

Impacts of Competition and Marketing Channels on Market Performance of Palm Oil Industry in Osun State, Nigeria

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Summary

The study investigated the impact of competition and marketing channels on the market performance of the palm oil industry in Osun State, Nigeria. A total of 211 marketers from the palm oil industry were selected using two-stage sampling techniques. Data collected were analyzed using suitable tools such as descriptive statistics, market structure-conduct-performance paradigm, market efficiency analysis, and fractional response model. Results show the value of the Gini coefficient (0.56) for palm oil marketers indicated a high level of inequality and that the palm oil industry in Osun State is relatively highly concentrated, hence an imperfectly competitive market. The result shows that eight sales channels are in operation in the industry. Furthermore, the study reveals that the palm oil industry in Osun State is inefficient. The fractional response model shows that market share, cost of purchasing, market cost, volume of palm oil losses and quantity hoarded are the significant factors influencing the marketing efficiency of palm oil marketers in the study area. The study concludes that the palm oil industry in Osun State is currently imperfectly competitive and inefficient. The study also suggests that palm oil marketers should organize into cooperatives so that they can pull enough of their resources to buy storage facilities and a potential vehicle to transport the palm oil from the rural market to the warehouse for storage, which will increase marketing revenue and lower transportation costs. Additionally, the study suggests that palm oil marketers be given credit access to expand their operations.

Key words

palm oil, sales, channels, competition, efficiency

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Introduction

Nigeria is presently the 5th largest palm oil producer in the world with an annual production of 1.4 million metric tonnes (Mt), behind Indonesia, Malaysia, Thailand and Columbia (USDA, 2022). The growing population and local processing industry have increased the demand for palm oil in Nigeria (Emehute et al., 2019). Indeed, the national demand has grown faster than the domestic supply. The production deficit is thus about 150,000 tonnes per annum (Ndubuisi, 2021). Consequently, Nigeria imports palm oil to satisfy the local demand (FAO, 2023). However, the government placed a 35% tariff on palm oil imported into the country to protect local investors such as oil palm producers, local processors and marketers of palm oil (Okeke, 2019). Despite these government efforts, local palm marketers face stiff competition from neighbouring countries such as the Benin Republic, Ghana and Togo (Aiyede, 2021). As a matter of fact, some palm oil traders smuggle cheaper palm oil into the country by infringing on import duty and taking advantage of the porous land border, thus leading to smuggling products whose market values are outrageously low (Okeke, 2019). Consequently, palm oil marketing in Nigeria operates in different market structures, affecting the market efficiency and margin.

An efficient palm oil marketing system depends on the nature of sales competition and channels (Adesiyani et al., 2023). Several activities along the marketing channels affect the distribution of palm oil and its marketing efficiency. Palm oil marketing in Nigeria starts with the processors who transform the oil palm fruits into palm oil and later sell it to the wholesalers, who buy in bulk and sell to the retail marketers, who then sell to the final consumers (Ali et al., 2008; Ada-Okungowa et al., 2013). Depending on the length of the chain, there are some handling costs at every stage of the marketing chain. As a result, the price paid by customers at the end of the chain differs significantly from the price paid at the farm gate at the beginning. This might result in a large market margin between the producers and the final customers. When the market margin is large, it can be used to suggest that producers or consumers are being exploited (Kehinde, 2021a). However, high margins cannot often be fully justified unless the prices involved are fully understood (Ali et al., 2008). Palm oil marketers experience price fluctuations since palm oil is a seasonal product that is abundant from January to April and scarce from July to October depending on the distribution of rain (Nwankwo and Nwosu, 2018). To maximize profit, palm oil marketers engage in palm oil hoarding to create scarcity, which affects the price of palm oil and its distribution (Anyanwu et al., 2020).

The marketers establish artificial scarcity by purchasing at a low cost during the boom and reselling during the downturn (Anyanwu et al., 2020). Price and sales volume fluctuations in palm oil have been apprehension in Nigeria for many years (Ezealaji, 2011; Okidim et al., 2019), as most marketers hoard palm oil to generate enormous profits (Wahab, 2022). Then, marketers adulterate their products by adding colour to entice buyers and maximize profit (Olorunfemi et al., 2014; Okeke, 2019). Also, there is no governmental support for quality control as about 90% of the smuggled palm oil products are of poor and substandard quality. Consequently, palm oil marketers suffer losses due to transit spoilage such as leakages and breakages in palm oil (Okoye and Nnamdi, 2023). They also suffer losses as

palm oil becomes rancid and contaminated because of inadequate storage and handling (Nwauwa, 2016). Hence, palm oil marketers seem not to be reaping the full economic benefit of palm oil as 80% of them remain in abject poverty and unable to expand their business (Ayawari et al., 2017). While existing literature on palm oil marketing, such as Oluwadare et al. (2009), Ojo et al. (2014), Igiri et al. (2015) Nze et al. (2019), Onu et al. (2021), and Aina et al. (2021), has covered various states such as Ondo, Abia, Cross River, Kaduna, Kogi States, there has been limited research focused on Osun State, Nigeria.

Though there are a lot of palm oil markets in Osun State, the type of market in which they operate is not yet determined (Ogungbemi, 2019; Oladejo et al., 2020; Ogunleye and Kehinde 2020). The current reality indicates a record of uncompetitive behaviour in the palm oil industry in Osun State. To our knowledge, no study has evaluated the effect of competition and marketing channels on the efficiency of palm oil marketing in Osun State. Thus, this study investigates the effect of competition and marketing channels on the efficiency of the palm oil industry in Osun State, Nigeria. This research is crucial, as the study envisaged generating valuable information on palm oil marketing that would assist policymakers in designing appropriate policies for intervention. Assessing the nature of competition in palm oil marketing will provide a better understanding of the type of market structure the market participants are exposed to along the marketing channel. Also, examining the marketing channels used in palm oil marketing will provide information about different marketing channels used in the marketing of palm oil as well as the activities involved in the movement of palm oil from the producer to the final consumer. Lastly, analyzing the effects of competition and marketing channels on marketing efficiency will point out empirical factors that constrain the efficiency of palm oil marketing.

Literature Review

The palm oil industry plays a crucial role in the economy of Nigeria, particularly in states like Osun, which have a rich history of palm oil production. The effectiveness of competition and marketing channels within this industry significantly influences its market performance, affecting factors such as pricing, distribution, product availability, and overall profitability. This literature review explores the role of competition and marketing channels in shaping the market performance of the palm oil industry in Osun State, with a particular focus on how these elements contribute to the growth and sustainability of the industry. Palm oil is one of the most widely consumed oils globally and plays an essential role in Nigeria's agrarian economy. The country is the largest producer of palm oil in Africa and the second-largest producer globally, although production in Nigeria has faced challenges in recent decades due to inefficiencies and lack of modernization in the sector (Ogunniyi, 2012). Osun State, located in the southwestern region of Nigeria, is one of the key contributors to the country's palm oil production. The state's climate, soil quality and traditional farming techniques have made it a favourable region for palm oil cultivation (Olajide, 2017). Palm oil is utilized across a range of industries, including food processing, cosmetics, pharmaceuticals and biodiesel production. Consequently, the local palm oil market in Osun is influenced by both domestic demand and international

market trends, alongside internal industry dynamics such as competition and marketing strategies.

