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# *Structure, Conduct and Performance of* Crayfish Market in Ibadan Metropolis, Oyo State, Nigeria

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**Abstract**

The study assessed the market structure, conduct and performance of Crayfish markets in Ibadan, Oyo State Nigeria.
Six (6) markets, where crayfish are predominantly sold were used in the survey. A multi-stage sampling procedure was used to select samples for data collection. A total of 50 crayfish sellers sampled were randomly selected from the six markets proportionate to the size and semi-structured questionnaires were used to collect data. Descriptive statistics, Gross margin analysis and Gini coefficient were deployed for data analysis. Analysis of the size and different composition of costs of marketing as well as margin revealed that purchase cost N25,000 (96%) the highest share of the total marketing cost. Aleshinloye market has the highest gross margin of N6,500. When the gross and profit margins were expressed as a percentage of total revenue, the average was found as 17.56 and 14.16% respectively. The crayfish marketing efficiency evaluation showed that they are highly efficient with an average efficiency ratio of 0.86. The Gini coefficient (0.77) showed that the market is an oligopoly. Problems encountered include lack of finance among others. It was however recommended that inefficiency may be improved by creating some measures that will improve competition such as the provision of sufficient market space and micro-credit facilities.

**Keywords:** Crayfish, Market structure Profit margin and Oyo State

## Introduction

Crayfish is regarded as an animal polypeptide having about 36-45% crude protein (Ibironke et al., 2014). It is an edible freshwater common bottom-dwelling crustacean that forms a greater proportion of shellfish and is found in abundance in the fresh waters of the Delta region of Nigeria, Israel et al., (2016). It resembles a small lobster and has high nutritive value. Crayfish is a rich source of lysine, sulphur and amino acids. It is also high in riboflavin, vitamin D and A, phosphorus, calcium and iron and as such it is good for supplementing high carbohydrates in the diet. Since it is high in polysaturated fatty acids, it can be used in lowering blood cholesterol level, Okeke and Nwankwo (2020)

Crayfish are well consumed in Nigeria, however, only a small portion of the body of a crayfish is edible. It is another source of cheap protein than any other animal protein, (Abou-Zaid and Mohammed, 2014).

Crayfish are highly medicinal because they are low in calories, reduce heart-related problems, goiter, etc. especially when consumed in large quantities Ele and Nkang (2014). It can be added to pap for infants and babies to improve the nutrition and taste of the food.

Marketing is a necessary channel in the supply of crayfish to the general populace as it brings together the forces of demand and supply in any location. Agricultural marketing plays a great role in the economy. It is the performance of all business activities that transfer the flow or direct flow of goods from producers to consumers with the mind of accomplishing the producer's objectives (Olukosi et al., 2005). Marketing of a product completely marks the end of production, because production is not complete until the finished goods get to the final consumer. Marketing of crayfish passes through different market participants and exchange of hands before they reach the final consumers (Ali et al., 2008). The longer the chain of actors involved in a marketing process, the more the costs incurred, and the more the inefficiency.

One of the ways to see if the marketing of a product is efficient or not is to assess its efficiency in the areas of marketing structure. In a market, there are many characteristics such as the number and nature of both sellers and buyers in the market, the nature of the product, the conditions of entry into and exit from the market as well as economies of scale, which determine competition that will exist in the market. Market structure attempts to describe and predict market outcomes through the extent of market competition. Olukosi et al. (2005) suggested that market structure may be defined as those characteristics of a market that seem to influence strategically the nature of competition and pricing within the market. Market structure as well as its conduct and performance have been widely used in marketing studies of agriculture (Adiguna et al., (2012); Giroh, D.Y et al., (2010) and Ele and Nkang (2014).

