Marketing of the Fresh Water Clam (Galatea paradoxa) in Southeastern Nigeria

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Chile is becoming an important food exporter worldwide. The Chilean food industry has been growing consistently during the last decade reaching almost US$8 billion, which represents 25% of total Chilean exports in 2004. The main objective of this study is to analyze the Chilean salmon, wine, and fruit export industry, and to understand the marketing strategies that have led this food industry to increased

affordable labour. The implications of these findings to clam market organisation, price-quality relationship, food sufficiency, and investment prospect are discussed.

KEYWORDS. Clams, *Egeria radiata*, *Galatea paradoxa*, marketing, fishers, seasons, Southeastern Nigeria

Notes About the Production and Supply-Demand of Fruit and Vegetables in the Countries of the European Union

Jaime de Pablo Valenciano
Jean-Pierre Lévy-Mangin
Juan Carlos Pérez Mesa

This study analyses the international fruit and vegetables trade, especially concentrating on the European Union. We will start with a rough description of the framework of growing, importing and exporting countries. Afterwards, we will take a closer look at the situation of these countries in order to identify suppliers and buyers. The most important conclusion to be drawn is that there is a strong concentration of commerce in areas with higher purchasing power, as a result of which the competition will increase and the traditional markets may be saturated.

KEYWORDS. Competition, international trade, export, import

Marketing of the Fresh Water Clam (*Galatea paradoxa*) in Southeastern Nigeria

James P. Udoh
Gabriel S. Umoh

ABSTRACT. This study investigated the structure, storage, distribution, and profitability of marketing fresh clams *Galatea paradoxa* in relation to harvesting time (dry and raining seasons) and in different locations in Southeastern Nigeria. Our results reveal that the marketing chain starts from the fishers to the consumers, with dealers and retailers as intermediaries. Seasonal fluctuations in supply and trade relationship significantly influence the market. Clam prices were found to fluctuate with size. Prices charged by fishers and dealers were uniform throughout the season. There were significant changes in quantity of clams sold between seasons ($P < 0.001$) and locations (area of purchase) ($P < 0.05$). Duncan's Multiple Range Test showed significant differences in weight of clams from clam-producing areas and other locations. The fishery is characterized by a favourable capital-output ratio, as reflected in the marketing margin; with low production cost and cheap, affordable labour. The implications of these findings to clam market organisation, price-quality relationship, food sufficiency, and investment prospect are discussed. doi:10.1300/J038v13n03_05

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KEYWORDS. Clams, *Egeria radiata*, *Galatea paradoxa*, marketing, fishers, seasons, Southeastern Nigeria

INTRODUCTION

From the food balance sheets prepared by experts (FAO,1966; Oyenuga, 1972; Olayide, 1979; CBN/NISER, 1991), it is generally recognized that Nigeria is a protein-deficient country. Nutritionists are extremely worried about the low level of readily available and affordable protein sources. Considering that the recommended per capita protein consumption is 64.0 g per day, the per capita protein consumption per day in the country is estimated at less than 100 grams.

The main sources of animal protein in Nigeria include beef, chicken, goat meat, eggs, fish, and recently, rabbit. Beef and goat meat are readily available in the northern part of the country, but they are scarce, and costly in the south. However, the south is blessed with abundant aquatic products such as fish, shrimps, and crabs including bivalves such as clam *Galatea paradoxa.*

The clam *Galatea paradoxa (=Egeria radiata)* is a member of order Tellinacea and family Donacidae. It is endemic to West Africa. Occurrence of the species is however, limited to sandy beds of lower reaches of certain rivers including Cross River around Itu (Nigeria), the Volta River around Sogankope (Ghana), and in Sanaga River (Cameroon) (Odiete, 1979). In these areas, clam forms the basis of an important local fishery. Literature search reveals that studies on clam in Nigeria concentrate on its biology, population dynamics, and nutritional value. Moses (1990) and Etim (1991) reported on the population dynamics of this species in the Cross River. About 200 fishers exploit the fishery, harvesting 15 million clams with weight totalling 810 tonnes annually (Etim, 1991). *G. paradoxa* is a protein-rich food with 61% crude protein and essential amino acid content comparable with that of whole hen's egg (Ifon and Umoh, 1987). However, there is no reporting on the marketing of this important fishery.