Competition is a crucial factor shaping the dynamics of any industry, including palm oil. In Osun State, competition in the palm oil sector arises from both local producers and external players, including large-scale processors and distributors. According to Akinyemi and Alabi (2019), the growing number of oil palm producers in the state has increased market rivalry, leading to both positive and negative consequences. On one hand, competition drives innovation and efficiency, as smaller producers strive to improve the quality of their products to meet consumer demands. On the other hand, it can lead to price wars, which reduce profit margins and limit the ability of smaller producers to expand their operations. Furthermore, competition among palm oil producers affects their market share and distribution networks. A study by Ojo and Adedokun (2020) highlights how intense competition can result in market segmentation, where producers focus on specific consumer segments to remain competitive. This segmentation allows producers in Osun State to tailor their products to niche markets, such as organic or locally produced palm oil, which can help maintain profitability despite competition.

Competition within the palm oil industry is a key determinant of market performance. As the palm oil market in Osun State is often composed of numerous smallholder farmers, cooperatives and medium-to-large enterprises, the competition is characterized by the coexistence of both formal and informal market players. This competitive environment drives various market behaviours, such as price setting, quality standards and supply chain efficiency. Studies indicate that increased competition in the palm oil industry can lead to better product quality and reduced prices for consumers, as businesses seek to gain a competitive edge (Jansen and Bunc, 2004). However, for smallholder farmers in Osun State, competition can also lead to challenges, particularly in terms of accessing markets and securing fair prices for their produce. Small-scale producers often struggle to compete with larger players who benefit from economies of scale and superior marketing power (Akinyemi, 2016). This imbalance between smallholder farmers and larger organizations is further exacerbated by limited access to credit facilities, technology and modern processing techniques (Olajide, 2017). Moreover, global market dynamics also influence the level of competition in the palm oil sector. The demand for palm oil has grown exponentially in international markets, particularly in countries such as China and India. This has encouraged foreign investors and multinational corporations to seek a share of Nigeria's palm oil market, intensifying the competition among domestic players (Ibrahim and Oladokun, 2019). These external competitive pressures force local producers to adapt by increasing productivity, enhancing product differentiation and investing in innovative marketing strategies.

Marketing channels refer to the routes through which palm oil is distributed from producers to consumers. In Osun State, marketing channels in the palm oil industry are diverse and involve multiple intermediaries. These channels typically include direct sales from producers to local consumers, traders who collect and sell to wholesalers, and larger-scale distribution to urban markets or export markets. The efficiency and effectiveness of marketing channels have a significant impact on the profitability and competitiveness of businesses in the palm oil industry.

Research by Daramola (2006) emphasizes that the complexity of the marketing channel structure often leads to high transaction costs, which can undermine the financial stability of palm oil producers. In Osun State, many smallholder farmers rely on informal marketing channels that involve middlemen or traders. These traders often control the pricing and distribution, leaving producers with less bargaining power and consequently receiving lower prices for their products (Adesina, 2018).

The marketing channels through which palm oil is distributed play a significant role in determining the market performance of producers. The effectiveness of these channels is influenced by factors such as cost, accessibility and consumer reach. In Osun State, palm oil producers typically utilize multiple marketing channels, including local markets, wholesale distributors or direct sales to larger buyers such as food processors and retailers. A study by Adewumi et al. (2018) underscores the importance of efficient marketing channels in enhancing market performance. The research reveals that producers who engage in direct sales to processors or large retailers tend to experience higher profits due to reduced intermediaries, which minimizes transaction costs. Conversely, producers relying heavily on local market channels often face challenges related to price fluctuations and limited access to larger consumer bases. The development of digital marketing channels is also gaining traction in the palm oil industry. According to a report by Nwachukwu and Eze (2021), many producers in Osun State are increasingly adopting online platforms to sell their products, especially to urban consumers. This digital shift provides an opportunity for producers to access broader markets and reduce their dependence on traditional physical markets. However, the adoption of digital marketing comes with its challenges, such as the need for technological infrastructure and digital literacy, particularly among rural producers.

On the other hand, larger-scale palm oil producers and companies with access to more formalized marketing channels are better positioned to reduce transaction costs, reach broader markets and secure higher profit margins. These companies can leverage vertical integration, which includes controlling both the production and distribution aspects of the supply chain, leading to more favourable terms in the market (Adepoju, 2015). One key challenge in Osun State's marketing channels is the limited infrastructure. Poor transportation networks and inadequate storage facilities in rural areas hinder the movement of palm oil to larger urban centres and export markets (Akinwumi et al., 2020). Furthermore, the lack of modern processing technologies often results in lower-quality products, which affects their competitiveness in both domestic and international markets. This highlights the importance of improving infrastructure and marketing strategies to enhance the market performance of the industry.

The relationship between competition, marketing channels and market performance is complex and multifaceted. From a theoretical perspective, market performance refers to the ability of firms within an industry to generate profits, maintain market share and achieve sustainable growth (Porter, 1985). In the case of Osun State's palm oil industry, several factors related to competition and marketing channels directly influence these outcomes. The level of competition in the market has a significant impact on pricing. In

a competitive market, producers are likely to lower their prices to attract customers, but this can erode profit margins. On the other hand, if the competition is limited due to monopolistic practices or inefficiencies in the marketing channels, prices may remain high, which could limit consumer access to palm oil and reduce overall market demand (Ogunniyi, 2012).

The ability to reach a broad consumer base is a crucial determinant of market success. Businesses that operate through more formalized marketing channels and have better access to urban and export markets tend to perform better (Akinyemi, 2016). Companies that lack effective marketing strategies or are constrained by poor infrastructure are likely to face difficulties in expanding their reach. Competition drives innovation and improvements in product quality, which is essential for retaining customers and fostering loyalty. In the palm oil industry, consumers are becoming increasingly conscious of product quality, particularly in terms of purity and health benefits. Producers who can distinguish their products through branding, quality control and innovative marketing strategies are likely to perform better in the marketplace (Adepoju, 2015).

The palm oil industry in Osun State is influenced by the interplay between competition and marketing channels which directly affect market performance. While competition can foster innovation, lower prices, and improve product quality, it also presents challenges for smallholder farmers who struggle to compete with larger players. Marketing channels, both formal and informal, play a pivotal role in determining how effectively palm oil reaches consumers and markets. Enhancing infrastructure, reducing transaction costs, and improving access to modern technologies are essential steps toward boosting the performance of the industry. Policymakers and industry stakeholders must work collaboratively to address these challenges and foster a more competitive and efficient palm oil sector in Osun State. Future research should explore the evolving role of digital marketing in further shaping the competitive landscape of the palm oil industry in Osun State.

