

# Marketing Channel Efficiency of Snakehead Fish (*Channa striata*) Caught In Kalinapu Village, Paju Epat District, East Barito Regency, Central Kalimantan Province

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## Abstract.

*Snakehead fish (Channa striata) is a high-value freshwater fishery commodity produced by artisanal fishers in Kalinapu Village, Paju Epat District, East Barito Regency. The marketing system in this inland village faces geographic constraints, limited transportation infrastructure, and the absence of cold chain facilities, which contribute to high distribution costs and a weak bargaining position for fishers. This study aimed to: (1) analyze the marketing channel structure; (2) calculate marketing costs, marketing margins, and farmer's share for each channel; and (3) determine the most efficient marketing channel for snakehead fish in Kalinapu Village. The study was conducted from March to June 2026 using a descriptive quantitative approach. The sample comprised 25 respondents selected by census and snowball sampling methods, consisting of 10 active fishers, 2 collectors, 1 wholesaler, 2 retailers, and 10 end consumers. Data were analyzed using marketing cost analysis, marketing margin analysis, farmer's share, and marketing efficiency ratio (Ep) based on Soekartawi (2002) and Kohls and Uhl (2002). The results showed that three marketing channels exist in Kalinapu Village. Marketing efficiency values were: Channel I (32.71%), Channel II (25.04%), and Channel III (28.78%), all classified as efficient (Ep ≤ 50%). Channel II, comprising fisher-collector Khusasi-retailer-consumer, was the most efficient channel with the lowest marketing costs (Rp15,024/kg) and a stable, routine distribution pattern. Channel III, which involved a wholesaler and bulk purchasing, yielded the highest farmer's share (60%) despite involving more intermediaries, due to economies of scale in distribution.*

**Keywords:** *Channa striata, farmer's share, marketing efficiency, marketing margin and snakehead fish.*

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## I. INTRODUCTION

Fisheries play a strategic role in supporting national food security and serving as a primary income source for communities, particularly in rural and inland areas. Snakehead fish (*Channa striata*) is one of the high-value freshwater commodities in East Barito Regency due to its high albumin content and relatively stable market demand (Rahman *et al.*, 2020). In Kalinapu Village, Paju Epat District, snakehead fish harvested from natural waters swamps, rivers, and floodplains constitutes the primary livelihood of artisanal fishers. Production data from the East Barito Fisheries Agency show that snakehead fish production in the study area fluctuated significantly between 2019 and 2023, reaching a peak of 429,196 kg in 2021 before declining sharply to 246,209 kg in 2023. This decline was driven not only by environmental factors but also by a social transition, as some fishers shifted to oil palm plantation employment in surrounding areas.

The price differential between the fisher level and the retail market has widened considerably. Based on Fisheries Agency data, the average fisher-level price of snakehead fish in 2022 was Rp49,000/kg, while the retail price reached Rp72,500/kg, a gap of Rp23,500/kg. In 2023, despite the significant drop in production, the fisher price decreased to Rp42,500/kg while the market price remained at Rp65,000/kg. This asymmetric pricing pattern suggests that the decline in production volume did not improve the bargaining power of fishers. Market intermediaries, particularly collectors, continued to dominate price-setting as the primary buyers. This condition reflects an oligopsonistic market structure in which a small number of buyers in this case two collectors face a large number of sellers (46 active fishers), enabling buyers to set purchase prices below the marginal value of the product (Sexton, 1994 in Fauzi and Mulyadi, 2020).

The marketing system in Kalinapu Village faces significant geographic challenges. The village is located in an inland area with limited transportation access. The distribution route from Kalinapu Village to Tamiang Layang Market covers approximately 30 km, traversed by motorcycle through wooden plank tracks in the dry season and by river transport (kelotok) during the wet season. Furthermore, the total distribution distance extends to approximately 57 km for products marketed to Telaga Itar Market in Tabalong Regency. The absence of cold chain facilities, including refrigerated storage and refrigerated transport, compels fishers to sell their catch immediately, eliminating any opportunity to wait for more favorable prices. These geographic constraints cause substantial variability in distribution costs and directly affect marketing efficiency (Hidayat *et al.*, 2022; Fauzi and Mulyadi, 2020).