The countless participants and the size of the business in a particular market can be used to measure the degree to which buying and selling power is intensive amongst them. A few large businesses can overpower a market and therefore control prices which will in turn affect the other business in the market. A lot has been done on the structure of fresh fish marketing in Oyo state. Available research includes Ayanboye et al., (2015) and Ayanboye and Adedokun, (2013) but there is a dearth of research effort on crayfish which has led to less essential research details and inadequate market information has not let the policymakers focus on its development. A study like this, therefore, serves as an eye opener to those who will like to develop the crayfish market into its full potential marketing hub and expand other business opportunities along the crayfish chain. This study, therefore, aims to determine the market structure, conduct and performance of crayfish, using Ibadan, Oyo state as a case study.

## Materials and Methods

The study was conducted in Ibadan city, the largest indigenous city in Sub-Saharan Africa. Ibadan, the capital of Oyo State is located between Longitude 70 20' and 70 40' East of the Greenwich meridian and Latitude 30 55' and 40 10'North of the equator. Agricultural activities in Oyo State include livestock production, prominent among which is fish farming, processing and marketing. A multi-stage sampling technique was used to select respondents from the study areas. In the first stage, the five urban (metropolitan) local governments were selected; these are Ibadan North local government, Ibadan North East local government, Ibadan North West Local government, Ibadan South -East local government and Ibadan South-West local government. The second stage involved the selection of six (6) markets from the urban local governments where crayfish are predominantly sold. These markets are Aleshinloye market, Dugbe market, Bodija market, Gate market, Oje market and Oja-Oba market. The third stage was the selection of respondents from each of the selected markets. A total of 50 crayfish marketers were randomly selected from the six (6) markets proportionately to the population size of crayfish sellers in the market and were used for the analysis.

Data for the study were obtained from both primary and secondary information sources. The primary data was collected with the aid of

a structured questionnaire administered to 50 crayfish sellers. Personal interview was also conducted and the results of the interview were interpreted in the questionnaire. While the secondary information was obtained from textbooks, journals, past projects, internet and conference papers.

Descriptive statistics such as frequency and percentage were used to interpret the socio-economic characteristics of the traders, while the Ginni coefficient was used to determine the market structure. The Ginni coefficients were computed by using the following formula according to Okereke and Anthonio (1988):

$G = I - \sum XiYi$ _----------(Eqn.1)

Where:

G = Ginni coefficient.

Xi = Percentage of sellers in the ith class of traders,

Yi = Cumulative percentage of sellers in the ith class of traders,

The Ginni coefficient varies from 0 to 1, where 0 implies perfect equality in the distribution (perfect market) and 1 implies perfect inequality (imperfect market). The closer the Ginni coefficient is to zero, the greater the degree of equality and the lower the level of concentration and the more competitive are the markets. Similarly, as the Ginni coefficient approaches unity, the greater the degree of inequality and the higher the level of concentration and the more imperfect are the markets. In other words, if G = 1 market is imperfect, and if G = 0 market is perfect and competitive.

The appraisal of the economic efficiency of the marketing processes and the various cost components of the marketing activities were computed while the marketing margin analysis was also carried out. To estimate the Gross margin (GM), the following formulae were adopted from Ogundele and Okoruwa (2003).

$GM = \sum_{r=1}^{n} Pqqi - \sum Pxxi$ ----------Eqn. 2

Where

GM= Gross Margin

Pq= Selling price of the quantity of crayfish sold/sack

q1= Quantity of crayfish sold

Px= Purchased price of crayfish bought

X1= Quantity of crayfish purchased by seller /sack

The net profit is obtained as follows according to Ogundele and Okoruwa (2003)

$= \sum_{r=1}^{n} Pqqi - TTC$

Where

= Net profit (N)

Pq and q1 are as defined before

TTC= Total cost

TTC can also be expressed as

$TTC = \sum pxxi + MC$, where

MC = Marketing cost

Thus,

$= \sum Pqqi - \sum PxXi + MC$

To evaluate the efficiency of the marketing function performed, this procedure was adopted