Materials And Methods

Study Area

The study was carried out in Osun State situated in southwestern Nigeria. Osun state was created on August 27, 1991, in the part of the old Oyo state and it covers an area of approximately 14,875 square kilometers (Fig. 1). The state shares a boundary with Ogun State to the south, Oyo State to the west, Ekiti and Ondo States partly to the East and Kwara State to the north. According to the report of the National Population Commission (NPC, 2017), there were 4,137,627 people. Osun State has 30 Local Government Areas (LGAs). The State is largely dominated by the Yorubas in which the major sub-ethnic groups are Ife, Ijesha, Ibolo and Igbomina. The State, having two ecological zones (rain forest to the south and derived savannah to the north), is well suitable for food production. This makes the people of the State engage more in agriculture. The vegetation of the state comprises of rainforest zone, derived savannah and savannah. The people of Osun are farmers who engage in the cultivation of cash and food crops

and the rearing of livestock. This climatic condition favours the cultivation of crops like maize, yam, cassava, vegetables, plantain and cocoa, cashews and palm oil. The State is among the states producing palm oil in Nigeria. As a state known for oil palm cultivation, oil palm plantations found in the study area are both private and state-owned. Palm oil marketing serves as a major source of income and means of employment for the people in Osun state, particularly the rural dwellers. This activity contributes to the economic growth of the state (Oladejo et al., 2020).

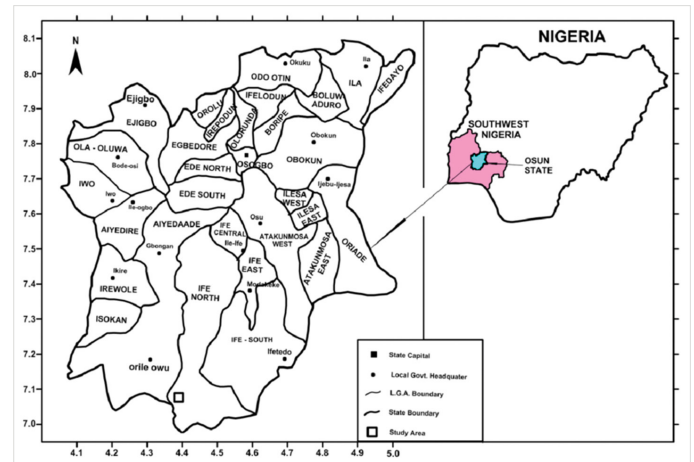


Figure 1. Map of Osun State showing the study areas

Sampling Procedure and Sample Size

A two-stage sampling technique was used to select the respondents. Two-stage sampling is used when a population is large and geographically dispersed. This reduces cost and time while maintaining representativeness. It is efficient in situations where a complete list of the population is unavailable (Cochran, 1977). In the first stage, ten major markets were purposively selected based on their prominence in palm oil marketing in Osun State. These markets include Sabo (Ilesha), Sabo (Ile-Ife), Olode, Alamisi, Ode-omu, Apomu, Odori, Sekona, Owena and Ada market (Table 1). The second stage involved a simple random sampling of palm oil marketers from the selected markets. Based on proportionate sampling, a total of 211 marketers were selected from all the markets. These marketers comprise 119 wholesalers and 92 retailers. Primary data were used for this study. The data were sourced from a cross-sectional survey, which entailed the administration of a well-structured questionnaire for the marketers. The questionnaire was used to elicit data such as the costs of input used, quantities of palm oil sold and their market prices, the marketing channels used in palm oil marketing and challenges faced in the marketing of palm oil.

Analytical Techniques

Data were analysed with the aid of descriptive statistics, market structure conduct, Gini-coefficient, marketing efficiency and fractional response model. Descriptive statistics (frequencies and percentages) were used to describe the socio-economic characteristics of palm oil marketers.

Table 1. Sampling design for palm oil marketers

S/N	LGAs	Major Market (1 st stage)	Marketers (2 nd stage)		
			Wholesaler	Retailers	Total
1	Ilesha West	Sabo (Ilesha)	15	10	25
2	Ife Central	Sabo (Ile-Ife)	15	10	25
3	Ife South	Olode	15	10	25
4	Odo-otin	Alamisi	10	10	20
5	Aiyedade	Ode-omu	6	6	12
6	Isokan	Apomu	15	10	25
7	Ejigbo	Odori	10	8	18
8	Ede South	Sekona	10	10	20
9	Ondo East	Owena	15	10	25
10	Boripe	Ada	8	8	16
Total	10	10	119	92	211

Assessment of the Nature of Competition in the Palm Oil Industry

a) The Gini Coefficient

The Gini coefficient was used to measure the nature of competition in palm oil marketing. The Gini coefficient is a numerical representation of the degree of inequality in the market. The Gini coefficient ranges between 0 and 1 and is used in determining the level of concentration in the market structure (Bukar et al., 2015). A Gini coefficient of 0 is indicative of a perfect equality in seller/buyer concentration while a coefficient of 1 means perfect inequality, the higher the concentration, the higher the inefficiency in the market structure (Zorinah, 2016). Mathematically expressed as:

$$GC = 1 - \sum_{k=0}^n [(X_k - X_{k-1})(Y_k + Y_{k-1})] \quad (1)$$

where

- GC = Gini coefficient
- X_k = the cumulated proportion of the population variable, for $k = 0 \dots n$, with $X_0 = 0$ and
- $X_n = 1$;
- Y_k = the cumulated proportion of the income variable, for $k = 0 \dots n$, with $Y_0 = 0$ and $Y_n = 1$;
- Σ = summation sign.

To compute the percentage of marketers (x), the volume of palm oil marketed was divided into six groups, ranging from the smallest to the largest, as indicated by Tiku et al. (2009). The number of marketers who transacted in that amount was recorded in each category and then divided by the total number of marketers surveyed. The total annual sales for each group were computed and weighed with respect to the total annual sales of all the categories

to obtain the cumulative proportion of sales (y) from the various categories formed. After that, the total proportion was calculated.

The Lorenz curve was used to further illustrate the structure of the market. It graphically depicted the nature of seller concentration that was quantitatively analyzed using Gini coefficient. The Gini values of wholesalers and retailers were used to create the Lorenz curve in Excel. A Lorenz curve that is closer to the line of absolute equality suggests equal market participants, whereas a Lorenz curve that is further away from the line of absolute equality shows unequal market participants (Iwuji, 2015).

b) The Concentration Ratio

The concentration ratio was used to measure the market share of marketers in the palm oil market. This study employed a four-firm concentration ratio (CR4). It is calculated as the sum of the percentage market share of the four largest marketers of the total volume of the palm oil market.

