Volume 6, Issue 2, 2021/22
ISSN: 2672-4197 (Print)
ISSN: 2627-4200 (Online)
Pages 85-101

Market Efficiency of Seafood Retailing in Some Selected Markets in Lagos State

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Abstract

This study investigates the market efficiency and profitability of seafood retailing in three major markets in Lagos State, Nigeria - Epe, Makoko, and Badagry - drawing on market efficiency theory to examine income distribution, pricing structures, and operational performance. Employing a stratified random sampling method, this study collected primary data from 150 seafood retailers and applied descriptive statistics, cost-return analysis, Gini coefficient, and multiple regression modeling for analysis. The results reveal that seafood marketing is largely decentralized and competitive, yielding an average gross margin of 62While previous studies focus primarily on wholesale channels or aggregate-level performance, this research offers a more detailed understanding of urban retail dynamics, highlighting market channel flexibility and spatial variations in profitability and institutional support. Structural constraints; including price volatility, poor infrastructure, limited credit, and inadequate energy access - continue to impede efficiency and scalability. These findings provide empirical grounding for policy and donor interventions aimed at strengthening urban fish markets through targeted investments in infrastructure, inclusive financing schemes, cooperative development, and extension services. The study offers actionable insights for regional fisheries policy and development program, particularly in designing gender-sensitive, pro-poor market support systems. Limitations include the cross-sectional design, seasonal price fluctuations, and reliance on self-reported data. Nevertheless, the research underscores the strategic potential of retail fish markets as engines of inclusive economic growth and food system resilience.

Keywords: Seafood marketing, Market efficiency, Profitability analysis, Income distribution, Gini coefficient

INTRODUCTION

Fish is a vital source of animal protein and plays a critical role in global food security and nutrition. Worldwide, fish contributes an estimated 17–50% of animal protein intake across many coastal developing countries (Onoja et al., 2012). In sub-Saharan Africa, fish accounts for about 22% of dietary animal protein, underscoring its significance in feeding growing populations. In Nigeria, fish is an irreplaceable food item; contributing approximately 40% of the population's animal protein intake (Olatunde, 1998; CGIAR, 2021)- with per capita consumption estimated at 13.3kg per year, below the global average of around 20kg (World Fish, 2020). The fisheries sector also underpins millions of livelihoods through artisanal fishing, aquaculture, processing, and trade, placing it at the core of both economic development and nutritional resilience (Agbeja and Jenyo-Oni, 2013).
Globally, discussions around sustainable

fisheries emphasize not only responsible production and stock conservation (aligned with SDG 14), but also the efficiency of distribution systems to ensure timely, safe, and affordable access to fish (UN, 2015). In rapidly urbanizing contexts- especially in secondary and tertiary African cities- informal market networks have become critical conduits for food distribution (Moreau and Garaway, 2021). These seafood retail markets handle highly perishable products at scale, yet infrastructure gaps, limited policy support, and quality control challenges constrain them.

Despite Nigeria's significant dependence on fish, the country faces a pronounced supply–demand gap: national fish demand is estimated at 3.2 million metric tonnes annually, while domestic production stood at only about 1.2 million tonnes in 2018, with the shortfall met primarily through imports—resulting in a trade deficit approaching US $1 billion annually (The FishSite, 2021). However, increasing production alone is insufficient unless fish reaches consumers through efficient, well-functioning marketing channels.

In Lagos State, Nigeria's largest urban and coastal center, seafood is marketed through a complex network of formal and informal systems. Fish is sold in fresh, frozen, smoked, or sun-dried forms across markets operating on daily, weekly, or periodic schedules. Pricing is largely bargain-based, characteristic of informal dynamics, while the perishable nature of fish underscores the need for appropriate storage, timely turnover, and preservation.

Retailers, as the final link in the value chain, play a crucial role in ensuring product quality and availability. They mitigate post-harvest losses through traditional methods such as smoking and icing, coupled with rapid stock rotation. Although earlier studies in Nigeria and West Africa (Adeleke and Afolabi, 2012; Madugu and Edward, 2011; Osundare and Adedeji, 2018) have shown that fish marketing can be profitable and relatively efficient, these studies tend to emphasize wholesale or aggregate-level analysis, with limited attention to the retail segment, particularly in dense urban informal settings.

This study, therefore, assesses the market efficiency and profitability of seafood retailing in selected Lagos markets, using the retail sector as a lens to evaluate the overall performance of the fisheries value chain. Grounded in market efficiency theory, it examines key questions: Are marketing margins reasonable and reflective of value addition rather than waste? Are profits sufficient to sustain traders' livelihoods without inflating consumer prices? How equitably is value distributed across participants—do a few actors capture most of the gains, or is income more broadly shared?

In addressing these questions, the study provides new empirical insights relative to previous work. The findings contribute to broader global discussions on sustainable fisheries and informal market dynamics, particularly by emphasizing the role of retail market efficiency in achieving food security and inclusive economic development. Ultimately, a better understanding of seafood retail efficiency can help inform policy and targeted interventions to strengthen the fisheries value chain in Nigeria.