It is one thing for a product such as the clam to be produced and another for it to get to the ultimate consumers. Thus, Bailey et al. (1987) and Olayemi (1996) attribute lack of self-sufficiency in animal products to production and marketing disabilities. Marketing is essential as the product, though produced in the study area, needs to be evenly and efficiently distributed if it must serve the needs of the greater majority of the citizenry. For instance, in the consumer survey of Western Nigeria, Adeyokunnu (1980) reported both quantitative and qualitative deficiencies in protein intake. He identified among others, inefficient distribution as being responsible for this situation. He further identified fisheries' marketing problems which include a large unsatisfied demand;

lack of knowledge of demand, supply, and prices because of the localized nature of the domestic trade; and a large import component of the total supply. For fresh clam, the problem may even be more severe as there exists virtually no empirical information on its market which could assist in efficient distribution and marketing planning.

This study investigates the marketing of clam in Southeastern Nigeria with the following objectives, mentioned *inter alia*:

- Examine the structure of clam marketing in southeastern Nigeria;
- Assess the distribution and storage systems in operation; and
- Analyse the price relations and profitability of clam marketing.

The study was restricted to marketing as production involves merely harvesting the clam from the wild during the on-season. There is presently no conscious effort to culture the clam in Nigeria.

METHODOLOGY

Study Area

The study area, Southeast Nigeria, comprises the present Akwa Ibom and Cross River States with an area of 28,585 square kilometers and located at 07°-4° 30′ N; 0070 30′-9° 30′ E. The Cross River rises from the western slopes of the Cameroon high lands (05° 45′ N; 008° 50′ E) and empties into the Atlantic Ocean. The region is largely tropical and encompasses a lot of natural resources including fisheries, mineral, agricultural, and forestry resources. It is traversed by many rivers, creeks, and coastal waters which breed large species of shrimps, fishes, clams, and oysters. A population of over seven million people, mostly agrarian, inhabits the region. Particularly, fishers inhabit the coastal communities.

Methods of Data Collection

This study comprises two aspects, namely quantitative and qualitative. The qualitative aspects of clam marketing such as pricing, market conduct, profitability, and effects of season were based on observatory study and opinion of traders and consumers. The selling prices of clams were traced along the different levels of exchange between buyers and sellers along the marketing chain in different areas of purchase. A survey of the clam traders was carried out at each marketing station. A random sampling of retail buyers (representing the consumers) was taken at the point of purchase. In all, 194 traders were surveyed–63 in Akwa Ibom State and 131 in Cross River State. Also, 105 consumers

were sampled. In the quantitative aspect, samples of bags of clams were weighed and their prices obtained in the wholesale market. Samples of clams were also purchased from retailers. The quantities purchased were taken to the laboratory and subsequently weighed as a whole (with the shells). Thereafter, weight of the clam meat was taken. The study period was split into two–the February/March season, which represents the harvesting season (dry season) and the April/May season in 1999 to represent the onset of the raining season. Clam fishing season spans from November to May during the dry season just before flooding of the Cross River.

The marketing/sales points sampled were Akamkpa, Calabar, and Odukpani in Cross State; and Itu, Eket, Etinan, Ikot Ekpene, Oron, and Uyo in Akwa Ibom State (Figure 1). They were purposely selected for their proximity and being clam-consuming areas.

Data Analysis

The data collected were subjected to both descriptive and statistical analyses. The selling prices were first calculated in Nigerian Naira (₦) per bag (or basin of 50 kg) in wholesale markets and then converted to Naira per kilogram (₦/kg). Modal average prices of wholesale clams at the various levels of marketing were tabulated. From this, the profit level and marketing margin were calculated (O'Connel, 1981). The total retail weights and retail prices at different sales locations surveyed were used in calculating the analysis of variance (ANOVA) and simple regression. The simple regression involved is given as:

$$P = a_o + a_1Q + e_i \quad (1)$$

where, P = price of clam (₦/kg)
a_o = constant term
Q = weight of clam (kg)
a_1 = coefficient of Q
e_i = error term

Duncan's Multiple Range Tests were performed for both weights and prices, for the two seasons. This was in an effort to identify locational and seasonal differences. Following O'Connel (1981), the revenue forgone by the fisher through the intervention of intermediaries was quantified as:

$$\Delta Q \times \Delta P \quad (2)$$

where, ΔQ = difference in quantities (Kg/₦) between wholesale and retail markets,

ΔP = price effect of unit change in quantity (that is, regression coefficient, a_1, of price-quantity relationships, equation 1).