$= \sum pixi + MC) \div \sum piqi)$

Where

= Pricing efficiency

N= number of respondents

Pixi and Piqi as earlier defined

**Results and Discussion**

The results on socio-economic characteristics of Crayfish sellers are shown in Table 1. The crayfish traders were predominantly female in the study area. This findings is in agreement with Kainga and Kingdom (2012) and Bassey *et al.*, (2013) that reported more women (93%) and (55%) respectively than men in the crayfish marketing. The result show more participation of women in crayfish marketing. Results in Table 1 also revealed that the traders within age group 31-40 is the highest, an indication that most of the traders are in their active age. The result also revealed that 86% of the traders are married. This finding implied that crayfish marketing in the area is dominated by married

women. This report agreed with Okeke and Nwankwo (2020) and Bassey *et al.,* (2013), reported that greater percentages of the respondents in their different marketing studies were married.

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Moreover, the result above showed that 10% of the crayfish traders have no formal education while the larger percentage (60%) of the traders have secondary education in the study area. A similar result was reported by Kainga and Kingdom (2012) and Bassey et al., (2013), that majority of their respondents attained secondary education.

The result further disclosed that only 24% of the respondents have between 5–10 years while the majority (76%) of the crayfish traders have more than 10 years of experience. This is a clear indication that the majority of the traders are well experienced. This finding was not different from the report of Bassey et al., (2013) who reported that (50%) of their respondents acquired 10 years of marketing experience.

About 44% of the respondents financed their crayfish marketing businesses from their savings. None of them got their capital from the bank and 36% from Cooperatives while only 20% obtained theirs from friends. This result is evident that small-scale businesses do not have access to loans from banks. The result showed that all the crayfish traders in the study area belong to a Cooperative association, among which are Omonigbeyin fish seller's association, Alaseyori fish seller's association etc. According to the traders, they derived financial support from these associations. These cooperative societies however impose a barrier to entry into the market by forcing intending sellers to join the association.

**Table 1**. **Socio-economics characteristics of the Crayfish traders**

| Socio Economics Variables | Frequency | Percent (%) |
|---|---|---|
| **Gender** | | |
| Male | - | - |
| Female | 50 | 100.00 |
| **Age** | | |
| 20-30 | 5 | 10.00 |
| 31-40 | 30 | 60.00 |
| 41-50 | 11 | 22.00 |
| >50 | 4 | 08.00 |
| **Marital status** | | |
| Single | 3 | 06.00 |
| Married | 43 | 86.00 |
| Divorced | 4 | 08.00 |
| **Education Status** | | |
| No formal Education | 5 | 10.00 |
| Primary Education | 10 | 20.00 |
| Secondary Education | 30 | 60.00 |

| | | |
|---|---|---|
| Tertiary Education | 5 | 10.00 |
| **Years of Experience** | | |
| **<5** | - | - |
| 5-10 | 12 | 24.00 |
| >10 | 38 | 76.00 |
| **Scale of Business** | | |
| Wholesaler | 10 | 20.00 |
| Retailers | 40 | 80.00 |
| **Source of Finance** | | |
| Personal saving | 22 | 44.00 |
| Bank loan | - | - |
| Cooperative | 18 | 36.00 |
| Family and Friends | 10 | 20.00 |
| **Membership of Association** | | |
| Yes | 50 | 100.00 |
| No | - | - |

***Market Structure of Crayfish***

The market structure of crayfish marketing at retail level was investigated by measuring the ginni coefficient. Only retail market of crayfish was analysed in this study because the wholesale market was very minute. The result of the market structure is shown in table 2.

**Table 2: Market structure of crayfish**

| Weekly FrequencySales (N) | % of retailers | Cum % of retailers | Total Value of weekly sales (N) | % total value of weekly sales | % of weekly sales | Cum. % of weekly sales (N) | $\sum X_1Y_1$ |
|---|---|---|---|---|---|---|---|
| 3,000-5,000 | 27 | 54 | 54 | 35,000 | 7.44 | 7.44 | 0.04 |
| 5,001-7,001 | 11 | 22 | 76 | 68,000 | 14.45 | 21.89 | 0.05 |
| 7,002-9,002 | 6 | 12 | 88 | 82,000 | 17.43 | 39.32 | 0.05 |
| 9,003-11,003 | 4 | 8 | 96 | 130,000 | 27.63 | 66.95 | 0.05 |
| 11,004-13,004 | 2 | 4 | 100 | 155,500 | 33.05 | 100 | 0.04 |
| Total | 50 | | | 470,500 | | | 0.23 |