Theoretical Framework

This study is grounded in market efficiency theory, which posits that markets function optimally when goods are delivered in the right form, place, and time, with minimal cost and loss, and in a manner that ensures fair returns to all participants (FAO, 1997; Adegeye and Dittoh, 1985). Within the context of agricultural and fisheries markets, this concept emphasizes the role of efficient marketing systems in resource allocation, loss reduction, and equitable value distribution across actors in the value chain. Specifically:

• Efficiency is assessed by the ability of traders to generate form, place, and time utility - through activities such as preservation, packaging, and timely distribution - while minimizing marketing costs, including transportation, storage, and handling (FAO, 1997; Olukosi et al., 2005).

• Profitability is measured using indicators such as gross margins and marketing margins, which reflect the economic viability and sustainability of retail operations (Omonona Agoi, 2007; Osundare and Adedeji, 2018).
• Equity is evaluated through income distribution metrics, such as the Gini coefficient, to assess the fairness of earnings among retail actors within the seafood value chain (World Bank, 2009).

Retail markets deserve focused attention as they represent the final interface with consumers, where product quality, accessibility, and pricing are determined. Inefficiencies at this stage - such as high spoilage rates, lack of cold storage, or asymmetrical market power - can undermine the benefits of production-level improvements. Thus, analyzing retail performance complements production-oriented research by revealing value leakages, exploitative pricing, and logistical bottlenecks in the distribution system.

The application of market efficiency theory in this study is broadened to include the political economy of informal urban food markets. In Lagos, informal seafood retail systems operate through adaptive practices, social networks, and non-contractual trust arrangements that enable high-frequency trade in perishable goods (Moreau and Garaway, 2021). Despite their functionality, these systems are often constrained by infrastructure deficits (e.g., lack of cold storage and unreliable electricity), regulatory ambiguities, and limited access to institutional support, such as credit, extension services, and market governance structures (Onu and Madukwe, 2017; Oyebanji et al., 2020).

By applying market efficiency theory within this informal context, the study links local retail dynamics to broader global discussions on sustainable fisheries, post-harvest loss reduction, and inclusive urban food system governance (HLPE, 2017). Understanding the economic behaviors and operational constraints of seafood retailers is essential for informing policy interventions that enhance market efficiency, empower small-scale actors, and contribute to urban food security.

METHODOLOGY

Study area Lagos state (figure 1), situated in the southwestern geo-political zone of Nigeria shares its boundaries with Ogun State in northern and eastern borders west is the border of Benin Republic, southern border stretches for about180 kilometers (km) along the coast of the Atlantic Ocean area of 3,577km² landmass of which 786.94 km² (22%) being the Lagos lagoons. Lagos state is rich in different forms of aquatic ecological zones that support different varieties of fish species and aquatic organisms thereby providing productive fishing opportunity for fishermen/women.

The study was carried out in three fish markets across Lagos state, namely, Epe (bordering Ogun State), Makoko (Yaba–central Lagos), and Agbalata (Badagry–bordering the Republic of Benin). These markets were purposively selected because of their strategic location; Epe being towards the northern boundary, Badagry market located in the Eastern boundary and Makoko towards the center of the state and their proximity to fishing landing sites.

Data collection

Primary data for this study were collected using structured questionnaires administered to respondents selected through stratified random sampling across three major seafood markets in Lagos State. The selected markets- Epe, Makoko and Badagry - were treated as distinct strata to ensure geographic representation and diversity in market characteristics. Within each market stratum, simple random sampling was used to select individual seafood retailers from those available and approachable at the time of the survey. In total, 150 seafood retailers were surveyed: 60 from Epe, 50 from Makoko, and 40 from Agbalata.

The questionnaire was designed to collect detailed information on the socio-economic characteristics of respondents (including age, education level, household size, years of marketing experience, and association

membership), operational costs and revenue, marketing practices, sources of start-up capital, and key challenges encountered in seafood retailing.

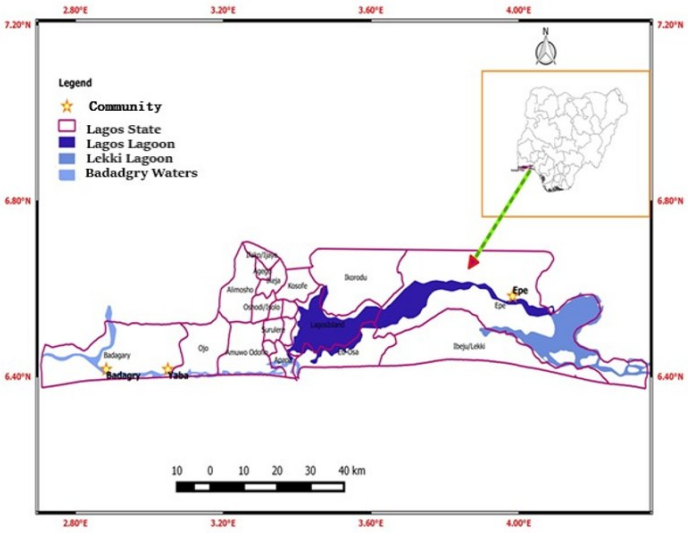

Figure 1: Map of Lagos State, Nigeria indicating the study areas. Source: Field survey 2018