RESULTS

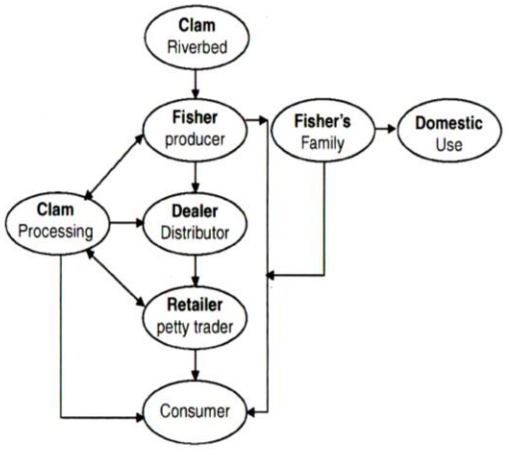
Structure of Clam Marketing System

The market structure is constituted by the characteristics that affect the behaviour and performance of firms that sell in the market as well as the set up of the market in terms of degree of connection, and number of firms and size. (Adegeye and Dittoh, 1983; Adekanye and Olayide, 1988, 1995). Figure 1 shows the structure and general pattern of distribution and marketing of clams as observed during the study. The figure shows that clam passes through a number of intermediaries before getting to the final consumer. These include:

1. *The Fisher*: The fisher is indispensable in this trade. He does the fishing by diving to the riverbed. They are usually skilled in this occupation. After the clams are harvested from riverbed and brought to the beach, some are kept aside for domestic use while the others are sold out directly to dealers in bags or basins, and often, directly to consumers. The fisher's family can also process the clams by grilling, frying, and/or selling the clam fresh. At the end of the day the unsold clams are packed into bags and baskets and kept for the next market day. The fishers usually catch three to five bags of clams a day during on-season.
2. *Intermediaries*: Two types of intermediaries were identified, the dealers and retailers:

- *Dealers*–This group of people buy three to four bags of clam directly from the fishers (wholesale) and in turn sell to retailers. The dealers can be also engaged in processing of clams. It is also the duty of the dealers to transport the clams to different areas or points of sales where they are consumed.
- *Retailers*–The retailers sell in small units to the household consumers. They display the clams on the floor or on a table in the market stalls. Some retailers (usually females of different age groups) hawk clams from place to place. They usually buy one bag per day from dealers in major markets. They then transport their purchases to their respective stalls or sheds for retailing. Often those who cannot buy a bag, purchase one as a group and thereafter distribute the clams among themselves. Most retailers do exhaust their stock of clams daily. Some retailers buy directly from the fisher and resell to consumers.

FIGURE 1. General pattern of Distribution and Marketing of *Galatea paradoxa* in Southeastern Nigeria



Retailers sell clam in different forms. Some sell clams with shells or fresh/stewed clam meat. Those who sell clam meat collect the shells, allow them to accumulate and thereafter sell them to feed millers, and building construction firms.

Storage System

The dealers do not have storage problems since they sell off their stock in the clam markets. The retailers encounter storage problems hence they purchase not more than one bag daily. The fresh clams are displayed on tables at the market stalls and sprinkled with water intermittently to keep them alive. Others are kept in basins containing fresh water. The onset of spoilage is noticed after two days' storage.

Market Conduct

Interaction. The fishers and intermediaries interact often when performing the marketing functions. The dealers are in intimate contact with the fishers. Each dealer goes to the beach market to purchase her needs. They are then conveyed in groups to their points of sales by public transport. At the beginning of the harvest season when clams are abundant, cordial relationships exist among the three parties (fisher, dealer, and retailer). However with the onset of rain and scarcity of clams, the fishers and the dealers become strict on pricing.

Trade Associations. There does not exist any active trade association among the fishers, dealers, and traders. There is however, unity in decision making. These decisions, though not binding, are yet difficult to break. Dealership is open to any interested person or persons. It is the duty of longstanding dealers to introduce new entrants into the trade. Entry into the retail trade is equally free. Thus, clam market is close to being perfectly competitive. The number of clam traders (194) is not quite robust but there are many consumers. Therefore, clam market is not exactly atomistic.