Mean weekly sale = ₦9,470

Coefficient = $1 - \sum X_1Y_1$

$1 - 0.23 = 0.77$

Table 2 showed that a small percentage of the retailer accounted for the higher percentage of total weekly sales with the distribution given a Gini coefficient of 0.77. The average monthly sales per retailer were N9,470. Four percent of the retailers made sales worth N 155, 500.00, which accounted for 33.05% of the total value of weekly sales. Furthermore, 96% of the retailers made total weekly sales of N 315, 000.00. The Gini coefficients indicate a high structure defect, that is, a wide departure from a perfect market model whose concentration should approach 0 and also confirmed that the retail level is an oligopolistic structure. According to Parker and Connor, (1979) a Gini coefficient higher than 0.4 can be considered oligopolistic.

***Crayfish marketing practices***

This study revealed that 80% of crayfish traders in the study area are retailers. This may be due to the financial issue of the traders. Crayfish can be purchased by the traders from Lagos and Ondo states in baskets and sacks, however, those who cannot travel a long distance among the traders purchased crayfish from the few wholesalers around and resell it in the market. This may be the reason why crayfish is expensive because the wholesalers revealed they spent a lot of money in transporting crayfish to the market. Crayfish are sold in Kongos (a prevalent unit of measurement in Oyo State) and tins (evaporated milk brand and tomato tins) to the final consumers. It can also be presented to the consumers and sold in plastic paint containers which are often referred to as painter. These are empty plastic containers used to store paint or popular custard brand and butter brand. Crayfish products are differentiated by colour and size.

***Crayfish market performance***

The various cost components per sack is given in Table 3. The calculation is done per sack because this is common to all the traders in all the markets. It is evident in the table that the purchase cost in all the markets surveyed took the lion's share with an average value of 25,000 representing 96% of the total cost. This corroborates the findings of Ele and Nkang (2014) who reported that the purchased cost was about 83% of the total cost of crayfish marketing in Anambra state. This is followed by running cost which constituted 2.48% of the total cost.

**Table 3.**Cost component in Crayfish marketing/sack

| Item | Aleshinloye | Dugbe | Bodija | Gate | Oje | Oja-Oba | Total | Average Total | % Total |
|---|---|---|---|---|---|---|---|---|---|
| Transport cost | 400 | 350 | 200 | 450 | 450 | 450 | 2,300 | 383. 33 | 1. 473 |
| Purchase cost | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 150,000 | 25,000 | 96. 043 |
| Running cost | 800 | 850 | 600 | 500 | 530 | 600 | 3,880 | 646.67 | 2. 484 |
| Total cost | 26,200 | 26,200 | 25,800 | 25, 950 | 25,980 | 26,050 | 156,180 | 26, 030 | 26. 030 |

***Marketing Margin and Profit Margin***

The gross margin (GM), and profit margin (PM) calculated for the various markets is shown in Table 4. From the table, Aleshinloye market has the highest gross margin of ₦6,500 followed by Dugbe market, with a gross margin of ₦5,980/bag. This is followed by Bodija market with a gross margin of ₦5,500 per bag. The remaining markets, Oje, Oja -Oba and Gate have the same gross margin of ₦5000/ bag. The reason for the high gross margin in Aleshinloye, Dugbe and Bodija may be due to the caliber of households living in the environment. People in Ibadan generally believe that the markets are surrounded by houses that occupy by rich people. The gross margin is likely to be high in a place dominated by rich people as pointed out by Ele and Nkang (2014). When the average crayfish gross margin for all the market was expressed as a percentage of total revenue, it gives 17.56 percent. The average profit margin for all the markets was ₦4,300 and when this is also expressed as a percentage of total revenue, it gives 14.16 percent.