Method of analysis

The paper employs a multi-faceted analytical approach. Data were analyzed using descriptive statistics, budgetary Analysis, Regression analysis, Lorenz curve and Gini coefficient to measure income equality in the markets. The socio-economic characteristics of the respondents were presented with the use of the descriptive statistical tools such as frequency distribution and simple percentages. NP = TR-TC; ME= TR/TC

Exponential Function Model

The exponential regression model is specified as:

$$\log \gamma = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e$$

where:

- γ = Monthly profit from fish sales (₦)
- X_1 = Age of respondents (years)
- X_2 = Marital status (1 = single/widowed, 2 = married)
- X_3 = Level of education (years)
- X_4 = Household size
- X_5 = Years of experience
- X_6 = Membership of association
- X_7 = Cost of sales

Results from the **linear form** of the regression model were selected and displayed for this study because, in comparison to the other forms (i.e., exponential, semi-log, and double-log), it displayed a higher number of significant variables. In addition, the value of R^2 (coefficient of multiple determination) and the F-ratio accord with *a priori* expectations in terms of the signs and statistical significance of the estimates.

Gini Coefficient and Income Distribution

The Gini coefficient is widely used in measuring inequalities in many fields. In this study, the Gini coefficient and Lorenz curve were used to analyze the income distribution patterns of fish retailers, alongside the decile distribution.

The income distribution model is specified as:

$$G = 1 - \sum X_i Y_i$$

where:

- G = Gini coefficient
- X_i = Proportion of the population
- Y_i = Cumulative proportion of income
- $\sum$ = Summation sign

The Gini coefficient ranges from 0 (or 0%) to 1 (or 100%), with 0 representing perfect equality and 1 representing perfect inequality.Gini coefficient expressed as a percentage describes the Gini index. Perfect equality exists when everyone in the country has equal share of national income, while perfect inequality exists when one person controls the national income and the rest of the individuals hold no income. When the value approaches 0, it shows that income is equally distributed and it is unequally distributed when the value approaches 1. The Lorenzo curve (a graphic measure) and corresponding Gini coefficient were used to examine the degree of income inequality within fish retailers. The Lorenz curve shows income (or wealth) distribution by plotting the population percentile by income on the horizontal axis and cumulative income on the vertical axis. The Gini coefficient is equal to two times the area between the Lorenz curve and a diagonal line of equality. As indicated in figure 2, if the area between the line of perfect equality and Lorenz curve is A, The Gini coefficient can also be expressed in terms of the Lorenz curve. If the area under the Lorenz curve is denoted as B, then the Gini coefficient is defined as:

$$G = \frac{A}{A + B}$$

Since $A + B = 0.5$, the formula can be simplified as:

$$G = 2A = 1 - 2B$$

(FAO, 2006)

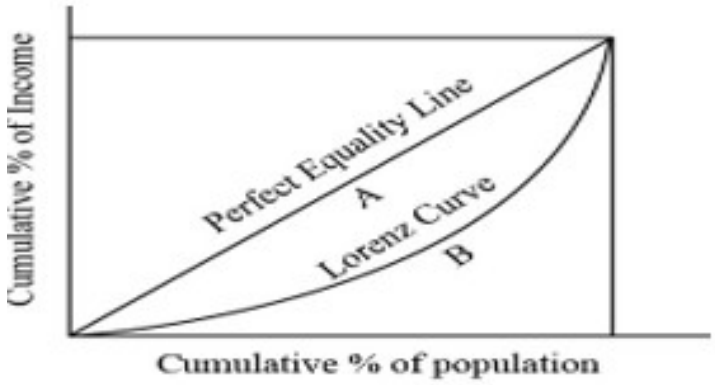

Figure 2: Lorenzo Curve

Limitation of study

The multispecies nature of Nigerian waters made it difficult to disaggregate fish sales by species, as marketers sold whatever was available from daily catches. Seasonal variations in fish availability and prices were also not fully captured due to the cross-sectional design of the study. Furthermore, reliance on self-reported data from traders, many of whom lacked formal records, may have introduced recall bias and affected data accuracy.

RESULTS AND DISCUSSION

Demographic and Socio-Economic Characteristics of Respondents All surveyed fish marketers were female, with over 81% under the age of 50 and 41% below 40, reflecting a predominantly economically active population. This demographic mirrors patterns observed in other Nigerian regions, where women - especially middle-

aged adults - dominate post-harvest fisheries roles (Adeosun et al., 2019). The high proportion of married respondents (86.7%) underscores the role of family support systems, with marriage anchoring women to communities and facilitating household labor contributions.

Household sizes were generally large, with 66% of respondents having 6–10 members and 24% exceeding 10. While large households may offer labor support, they also present financial and time burdens that could impact market efficiency. This supports prior findings that smaller households often correlate with higher productivity due to fewer domestic constraints (Madugu and Edward, 2011).

Educational attainment was modest: 39% had no formal education, 42% had only primary education, and 19% completed secondary school. While low literacy levels could limit formal business development, informal knowledge transmission - via family apprenticeships - appears to sustain participation and resilience in the trade. This suggests that, contrary to conventional assumptions, small-scale fish marketing may rely more on experiential learning than formal education (Dogondaji and Baba, 2010).