In fisheries marketing systems, products do not pass directly from producers to end consumers but flow through a series of marketing institutions collectors, wholesalers, and retailers each of which performs specific distribution functions and extracts a portion of the final consumer price as marketing margin. The longer the marketing channel, the higher the total marketing cost and the smaller the share of the final price received by the fisher (Basu and Irawan, 2017; Kotler and Keller, 2016). Marketing efficiency is determined not only by channel length but also by transaction volume, the operational capacity of marketing institutions, and the quality of infrastructure supporting distribution. Prior studies on fisheries marketing efficiency have predominantly focused on aquaculture commodities such as catfish and tilapia in areas with relatively good market access, while research specifically addressing wild-caught snakehead fish marketing in inland villages remains scarce (Sari *et al.*, 2024; Rini and Hasanah, 2021).

Based on the foregoing conditions, this study identified three research gaps: (1) the marketing channel structure in Kalinapu Village has not been systematically mapped; (2) the magnitude of marketing costs and margins absorbed by intermediaries suspected to result in a low farmer's share for fishers has not been quantified; and (3) the efficiency level of each marketing channel has not been empirically determined. This study therefore aimed to: (1) analyze the marketing channel structure of snakehead fish (*Channa striata*) in Kalinapu Village; (2) calculate marketing costs, marketing margins, and farmer's share on each channel; and (3) determine the most efficient marketing channel. The findings are expected to contribute to fisheries economics literature and provide an evidence base for local government policy on improving marketing efficiency and fisher welfare in inland areas.

## II. METHODS

### Research Location and Time

This study was conducted from March to June 2026 in Kalinapu Village, Paju Epat District, East Barito Regency, Central Kalimantan Province. The location was selected purposively because Kalinapu Village is an active snakehead fish (*Channa striata*) harvesting area that relies on natural catch from public waters and exhibits a multi-intermediary marketing structure. Marketing activities from this village extend to Tamiang Layang Market ( $\pm 30$  km) and Telaga Itar Market, Tabalong Regency ( $\pm 57$  km from the village).

### Population and Sample

The study population comprised all actors involved in the snakehead fish marketing chain in Kalinapu Village, including fishers as primary producers, collectors, a wholesaler, retailers, and end consumers. A census method was applied to fishers (10 active fishers), collectors (2), wholesaler (1), and retailers (2) given the small and enumerable population. End consumers (10 respondents, 5 per marketing channel) were selected using snowball sampling, as no official registry of fish buyers exists in the study location. Total respondents numbered 25 individuals, as detailed in Table 1.

**Tabel 1. Research Respondents**

No.	Type of Respondent	Number (Persons)	Sampling Method
1	Active Fishers	10	Census
2	Collectors	2	Census
3	Wholesaler	1	Census
4	Retailers	2	Census
5	End Consumers	10	Snowball Sampling
<b>Total</b>		<b>25</b>	

Source : Primary data processed (2026)

### Data Collection

Primary data were collected through structured interviews and questionnaires administered to all respondent categories. Questions covered selling and buying prices at each level, marketing costs (transportation, labor, storage, levies), and sales volumes. Field observation was conducted to document distribution patterns and routes. Secondary data were obtained from the East Barito Fisheries Agency and relevant prior research.

### Data Analysis

Data were analyzed using four quantitative methods following Soekartawi (2002) and Kohls and Uhl (2002).

#### Marketing Channel Structure Analysis.

The percentage of channel use was calculated as:

$$Q_s = (S_i / TS) \times 100\%$$

where  $Q_s$  is the percentage of fishers using channel  $i$ ,  $S_i$  is the number of fishers using channel  $i$ , and  $TS$  is the total number of fisher respondents.

#### Marketing Cost Analysis.

Total marketing cost was calculated:

$$C_p = TB_v + TB_f$$

where  $C_p$  is total marketing cost,  $TB_v$  is total variable costs, and  $TB_f$  is total fixed costs.

#### Marketing Margin Analysis.

Marketing margin was calculated as:

$$M = P_r - P_f$$

where  $M$  is marketing margin (Rp/kg),  $P_r$  is the price at the consumer level (Rp/kg), and  $P_f$  is the price at the producer (fisher) level (Rp/kg). Margin was also expressed as a percentage of the consumer price.

#### Farmer's Share.

The proportion of the final consumer price received by the fisher was calculated as:

$$FS = (P_f / P_k) \times 100\%$$

where  $FS$  is farmer's share (%),  $P_f$  is the price received by the fisher (Rp/kg), and  $P_k$  is the price paid by the end consumer (Rp/kg). A farmer's share value  $\geq 70\%$  indicates an efficient marketing system; a value  $< 70\%$  indicates inefficiency (Kohls and Uhl, 2002).