***Efficiency of marketing functions performance***

Efficiency is the minimization of input used. It is often regarded as the reward of output accrued through the employment of the most profitable methods of performing marketing jobs. The analysis of the crayfish pricing efficiency in Ibadan markets is presented in Table 5. The survey of the market locations shows that all the efficiency ratios are very close to one, which revealed that the crayfish traders are highly efficient in marketing

operations. The crayfish traders in Aleshinloye were, however, the least efficient with an efficiency of 0.83. The average total pricing efficiency for all the markets was 0.85. This agrees with the result of Okeke and Nwankwo (2020), who reported a marketing efficiency as high as 0.82 (81.67%) in their study of crayfish marketing.

**Table 4.** Gross margin and profit margin for Crayfish traders

| Item | Aleshinloye | Dugbe | Bodija | Gate | Oje | Oja-Oba | Total | Average Total |
|---|---|---|---|---|---|---|---|---|
| Purchase cost (a) | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 150,000 | 25,000 |
| Marketing cost(b) | 1,200 | 1,200 | 1,200 | 800 | 950 | 1,050 | 6,180 | 1,030 |
| Total cost (c) | 26,200 | 26,200 | 25,800 | 25,950 | 25,980 | 26,050 | 156,180 | 30,330 |
| Revenue (d) | 30,500 | 30,500 | 30,000 | 30,000 | 30,000 | 30,980 | 181,980 | 30,330 |
| Gross Marketing Margin (e) | 5,500 | 5,500 | 5,000 | 5,000 | 5,000 | 5,980 | 31,980 | 5,330 |
| Net Profit Margin (f) | 4,300 | 4,300 | 4,200 | 4,050 | 4,020 | 4,930 | 25,800 | 4,300 |
| e as % of d =g | 18.033 | 18.032 | 16. 667 | | 16. 667 | 19. 302 | 105.. 386 | 16. 667 |
| f as % of d =h | 14.098 | 14.098 | 14 | 13. 350 | 13. 400 | 15. 913 | 85. 010 | 14. 168 |

**Table 5.** Crayfish pricing efficiency

| Item | Aleshinloye | Dugbe | Bodija | Gate | Oje | Oja- Oba | Total |
|---|---|---|---|---|---|---|---|
| Average Total Cost | 26,200 | 26,200 | 25,800 | 25,950 | 25,980 | 26,050 | 156,180 |
| Average Total Revenue | 30,500 | 30,500 | 30,000 | 30,000 | 30,000 | 30,980 | 181,980 |
| Pricing Efficiency | 0.86 | 0.86 | 0.86 | 0.87 | 0.87 | 0.84 | 5.15 |

**Constraints to Crayfish traders in the Area**

The problem encountered by crayfish traders is presented as shown in Table 6. The table revealed that greater numbers of the crayfish traders are faced with the problem of inadequate capital (35%). This result disclosed that inadequate capital is a major factor affecting the traders in the area.

**Table 6.** Problems encountered by the traders

| **Problem** | **% of respondents** |
|---|---|
| Pest damage | 14 |
| Stealing | 3 |
| Inadequate storage facilities | 14 |
| Inadequate capital | 35 |
| Poor sales | 7 |
| Market Space | 25 |

**Conclusion and Recommendation**

The analysis of the size component of the marketing costs shows that the purchased price took the lion share in all the markets. The evaluation of the efficiency of the marketing function performance showed that the markets were efficient with the efficiency ratio close to one. The high net profit margins obtained

implied that the crayfish traders were able to cover both their variable and fixed costs. Thus, crayfish marketing can be considered a viable business worth investing in, in the study areas. Crayfish marketing is also characterized by fewer numbers of buyers and sellers. The distribution also showed that very few retailers accounted for the higher total weekly sales. Structurally, the market is oligopolistic. The inefficiency in the markets may be improved upon by creating some measures that will improve competition such as the provision of sufficient market space and micro-credit facilities.

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