The concentration ratio of individual marketers was calculated using a formula:

$$C_k = \sum_{i=1}^r S_i \quad (2)$$

where

- C_k = concentration ratio for the first k largest firms;
- S_i = percentage share of the k largest firms;
- r = the number of firms for which the ratio is going to be calculated; $r = 1, 2, 3, \dots, r$

Kohls and Uhl (1985) suggest that as a rule of thumb, the four largest enterprises' concentration ratio of 50% or more is an indication of the existence of a strong oligopolistic industry, 33 to 50 % is a weak oligopoly, and less than 33% indicates the existence of the competitive industry.

Marketing Margin

Marketing margin is divided into two: Gross Marketing Margin (GMM) and Net Marketing Margin (NMM). According to Bila and Bulama (2006), GMM is the difference between the purchase price and the selling price. It depicts the portion of a consumer's expenditure on a commodity that the producer or marketing agents receive whilst the Net Marketing Margin NMM is the difference between Gross Marketing Margin GMM and Total Marketing Cost (TMC) (Kehinde, 2021b, Tijani and Kehinde, 2022; Olupona and Kehinde, 2022). NMM indicates that the palm oil market industry is more profitable for marketers.

GMM and NMM were calculated as thus:

$$GMM = SP - PP \quad (3)$$

$$TMC = TFC + TVC \quad (4)$$

$$NMM = GMM - TMC \quad (5)$$

where:

- GMM = Gross Marketing Margin (₦);
- SP = Selling Price (₦);
- PP = Purchase Price (₦);
- TFC = Total Fixed Cost (₦);
- TVC = Total Variable Cost (₦);
- TMC = Total Marketing Cost (₦);
- NMM = Net Marketing Margin (₦).

The average TVC consists of the average cost of palm oil, the average cost of labour, transportation, packaging, rents levies and produce loss. The average TFC of palm oil marketers consists of the average depreciation on drums, kegs, funnels, tables and chairs.

Depreciation

Depreciation on TFC was calculated using the straight-line method. Depreciation is the systematic lowering of a recorded cost of fixed assets. The purpose of depreciation is to match a portion of the cost of fixed assets to the revenue it generates (Oke et al., 2019; Kehinde, 2022).

$$Depreciation = (C - SV) / No_i \quad (6)$$

where:

- C is the amount in which the fixed asset is purchased (₦);
- SV is the value of an asset, when the owner decides to dispose and may be able to sell it for some reduced amount (₦);
- No_i is the period over which one expects that the asset will be productive (years).

Marketing Efficiency

The marketing efficiency (ME) was calculated as the percentage of income realized in palm oil marketing compared to the costs of marketing services (Ozougwu, 2006). Marketing efficiency is critical for determining the level of marketing efficiency. The following formula was used to calculate marketing efficiency:

$$ME = (O / I) \times 100 \quad (7)$$

where:

- E = Marketing efficiency;
- O = Output of marketing system (value added or the net marketing margin, that is, the difference between consumer's price and producer's price);
- I = Input used in the marketing process (cost of marketing service).

The market is inefficient if marketing efficiency is less than one, but it is efficient if it equals one. The market is very efficient, though, if the marketing efficiency is greater than one. If efficiency is stated as a percentage, 100% denotes an exceedingly efficient system, whereas less than 100% denotes inefficiency.

Fractional Response Model

The Fractional Response Model was used to analyze the influence of competition and channel of marketers on marketing efficiency because it can handle variables that are constrained between zero and one. The conditional mean of the fractional response will be calculated using direct models, and the anticipated values will be kept within the unit interval.

The quasi-maximum likelihood estimation (QMLE) approach was used to create robust estimators of the conditional mean parameters with sufficient efficiency qualities. Let 'y' stand for the fractional response variable, and 'x' for the set of explanatory variables with a conformable parameter vector.

After that, the conditional mean is defined as follows:

$$E[y/x] = G(x' \beta) \quad (8)$$

where $G(\bullet)$ denotes a function bounded between zero and one, typically a cumulative distribution function like the logistic (fractional logit model) or the normal (fractional probit model). This link function ensures that the prediction of the model lies between zero and one, making them consistent with the nature of the fractional response variable.

$$y_i^* = \varnothing(x_i \beta + u_i) \quad (9)$$

$$z_i = I(w_i^{\gamma} + \varepsilon_i > 0) \quad (10)$$

$$y_i^* = z_i y_i^* \quad (11)$$

where:

$i = 1, \dots, n$ indexes the individuals, y_i^* = a latent dependent variable whose data generation process is characterized by a fractional probit model ($\varnothing(\bullet)$ denotes the standard normal cdf); z_i = an observed binary variable indicating whether an individual has a "missing" outcome ($z_i = 0$) or not ($z_i = 1$), and y_i is the observed dependent variable; The vectors x_i and w_i contain observed explanatory variables, while β and γ are corresponding vectors of parameters.

Finally, u_i and ε_i denote error terms, which capture the aggregated effects of unobserved variables. These error terms are assumed to follow a (conditional) bivariate normal distribution, i.e.,

$$\begin{pmatrix} u_i \\ \varepsilon_i \end{pmatrix} | x_i, w_i \sim N \left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right) \quad (12)$$

where $\rho \in (-1, 1)$ denotes the correlation parameter. The variances of one have been chosen due to normalization since the parameters are only identified up to scale. Note that the fact that ε_i has a (conditional) normal distribution implies that the data generation process of z_i is characterized by a probit model.

The empirical model specification for the fractional response model expressing the relationship between the dependent variable and the explanatory variables is implicitly expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{10} X_{10} + \varepsilon \quad (13)$$

where:

- Y = marketing efficiency (%)
- $X_1 - X_{10}$ = vector of explanatory variables that may influence the marketing efficiency.

The independent variables for competition are defined as follows:

- X_1 : mode of operation (full time = 1, part time = 0);
- X_2 : access to market information (access = 1, no access = 0);
- X_3 : entry and exit condition (yes = 1, no = 0);
- X_4 : membership of association (yes = 1, no = 0);
- X_5 : market share (%).

The independent variables for channels are defined as follows:

- X_6 : quantity of palm oil hoarded (litres);
- X_7 : volume of palm oil losses (litres);
- X_8 : market cost (Naira);
- X_9 : cost of purchase (Naira);
- X_{10} : selling price (Naira).

$\beta - \beta_{10}$ = vector of parameters to be estimated, and;

ε = vector of error terms.

Definitions of Variables in the Fractional Response Model

Mode of operation (X_1): is postulated to have either a positive or negative effect on the marketing efficiency of the marketers. The mode of operation of marketers can be measured as full-time or part-time (Olagunju, 2008).

Market information (X_2): this is the level at which marketers can access information. It is postulated to have either positive or negative impacts on the marketing efficiency of the marketers (Iwuji, 2016).