#### Marketing Efficiency.

The marketing efficiency ratio was calculated as:

$$E_p = (C / P_k) \times 100\%$$

where  $E_p$  is the marketing efficiency ratio (%),  $C$  is total marketing cost (Rp/kg), and  $P_k$  is the price at the consumer level (Rp/kg). An  $E_p$  value  $\leq 50\%$  indicates an efficient marketing channel; a value  $> 50\%$  indicates inefficiency (Soekartawi, 2002).

**Tabel 2. Criteria for Marketing Efficiency Indicators**

Indicator	Threshold	Interpretation
Farmer's share (FS)	$\geq 70\%$	Efficient
	$< 70\%$	Inefficient
Marketing Efficiency Ratio (Ep)	$\leq 50\%$	Efficient
	$> 50\%$	Inefficient

Source : Kohls and Uhl (2002); Soekartawi (2002)

## III. RESULT AND DISCUSSION

### Marketing Channel Structure

Based on field research, three distinct marketing channels were identified for snakehead fish (*Channa striata*) in Kalinapu Village, as presented in Table 3.

**Tabel 3. Marketing Channel Patterns of Snakehead Fish (*Channa striata*) in Kalinapu Village**

Channel	Distribution Pattern	Distribution Distance	Market Destination
I	Fisher → Collector Umar → Retailer → Consumer	±30 km	Tamiang Layang Market (local retail)
II	Fisher → Collector Khusasi → Retailer → Consumer	±30 km	Tamiang Layang & Tampu Langit Markets (daily retail)
III	Fisher → Collector Khusasi → Wholesaler → Consumer	±57 km	Telaga Itar Market, Tabalong (bulk/institutional)

Source : Primary data processed (2026)

Channel I is managed by collector Umar, who purchases fish directly from fishers in Kalinapu Village and distributes them to retailers at Tamiang Layang Market. Distribution is carried out irregularly, in small volumes, and with variable transportation modes (motorcycle or hired vehicle) depending on weather and road conditions. Channel II is operated by collector Khusasi and follows a more regular and stable distribution pattern to retailers in both Tamiang Layang and Tampu Langit. Channel III also involves collector Khusasi, but links to a wholesaler (Tamrani) located at Telaga Itar Market, Tabalong Regency, who sells directly to institutional buyers including culinary businesses and catering services for events.

The distribution of fishers across channels reveals the dominant preference: 5 fishers (50%) use Channel I, 3 fishers (30%) use Channel II, and 2 fishers (20%) use Channel III. The dominance of Channel I reflects fishers' tendency to sell through the most accessible route, despite its higher marketing costs per kilogram. This pattern is structurally driven by the absence of cold chain facilities fishers must sell quickly to prevent quality deterioration and by the oligopsonistic market structure in Kalinapu Village, where 46 registered fishers face only 2 collector-buyers. This structural imbalance grants collectors substantial price-setting power (buyer market power), positioning fishers as price takers unable to negotiate based on production volume, season, or distribution target (Robinson, 1933; Sexton, 1994 in Fauzi and Mulyadi, 2020). These findings support Hypothesis 1 and are consistent with Rahman *et al.* (2020) and Kotler and Keller (2016), who emphasize that channel structure and the number of intermediaries directly influence producer welfare.

#### Marketing Costs, Marketing Margins, and Farmer's Share

Detailed marketing costs and margins at each institutional level are presented in Table 4.

**Table 4. Marketing Costs and Margins at Each Marketing Institution Level**

Channel	Marketing Institution	Marketing Cost (Rp/kg)	Marketing Margin (Rp/kg)
I	Collector Umar	14,125	15,000
	Retailer (Ardiansyah)	5,500	15,000
II	Collector Khusasi	12,857	10,000
	Retailer (Riduan)	2,167	20,000
III	Collector Khusasi	12,857	10,000
	Wholesaler (Tamrani)	1,533	10,000

Source : Primary data processed (2026)

The consolidated summary of marketing costs, margins, and farmer's share across all channels is presented in Table 5.

**Table 5. Summary of Marketing Cost, Margins and Farmer's Share per Marketing Channel**

Channel	Fisher Price (Rp/kg)	Consumer Price (Rp/kg)	Total Marketing Cost (Rp/kg)	Marketing Margin (Rp/kg)	Farmer's Share (%)
I	30,000	60,000	19,625	30,000	50.00
II	30,000	60,000	15,024	30,000	50.00
II	30,000	50,000	14,390	20,000	60.00

Source : Primary data processed (2026)

The uniform fisher price of Rp30,000/kg across all three channels, irrespective of season, volume, or distribution target, confirms the structural dominance of collectors in price determination. Fisher-level prices do not reflect changes in consumer-level prices: while consumer prices vary from Rp50,000/kg (Channel III) to Rp60,000/kg (Channels I and II), the fisher price remains constant. This price asymmetry indicates that

value added through distribution is disproportionately captured by marketing intermediaries, consistent with Hidayat *et al.* (2022) and Fauzi and Mulyadi (2020).