Point of Sale. Harvested clams are sold to dealers at the beach markets at Ayadehe in Itu (Clam producing area; CPA), Akwa Ibom State and Ikoneto in Creek Town (CPA), and Odukpani (Cross River State). Dealers principally sell their clams at major markets in Akamkpa, Calabar, Etinan, Ikot Ekpene, Oron, and Uyo. (Figure 1). At the wholesale markets clams are sold in basins (of 40 kg and 80 kg of total clam weight, T.W) and in bags (of 65 kg and 90.5 kg, T.W).

Pricing Policy

The price is determined by considering the cost of production, quantity of clams and other charges, and making allowances for profit. The prices vary depending on the unit of measurement. The prices at which dealers sell to the retailers vary. Prices increase with increase in quantity or scarcity of clams. Table 1 shows the market prices along the marketing chain during the study. The table shows the price of fishers, dealers, and retailers, standardized on 90.5 kg/bag basis. In reality, a 40 kg (basin) of clams was sold between ₦50.00 and ₦60.00 (January and March, 1999), ₦100.00 (April) and subsequently, ₦125.00 (May). An 80 kg (basin) bag of clams was sold between ₦100.00 and ₦150.00 (January/March) and ₦200.00 (April/May) at Itu. A 6 kg (bag) of clams was sold between ₦150.00 and ₦200.00 (February/March, 1999) and for about 300.00. (April/May). The 90.5 kg bags of clams were sold between ₦200.00 and ₦250.00 (February/March) and ₦300.00 per bag (April/May).

This was the market situation in Itu. At Odukpani, the price of clams was ₦70.00 for 50 kg (bag) (February/March) and ₦100.00 (April/May). When standardized with the 90.5 kg (bag), they are equivalent to ₦126.70 and ₦181.00, respectively, for the two seasons.

The quantity of clams sold varied from market to market depending on the area and prevailing market situations. The quantities of clams sold by the retailers at various markets during the study are shown in Table 2. The area with the highest quantity of retail clams was Itu, Akwa Ibom State (1.7104 kg)

TABLE 1. Average Clam Prices (₦/bag) Along Marketing Chain During this Study

State/Area	S	Fisher/Dealer	Dealer/Retailer	Retailer/Consumer
Cross River State				
Odukpani	1	126.70	126.70	291.50
	2	181.00	181.00	458.10
Akamkpa	1	+	300.00	370.30
	2	+	400.00	545.60
Calabar	1	+	300.00	379.30
	2	+	400.00	482.90
Akwa Ibom State				
Itu	1	250.00	250.00	249.50
	2	350.00	350.00	462.22
Eket	1	+	300.00	405.70
	2	+	400.00	593.80
Etinan	1	+	300.00	499.30
	2	+	400.00	726.30
Ikot ikpene	1	+	300.00	333.80
	2	+	400.00	485.60
Oron	1	+	300.00	389.90
	2	+	400.00	567.00
Uyo	1	+	300.00	332.30
	2	+	400.00	462.60
Averages	1	188.40	275.20	361.40
	2	265.50	370.20	531.60
Margins	1	–	86.80	86.20
	2	–	104.70	161.40

+ = Consumption centres (non-producing), no fisher/dealer interaction.
S = Season.
1 = February/March (Dry season).
2 = April/May (Raining season).

while Etinan had the least quantity (0.9062 kg) during the dry season. During the raining season, the area with the highest quantity of retail clams was Odukpani in Cross River State (0.988 kg) and lowest, Etinan in Akwa Ibom State (0.623 kg). The quantity of whole calms reduced from 1.2221 kg to

