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ARTICLE

Unlocking the Mechanics of the Small Pelagic Fish Marketing Systems in Malawi: Insights from Market Structure Conduct and Performance Paradigm

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ABSTRACT

Usipa (Engraulicypris sardella) is among the most extensively consumed fish species in Malawi. However, its substantial economic potential remains largely underutilized. This study analyzed the structure, conduct, and performance of the Usipa value chain across major fish markets in Mangochi, Blantyre, and Lilongwe districts. It focused on key actors including fishers, processors, wholesalers, and retailers. A purposive sampling strategy was employed to identify landing sites and markets, followed by a comprehensive census of 307 market participants. The findings reveal a mildly competitive market structure, with some evident oligopolistic tendencies and a notable absence of formal coordination mechanisms. Most fishers and processors reported engaging in parallel pricing behavior, often adjusting heap sizes to align with competitors. Wholesalers and retailers, on the other hand,

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exhibited less pricing flexibility. Although the majority of actors rejected exclusionary pricing aimed at deterring new entrants, 68 percent expressed a willingness to increase prices to maximize profits, indicating the presence of localized collusive tendencies. These behaviors may adversely affect consumers through non-competitive pricing and undermine the efficiency of the value chain. Furthermore, marketing channels involving more intermediaries than others were associated with elevated marketing margins, suggesting structural inefficiencies in distribution and pricing. Policy interventions aimed at enhancing coordination among the Usipa value chain actors, reducing fixed transaction costs, and introducing regulated price bands may serve to improve both market efficiency and equity.

Keywords: Usipa; Fish Marketing; Market Structure; Market Conduct; Marketing Node

1. Introduction

Fish has become an increasingly important source of dietary protein globally, driven by rising population growth and shifting consumer dietary preferences. In Malawi, fish play a vital role in both nutritional security and economic livelihoods, contributing approximately 28% of the nation's total protein intake. Per capita fish consumption rose from 10.7 kg in 2016 to over 12.6 kg in 2018, reflecting growing domestic demand. In 2020, aquaculture production reached over 9,400 metric tonnes, compared to more than 171,100 metric tonnes from capture fisheries [1]. To meet this rising demand amid declining catch volumes from Malawi's lakes, a range of interventions has been implemented. These include efforts to strengthen both aquaculture and capture fisheries through capacity building, improved production practices, market development, and the promotion of sustainable fishing techniques [2]. However, despite the sector's considerable potential and substantial investments in research and training, Malawi continues to underperform in revitalizing its fisheries industry to meet national food and economic needs [3].

Across Africa's freshwater ecosystems, the abundance of small pelagic fish species—such as Usipa (*Engraulicypris sardella*)—has increased significantly in recent years [4, 5]. Several studies have documented a notable rise in the availability and trade of small pelagic species in regional fish markets, reflecting their growing importance in inland fisheries [4–6]. According to Mills et al. [7], small pelagic fish constitute the majority of catches in the African Great Lakes, with production from the major lakes estimated at approximately 780,000 tonnes in 2019. In Malawi, *Engraulicypris sardella* was the dominant fish species in 2018, accounting for 71% of the total fish population and serving as the principal source of fish protein in the national diet [7]. The increasing commercialization of small pelagic species such as Usipa has prompted critical reflections on the effectiveness of fish market systems in ensuring that consumers access fish [9–12].

An effective fish marketing system should meet consumer needs by providing good-quality fish at fair prices. In Malawi, the fish marketing system remains weak, even though fish is a key part of most diets, demand for fish is growing, and catches of Usipa are increasing. The fisheries sector contributes about 4% to the country's Gross Domestic Product (GDP), but it still faces major challenges, especially after the fish is caught. For example, post-harvest losses are high, with around 43% of fish lost at the beach, 54% during processing, and 69% during marketing [8]. These losses reduce the value of the sector and show the need to improve how fish are handled, processed, and sold. According to Muringai et al. [13] and Tran et al. [14], the fishery industry continues to be significant for Malawi and beyond in terms of revenue and nutrition security.

The fish market system plays a crucial role in distributing fish and fish products to various regions of the nation, following their respective needs for consumption [15, 16]. By doing so, the fish marketing system subtly facilitates the distribution of revenue and Usipa products. Therefore, in order to guarantee that value chain participants in the fish value chain receive both wholesome food and a fair amount of revenue to sustain their families, an effective and efficient marketing system is

required. This necessitates a thorough investigation into the structure, conduct, and performance of Malawi's fish marketing system to identify inefficiencies and recommend corrective measures that benefit all stakeholders across the Usipa fish value chain.

While an efficient fish marketing system should provide maximum benefits for all participants, it is unclear how well the current Usipa marketing system meets its distribution goals. There is a lack of knowledge to help scholars and policymakers understand the Usipa marketing system and develop policies that could improve market competitiveness. While much attention is being given to increasing fish production, improving nutrition, and reducing post-harvest losses, less focus has been placed on strengthening the marketing of fish [15, 17]. The literature is limited in terms of understanding barriers to entry, product differentiation, and the organizational structure of actors in the Usipa value chain. Additionally, there is little information on pricing strategies, the use of discriminatory practices, or the distribution of costs and returns among value chain participants. Policymakers and market actors need this information to create a more effective market that ensures sustainable profits for all involved.

The previous studies on fish marketing have not fully characterised the fish marketing system. There is disjointed information on fish marketing. The studies have partially described the fish marketing system. For example, Phiri et al. [18], Chiwaula et al. [19], Torell et al. [8], and Rice [20] studied the marketing system of fish in Malawi. Although several studies have examined fish marketing, few have focused on small pelagic species, which are widely consumed. Even the available studies on small pelagic fish have not fully considered the interactions and synergies between different market actors. The structure, conduct, and performance (SCP) framework, which takes these synergies into account, is useful for understanding how various actors in the fish market interact. This study aims to fill the knowledge gap by analyzing the current structure of the Usipa fish marketing system, the behavior of market participants, and how their interactions impact the system's overall effectiveness. A comprehensive understanding of the Usipa fish market system in Malawi is essential for identifying challenges and opportunities, ultimately improving the fisheries industry's ability to deliver benefits to consumers and stakeholders across the value chain.