A notable strength among respondents was marketing experience. Nearly 90% had more than a decade in the trade, with many exceeding 20 years. Such experience confers advantages in understanding seasonal dynamics, customer behavior, and price negotiation - factors critical to profitability (Ali et al., 2008).

Market associations played an important role in trader organization. In Oluwo (Epe), active groups such as Egbe Eleja Gbigbe and Egbe Eleja Yiyan provided platforms for price coordination and collective support. In contrast, Badagry and Makoko had weaker or absent organizational structures, highlighting the uneven institutional support across locations. The presence of strong associations may enhance trader agency, improve bargaining power, and contribute to income stability. Income data further affirmed the viability of fish marketing as a livelihood. A large proportion of respondents earned above the then-national minimum wage (₦18,000 in 2018), with many supporting households and reinvesting profits - aligning with Babalola et al. (2015), who found that fish marketing can elevate families above the poverty threshold.

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These findings not only confirm previous studies but also extend them by highlighting regional disparities in institutional support and the nuanced role of informal learning. The profile of these female fish marketers; middle-aged, married, experienced, and resilient; demonstrates the critical but often undervalued contribution of women in sustaining Nigeria's post-harvest fisheries economy.

Table 1: Percentage Distribution of the socio-demographic characteristics of respondents

Variable	Epe (n=60)	Makoko (n=50)	Badagry (n=40)	3 markets combined (n=150)
Age				
≤ 40	23 (38.3%)	19 (38.0%)	20 (50.0%)	62 (41.3%)
40–49	33 (55.0%)	16 (32.0%)	11 (27.5%)	60 (40.0%)
≥ 50	4 (6.7%)	15 (30.0%)	9 (22.5%)	28 (18.7%)
Marital status				
Married	52 (86.7%)	41 (82.0%)	37 (92.5%)	130 (86.7%)
Single/widowed	8 (13.3%)	9 (18.0%)	3 (7.5%)	20 (13.3%)
Number of years of education				
No education	24 (40.0%)	14 (28.0%)	20 (50.0%)	58 (38.7%)
1–6	20 (33.3%)	27 (54.0%)	16 (40.0%)	63 (42.0%)
7–12	16 (27.7%)	9 (18.0%)	4 (10.0%)	29 (19.3%)
Household size				
≤ 5	2 (3.3%)	8 (16.0%)	5 (12.5%)	15 (10.0%)
6–10	39 (65.0%)	29 (58.0%)	31 (77.5%)	99 (66.0%)
≥ 11	19 (31.7%)	13 (26.0%)	4 (10.0%)	36 (24.0%)
Years of experience				
≤ 10	13 (21.7%)	12 (24.0%)	7 (17.5%)	32 (21.3%)
11–20	38 (63.3%)	27 (54.0%)	29 (72.5%)	94 (62.7%)
≥ 21	9 (15.0%)	11 (22.0%)	4 (10.0%)	24 (16.0%)
Belong to a fish retailer's association				
Yes	44 (73.3%)	35 (70.0%)	29 (72.5%)	80 (53.3%)
No	16 (26.7%)	15 (30.0%)	11 (27.5%)	70 (46.7%)

Source: Field study, 2018

Marketing channel

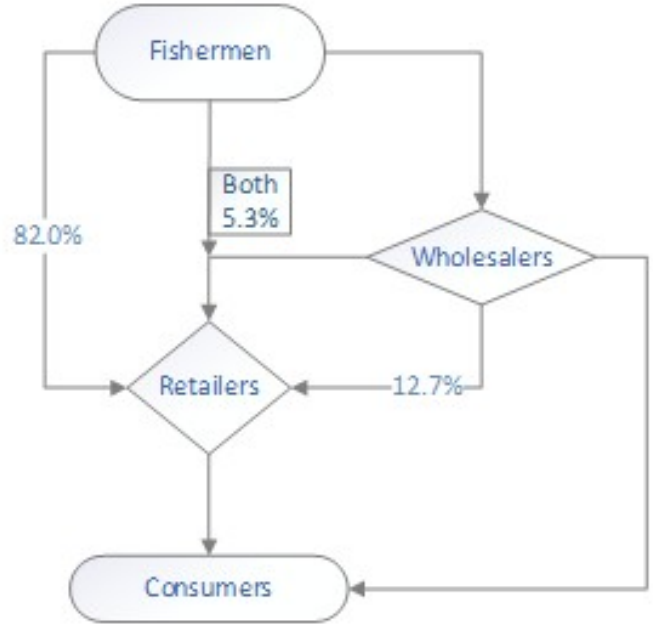
The fish retailers in all three markets reported free entry and exit in the trade, meaning there were no prohibitive barriers to becoming a fish seller or leaving the business. This is typical of competitive markets where many small sellers operate. We identified the major marketing channels through which local seafood moves from producers to consumers, illustrated conceptually in Figure 3. The channels can be categorized as either decentralized (direct) or centralized (with middlemen), and our findings show the trade is largely decentralized: • Direct-from-fishermen to Retailers to Consumers (Decentralized Channel): The vast majority of respondents (about 82.0%) indicated that they purchase their fish supply directly from fishermen and then sell to the final consumers. In this channel, the retailer bypasses any wholesaler or intermediary. This direct sourcing was common in all the markets, implying strong linkages between artisanal fishermen and women retailers on the shore. Such a channel is efficient in that it reduces the number of intermediaries and possibly transaction costs. Our observation aligns with reports by Madugu and Edward (2011) in