TABLE 2. Average Numbers, Weights, and Prices of Clams in Retail Markets

State and Areas	February/March Season					April/May Season				
	Whole Clam		Clam Meat			Whole Clam		Clam Meat		
	SN	Weight (Kg)	Prices (₦/Kg)	Weight (Kg)	Price (₦/Kg)	SN	Weight (Kg)	Price (₦/Kg)	Weight (Kg)	Price (₦/Kg)
Cross River										
Odukpani	11	1.553	$3.221^{a,b}$	0.349	14.314	7	0.988^{a}	5.061	0.222	22.492
Akamkpa	28	$1.222^{a,b}$	4.091^{b}	0.395	12.652	19	0.829^{a}	$6.029^{a,b}$	0.268	18.643
Calabar	24	1.193	4.191^{b}	0.222	22.523	16	0.937^{a}	5.336^{a}	0.209	23.958
Akwa Ibom										
Itu	40	1.710^{c}	2.923^{a}	0.400	12.500	8	0.979^{a}	5.107^{a}	0.124	23.343
Eket	3	$1.115^{a,b}$	4.488^{b}	0.189	26.399	9	0.762^{a}	6.562^{a}	0.131	38.343
Etinan	16	0.906^{a}	5.518	0.192	26.069	11	0.623^{a}	8.026	0.132	37.908
Ik. Ekpene	16	1.356^{b}	$3.689^{a,b}$	0.264	18.925	11	0.932^{c}	5.365^{a}	0.182	27.518
Oron	16	$1.161^{a,b}$	4.308^{b}	0.205	24.378	11	0.798^{a}	$6.266^{a,c}$	0.141	35.461
Uyo	30	$1.362^{b,c}$	$3.672^{a,b}$	0.232	21.561	21	0.978^{a}	5.112^{a}	0.207	24.155
Average	22	1.286	4.00	0.272	19.925	20	0.870	5.874	0.190	27.961
Margin	–	–	–	–	–	1.22	0.428	1.881	0.083	8.036
Minimum	11	0.906	2.923	0.189	12.500	7	0.623	5.061	0.131	18.643
Maximum	40	1.710	5.518	0.400	26.399	21	0.998	8.026	0.268	38.168

Figures in the same column having the same superscript are not significantly different ($P > 0.05$) (D.M.R.T); SN = Size of retail sample (numbers).

0.8293 kg, respectively, at Akamkpa during the two seasons. Generally, there was a reduction in the number of clams (−1.22), weight of whole clams (−0.4279 kg), and clam meat (−0.0825 kg) in the raining season (Table 2). Comparatively, Akamkpa had the highest and lowest quantities of clam meat (0.268 kg and 0.131 kg) in Cross River State. Clam prices fluctuate inversely with retail clam weights. Thus, the highest unit clam price was recorded in Etinan, which also recorded the lowest unit in whole clam weight.

Profit Making

Despite fixing their prices independently, no significant difference was found among the fishers' prices. The dealers stepped up prices between ₦30.00 and ₦50.00 per bag when selling to retailers. Table 3 shows the

TABLE 3. A Comparison of Profit Level of the Marketing Agents and Average Price Increase (₦/bag)

Agents	Average Price Increase (₦/bag)		Seasonal Difference	
	Feb./Mar.	April/May	(₦)	%
Fisher	–	–	–	–
Dealer	55.60	86.60	31.00	55.75
Retailer	55.10	135.50	80.40	145.92
Agents' Difference	(₦) −0.50	48.90	–	–
	% (−1.00)	(−56-47)		

Source: This study.

increase in prices at each level of marketing after adjusting for transport and other expenses. Since the fishers did not disclose how much it costs them to produce a bag of clams, one cannot compute their profit. During the dry season, the dealers made an average profit of 1% (₦55.60 per bag) over the retailers; who in turn were better off than the dealers, making a profit of 56.47% (₦ 135.50 per bag) over the dealers (₦ 86.60/bag) during the raining season. A seasonal difference in price increase indicates that dealers made an added profit of 55.75% (₦ 31.00/bag) and retailers, 145.92% (₦ 80.40/bag) over the dry seasons. Some dealer-retailers made additional profits of 50% (₦ 27.80/bag) and 49% (₦ 66.20/bag). During the two respective seasons (Table 4) seasonal profit made was 143.31% (₦ 118.80/bag).

Marketing Margin

The marketing margin of fresh clams as presented in Table 5 is between 30 and 39%. No computation was made for the fisher for lack of information. In the dry season the dealers and retailers received approximately 15% each of the consumer's money while the market margin was 39%. Retailers increased their margin to 24% in the season.

The revenue forgone by the fisher by passing through intermediaries in marketing clams was quantified as shown in Table 6. The last column of Table 6 indicates the total revenue forgone by the fisher as ₦11.86/kg and ₦11.03/kg for the two seasons, respectively. If he was to market the clams himself up to Akamkpa, the fisher would have made additional profit of ₦1.509/kg or ₦ 1365.00/bag (i.e., ₦ 1.509/kg × 90.5 kg/bag) to his normal sales at the beach market at Itu. Hence, over ₦1073 and ₦ 998, respectively, is forgone per bag

TABLE 4. Profit of Ordinary Retailers Compared with That of Dealer-Retailers

Agents	Average Price Increase (₦/bag)		Seasonal Difference	
	Feb./Mar.	April/May	(₦)	%
Retailer	55.10	135.50	80.40	145.92
Dealer-Retailer	82.90	201.70	110.80	143.31
Difference (₦)	27.80	66.20	–	–
%	50.00	49.00		

Source: This study.