This study makes four key contributions to the literature. First, it systematically assesses the effectiveness of Malawi's small pelagic fish marketing system, adding to the limited research in this area. Second, it provides valuable data for discussions on small pelagic marketing strategies that could improve market efficiency. The study describes the characteristics of small pelagic fish markets in Malawi, focusing on the types and number of actors involved, their behaviors, and how this influences market efficiency. Third, the study uses reliable analytical techniques to evaluate the structure, conduct, and performance of the market, an approach recognized for its ability to holistically characterize marketing systems [12, 21]. Fourth, the study highlights the importance of small pelagic fish, which are an affordable protein source, especially for low-income households. The low cost of small pelagic fish also makes them an accessible product for entry-level traders, making it an attractive option for pro-poor initiatives led by the public, commercial, and non-governmental sectors. This focus is crucial for improving the marketing of small pelagic fish and enhancing its potential for poverty reduction.

2. Materials and Methods

2.1. Theoretical Framework

Profit maximization theory serves as the foundation for this research. According to the neoclassical theory of the firm, the primary goal of a business is to maximize profit. The firm maximizes its profit objective when it follows two rules: (i) marginal cost equals marginal revenue, and (ii) the marginal cost curve intersects the marginal revenue curve by gradually rising from minimal values [22].

Maximum profits refer to pure profits, which are a surplus above the average cost of production. In this study, profit maximization theory will be used, and it is hypothesized that traders seek to maximize profit so as to remain buoyant in the business. They are motivated by profit to remain in the business. That being the case, they will always look for those techniques that max-

imize profit from their businesses. Since the main aim of traders in this case is profit maximization, the conduct of traders will be directed toward devising mechanisms to achieve the ultimate goals of increasing sales and minimizing costs so that there is a high profit. These mechanisms may, in this case, include promotion of the product so that it gets public attention in terms of the increased number of customers. In this case, the trader is constrained by the objective of profit maximization subject to marketing costs.

The ultimate objective of profit maximization theory is to maximize profits. Profit is the difference between revenue and total cost:

$$Profit\ (\pi) = Revenue\ (-Total\ Costs\ (TC)) \quad (1)$$

$$Profit\ (\pi) = \ (Q * p) - (FC + VC) \quad (2)$$

To maximize profits, firms need to determine the quantity that yields the highest difference between revenue and total cost. This occurs when marginal revenue (MR) equals marginal cost (MC). Mathematically, the profit maximization condition can be stated as:

$$MR = \ MC \quad (3)$$

First-order derivatives play a crucial role in determining the optimal level of output. Taking the first derivative of the profit function with respect to quantity (Q), we can find the marginal revenue:

$$Marginal\ Revenue = \ \frac{\partial(Q * P)}{\partial Q} \quad (4)$$

$$Marginal\ Revenue\ (MR = P) \quad (5)$$

Taking the first derivative of the total cost function with respect to quantity (Q), we find the marginal cost:

$$Marginal\ Revenue = \ \frac{\partial TC}{\partial Q} \quad (6)$$

By equating marginal revenue and marginal cost, we obtain the profit maximization condition:

$$P = MC \quad (7)$$

For maximum profit to be achieved, the second order condition must hold. If this condition is not met, it means traders are not maximizing profit. If indeed q is the profit maximizing output for a particular trader, economically it means that the rate of MR is less than the rate of change of MC at $MR = MC$.

2.2. Data

The study was conducted in three districts of Malawi: Mangochi (Msaka and Malembo landing sites), Blantyre (Limbe and Chirimba), and Lilongwe (Area 2, Mgona, and Malichero). Data on fishers and processors were collected in Mangochi, as the focus of the study was on Usipa fishers, processors, and sellers. Although Usipa is produced in several districts along the lakeshore, Mangochi was selected due to its significant contribution to Usipa supply for the Blantyre markets. Data on wholesalers and retailers were collected in Blantyre (Limbe and Chirimba) and Lilongwe (Area 2, Mgona, and Malichero), as these are the primary marketing sites for Usipa fish in Malawi.

The study aimed to explore the Usipa fishery in Malawi through both primary and secondary data. Primary data were collected using questionnaires, interviews, and physical observation, while secondary data were gathered from internet research, the Department of Fisheries, and government statistics. A market scoping study was conducted to identify key market players, marketing challenges, and information sources. Key informants, including Technical Assistants, provided data on the number of Usipa fishers, landing times, value chain actors, and marketing associations, while market leaders offered insights into fish availability, bylaws, and fees.

Authorization for data collection was obtained from the Lilongwe City Council, Blantyre City Council, and the Monkey Bay fisheries office. Informed consent was sought from all traders and participants. The study focused on Usipa value chain actors, including fishers, processors, wholesalers, and retailers, with fishers and actor leaders serving as key informants. A reconnaissance survey was initially conducted to map the population, but due to the informal nature of the system and seasonal variations in actors, a census of the markets was selected for analysis. Purposive random sampling was used to select landing sites in Mangochi and wholesale and retail markets in Blantyre and Lilongwe. A total of 307 actors were interviewed, comprising 75 fishers, 76 processors, 63 wholesalers, and 93 retailers. Due to the

absence of a standardized method for determining sample sizes across different value chain levels, a census approach was adopted. The data collection followed all ethical procedures set by the Lilongwe University of Agriculture and Natural Resources, and informed consent was obtained from all participants.

2.3. Analytical Framework

2.3.1. Assessing Market Structure

A number of ways were identified in analysing the structure of the Usipa fish marketing system. The study used the nature of the product, marketing channels, barriers to entry and analysis of market competition to analyse the structure of the Usipa fish marketing system. Herfindahl-Hirschman Index (HHI) to determine market concentrations [23]. HHI specified as follows:

$$HHI = \sum_{j=1}^{n} MC^2 \quad (8)$$

Where: MS_i is the Market Share of trader i; and n is the number of traders in the market.