Adamawa State, who also found a decentralized distribution channel where retailers bought directly from producers (fishermen) for processed fish marketing. A decentralized system allows even consumers or agents to buy from producers without going through a central agent, fostering competition. • Wholesaler-mediated Channel (Centralized Channel): A smaller portion of the retailers (approximately 12.7%) obtained their fish through wholesalers (middlemen). In this channel, fishermen sell in bulk to wholesalers, who then resell to the retailers, and finally the fish reach consumers. This adds an extra link in the chain and often occurs when fishermen land very large catches or when retailers cannot go directly to landing sites. Only a few of our respondents relied exclusively on wholesalers, but some reported using both direct and wholesale sources depending on availability and price. • Mixed Sourcing: Notably, 5.3% of respondents adopted a flexible, mixed sourcing strategy - alternating between direct purchase and wholesale supply depending on market dynamics such as availability, price fluctuations, or demand surges. This underscores a previously underexplored dimension of artisanal fish markets: dual-channel use as a practical market adaptation strategy (channel hybridity). Unlike earlier studies that primarily framed marketing structures as binary (centralized vs. decentralized), our findings reveal an emerging trend toward situational channel switching, offering new insights into the adaptability and resilience of fish marketing systems under conditions of uncertainty Overall, the seafood marketing system in the study area is characterized by a competitive structure with low concentration and high flexibility. Direct sourcing predominates, ensuring low prices for consumers and higher profit margins for producers and retailers. The limited role of intermediaries reflects an open market with minimal regulatory constraints - no licensing requirements, entry quotas, or trader associations with gatekeeping power. This structure promotes not only competition but also empowerment - especially for women traders - by lowering participation barriers and allowing for entrepreneurial experimentation. It also implies that interventions aimed at improving fish marketing efficiency should prioritize infrastructure at landing sites (e.g., cold storage, transport), rather than intermediary reform. Our study contributes a fresh perspective by demonstrating that marketing channel hybridity - rather than strict adherence to either direct or centralized models - can serve as an informal risk mitigation strategy. This adaptive sourcing behavior, largely undocumented in earlier studies, reflects the agility of artisanal fish markets in responding to ecological and supply-side fluctuations, especially in resource-constrained urban contexts like Lagos.

Profitability Analysis of Fish Marketing

To assess financial performance, we conducted a cost and returns analysis for fish retailers on a monthly average basis (summarized in Table 2). The results clearly demonstrate that fish marketing was profitable in all three markets, though the level of profit varied: • Oluwo Market (Epe): An average retailer recorded a monthly revenue of approximately ₦119,117. Total operating costs - including fish stock purchases, transport, processing (e.g., smoking), and market fees - amounted to about ₦56,019. This resulted in a net monthly profit (before tax) of ₦63,098. After accounting for a nominal tax or market levy (estimated at ₦416), the net income was around ₦62,682. • Asejere Market (Makoko, Yaba): Retailers in this urban center reported the highest average monthly revenue at ₦179,199. However, operational costs were also elevated (₦68,472), driven by higher expenditures on transportation, market space, and processing fuel. The resulting net profit, after tax, stood at ₦110,311 - the highest among the three markets surveyed. • Agbalata Market (Badagry):Here, retailers earned an average of ₦149,435 monthly, incurring total costs of around ₦52,849. Net income after tax was estimated at ₦96,170, placing it between Epe and Makoko in terms of profitability. These figures indicate that seafood retailing yields substantial monthly incomes, well above basic wage standards. The profit variation can be attributed to factors like location and scale; Makoko is an urban market with access to a larger customer base and possibly higher value fish products, which might explain the higher revenues and profits there. Epe, while a major landing site, had the lowest net profit among the three; this could be due to more competition or the costs of smoking and storage affecting margins. Badagry's performance was solid, likely reflecting its role in cross-border trade (proximity to the Benin Republic) and local demand. We also calculated the marketing efficiency (profitabil-