Entry and exit condition (X_3): these are the conditions that block or impede the ability of a competitor to enter an industry. It is postulated to have either positive or negative impacts on the marketing efficiency of the marketers (Tiku et al., 2009).

Membership of association (X_4): is postulated to have either a positive or negative influence on the marketing efficiency of the marketers. This means that being a member of the marketing association enhances the marketing efficiency of the marketers (Iwuji, 2015).

Market share (X_5): this is the total amount of palm oil sold by the marketers within the marketing cycle in consideration. It is

postulated to have positive impacts on the marketing efficiency of the marketers. This is because the higher the quantity of palm oil sold, the higher the total revenue that will be generated, market share is measured in percentage (Busari et al., 2022).

Volume hoarded (X_6): this is the total quantity of palm oil kept or hoarded for resale by palm oil marketers within the marketing cycle in consideration. It is postulated to have a positive or negative impact on the marketing efficiency of the marketers. The quantity hoarded is measured in litres (Nwauwa, 2016).

Volume of palm oil losses (X_7): this is the total quantity of palm oil losses within the marketing cycle in consideration. It includes losses during transportation, through keg eaten by rodents, rancidity during storage and theft. It is postulated to have negative impacts on the marketing efficiency of the marketers. The quantity of palm oil losses is measured in litres (Ojo et al., 2014).

Market cost (X_8): they are all the costs associated with planning and executing a marketing plan. It also refers to the charges that should be charged for any marketing operations. It was expected to have a good or negative impact on the marketers' marketing efficiency (Obasi and Kalu, 2015).

Cost of purchase (X_9): this is the price at which palm oil marketers pay for palm oil. It is postulated to have either good or negative impacts on the marketing efficiency of the marketers (Njoku, 2017).

Selling price (X_{10}): it is the price at which the marketers sell agricultural products to the customers. It is also referred to as a market value or agreed-upon exchange rate that allows a buyer to acquire products (Farayola et al., 2013).

Assumptions in the Measurement of Variables

Assumptions in the Measurement of Revenue

The pre-survey revealed that the marketers sell or buy at a standardized size of 30 litres/keg, and this was used in the conversion of the quantity bought or sold. The price range for wholesale and retail marketers was used as given.

Assumptions in the Measurement of Costs

Depreciation was calculated using the straight-line method for input that cannot be exhausted in one marketing cycle such as the tables, chairs, drums, kegs and funnels which are used by the marketers. In the study area, the marketers gave a range of expected useful life for tables and chairs from 5 – 10 years. Therefore, this study used the years given by each marketer as expected useful life in calculating depreciation for tables and chairs. Also, the marketers gave a range of years in which they used their kegs from 1 to 2 years.

With this in mind, this study used the years given by each marketer as expected useful life for kegs to calculate depreciation. Furthermore, the marketers gave a range of years in which they use their funnels from 1-5 years and in accordance with that, this study used the years given by each marketer as the expected useful life for funnels to calculate depreciation. The marketers gave a range of expected useful life for drums from 5 – 10 years. Therefore, this study used the years given by each marketer as expected useful life

in calculating depreciation for drums. The average variable costs were costs of labour, transportation, packaging, levies, shop rent and produce loss which were calculated for the volume handled by each respondent.

Wholesalers are marketers that sell only in large quantities to retailers. They require a huge capital outlay for startup. They often sell only in kegs (25 litres) (Tiku and Sinonya, 2012).

Retailers generally sell only to the final consumers using tins, 5-litre kegs, or whatever measurement units the consumer can afford. Their capital requirement is not as large as the wholesalers (Tiku and Sinonya, 2012; Wahab, 2022).

Quality control is carried out by regulatory agencies such as NAFDAC and environmental officers who regularly inspect and

monitor stakeholders in the palm oil markets to improve the quality of palm oil on sale in the markets (Olorunfemi et al., 2014).

Results and Discussion

Socio-Economic Characteristics of Palm Oil Marketers

Socio-economic characteristics of palm oil marketers investigated in the study include age, gender, marital status, year of education, marketing experience and household size. The results of the socioeconomic characteristics of both wholesale and retail marketers are presented in Table 2. The Table shows that most (56%) marketers (wholesalers (51%) and retailers (62%)) were in the age range of 26-45 years.

Table 2. Socio-economic characteristics of the palm oil marketers

	Wholesalers		Retailers		Pooled	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Age group						
≤25	03.00	02.50	02.00	02.20	05.00	02.40
26 – 45	61.00	51.30	57.00	62.00	118.0	55.90
46 – 65	54.00	45.40	28.00	30.40	82.00	38.90
>65	01.00	00.80	05.00	05.40	06.00	02.80
Mean(SD)	44.61 ± 8.38		42.93 ± 12.50		43.89 ± 10.39	
Gender						
Male	03.00	02.50	00.00	00.00	03.00	01.40
Female	116.0	97.50	92.00	100.0	208.0	98.60
Marital status						
Single	02.00	01.70	02.00	02.20	04.00	01.90
Married	106.0	89.10	78.00	84.80	184.0	87.20
Divorced	08.00	06.70	05.00	05.40	13.00	06.20
Widowed	03.00	02.50	07.00	07.60	10.00	04.70
Level of education						
No formal education	01.00	00.80	05.00	05.40	06.00	02.80
Primary	52.00	43.70	44.00	47.80	96.00	45.50
Secondary	58.00	48.70	38.00	41.40	96.00	45.50
Tertiary	07.00	06.00	05.00	05.40	12.00	05.70
Adult Education	01.00	00.80	00.00	00.00	01.00	00.50
Mean	8.79 ± 3.10		8.18 ± 3.48		8.52 ± 3.28	
Total	119	100	92	100	211	100

Source: Field Survey, 2024

The Table further reveals that the mean age of wholesale and retail marketers is 44.6 ± 8.38 and 42.93 ± 12.49 years, respectively. This implies that palm oil marketers in the study area are still in their active and productive years. This supports the findings of Anyanwu et al. (2020), Nwankwo and Nwosu (2018) and Oluwatusin (2017) that palm oil marketers have the energy and strength required to travel from one place to another in search of palm oil and to carry out most of the tedious marketing activities with regards to palm oil marketing.

Furthermore, the majority (99%) of both wholesalers and retailers were female implying that palm oil marketing activities are dominated by females. This result was supported by the findings of Oladejo et al. (2020) and Nse-Nelson et al. (2021) who state that women feature prominently in palm oil marketing, especially in rural markets where men constitute less than 5% of the traders. As shown in Table 2, the majority (87%) of the marketers were married. This indicates that palm oil marketers have adequate responsibilities that may necessitate their commitment to their chosen occupation to maintain a consistent flow of revenue to fulfill their family's needs, which may positively influence the marketing efficiency of palm oil. This concurs with Udoh and Essien (2015) and Oladejo et al. (2020), who found out in their respective studies that the majority of palm oil marketers were married. Table 2 also indicates that a large proportion (97.2%) of the marketers (both wholesalers and retailers) had one form of education or the other. This denotes that they should be able to comprehend and keep a record of their marketing transactions. These facts validate the findings of Iwuji (2015) that most palm oil marketers have formal education.