The market shares were calculated based on quantities of Usipa fish handled by each trader as follows

HHI specified as follows:

$$MS_i = \frac{V_i}{\sum_{i=1}^{n} V_I} \quad (9)$$

V_I is the quantity of Usipa fish handled by trader i (in kg); and ∑ Vi is the total quantity of Usipa fish handled by traders in the market (in kg).

2.3.2. Assessing Market Conduct

To analyse the conduct of the Usipa fish marketing, the study used product differentiation. Product differentiation was done by analysing the forms that are available at the selected markets. The study further analysed the price-setting mechanisms adopted by the various fish actors. The study also assessed the knowledge of price information of various forms of Usipa sold at the selected markets. Conduct was further analysed by analysing the perceptions of various Usipa fish chain actors on competitive behaviour. The study further analysed the setting mechanisms adopted by various fish traders at various fish value chain stages. Moreover, the study also analysed the engagement of fish actors in formalized fish markets.

2.3.3. Assessing Market Performance

Bain [24] described market performance as the economic result of changes in the market environment and the patterns of behaviour that marketing agents follow in pursuit of an economic goal which is mostly profit.

Total Gross Marketing Margin (TGMM)

Marketing margins were calculated at every stage of the market channel. These margins were compared with the consumer price (retail price), which represents the final price paid by the consumer. The more costs involved in the marketing channel, the greater the marketing margin. Long marketing channels tend to have larger marketing margins than relatively shorter channels. In our case, we calculated marketing margins at each level of the marketing channel.

$$GMM = \frac{Selling\ price - Producer\ price}{Producer\ price} * 100 \quad (10)$$

3. Results

3.1. Socio-Economic and Demographic Characteristics of Usipa Chain Actors

Table 1 presents the descriptive statistics of the Usipa value chain actors. Overall, most of the actors in the value chain were male, with 75% of all participants being male. All fishers were male, which is typical, as women rarely engage in fishing due to its risky nature and the extended time away from home. Among wholesalers and retailers, 83% and 80%, respectively, were male, while the majority of processors (63%) were female.

The average age of actors in the Usipa value chain is about 36 years. The F-test shows a significant difference in the age of actors across different value chain nodes ($p = 0.004 < 0.05$). Retailers are generally younger compared to other actors, which may be due to the low capital requirements for retail fish businesses, allowing more young people to participate in Usipa trading. The average household size for value chain actors is 5, and most actors are married (77%). While the proportion of actors with a particular marital status varies across the nodes, the Chi-square test shows no significant difference in marital status across the value chain nodes (p

Table 1. Descriptive statistics of the Usipa value chain actors.

Variable	Fisher (n = 75)	Processor (n = 76)	Wholesaler (n = 63)	Retailer (n = 93)	Overall (n = 307)	P-Value
Gender (% of male)	100.00	36.84	82.54	79.57	74.59	0.000
Age	36.22	36.35	37.06	33.99	35.75	0.2953
Marital status (%)						
Married	77.33	81.58	75.27	73.02	76.87	
Separated	5.33	3.95	1.08	6.35	3.91	
Divorced	2.67	1.32	0.00	1.59	1.30	
Widowed	0.00	2.63	0.00	3.17	1.30	
Single	14.67	10.53	23.66	15.87	16.61	
Household size	5.92	6.17	5.16	5.09	5.57	0.0033
Education level						
No education	16.00	13.16	7.94	4.30	10.10	0.000
Junior primary	14.67	11.84	6.35	3.23	8.79	
Senior primary	52.00	46.05	34.92	34.41	41.69	
Junior secondary	6.67	11.84	23.81	11.83	13.03	
Senior secondary	10.67	17.11	20.63	39.78	23.13	
Tertiary	0.00	0.00	6.35	6.45	3.26	
Occupation (%)						
Business	66.27	69.41	66.70	67.83	67.61	0.538
Farming	21.69	22.35	16.67	17.39	19.44	
Casual labor	12.05	8.24	16.67	13.04	12.39	
Formal employment	0.00	0.00	0.00	1.74	0.56	
Access to credit	12.00	25.00	6.35	15.05	14.98	0.0165
Active months	10.37	9.72	11.29	11.06	10.61	0.0002
Years of experience	13.40	10.12	11.74	8.77	10.84	0.0014

Source: Author's construction based on survey data 2021.

= 0.124 > 0.05). In terms of education, most actors have some senior primary education (42%), with about 23% having completed some senior secondary education. Interestingly, very few actors at the lower nodes (fishers and processors) have higher education levels. Regarding occupation, 68% of the actors reported running businesses as their main occupation, followed by farming (19%) and casual labor (12%). Less than 1% were formally employed. Respondents noted that trading Usipa products requires attention to market changes, such as price fluctuations and supply levels, which can be difficult to manage for those with formal employment. The table shows no significant difference in primary occupations across value chain nodes.

On average, all actors are involved in the value chain for about 10.6 months a year, with wholesalers working more months (11.3) than other actors. The F-test shows a significant difference in the number of months Usipa products are traded across the value chain nodes ($p = 0.0002 < 0.05$). Wholesalers and retailers are involved in Usipa trade for more months than fishers and processors. This difference is partly due to the fishing ban during the breeding season on Lake Malawi, which limits the active trading months for fishers and processors. Wholesalers and retailers can trade Usipa products nearly year-round, as processed products (e.g., sundried, smoked, parboiled) can be stored longer. Value chain actors, on average, have about 11 years of experience, with fishers having the most experience (13 years). The F-test shows a significant difference in the number of years of experience across the value chain nodes ($p = 0.0014 < 0.05$). Fishers tend to have more experience than other actors, partly because they often involve their children in fishing activities. Wholesalers also have more experience on average than other actors, as some own market spaces that generate income even on days without products to sell. Retailers, however, have fewer years of experience, as many are relatively new to Usipa trading due to the increased demand for the product in their areas.