ity) ratio for each market, defined here as the ratio of net profit to total cost (often termed gross margin over cost). The efficiency ratios were 0.40 for Epe, 0.73 for Makoko, and 0.63 for Badagry. An efficiency ratio of 0.40 means that for every ₦1 of cost, the seller earns ₦0.40 in profit (i.e., a 40% return on cost). Makoko's 0.73 (73% return on cost) is notably high, suggesting that traders there are able to mark up prices or operate with lower relative costs - possibly due to economies of scale or higher value fish. Badagry's 0.63 (63% return) is also strong. On average, across all markets, the efficiency was about 0.62 (62%), which confirms that fish marketing is a profitable venture for those involved. These profitability results are consistent with previous studies on fish marketing in Nigeria. For example, Bassey et al. (2015) reported that fresh fish traders in southern Nigeria enjoyed significant profit margins, roughly on the order of 20–25% of their selling price as net income. In another study, Adeosun et al. 2019 found fish marketing in Oyo State to be financially rewarding for retailers, contributing meaningfully to household incomes (the majority of marketers in their study earned income sufficient to sustain their families). Our findings echo these; the net returns from seafood marketing enable reinvestment and improved livelihoods for the women involved. The cost of goods sold (i.e., the purchase price of fish from fishermen or wholesalers) was the largest component of total cost for our respondents – typically 45–67% of their expenses. In two markets (Epe and Badagry) it was over half of all costs, whereas in Makoko it was around 44% (with other costs like transport, rent, and processing being comparatively higher). Even so, after covering all costs (including transportation, market fees, spoilage, processing materials like salt and firewood, etc.), the traders were left with a comfortable margin.



Source : Field study, 2018

Figure 3: Marketing channel of fish

It should be noted that these profit calculations do not factor in the opportunity cost of the traders' labor, since most of the women devote their full time to the business. However, given the income levels (₦60k–₦110k per month), even if one imputed a labor cost, the business would likely remain profitable. In fact, these incomes are several times higher than Nigeria's per capita monthly income,

underscoring that fish marketing can be a path for economic empowerment.

The characterization of fish marketing as "lucrative" is well supported in the literature. For example, Nwabueze and Nwabueze (2011) observed that despite infrastructural and logistical challenges, fish marketers in Delta State found the trade rewarding. Similarly, Nwankwo et al. (2017) reported net returns on investment of 60% and 31% for wholesalers and retailers, respectively, in Lagos. Our results reaffirm that the retail segment - particularly in urban centers; is a high-yield component of the fisheries value chain.

While profitability has been widely documented, our study provides a more granular understanding of spatial differences in cost structures and returns within a single metropolitan region. Moreover, it highlights the need for productivity-enhancing interventions - such as access to affordable processing technology and credit support - to sustain and potentially scale up profitability, especially for low-margin areas like Epe. The findings also suggest that policies targeting the formalization of fish marketing (e.g., through cooperative development, trader registration, or market infrastructure upgrades) should recognize the already substantial contributions of informal actors and seek to enhance rather than replace their operations.

Influence of Socio-Economic Factors on Marketers' Income To understand income variability among fish marketers, a multiple regression was conducted using monthly revenue as the dependent variable and predictors including age, marital status, education, household size, years of experience, association membership, and total cost of sales. The analysis, conducted across the three markets (Epe, Makoko, Badagry) and for the pooled data, adopted a linear model with strong explanatory power ($R^2 = 0.986$–0.996 for individual markets; 0.811 overall), indicating that these variables - especially cost of sales - accounted for most income variation. Total cost of sales emerged as the most consistent and significant predictor ($p < 0.05$) across all markets. This suggests that scale of operation (how much fish a marketer purchases) directly influences income - a finding consistent with Nwankwo et al. (2017), who observed that higher marketing costs often indicate higher sales volumes and thus greater revenue. Other socio-economic variables had market-specific effects:

• In Epe, both age and education negatively influenced income, while years of experience and association membership had significant positive effects. This implies that younger, less formally educated but more experienced and socially connected marketers tend to earn more. Such a trend supports the findings of Ali et al. (2008) and Madugu and Edward (2011), who emphasized the value of practical experience and social capital - over formal education - in determining success in informal marketing environments. Our results further underscore the functional role of market associations not only as support networks but also as platforms for knowledge exchange, informal credit access, and collective bargaining.

• In Makoko, only years of experience showed a significant positive effect on income. The insignificance of other socio-demographic variables such as age, education, and household size may reflect a homogeneous respondent profile or the overwhelming influence of trade volume in this urban, high-traffic market. This suggests that individual characteristics are relatively less important in urban settings where product turnover and customer flow dominate income potential.

• In Badagry, none of the socio-economic variables - aside from cost of sales - were statistically significant. This outcome implies that income levels in this border-oriented market are primarily driven by operational scale, with minimal influence from personal characteristics. The result may also reflect the influence of external demand from cross-border trade, which tends to reward inventory capacity more than individual trader profiles.