Assessment of the Nature of Competition in the Palm Oil Industry in Osun State

a) Market Concentration for Wholesalers

The structure of the palm oil market was analyzed using the Gini coefficient. In Table 3, the analysis of the Gini coefficient revealed that many wholesalers (42%) in the palm oil market had a total monthly volume of sales range of about ₦16million –

₦26million. The computed Gini coefficient for palm oil marketers was 0.46 implying that there was a moderately high concentration in the volume of sales among the wholesalers in the study area, reflecting a competitive market condition. As shown in Fig. 2, the Lorenz curve revealed the extent of departure of the curve from the line of equality pointing to an imperfect market competition (0.46% Gini). This implies a variation in quantities sold, volume of sales, quality and prices.

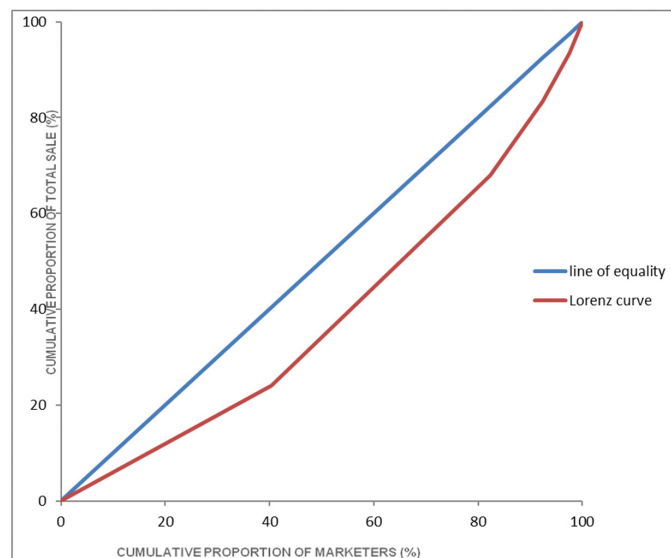


Figure 2. Lorenz Curve for Palm Oil Marketers (Wholesalers) in Osun State

Several studies have used the Gini coefficient and Lorenz curve to determine the market structure for palm oil. Tiku et al. (2012) found a Gini coefficient of 0.65 and 0.54 for merchants and processors respectively, indicating an oligopoly market structure among palm oil marketers in Cross River State, Nigeria. Iwuji (2015) also identified a highly concentrated palm oil market in Abia and Kaduna States, Nigeria with a Gini coefficient of 0.65 and 0.48 respectively.

Table 3. Gini Coefficient for Palm Oil Marketers (Wholesalers) in Osun State

Range of Sales volume (₦'000,000)	Number of Marketers	Percentage of Marketers (x)	Total value from Palm oil Sales (₦'000)	Percentage of Total value (₦) from Palm oil Sales (%)	Cumulative Percentage of Total value (₦) from Palm oil Sales (y)	Xy
6-16	48	0.403	566,367.70	0.241	0.241	0.097
16.1– 26	50	0.420	1,029,158.30	0.438	0.679	0.286
26.1- 36	12	0.100	3,626,334.00	0.154	0.834	0.084
36.1 – 46	6	0.050	236,202.00	0.100	0.934	0.047
46.1 – 56	3	0.025	153,821.50	0.066	1.000	0.025
Total	119	1.000	2,348,183.5	1.000	Σxy	0.539
GINI COEFFICIENT	$1 - \Sigma xy$	0.46				

Note: 1000 ₦ = 0.64 €

b) Market Concentration for Retailers

The analysis of the Gini coefficient in Table 4 also shows that the highest percentage of retailers (55%) in the palm oil market had a total monthly volume of sales of about ₦1 million – 3 million. The computed Gini coefficient for retailers was 0.54 implying that there was a moderate level of inequality in the retailers' volume of sales and that the palm oil market in the study area was concentrated. As shown in Fig. 4, the Lorenz curve for retailers revealed that the extent of departure of the curve from the line of equality showed imperfect market competition. This implies variation in quantities sold, volume of sales, quality and price. This also implies a variation in quantities sold, volume of sales, quality and price.

The Marketing Channels Involved in Palm Oil Marketing

The marketing channel involved in the marketing of palm oil in the study area is shown in Fig. 3. About eight (8) marketing channels were identified based on the different relationships existing among the market actors in the study area. As shown in Fig. 3, the main receivers from processors were wholesalers and retailers, with an estimated percentage share of 94% and about 6% respectively.

In marketing channel 1, processors are the first actors who process palm fruit into palm oil. The majority (94%) of the wholesalers buy directly from the processors. The wholesalers often buy from the processors found at oil mills or those that come to the markets. Also, they often pay in advance to attract processors to sell primarily to them and to assist the processors in the form of credit to process palm oil. The wholesalers (57%) sell directly to the retailers. Most of the wholesalers in the study area sell to people (retailers) from nearby towns and cities such as Lagos, Ilorin and Ibadan and to the northerners. Also, retailers (74%) sell to household consumers in smaller quantities. Household consumers use palm oil as a cooking ingredient. The first channel is the most common in the study area and it carries the largest volume of palm oil.

In marketing channel 2, about 8% of the retailers sell their palm oil to commercial users. These commercial users include restaurants, eateries and other food outlets. Commercial users often buy in smaller quantities and sometimes larger quantities from retailers, and they use it for commercial purposes. Retailers sell to commercial users in 5 and 25-litre kegs.

Table 4. Gini Coefficient for Palm Oil Marketers (Retailers) in Osun State

Range of Sales volume (₦'000,000)	Number of Marketers	Percentage of Marketers (x)	Total value from Palm oil Sales (₦'000)	Percentage of Total value (₦) from Palm oil Sales (%)	Cumulative Percentage of Total value (₦) from Palm oil Sales (y)	Xy
1 -3	51	0.554	97,203.00	0.273	0.273	0.151
3.1 – 6	23	0.250	98,684.10	0.278	0.551	0.138
6.1 – 9	12	0.130	91,062.50	0.256	0.807	0.105
9.1 – 12	3	0.032	31,177.00	0.087	0.895	0.029
12.1- 14	3	0.032	37,848.00	0.106	1.000	0.033
Total	92		355,974.60	1.000	Σxy	0.456
GINI COEFFICIENT	1-Σxy	0.54				