The study also examined access to credit. Generally, most actors did not have access to credit, with only 12% of fishers, 25% of processors, 6% of wholesalers, and 15% of retailers having access. The main sources of credit were friends, family members, other value chain

players, and village banks.

3.2. Structure of the Usipa Marketing System in Malawi

3.2.1. Nature of the Product

This study focused on four forms of Usipa products, namely fresh, smoked, sundried, and parboiled. **Figure 1** shows that fishers were involved in selling fresh Usipa only. Sundried Usipa comprised the majority of the Usipa sold by processors, wholesalers, and Retailers. The survey respondents indicated that this was because sundried Usipa is less perishable compared to other forms of Usipa products. **Figure 1** further shows that processors handled relatively more forms of Usipa products compared to the other actors, who did not handle any fresh Usipa, and a few handled smoked Usipa.

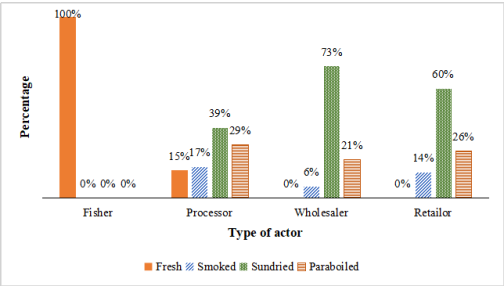

Figure 1. Forms of Usipa fish products handled by respondents Usipa marketing actors.

Source: Author's construction based on survey data 2.

3.2.2. Marketing Channels

Marketing channels are a set of pathways a product follows after production, culminating in purchase and consumption by the final consumer. Although it is purported that due to limited time, financial and technical capacity, fishers sell to intermediaries, including processors, wholesalers, and retailers to sell the Usipa product, perhaps a lack of specialization is the major driver of the choice of market channel. The study identified 8 market channels that are commonly used in the study area, as depicted in **Figure 2**.

Channel I involved the Fisher-Consumer. The fisher sold fresh Usipa directly to the consumer, and this was the least used channel. The consumers included people who visited the landing sites either for educational or leisure purposes, as well as households near the landing sites. This result was consistent with a study by Torell et al.[8], which indicated that fishers occasionally sold to consumers at auction prices at the landing site.

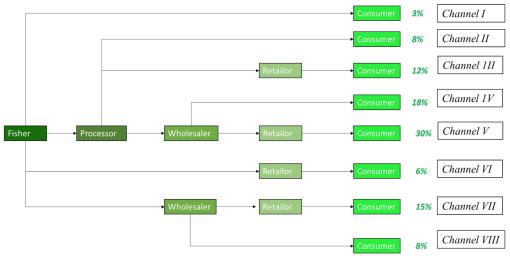

Figure 2. Usipa marketing channels.

Source: Author's construction based on survey data.

Channel II, involving the Fisher-Processor-Retailer, dealt with processed Usipa. The customers were similar to those of Channel I, but unlike fresh Usipa, this channel was dominated by processed Usipa.

Channel III consisted of the Fisher-Processor-Retailer-Consumer. In this channel, the fisher sold fresh Usipa to processors, who, in turn, used various processing techniques to improve the taste and shelf life of the Usipa. The processors sold in small quantities to retailers, who then sold the products in nearby markets to final consumers.

Channel IV involved the Fisher-Processor-Wholesaler-Consumer. In this channel, Usipa moved from the fisher to the processor, who sold it to the wholesaler in major cities. The wholesalers then sold in smaller quantities to consumers who visited the markets where wholesaling occurred. These consumers were typically families who bought in considerable numbers, as well as individuals running restaurant businesses that sought to minimize costs by purchasing at wholesale prices.

Channel V was the most frequently used and the longest chain among the identified marketing channels. It consisted of the Fisher-Processor-Wholesaler-Retailer-Consumer. The fisher sold the fish to processors, who sold various forms of Usipa to wholesalers either at the processing site or in major marketing hubs in cities. The wholesalers then sold the Usipa to retailers, who, in turn, sold it to final consumers in community markets.

Channel VI involved the Fisher-Retailer-Consumer. The fisher sold fresh Usipa to retailers, who then sold

it to consumers in nearby markets. The retailers purchased in smaller quantities and sold the fresh Usipa in markets close to the landing sites. They typically placed the Usipa on ice to reduce spoilage.

Channel VII involved the Fisher-Wholesaler-Retailer-Consumer. Instead of selling to processors, the fisher sold to wholesalers who bought in larger quantities. The wholesalers then transported the Usipa to urban markets to sell to retailers. The retailers distributed the fish throughout communities, selling directly to consumers.

The last identified channel, Channel VIII, was similar to the arrangement in Channel VII, with the key difference being that wholesalers sold directly to final consumers who visited the markets where wholesaling took place.

3.2.3. Market Competition

The study explored market concentration by looking at the HHI. Ideally, the HHI should have been computed in cases where a complete census of all market players existed to correctly gauge the share that every player had in the market. Nevertheless, it was employed in this study since the majority of the players in the sampled markets were targeted, and the few whose information was not collected were excluded because they either did not agree to participate in the study or were not available in the market. The study considered the thresholds proposed by the United States Department of Justice, where an HHI below 1500 denoted a competitive market; 1500 to 2500 denoted a moderately competitive market; and an HHI above 2500 referred to a market that was not competitive, marred by few players controlling the market. Regardless of the form of fish traded, the results in **Table 2** indicated that the Usipa market was moderately competitive for all forms of Usipa, as the calculated HHI for all forms ranged between 1500 and 2500.