TABLE 5. Marketing Margin at Each Level of Marketing of Fresh Clams in Southeastern Nigeria

Intermediaries	February/March (%)	April/May (%)
Dealer	15.41	15.14
Retailer	15.28	23.68
Market	30.69	38.82

TABLE 6. Explanation of Revenue Forgone by the Fisher

Season	Price Effect of Unit Change in Quantity (₦/kg) ΔP	Marginal Difference in Weight (₦/kg) ΔQ and Regional Price Effect of Unit Movement, that is, Revenue Forgone by Fisher per Area (₦/kg), (ΔP × ΔQ)							Total Revenue Forgone by Fisher at Source (₦/kg)*
		Akampa	Calabar	Eket	Etinan	Ikot Ekpene	Oron	Uyo	
Feb/March		+10.4883	0.5174	0.5951	0.8042	0.5349	0.5497	0.3487	
(Dry)	3.0901	++1.5089	1.5988	1.8389	2.4851	1.6529	1.6986	1.0775	11.8607
April/May		+0.1497	0.042	0.2170	0.3560	0.4710	0.1810	0.0090	
(Wet)	7.7387	++1.1585	0.3250	1.8793	2.7550	3.6449	1.4007	0.0696	11.0330
									₦998.49

\+ represents Marginal difference in weight) ΔQ,
++ represents Regional price effect of unit movement ΔP × ΔQ,
* Sum total of all ++.

by the fishers to market intermediaries in the two seasons. This amounts to a monthly loss of about ₦85,840.00 and ₦79,840, respectively, at a catch rate of 4 bags per fisher in a 20-day fishing month.

Price-Quantity Relations

Variations were observed in the quantity of clams sold at the different points of sale (Table 7). There was reduction in quantity as the clam leave Itu (CPA) for other markets. ANOVA of clam weights obtained from the retail markets (showed that there was very high statistical significance in changes in quantity of clams between the two seasons ($P < 0.0001$, $F_{1,17} = 71.45$) and among areas of purchase ($P < 0.05$, $F_{1,17} = 5.69$). The clam price-quantity relationship is described by the equations:

1. $P = 7.9857 - 3.0901\ Q$; $r^* = -0.975$ (February/March)
2. $P = 12.6033 - 7.7387\ Q$; $r^* = -0.9898$ (April/May)

Duncan's Multiple Range Test (DMRT) showed that retail weight of clams from Itu was significantly higher from those sold at Akamkpa, Calabar, Eket, Etinan, and Oron during the February/March season. Other significant differences are shown in Table 2. No significant difference in quantity of clams sold was observed in the April/May season.

An analysis of variance for prices of retail clams (Table 8) showed that there was a very high significant difference between seasonal prices ($p < 0.0001$, $F_{1,17} = 190.73$) and market of purchase ($p < 0.001$, $F_{1,17} = 17.79$). Retail prices of clams were significantly higher in the other markets than those of Itu (CPA).

DISCUSSION

The structure of the clam marketing as observed in this study can be described as fragmented compared with that of fish. The fragmented structure

TABLE 7. Result of Analysis of Variance of Whole Weights of Clams Obtained During the Survey

Sources of Variation	DF	SS	MS	F	Significance
Between seasons	1	0.7860	0.7860	71.4545	0.0001
Between Areas	8	0.5011	0.626	5.6905	0.05
Error	8	0.0878	0.011		
Total	17	1.3749	–	–	–

TABLE 8. Result of Analysis of Variance of Prices of Fresh Clams Obtained During the Survey

Sources of Variation	DF	SS	MS	F	Significance
Between seasons	1	1562.03	156.00	190.7287	0.0001***
Between Areas	8	1165.2681	145.6585	17.7854	0.001*
Error	8	65.5185	8.1898		
Total	17	2792.8166			

***Significant at $p < 0.001$ and
*Significant at $p < 0.05$.

of clam marketing could be attributed to lack of involvement of firms and companies and the fact that harvesting and marketing of clams are handled by few individuals and families (Ladipo and Fabiyi, 1983; Eyo et al., 1991).