Note: 1000 ₦ = 0.64 €

Marketing channel 1: Processors-Wholesalers (94%) - Retailers (57%) - Household (Consumers) (74%)
 Marketing channel 2: Processors-Wholesalers (94%) - Retailers (57%)-Commercial (Consumers) (8%)
 Marketing channel 3: Processors-Wholesalers (94%) - Retailers (57%)-Industrial (Consumers) (6%)
 Marketing channel 4: Processors-Wholesalers (94%) - Commercial (Consumers) (6%)
 Marketing channel 5: Processors-Wholesalers (94%) - Household (Consumers) (0.2%)
 Marketing channel 6: Processors-Wholesalers (94%) - Industrial (Consumers) (19%)
 Marketing channel 7: Processors-Wholesalers (94%) - Speculators (18%)
 Marketing channel 8: Processors- Retailers (6%) - Sub-retailers (12%)

Figure 3. Various channels used in marketing of palm oil in Osun State

Source: Field Survey, 2024

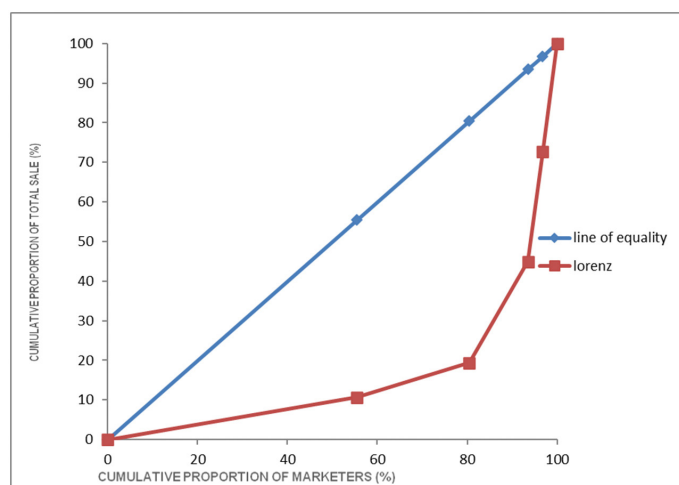


Figure 4. Lorenz Curve for Palm Oil Marketers (Retailers) in Osun State

In marketing channel 3, about 6% of retailers sell their palm oil directly to industrial users, mostly soap makers. They use it in baking soda and toilet soaps. They often buy in smaller quantities and sometimes larger quantities from retailers. Retailers sell to industrial users in 5-litre and 25-litre kegs.

In marketing channel 4, about 6% of the wholesalers sell their palm oil directly to commercial users and the wholesalers often sell to them in larger quantities. Commercial users prefer to buy in bulk from wholesalers to reduce cost per unit. Wholesalers sell to commercial users using 5-litre, 15-litre and 25-litre kegs.

In marketing channel 5, about 0.2% of the wholesalers sell their palm oil directly to household users. Although this channel exists, it is less common because most wholesalers prefer to sell in large quantities. They sell to household users that want to purchase in bulk and at times they also sell in smaller quantities using 5-litre kegs.

In marketing channel 6, about 19% of wholesalers sell their palm oil directly to industrial users, mostly soap makers. However, industrial users often buy rancid palm oil from wholesalers at lower prices. Wholesalers sell to industrial users using 25-litre kegs.

In marketing channel 7, about 18% of wholesalers sell their palm oil directly to speculators. They often purchase palm oil in large quantities from wholesalers during the boom period when the price of palm oil is low. Speculators store and sell off when the supply of palm oil has reduced. Sometimes, they pay in advance to assist wholesalers in the form of credit to purchase palm oil.

In marketing channel 8, about 6% of retailers as indicated in Fig. 3 buy directly from the processors, also retailers (12%) sell their palm oil to sub-retailers within the study area. These sub-retailers in turn sell to household users.

Marketing Margin and Marketing Efficiency of Palm Oil Marketing

Table 5 reveals the cost incurred by wholesalers and retailers, as well as the average total sales, average total purchase, gross margin, net marketing margin and marketing efficiency. The average TVC

per litre of palm oil for both wholesalers and retailers was ₦11.89 and ₦33.17 respectively. The average TFC per litre of palm oil ₦0.67 and ₦0.84 is also indicated in Table 5 for both wholesalers and retailers. As such, the average TMC per litre of palm oil for wholesalers and retailers were ₦12.56 and ₦34.01 respectively. This was so because there are some additional costs incurred by retailers, which include additional packages used and levies. Table 5 also shows that NMM per litre of palm oil for wholesalers and retailers were ₦69.45 and ₦106.75, respectively. This shows that palm oil retailers have a higher margin than the wholesalers, indicating that the retail marketing of palm oil is highly profitable as shown by the positive net margin. This corroborates with the findings of Nse-Nelson (2021), that there was a positive net margin in palm oil marketing implying profitability and the findings of Njoku (2017), that the marketing margin for retailers was higher than wholesalers in *IrvingiaSpp* marketing. The marketing efficiency values for wholesaler and retailer marketers were 20.22% and 24.42%, respectively as shown in Table 5. This shows that palm oil marketing is inefficient in the study area with an efficiency score of less than 100%. When compared to wholesalers, retailers are more efficient in their business, which could be due to the higher revenue generated per month by wholesalers as compared to retailers. The calculated t - values for TVC, TMC, NMM and ME were 12.24, 13.07, 8.71 and 1.42 respectively which were found to be statistically significant at 1%. Therefore there is a significant difference between the TVC, TMC, NMM and ME of wholesalers and retailers. These performance indicators show that palm oil marketing in the study area is viable.

Impact of Competition and Marketing Channels on the Marketing Efficiency of Palm Oil Marketers

The effect of competition and marketing channels on the marketing efficiency of palm oil marketers was examined using the fractional response model. The maximum likelihood estimate for this model is presented in Table 6. The Wald chi-square value was statistically significant at 1% with a log pseudo-likelihood of -13.704 and this confirmed the goodness of fit of the model. The result shows that the competition variable, which is the coefficient of market share (X_5), is among the significant factors that influence the marketing efficiency of palm oil marketers. The coefficient of market share has a positive influence on marketing efficiency. This suggests that an increase in the market share would increase the marketing efficiency of palm oil marketers. As revealed, the marginal effect is 0.0024, which denotes that 1% boost in market share will lead to a 0.24% increase in marketing efficiency. This implies that as marketers expand their businesses, there will be more competition in the market thereby increasing their marketing efficiency.

Furthermore, variables for marketing channels, which include cost of purchasing (X_{10}), market cost and quantity hoarded (X_9) are among the significant factors that influence the marketing efficiency of palm oil marketers. The quantity of palm oil hoarded is found to be statistically significant at 10% but negatively influences marketing efficiency. As shown, a unit increase in the quantity of palm oil hoarded would lead to a 0.021% decrease in marketing efficiency. The reason for this may be that hoarding of palm oil by marketers creates scarcity, which prevents the free flow of palm oil to consumers and increases the price of palm oil in the market.