3.3. Market Conduct

Forms of Usipa

Usipa largely existed in four forms, namely fresh, parboiled, sun-dried, and smoked, but there were also other forms, like fried, which had become commonly found (**Figure 3**). The prices for each of the forms generally varied. Fresh Usipa was usually more expensive compared to other forms of Usipa processing. The fresh form was expensive because it was usually of higher quality compared to other forms of Usipa, such as dried and smoked. Parboiled Usipa was equally expensive because it maintained its quality in that processed form. However, a quick observation from the study was that most traders chose to trade in a particular form because of the ease of storability. For example, it was earlier reported that most fish traders (wholesalers and retailers) tended to trade in sun-dried Usipa (73% and 60% of wholesalers and retailers, respectively) as this was the form that could be stored for a longer period of time and was also more affordable. Thus, consumers' decisions to purchase a particular form of Usipa largely depended on the price of the product (affordability) and consumer preferences (for instance, the choice of whether to purchase fresh or sun-dried Usipa).

Figure 3. Usipa product forms.

Source: photos taken by author during survey.

3.3.1. Price Setting Mechanisms

The study further explored how the different actors set prices for the product they sell. **Table 3** presents results on the price setting mechanisms the fish marketing actors follow when setting their Usipa prices. The test on whether the differences in responses across actors were statistically significant showed that the differences were statistically significant (chi2 = 203.59; p = 0.000). Most of the fishers (34%) observed others to set their prices, whereas 23% of them set their prices based on the relative scarcity of the (fresh) Usipa product. Processors, on the other hand, mostly set their prices depending on the costs that they incurred (31%), whereas 24% of them also set their prices based on the prices of other traders

Table 2. Hirschman Herfindahl Indices for Usipa traders.

Fish Form	Fisher	Processor	Wholesaler	Retailer	All Actors
Fresh	2,067.91				2,067.91
Smoked		2,312.05	2,459.29	2,358.39	2,123.06
Sundried		2,086.20	2,014.35	2,141.45	2,067.91
Parboiled		2,223.42	2,202.19	2,042.46	2,134.62
All forms	2,067.91	2,111.09	2,134.56	2,123.06	2,109.17

Source: Author's construction based on survey data.

on the market.

The majority of the wholesalers (31%) set their prices based on the costs that they incurred in trading in the product, whereas 23% of them observed other traders' prices to set their prices. 19% of wholesalers set their prices based on their desired profit whereas only 14% of the wholesalers colluded with other traders to set their prices for Retailers, collusion was the mode through which most of them (33%) set their prices and this was followed by setting prices depending on the costs that they incurred (24%) only 15% of Retailers set their prices based on the profits that they desired or by observing other traders.

The study further explored the price-taking behavior of actors by asking respondents how they would react if their competitors raised the prices of Usipa. As shown in **Figure 4**, the majority of actors across all categories indicated that they would raise their prices, even if they had not experienced a significant increase in their costs. This suggests that most actors are price takers, adjusting their prices according to market conditions, even without changes in their cost structure. Interestingly, relatively few actors responded by lowering their prices to remain competitive. The responses were largely consistent across all actors, as indicated by the chi-square test, which showed no significant difference in how different chain actors reacted to price increases ($p = 0.235$).

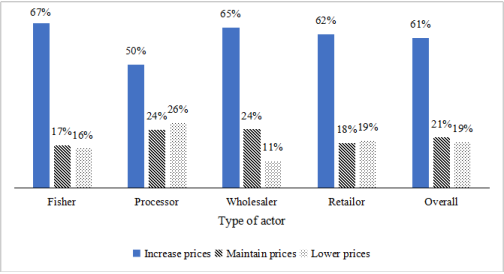

Figure 4. Price taking behavior.

3.3.2. Value Addition Activities

The study further explored the value-added activities performed to improve the Usipa fish product. Results in **Table 4** showed that about 54% of traders did some sorting and grading, 25% used some unique processing methods (such as applying some cooking oil for the fish to have a shiny look), and 15% added preservatives to their Usipa to increase their shelf life.

3.3.3. Knowledge on Price Information

Actors were also asked whether they knew the buying and selling prices before starting to purchase or sell their Usipa product. **Figure 5** shows that, majority of the actors did not know the exact prices in advance, as only 22% and 33% of all traders knew the buying and selling prices in advance, respectively. Nevertheless, we find significant differences in responses to these questions across marketing chain actors, where relatively more retailers (44%) knew the selling price before selling their product. Only 38% of processors knew the selling price in advance, while only 34% of them knew the prevailing buying prices in advance. Fish are auctioned off, and the price is decided on the beach, thus, the price is sometimes known in advance.

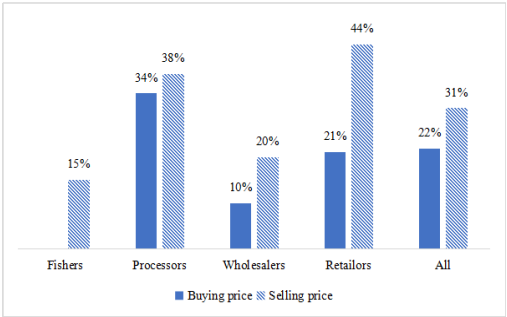

Figure 5. Percentage of actors who know prices in advance.

Table 3. Proportion of value chain actors reporting a price setting mechanism.

Price Setting Approach	Fisher (n = 75)	Processor (n = 76)	Wholesaler (n = 63)	Retailer (n = 93)	Overall (n = 307)
Observe other traders	33.57	24.22	22.58	15.53	23.69
Collusion with other traders	16.43	10.94	13.71	32.92	19.35
Depends on desired profit	16.43	13.28	19.35	15.53	16.09
Depends on costs incurred	10.71	31.25	31.45	24.22	24.05
Considers relative scarcity	22.86	20.31	12.90	11.80	16.82

Chi2(87) = 203.59, p = 0.000.

Table 4. Value addition activities.

