co-integration tests are presented in table 4. ECTAN represents the residuals of the price function of Anambra State, ECTEN represents the residuals of the price function of Enugu State, and ECTIM represents the residuals of the price function of Imo State. It is evident from the table that critical values for Anambra and Enugu States were greater than their ADF t- statistics at 5% level of significance. Therefore, the null hypothesis is rejected. This suggests that the wholesale prices of cocoyam in rural areas and the wholesale prices of cocoyam in urban areas of Anambra State and Enugu State are integrated. The implication here is that prices of cocoyam in these markets move together for a long period of time. Market integration among these markets could be attributed to proper and efficient use of market information (Bila, Ojo and Bulama, 2022). The role of storing or holding back sales until reliable information, especially during lean period cannot be overemphasised. Also, the integration is due to the flow of cocoyam from surplus region to the deficit areas. The above result agrees with the study of Ddungu et al (2015) and Debaniyu (2013) who reported that storability of the cowpea resulted into integration, because it avails the marketers the opportunity of obtaining reliable information about prices

and demands between markets.In the case of Imo State, the critical values, both at 1%, 5% and 10% are greater than ADF statistic. Therefore, the null hypothesis is accepted. This indicates a poor price transmission between the rural markets and those of urban markets which implies inefficiency in the pricing system of cocoyam in the area.

Table 4: Result of Augmented Engle Granger (AEG) test for Cointegration.

Variables	ADF statistics At Level	Asymptotic critical values** At 1%	At 5%	At 10%
ECTAN	-6.22*	-3.90	-3.34	-3.04
ECTEN	-5.16*	-3.90	-3.34	-3.04
ECTIM	-2.37	-3.90	-3.34	-3.04

Source: Field survey, 2023 * Significant at level, ** asymptotic critical values

TheGranger result obtained is consistent with the proposal of Granger (1986) that co-integration between two markets is an indicative of the existence of long run relationship between them. Additionally, if two markets are integrated, the price in one market would be found to have an impact on the price in other market. On the other hand, lack of co-integration in the case of Imo may not imply absence of transmission, as price signals may be transmitted instantaneously as are expected for staple food commodity like cocoyam.

Constraints to wholesale marketing of cocoyam

Table 5 shows the distribution of the respondents according to their perception on the problems of wholesale marketing of cocoyam in the study area. The problem of high cost of transportation of cocoyam ranked highest and was perceived as the most serious (M = 3.20). this is in line with Ajie (2014), Ugwumba, *et. al* (2011) reported that transportationcosts was a critical factor affecting marketers. This according to marketers was attributed to high cost of fuel, few vehicles plying their roads as a result of bad roads and distance to the market. Another constraint of importance to wholesale marketing of cocoyam are insufficient storage facilities (M = 2.64) and spoilage (M =2.80). Marketers attributed these problems to the perishable nature of cocoyam especially when humidity and temperature are high. This confirms the findings of Okwuokenye and One molease (2011) who reported that spoilage as a result of poor storage facilities is a major challenge faced by yam marketers.Inadequate capital (M = 2.72) was also noted as a serious limiting factor to cocoyam marketing, because wholesale marketing demands a huge capital outlay. This agrees with Fadipe (2015) who reported that inadequate capital was a critical factor limiting the wholesaling of the produce. Also seasonality which ranked 2.50 was perceived by the marketers as being an important limiting factor. This was attributed partly to poor storage facility which can result to food loss, thus contributing to the scarcity of the produce. This disagrees with Opata (2016) who reported seasonality of the produce as no serious factor to cocoyam marketing.High marketing charges/levies (M = 2.50) was also considered by marketers as an important factor constraining marketing. Poor market information (M = 2.71), lack of uniform measurement (M = 2.31), and bulkiness (M = 1.60) and association problem (M = 1.50) were not perceived by marketers as important limiting factors to wholesale marketing of cocoyam.

Table 5: Constraints to wholesale marketing of cocoyam

Constraints	Meanscore	Rank
High cost of transportation	3.20	1st
Spoilage	2.90	2nd
Inadequate capital	2.72	3rd
Insufficient storage facilities	2.64	4th
High market changes	2.62	5th
Seasonality of product	2.50	6th
Lack of uniform measurement	2.31	7th
Poor market information	2.21	8th
Bulkiness of product	1.60	9th
Association problem	1.50	10th

Source Field survey, 2023

CONCLUSION AND RECOMMENDATION

From the findings, positive values of marketing marginwere observed across markets, confirming relatively an efficient marketing of cocoyam in the area. The study also revealed partial market integration between rural and urban markets. Based on the above, the following recommendations are made.

i. There is need to gear towards improving more on the price transmission; it forms bedrock for marketing efficiency of cocoyam in the area.
ii. An efficient and integrated cocoyam market will encourage export. Therefore, Government should encourage cocoyam marketers to engage in International trade of cocoyam.

iii. Government should provide necessary transportation facilities such as good network of roads to rural and farm areas. This is to ameliorate the transportation problems so as to improve marketing efficiency.

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