The system of price determination of clams dictates that prices rise as the retail stage is approached. Ladipo et al. (1982) found similar situation in fish prices. Fluctuations in prices were principally due to either abundance or scarcity of clams. The weather conditions and the number of fishers involved in harvesting may have affected this. At the onset of rainfall (March/April) and in the raining season proper, there is increase in water level in the Cross River. This makes it more dangerous to dive for clams. Thus, only the more experienced fishers continue in the harvesting exercise. Consequently, there is a reduction in the abundance of clams in the market.

The prices of clams are also shown to vary with location. Prices tend to increase as the distribution is farther away from the source, while the quantity decreases. Lawson (1963) reported similar observation in Ghana. The prices of clams occurring at different places along River Volta in Ghana were different. Large baskets of smoked "oysters" (clams) which cost $G2.12 6d downstream, sold at $G6 at the market at Akuse, and in Accra, similar quantity fetched $G9. From our present study, it was observed that the average retail prices of clams varied from about ₦30/kg at the beach market at Itu, to ₦55/kg at Etinan, some 55 kilometers away from the source.

Calculations of marketing margin indicate that the marketing margin of the retail market ranged between 30 and 39%. This margin is considered high since no major processing is done on the clams. Ladipo and Fabiyi (1983) found marketing margin in frozen fish marketing in Kwara State, Nigeria to range between 37 and 45%. This was also considered high since no processing was done on the fish. The high marketing margin was basically due to the

many intermediaries in the marketing chain. From the present study the retailers receive between 15 and 24% (marketing margins) of the consumer's money. The margins are considered moderate. But when a retailer is considered with her sales, these margins are low. On the contrary the marketing margin of 15% of the dealer is high considering his sales. A dealer making a profit of ₦55.60 per bag can make a total of ₦166.80 if she succeeds in selling three bags. On the contrary, the retailer cannot sell more than one bag in a day. It is in this context that her earnings compared with that of the dealer, is low and unfair, since she is the one that effects the exchange of clams with the consumers.

Table 6 shows that fisher forgoes much money (₦ 80,000 to ₦86,000 monthly) for not marketing all his clams personally. These figures are the revenues, accruing to distant retailer by selling lower quantities than that sold at the beach market (at source). The implication here is that if the fisher sells at the same rate as retailer to the consumers, he should make additional profits per bag (O'Connel, 1981). This illustrates the need to make the fisher better oriented in marketing.

CONCLUSIONS AND IMPLICATIONS

The present study is an empirical investigation on the seasonal variation of clam marketing in Southeastern Nigeria. The results confirm seasonal changes in the weight of clams obtained in the dry and raining seasons. Differences were also observed in the weights of clams across location. Marketing margins at retail markets were found to be low, thus fishers and retailers are not making attractive margin as compared with their dealers/middlemen counterparts. The market lacks organisation.

A general implication is that, broadly speaking, fishers may not be able to improve on their current subsistent operations, thus clams supply may not be expected to improve. Therefore, sector-specific policies including pricing and subsidies that will ensure that the fisher obtains commensurate income for his efforts or is assured of recovering at least his cost of production, can stimulate clam production and distribution (O'Connel, 1981). Such stimulation should however be biologically sustainable without over-fishing the stock.

To the extent that the unfavourable marketing arrangement can be ameliorated through policy formation and implementation, clam fishers can help themselves a great deal by forming clam producers' cooperative with the thrust of influencing prices of clam in line with the production realities, so that they may not be disadvantaged. This can enhance their income, improve their well-being, and consequently assist in the development of the economy.

Additionally, the introduction of appropriate processing technology will increase product differentiation, shelf life, all-year availability of clam meat products, and improve the well-being of all. Clam meat in its different forms are local delicacies and highly accepted (Ifon and Umoh, 1987). With available semi-skilled manpower, appropriate technology, and the right investment climate afforded by NEPAD (New Partnership in African Development), and Export Processing Free Trade Zone in the clam-producing region, Nigeria's 15 Million clams (810 MT p.a.) found principally in the sandy beds of Cross River could be transformed into both a local and global protein-rich food. Local and foreign entrepreneurs should venture into this fishing.