Activities (%)	Fisher (n = 13)	Processor (n = 21)	Wholesaler (n = 16)	Retailer (n = 7)	Overall
Grading and sorting	53.85	61.90	37.50	100	53.85
Unique packaging	0.00	4.76	12.50	0.00	5.77
Unique processing method	30.77	23.81	25.00	0.00	25.00
Add preservatives	15.38	9.52	25.00	0.00	15.38

3.3.4. Perceptions on Competitive Behaviour

The study further explored how actors respond competitively in relation to others in the market. **Table 5** presents the results from a series of questions asked to actors to assess their level of competitiveness when marketing Usipa. The survey revealed that most actors in the Usipa market, including fishers and processors, were willing to sell larger quantities of Usipa at the same price as their competitors. This flexibility is largely due to sellers' ability to adjust heap sizes to meet their trading goals. However, retailers and wholesalers were less flexible when it came to modifying heap sizes. The majority of actors disagreed with the idea of increasing prices to push out new competitors, but 68% agreed that they would raise prices to increase their profits. This suggests some degree of local collusion among Usipa marketing actors, which could be detrimental to consumers who may have to purchase the product at suboptimal prices. When asked whether actors advertise their products to stay competitive, 75% of traders reported doing so, while 35% of fishers disagreed, indicating that they do not feel the need to advertise to stay competitive. This is expected, as fishers are at the beginning of the fish marketing chain and face higher demand for the product.

The study respondents were asked who set the price of the Usipa product both when purchasing from other actors and when selling the product. **Table 6** presents result on who the price setters were when the actors purchased the product. The results generally indicate that for fresh Usipa, 77% of the processors indicated that they negotiated the price with the buyer. For smoked and sundried Usipa, the majority of the processors, wholesalers and retailers reported that the seller set the prices (45% for smoked and 49% for sundried Usipa) and this was followed by negotiations to set the buying price. For parboiled Usipa, the majority of the actors (41%) reported that the buying price is set through negotiations. Despite setting prices, processors buy fresh Usipa from fishers or middlemen at the beach and decide on the final product form based on market demand and capital at hand.

When it comes to setting the selling price, fishers and processors mostly set the selling price through negotiations (53% of fishers and 62% of processors), whereas the rest of these actors reported that the sellers set the price. The results further show that 49% of sellers were able to set prices for sundried Usipa, whereas 48% were able to set prices of the smoked fish. For parboiled Usipa, the majority (48%) of the processors negotiated on the selling price while the majority of the retailers set the prices themselves (37%). For wholesalers, the study established that 50% of them tended to have the upper hand themselves, whilst the other half also engaged in negotiations to set the price. It is worth noting

Table 5. Level of competition among the Usipa fish actors.

Description	Fisher (n = 75)	Processor (n = 76)	Wholesaler (n = 63)	Retailer (n = 93)	Overall	P-Value
I put a larger quantity of products compared to my competitors' offers at the same price (%)						0.045
Strongly agree	16.00	10.53	15.87	22.58	16.61	
Agree	29.33	42.11	22.22	22.58	28.99	
Neutral	20.00	18.42	25.40	24.73	22.15	
Disagree	18.67	21.05	20.63	33.33	24.10	
Strongly disagree	16.00	20.63	20.63	10.75	16.29	
I agreed with my competitors to change selling price or volume of Usipa products to drive out new comers (%)						0.111
Strongly agree	6.67	6.58	11.11	11.83	9.12	
Agree	28.00	42.11	20.63	25.81	29.32	
Neutral	13.33	19.74	22.22	21.51	19.22	
Disagree	26.67	22.37	26.98	27.96	26.06	
Strongly disagree	25.33	18.42	20.63	15.06	19.54	
I agreed with my competitors to change prices of Usipa products to increase profits (%)						0.519
Strongly agree	16.00	17.11	15.87	24.73	18.89	
Agree	48.00	46.05	55.56	48.39	49.19	
Neutral	20.00	22.37	19.05	16.13	19.22	
Disagree	10.67	13.16	7.94	7.53	9.77	
Strongly disagree	5.33	11.84	6.35	7.53	7.82	
I advertise my products to customers to beat competition%						0.000
Strongly agree	14.67	22.37	36.51	39.78	28.66	
Agree	41.33	50.00	49.21	46.24	46.58	
Neutral	9.33	9.21	9.52	8.60	9.12	
Disagree	25.33	17.11	6.35	5.38	13.36	
Strongly disagree	9.33	9.21	0.00	2.15	5.21	

that the differences in responses among actors for parboiled Usipa were statistically significant ($p < 0.05$).

3.3.5. Actors Engagement in Formalized Marketing

The study examined the involvement of Usipa fish marketing actors in formalized structural marketing, focusing on their affiliation to marketing associations, contractual arrangements, licenses, and bylaws (see **Table 7**). Only 5% of actors reported being in such associations, 14% engaged in formalized contractual agreements, and 4% had a business license, indicating a largely informal approach. However, 30% of traders followed bylaws, including restrictions on off-season fishing, recommended net types, and marketing levies. Only 11% of processors followed the bylaws.

3.4. Market Performance

Usipa Marketing Margins

The results in **Table 8** present marketing margins across the channels through which fish move from fishers to the final consumers. Generally, channels with lower marketing margins indicate a more efficient marketing system. In the first channel, the marketing margin is 0% because the producer sells directly to the consumer, who typically buys the fish right after the catch at the beach. This channel pertains to fresh Usipa, which is often highly demanded due to its high-quality characteristics. Since the fisher sells directly, they realize a producer's share of 100%.

In the second channel, where producers sell to processors who then sell directly to consumers, the marketing margins are lower, suggesting minimal costs from

Table 6. Price setters when selling Usipa.