Table 2: Average monthly cost and profits of the marketers

Variable	Oluwo Epe (N / %PCTE)	Asejere Makoko Yaba (N / %PCTE)	Agbalata Badagry (N / %PCTE)	Average across markets (N / %PCTE)
A. Total Revenue	119116.67	179199.00	149435.00	149250.22
B. Cost of goods sold	37413.40 (66.79)	30244.96 (44.17)	35703.00 (67.56)	34453.79 (58.28)
C. Gross profit (A-B)	81703.27	148954.04	113732.00	114796.44
Operating cost:				
D. Rent	2000.00 (3.57)	5000.00 (7.30)	3500.00 (6.62)	3500.00 (5.92)
E. Security and market levy	1200.00 (2.14)	3600.00 (5.26)	1500.00 (2.84)	2100.00 (3.55)
F. Firewood/charcoal	3000.00 (5.36)	5000.00 (7.30)	3000.00 (5.68)	3666.67 (6.20)
G. Salt/spices	3000.00 (5.36)	3500.00 (5.11)	1400.00 (2.65)	2633.33 (4.45)
H. Ice	150.00 (0.27)	1548.00 (2.26)	1567.50 (2.97)	1088.50 (1.84)
I. Transportation	7500.00 (13.39)	13500.00 (19.72)	1827.50 (3.46)	7609.17 (12.87)
J. Depreciation	1255.56 (2.24)	2279.04 (3.33)	3851.00 (7.29)	2461.87 (4.16)
K. Miscellaneous	500.00 (0.89)	3800.00 (5.55)	500.00 (0.95)	1600.00 (2.71)
L. Total cost	56018.96	68472.00	52849.00	59113.32
M. Profit before tax (A-L)	63097.71	110727.00	96586.00	90136.90
N. Tax	416.00	416.00	416.00	416.00
O. Total Profit (M-N)	62681.71	110311.00	96170.00	89720.90
P. Gross Margin (O-B)/O	0.40	0.73	0.63	0.62

Note: *PCTE = Percentage contribution to total expenses. Source: Field study, 2017.

In the pooled regression analysis, cost of sales remained the strongest determinant of income. Interestingly, household size showed a significant negative effect, indicating that larger family responsibilities may constrain business income. This could be due to increased household expenditure, labor division, or competing demands on the trader's time and finances - a trend also reported by Madugu and Edward (2011). This relationship suggests that the intersection of economic roles and domestic obligations can affect business outcomes, particularly for women traders.

In summary, scale of trade and marketing experience are the most consistent and influential drivers of income in informal fish retailing. In contrast, variables such as age, education, and household size exhibit context-dependent or inconsistent effects. These findings reinforce the notion that practical knowledge, access to working capital, and embeddedness in market networks are more critical than formal socio-demographic attributes for income generation in informal fish markets - a conclusion aligned with previous work (e.g., Nwankwo et al., 2017).

While earlier studies have identified individual factors affecting trader performance, our findings contribute a market-segmented perspective, revealing that the relative importance of socio-economic characteristics varies significantly by market type. This suggests that policy interventions - such as skills training, cooperative development, or capital access - should be tailored to local market dynamics rather than applying blanket solutions. Furthermore, the significant negative effect of household size invites further inquiry into intra-household labor allocation and its role in shaping women's income-earning potential within fisheries value chains.

Market Structure and Income Inequality among Fish Retailers

An important dimension of market structure is how equitably income or market share; is distributed among participants. To assess this, we computed the Gini coefficient (Figure 4) for the income distribution of fish retailers in each market. The Gini coefficient ranges from 0 (perfect equality, where everyone earns the same) to 1 (perfect inequality, where one participant captures all the income). In the context of market structure, a lower Gini value signals a more competitive environment with equitable earnings across sellers, while a higher value suggests income concentration, possibly reflecting oligopolistic behavior or structural inefficiencies.

The calculated Gini coefficients for the three study markets were as follows: • Oluwo Market (Epe): Gini = 0.17 • Asejere Market (Makoko): Gini = 0.21 • Agbalata Market (Badagry): Gini = 0.31

These values are relatively low by standard benchmarks, suggesting that incomes among fish retailers are evenly distributed, especially in Epe and Makoko. Even the highest value (0.31 in Badagry) falls below the commonly cited 0.35 threshold for significant inequality in agricultural market studies. As noted by Dillon and Hardaker (1993), and more recently supported by Musa et al. (2020), a Gini coefficient exceeding 0.35 is indicative of a concentrated market where few firms dominate. By contrast, values below 0.30 typically reflect a competitive, fragmented structure populated by many small-scale sellers with similar market shares.

Our findings, therefore, point to a highly competitive and relatively open/egalitarian market structure in the Lagos seafood retail system. The Lorenz curves (Figure 5), from which the Gini coefficients were derived, lie close to the 45° line of equality; indicating that, for instance, the bottom 50 % of traders collectively account for nearly 50% of total income. This lack of extreme outliers reinforces the notion of a level playing field in the markets.

This equitable distribution is likely a product of several reinforcing factors: • Low entry barriers, which facilitate the entry of new traders and prevent monopolization. • The perishable nature of fish, which necessitates rapid turnover and discourages stockpiling or long-term dominance. • Active trader associations, particularly in Epe and Makoko, which may promote fair competition and limit exploitative practices. • Daily sourcing dynamics, which make it difficult for any one trader to corner supply over time. When compared to prior studies, our Gini values (0.17–0.31) are significantly lower than those reported for similar Nigerian fish markets. For example, Aminu et al. (2017) documented Gini coefficients exceeding 0.4 in certain Lagos markets, implying greater income concentration. This divergence likely stems from differences in market typologies: while our study focused on decentralized, retail-level markets with minimal hierarchical control, theirs may have in-

Table 3: Results from the regression analysis of effects of the social characteristics of respondents on their revenue or income