Table 5. Marketing efficiency, marketing costs and gross palm oil of marketing per year

Items	Pooled (₦'000)	Wholesalers (₦'000)	Retailers (₦'000)	Pooled (₦/Litre)	Wholesalers (₦/Litre)	Retailers (₦/Litre)	T-test
Average Total Sales (SP)	12,096.24	18,688.80	3,568.89	529.31	480.99	591.82	
Average Total Purchase (PP)	9,687.66	15,080.71	2,711.87	421.69	398.98	451.06	
Average GMM (GMM = SP - PP)	2,408.57	3,608.09	857.02	107.62	82.01	140.76	9.63
Average Variable Cost (AVC)							
Labour Cost	39.14	62.80	8.53	1.53	1.57	1.48	
Transportation	114.11	185.32	22.01	3.91	4.90	2.63	
Packaging	93.12	87.54	100.33	12.01	2.58	24.21	
Rents	33.31	54.34	6.09	1.54	1.56	1.52	
Levies	16.19	19.02	12.53	1.38	0.46	2.56	
Produce loss	13.81	22.26	2.59	0.64	0.59	0.70	
Storage cost	5.36	8.93	0.75	0.16	0.23	0.07	
Average TVC	315.04	440.21	152.83	21.17	11.89	33.17	12.24***
Average Fixed Costs							
Average Depreciation on							
Tables & Chairs	0.31	0.30	0.32	0.04	0.01	0.08	
Drums	0.54	0.79	0.21	0.03	0.02	0.05	
Kegs	13.64	22.18	2.59	0.60	0.61	0.58	
Funnels	0.77	0.94	0.54	0.07	0.03	0.13	
Average TFC	15.26	24.21	3.66	0.74	0.67	0.84	11.87
Average TMC (TMC = TVC + TFC)	330.30	464.42	156.49	21.91	12.56	34.01	13.07
Average NMM (NMM = GMM - TMC)	2078.27	3,143.66	700.53	85.71	69.45	106.75	8.71***
Cost of Marketing Services (COMS = TMC+PP)	10,017.96	15,545.13	2,868.66	443.60	411.54	485.07	
ME (NMM ÷ COMS) * 100	20.75%	20.22%	24.42%				1.42*

Source: Field Survey, 2024 *** significant at 1%, ** significant at 5%, *significant at 10%, 1000 ₦ = 0.64 €

This is in accordance with the *expectation of apriori*. The coefficient of purchase cost by the marketers has a negative influence on marketing efficiency and is significant at 10%. The marginal effect is 0.0003, which denotes that if the cost of purchase by marketers increases by 1%, it will lead to 0.03 decreases in marketing efficiency. The implication is that the increase in purchase cost leads to higher cost per unit of palm oil marketing which will decrease their marketing efficiency. This is in line with the findings of Njoku (2017) that as the cost of purchase increases, marketing efficiency decreases. The quantity of palm oil loss is found to negatively influence marketing efficiency and is significant at 10%. As shown in Table 6, the marginal effect is -0.0002, which denotes that 1% loss in the quantity of palm oil will lead to a -0.02 decrease

in marketing efficiency. The implication is that high losses in the quantity of palm oil increase market cost which in turn affects efficiency negatively. This is in accordance with the *expectation of apriori*. The coefficient of market cost has a negative influence on marketing efficiency and is found to be statistically significant at the 1% level. The marginal effect is -0.0001, which implies that 1% increase in marketing cost will negatively affect the efficiency of palm oil marketers in the study area. This implies that an increase in market costs such as transportation cost and packaging costs will lead to more expenses and marketers tend to spend more thereby reducing their efficiency. This is in line with the findings of Nze et al. (2017) that the greater the cost a marketer incurs, the lesser his/her efficiency.

Table 6. Impact of competition and marketing channels on the marketing efficiency of palm oil marketers

Explanatory Variables	Marginal effect	Coef.	Robust Std. Err.	Z	P > z
Mode of operation	0.0021	0.0068	0.0085	0.80	0.426
Market share	0.0024*	0.0766	0.0766	0.012	0.012
Entry and exit	0.0005	0.0166	0.0166	1.27	0.205
Membership of association	-0.0000	-0.0019	-0.0135	-0.15	0.885
Quantity hoarded	-0.0002***	-0.0060	0.0305	-3.26	0.001
Market cost	-0.0001*	-0.0033	0.0085	-0.39	0.027
Quantity loss	-0.0002*	-0.0000	0.0000	-1.65	0.099
Selling price	-0.0026	0.0091	0.0358	-0.32	0.752
Cost of purchase	-0.0003*	-0.0010	0.0364	0.38	0.703
Market information	0.0004	0.0130	0.0108	1.21	0.227
_cons		-2.262	0.0896	-25.25	0.000
Number of observations			211		
Wald χ^2 (12)			41.51		
Log Pseudolikelihood			-13.70		
Prob > chi ²			0.0000		

Source: Field Survey, 2024 *** significant at 1%, ** significant at 5%, *significant at 10%

Conclusion and Recommendations

The study investigated the impact of competition and marketing channels on the market performance of the palm oil industry in Osun State, Nigeria. About 211 marketers from the palm oil industry were selected using two-stage sampling techniques. Data collected were analysed using suitable tools such as descriptive statistics, market structure-conduct-performance paradigm, market efficiency analysis and fractional response model. The results show the value of the Gini coefficient (0.56) for palm oil marketers indicates a high level of inequality and that the palm oil industry in Osun State is relatively highly concentrated, hence an imperfectly competitive market. The result shows that eight sales channels are in operation in the industry. Furthermore, the study reveals that the palm oil industry in Osun State is inefficient. The fractional response model shows that market share, cost of purchasing, market cost, volume of palm oil losses and quantity hoarded are the significant factors influencing the marketing efficiency of palm oil marketers in the study area. The study concludes that the palm oil industry in Osun State is currently imperfectly competitive and inefficient.

The study makes the following recommendation based on its findings:

- To put it briefly, marketing palm oil at retail is more profitable than marketing it at wholesale. To increase palm oil production and maximize profits, the study suggests that retail palm oil marketers should have access to low-interest financing facilities.
- Volumes of palm oil losses have a negative effect on the marketing efficiency of palm oil marketers. Hence, transport facilities should be put in place for marketers. Also, marketers are encouraged to use good storage facilities as this will go a long way in curbing the current rate of loss.
- Cost of palm oil purchase is one of the factors that negatively influences the marketing efficiency of palm oil marketers. Hence, the Federal and State governments should formulate policies that take appropriate measures to stabilize the price of palm oil.
- Palm oil marketers should join cooperative groups to enable them to pool their resources together and help them solve their problems in terms of credit supply and source of government interventions among others. This would enable most palm oil marketers to adopt the modern technique at a lower cost and obtain increased prices.

CREDiTAuthorship Declaration

Olufemi Adedotun Yesufu: conceived the project and supervised the work. **Opeyemi Olaotan Oladosu:** investigated, analyzed the data, and drafted the manuscript. **Ayodeji Damilola Kehinde:** contributed to editing the manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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