	Fisher (n = 72)	Processor (n = 76)	Wholesaler (n = 63)	Retailer (n = 93)	Overall	Chi2 (p-Value)
Who sets price for fresh Usipa%						0.861
The buyer	2.78	0.00	0.00	0.00	2.35	
The market	1.39	0.00	0.00	0.00	1.18	
The seller	43.06	38.46	0.00	0.00	42.35	
We negotiate	52.78	61.54	0.00	0.00	54.12	
Who sets price for smoked %						0.279
The buyer	0.00	0.00	16.67	0.00	2.50	
The market	0.00	15.38	0.00	26.32	17.50	
The seller	0.00	38.46	50.00	47.37	47.50	
We negotiate	0.00	46.15	33.33	26.32	32.50	
Who sets price for sundried (%)						0.784
The buyer	0.00	0.00	1.79	0.00	0.57	
The market	0.00	12.20	14.29	19.48	16.00	
The seller	0.00	48.78	44.64	50.65	48.57	
We negotiate	0.00	39.02	39.29	29.87	34.86	
Who sets price for parboiled%						0.024
The buyer	0.00	0.00	0.00	0.00	0.00	
The market	0.00	27.59	0.00	40.63	28.00	
The seller	0.00	24.14	50.00	37.50	34.67	
We negotiate	0.00	48.28	50.00	21.88	37.33	

Table 7. Actors' Engagement in formalized marketing.

Variable	Fishers	Processors	Wholesalers	Retailers	Overall	P-Value
Membership to marketing association or club	4.00%	7.80%	4.76%	5.38%	5.54%	0.747
Engage in formal contractual agreements	12.00%	18.42%	11.11%	12.90	13.68%	0.567
Had business license	8.00%	1.32%	3.17%	4.30%	4.23%	0.222
Followed bylaws	34.67%	10.53%	36.51%	37.63%	29.97%	0.000

processing, storage, and transportation. Channels 3 and 4 have margins exceeding 67%, indicating inefficiency due to high costs associated with processing, storage, transportation, and handling. Channel 5, with the highest margin, has a percentage of the final price at 71.41%, indicating high costs.

4. Discussion of Key Findings

4.1. Characteristics of Usipa Value Chain Actors

The small pelagic fish value chain is highly dominated by male fish value chain actors. This implies that the sector is male-dominated, with women primarily participating in the processing node. These results align with the findings of Manyungwa et al. [25] who noted that women are culturally prohibited from participating in fishing along the shores of Lake Malawi, and their involvement in the value chain is mostly confined to processing and marketing nodes [26, 27]. Age variation across the value chain was statistically significant, with the average age being 36 across the VC levels. This finding is consistent with the results of Mebrate and Worku [5] and Wongnaa, et al. [28], who reported that most actors in the fish value chain fall within the age ranges of 30–64 and 35–48 years. These age categories are considered to be highly productive, as actors in this range are likely to make informed decisions regarding business operations. The results further indicated that most actors in the value chain are characterized by low education levels. This is consistent with the findings of

Table 8. Market margins and fishers share.

Market Channel	Market Margins
Channel 1: Fisher-consumer	0%
Channel 2: Fisher-Processor-consumer	45.12%
Channel 3: Fisher-Processor-Wholesaler-Consumer	69.01%
Channel 4: Fisher-Processor-Retailer-Consumer	68.05%
Channel 5: Fisher-Processor-Wholesaler-Retailer-Consumer	71.41%
Channel 6: Fisher-Retailer-Consumer	50.45%
Channel 7: Fisher-Wholesaler-Retailer-Consumer	59.33%
Channel 8: Fisher-Wholesaler-Consumer	48.16%

Source: Authors' computations.

Manyungwa et al.[25] Mebrate et al.[5], and Chiwaula et al.[19] who concluded that most fishing communities were characterized by low education levels as a result of high school dropout rates at primary school level in Malawi. These results agree with findings by Agbekpornu et al.[29] which found that the majority were into farming apart from fish business followed by animal rearing and non-fish trading.

4.2. Market Structure

In Malawi, Usipa is primarily consumed in its dried, smoked, or parboiled form and in some cases, it is consumed fresh[30]. Fresh Usipa is one of the most highly demanded forms of fish. However, most traders do not purchase large quantities due to its perishable nature. As a result, they buy and sell only adequate amounts, as many lack access to proper storage facilities. This is why fresh Usipa is often sold door-to-door to ensure daily supplies are sold. Furthermore, because it cannot be stored for extended periods, it tends to be seasonal in most markets, especially when traders lack the necessary cold storage facilities.

Sun-dried Usipa is the most commonly consumed form, due to its availability and lower price compared to other forms of Usipa. Most of the Usipa available in the market is sun-dried. Sun-drying is a traditional method of preserving fish, which involves exposing it to the sun and wind to reduce moisture content and prevent spoilage[31]. Although some[32] argue that sun-drying enhances the fish's flavor and creates a unique texture, making it a staple in many coastal cuisines, in Malawi, the primary purpose of sun-drying is preservation. Sun-dried Usipa has a longer shelf life and is easier to store than fresh Usipa, making it available year-round. Despite its lower cost, sun-drying can result in losses of up to 30%, particularly during Malawi's rainy season (November to March)[33]. During this period, fish drying may be hampered by extended periods of cloud cover, high humidity, and occasional rain.

The third common form of Usipa is smoked Usipa, which is created by exposing the fish to smoke from smouldering wood. This process imparts a smoky flavor and helps preserve the fish for longer periods. Smoking in Malawi is primarily done for preservation and to extend shelf life. The fourth form of Usipa is parboiled Usipa, which is lightly boiled or cooked in boiling water before drying or smoking. This process helps preserve the fish and makes it easier to transport, although it is more fragile than smoked or sun-dried Usipa. Parboiling also results in a distinct texture and flavor compared to sun-drying or smoking.

The Usipa fish marketing and distribution network is heavily concentrated on processed Usipa, which has a longer shelf life than fresh fish. Processed Usipa is easier to transport and store, and the pressure to sell is considerably less compared to fresh Usipa. Public retail markets exist in urban centers across Malawi, including Lilongwe, Blantyre, Limbe, Zomba, and Mzuzu, though the study focused on selected markets in Lilongwe and Blantyre. Fresh fish is sometimes available in smaller urban centers, depending on demand and proximity to the source. In most public retail markets, fresh fish is sold at separate stalls, in 5-litre buckets for wholesalers, and in small heaps for retailers.