Variable	Epe Market (N = 60)	Makoko Market (N = 50)	Badagry Market (N = 40)	Markets Combined (N = 150)
Intercept	-6134.582 (-1.016) (0.314)	-13193.584 (-2.628) (0.012)	-28288.904 (-1.076) (0.000)	-5215.318 (-0.248) (0.805)
Age	-450.801* (-3.490) (0.001)	-147.105 (-1.865) (0.069)	-309.284 (-0.879) (0.080)	-7.558 (-0.021) (0.984)
Marital status	-773.567 (-0.448) (0.656)	335.216 (0.214) (0.831)	5609.011 (0.623) (0.639)	-5112.487 (-0.749) (0.455)
Years of Education	-303.565* (-2.476) (0.017)	223.680 (1.222) (0.228)	-945.345 (-1.470) (0.496)	-112.840 (0.199) (0.843)
Household size	-167.219 (-0.771) (0.444)	318.133 (1.188) (0.241)	-1661.993 (-1.311) (0.926)	-2178.131* (-2.370) (0.019)
Years of experience	403.806* (2.779) (0.008)	275.250* (2.387) (0.022)	-1175.588 (-1.467) (0.725)	478.487 (0.868) (0.387)
Association membership	3175.492* (2.304) (0.025)	-419.485 (-0.290) (0.773)	848.853 (0.162) (0.620)	-2606.322 (-0.470) (0.639)
Total cost of sales	3.359* (50.793) (0.000)	4.668* (86.724) (0.000)	4.894* (22.505) (0.000)	4.288* (20.092) (0.000)
R^2	0.988	0.997	0.914	0.811
Adjusted R^2	0.986	0.996	0.896	0.801
F-statistic	603.708	1794.362	48.762	86.933

Note: *Significant at 5%.

cluded wholesale markets or centralized systems where a few actors exert disproportionate influence.

These findings complement our earlier observations regarding free market entry and low concentration, aligning with the premises of efficient market theory. In such settings, any short-term abnormal profits attract new entrants, increasing competition and reinforcing income equality. This dynamic helps ensure that individual earnings are more a function of effort, experience, and investment capacity than of structural market advantages.

While prior research has linked low Gini values to competitiveness, our study extends this understanding by suggesting that income equity in retail fish markets reflects a form of inclusive competitiveness - one that supports both market efficiency and broad-based participation, especially by women. However, this finding requires deeper consideration. The Gini coefficient measures income dispersion, not absolute income levels. Therefore, uniformly low Gini values could also reflect uniformly small-scale operations, where traders earn similarly modest incomes with limited opportunity for expansion. This raises an important consideration: while equity fosters inclusion and stability, it may also signal a growth ceiling - where traders are trapped in micro-scale operations due to capital constraints, limited infrastructure, or risk aversion. Policymakers should therefore explore interventions that preserve competition while enabling upward mobility through credit access, processing equipment, or cooperative models. In conclusion, the Lagos seafood retail markets studied exhibit the characteristics of competitive and equitable systems, with low income inequality and broad access to market opportunities.

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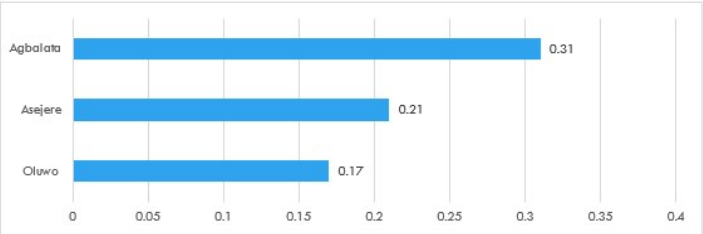

Figure 4: Gini Coefficient of the fish Markets

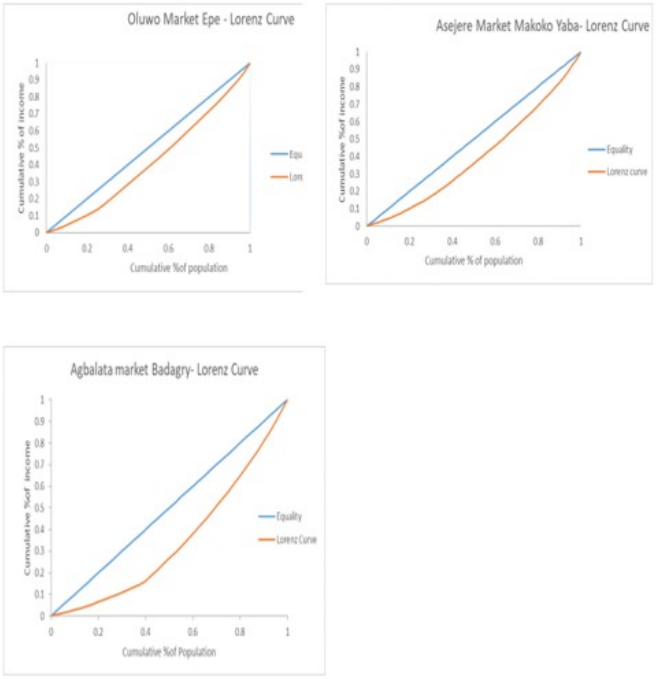

Figure 5: Lorenzo curve of the selected markets

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