STUDY LIMITATIONS

This study was not structured to establish the socio-economic status, personal characteristics, and preference behaviour of the 194 traders and 105 customers encountered during the survey. Lawson (1963) encountered 1000 to 2000 women in the clam market in Ghana. Future studies would need to incorporate these salient features to further understand the clam market.

REFERENCES

Adegeye, A.J. and S.A. Dittoh (1985). Essentials of Agricultural Economics, Impacts Publishers, Ibadan.

Adekanye, T.O. and S.O. Olayide (1988). "Definition of Terms" in: Adekanye, T.O. (ed) Readings in Agricultural Marketing. Longman Nigeria Ltd., Ibadan, pp. 5-11.

Adeyokunnu, T.O. (1980). "Agricultural Marketing and Small Farmers in Nigeria" In: Olayide, S.O.A. Emeka, and V.E. Bello Osagie (eds) Nigeria Small Farmers: Problems and Prospects in Integrated Rural Development CARD, Ibadan: pp. 88-115.

Bailey, C. and Marahudin, F. (1982). "Fish Marketing, Distribution: Studies and reviews," Centre for Living Aquatic Resources, 10, pp. 126-138.

Central Bank of Nigeria/Nigeria Institute for Social and Economic Research (CBN/NISER) (1991). Impact of Structural Adjustment Programme on Nigeria Agricultural and Rural Life. A National Report Vol. I, p. 101.

Etim, L. (1991). "Growth, Biochemical Composition and Reproductive cycle in *Egeria radiata* (Lamarck 1804) (Lamellibranchia: Tellinacea: Donacidae) from the Cross River in Nigeria." PhD Thesis. University of Calabar, Calabar. Nigeria. p. 193.

Eyo, A.A., J.O. Ayanda, and P. Bolorunduro (1991). "Marketing of Fresh and smoked Fish in Kainji, Jebba and Lake Chad Basin" In Proceedings of the 4th Annual Seminar of the Committee of Directors of Research. Institutes, eds. Tobor, J.G. and

Ezenwa. B.I.O., Nigeria Institute of Oceanography and Marine Research, Lagos. pp. 95-101.

Food and Agricultural Organization, FAO (1966). Agricultural Development in Nigeria 1965-1980, FAO, Rome. p. 10.

Ifon, E.T. and I.B. Umoh (1987). "Biochemical and Nutritional Evaluation of *Egeria radiata* (clam) a Delicacy of Some Riverine Peasant Population in Nigeria." Food chemistry 24, pp. 21-27.

Ladipo, O.O. and Y.L. Fabiyi (1983). "An Analysis of the Structure of Fish Marketing and Distribution in Kwara State of Nigeria." In proceeding of 3rd Annual conference of Fisheries Society of Nigeria. pp. 40-49.

Ladipo, O.O., O. Sonaike, and O.L. Oludimu (1982). "A Statistical Investigation of Fish Prices in Nigeria." In proceeding of 2nd Annual Conference of Fisheries Society of Nigeria. pp. 207-217.

Lawson, R.M. (1963). "The Economic Organization of *Egeria* Fishing Industry on the River Volta." Proceedings of Malacostracan Society of London, 35, pp. 273-287.

Moses, B.S. (1990). "Growth, Biomass, Mortality, Production and Potential Yield of the West African Clam. *Egeria radiata* (Lamarck) (Lamellibranchia: Donacide) in the Cross River system. Nigeria" Hydrobiologia 196. pp. 1-15.

O'Connell, J. (1981). "Price-Quality Relationships for Beef in Smithfield Market." *Journal of Agricultural Economics*, 32(2), pp. 159-166.

Odiete, W.O. (1970). "Water and Chloride Regulation in the Fresh Water Mussel, *Egeria radiata* L. (Bivalvia: Tellinacea, Donacidae)" *Nigerian Journal of Natural Sciences*, 1(2), pp. 93-97.

Olayemi, J.K. (1996). "Food Security in Nigeria": The Report of a research Study sponsored by Development Policy Centre, Ibadan, Nigeria. p. 7.

Olayide, S.O. (1979). Food Production in Nigeria, University of Ibadan, Nigeria. p. 256.

Oyenuga, V.A. (1972). "Protein Nutrition in Nigeria." Paper Presented at the Symposium on Annual Protein Foods, University of Ife.

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