The Herfindahl-Hirschman Index (HHI) indicates that the Usipa market is moderately concentrated, sug-

gesting that the fish market is mildly competitive but also exhibits some oligopolistic tendencies. The HHI reveals that, at each actor level, the fish market maintains a certain degree of competition, but there are also oligopolistic elements present. These tendencies may lead to inefficiencies resulting from barriers within the market system. Interviews with key informants in the Usipa fish value chain further highlighted several challenges affecting the structure of the Usipa fish markets, including poor access to credit, spoilage due to inadequate storage facilities, transportation issues, and a lack of coordinated market support systems. These challenges create opportunities for traders with varying capacities to collaborate and partially dominate the market, particularly at the value chain nodes where few actors control the market.

4.3. Market Conduct

Most actors lack advanced knowledge of buying and selling prices, indicating a level of information asymmetry in the market. Based on supply and demand, the previous day's fish prices serve as a guideline for setting future prices. The study's findings partly contradict the work of Torell et al.[8], who argue that processors and traders know in advance the prevailing prices in wholesale and retail markets, allowing them to divert products to markets where prices are higher at short notice or even withhold the product from the market, particularly for smoked and dried fish. This situation is different in the case of Usipa, possibly due to the nature of the fish under study (small pelagic species). The relative scarcity of Usipa at times contributes to this phenomenon. The results generally show that most actors lack knowledge of the existing selling prices before going to sell, as well as the purchase prices before buying their produce. This indicates a level of information asymmetry, which prevents actors from receiving price information in advance to make informed trade decisions. This lack of transparency may hinder efficient decision-making and could make the market conduct less attractive due to uncertainty.

There is evidence of competitive behavior among actors, including efforts to sell larger quantities, adjust prices for profitability, and advertise products. However, localized collusive behavior is also observed, particularly in price-setting activities, which could disadvantage consumers. The competitive behavior may make the market conduct dynamic but could also introduce inefficiencies.

Different actors, such as processors and retailers, play roles in setting prices, with negotiation being a common practice. However, there are variations in price-setting mechanisms across different forms of Usipa, indicating complexity in the market conduct but also opportunities for negotiation and flexibility. Engagement in formalized marketing practices, such as membership in associations or adherence to bylaws, is low among actors. While this informal structure may lower barriers to entry, it could also lead to inefficiencies and challenges in regulating the market, potentially making the market conduct less attractive in terms of stability and institutional support.

4.4. Market Performance

The effectiveness of the fish marketing system can be better understood by examining marketing margins across various market channels. Higher efficiency is indicated by channels with smaller marketing margins, such as Channel 1, where fishermen sell directly to customers. This is because a more efficient and economical marketing system is created when there are fewer middlemen and lower transaction costs. Channels with greater margins—such as Channels 3, 4, and 5—highlight inefficiencies caused by rising expenses for handling, processing, storage, and transportation. These additional expenses reduce overall competitiveness and increase marketing margins. The higher margins may also result from exploitative practices, such as excessive markups by intermediaries. The real issue arises when middlemen profit disproportionately, to the detriment of both fishers and consumers.

5. Conclusions

This study examined the structure, conduct, and performance of the Usipa marketing system in selected markets in Malawi. It explored various aspects, including marketing channels, market competition, price-

setting mechanisms, product differentiation, and actors' knowledge of price information. The Usipa product is available in four forms: fresh, sundried, parboiled, and smoked. Few actors along the value chain perceived significant barriers to entry, and the fish marketing system was found to be moderately competitive for retailers, wholesalers, and processors. The majority of actors set prices by observing the behavior of others or based on their incurred costs, although a notable proportion engaged in price collusion with other actors. The Usipa marketing business is a profitable venture for those involved; however, the study revealed that the return on investment is lower at the lower nodes, especially for fishers. This finding aligns with the results from the market concentration analysis, which indicated that fishers struggle to be competitive. While the study generally found competitive behavior among marketing actors, it also revealed that the majority of retailers engage in price collusion. While collusion may benefit those involved, it leads to welfare losses for consumers, who are likely to pay suboptimal prices for Usipa. Additionally, collusion undermines the competitiveness of other retailers who cannot compete with the coordinated pricing strategies. To mitigate this, regulatory structures for retailers should be introduced, where price bands could be agreed upon at the market level, reducing collusive behavior and enhancing market fairness.

Enhancing access to financing could encourage fishers to trade in larger quantities, thereby improving their efficiency and profitability. Furthermore, this would increase the availability of Usipa for consumers, contributing to its nutritional value. Such initiatives, however, must be accompanied by measures to prevent overfishing, ensuring the sustainability of the species. Efforts to reduce fixed costs should be prioritized within the policy framework governing the Usipa marketing system. This is particularly important for fishers, who are at the initial nodes of the value chain and would benefit from improved fishing gear, such as boats and engines, to enhance their operational efficiency. Policy interventions that subsidize such gear could substantially improve fishers' productivity. However, for these interventions to be effective, it is essential to maintain up-to-date and reliable lists of active fishers, ensuring that those eligible for support are accurately identified and targeted.

Author Contributions

Conceptualization, M.G.M.; methodology, M.G.M.; software, M.G.M.; validation, M.C.; formal analysis, M.C.; investigation, M.C., D.J.; resources, M.C., I.P.-Ph.; data curation, R.B.; writing—original draft preparation, R.B.; writing—review and editing, M.G.M., M.C., D.J., I.P.-Ph. and J.D.; visualization, D.J.; supervision, D.J.; project administration, I.P.-Ph.; funding acquisition, J.D.. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

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Informed Consent Statement

Informed consent was obtained from all participants that were involved in the study.

Data Availability Statement

Date is available on request.

Conflicts of Interest

The authors declare no conflict of interest.

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