Channel I recorded the highest total marketing cost at Rp19,625/kg. Two primary factors drive this result. First, distribution is conducted in small volumes through retailers, meaning there are no economies of scale transportation and operational costs per kilogram are relatively high. Second, road access from Kalinapu Village to Tamiang Layang Market is heavily weather-dependent; during the wet season, when the dirt road becomes impassable, distribution shifts to river transport (kelotok), increasing both transport time and cost. Both factors together produce a bimodal cost distribution across seasons that raises the average marketing cost substantially.

Channel II, managed by collector Khusasi, achieves a lower total marketing cost of Rp15,024/kg. The critical differentiating factor is the regularity of the distribution pattern: Khusasi operates a stable, scheduled distribution to Tamiang Layang and Tampu Langit markets, enabling more efficient use of transport capacity. Although Channel I and Channel II have the same farmer's share (50%) and the same consumer price (Rp60,000/kg), the lower marketing cost in Channel II demonstrates that consistent distribution scheduling substantially reduces per-kilogram operational costs, even without changes in channel length.

Both Channel I and Channel II produce a farmer's share of 50%, which is below the 70% efficiency threshold established by Kohls and Uhl (2002). This result indicates that from the perspective of price distribution equity, Channels I and II are classified as inefficient fishers receive only half of the end-consumer price, while the remaining 50% is absorbed by intermediaries through marketing costs and profits. This outcome is reinforced by three structural factors: (1) geographic constraints elevating transportation costs; (2) the absence of cold chain facilities compelling immediate sale; and (3) the oligopsonistic market structure limiting fisher bargaining power.

It is important to note that this study employs two complementary efficiency indicators measuring different dimensions. Farmer's share measures the equity dimension what proportion of the consumer price reaches the fisher while the marketing efficiency ratio ( $E_p$ ) measures the cost dimension how small the ratio of total marketing cost is relative to the consumer price. The two indicators can yield divergent conclusions for the same channel: a channel may be cost-efficient ( $E_p \leq 50\%$ ) yet still produce a low farmer's share if intermediary profits dominate the price gap between producer and consumer (Soekartawi, 2002; Kohls and Uhl, 2002). This is precisely the case for Channels I and II: their  $E_p$  values are below 50% (cost-efficient), but their farmer's share values are 50% (price-distribution inefficient).

Channel III shows the most distinctive pattern. Despite involving more intermediaries and covering a longer distribution distance ( $\pm 57$  km to Telaga Itar Market), it achieves the lowest total marketing cost (Rp14,390/kg), the lowest marketing margin (Rp20,000/kg), and the highest farmer's share (60%). The lower consumer price in Channel III (Rp50,000/kg compared to Rp60,000/kg in Channels I and II) appears paradoxical but is explained by a bulk pricing mechanism: the wholesaler sells to institutional consumers culinary enterprises, catering services, and event organizers in large volumes. This large-volume distribution compresses per-kilogram costs and profit margins, while maintaining overall business profitability through volume rather than unit margin. This mechanism supports Khan *et al.* (2021), who demonstrated that large-volume distribution reduces per-unit marketing costs and increases the producer's share of the final price.

However, Channel III's efficiency is contingent on production consistency. Based on production data showing a significant decline to 246,209 kg in 2023 from 408,352 kg in 2022, the wholesaler's ability to commit to large-volume purchases from Kalinapu fishers cannot be guaranteed during low-production periods. In such conditions, the wholesaler tends to reduce volume purchases or source from alternative suppliers, causing local fishers to lose access to the channel that provides them the highest economic value. This vulnerability distinguishes Channel III from Channels I and II, which serve stable local daily demand and are therefore more resilient to production fluctuations.

These findings confirm Hypothesis 2: marketing costs, marketing margins, and farmer's share are jointly influenced by both channel length and transaction volume. As demonstrated: Channel I (short, small volume) incurs the highest marketing cost (Rp19,625/kg); Channel II (short, regular volume) incurs a lower

cost (Rp15,024/kg) at equivalent channel length; and Channel III (long, large volume) achieves the lowest cost (Rp14,390/kg), lowest margin (Rp20,000/kg), and highest farmer's share (60%). These results extend Arifin *et al.* (2021) by demonstrating that the conventional generalization shorter channels yield higher farmer's share is subject to an important exception when large-volume distribution economies are operating.

### Marketing Efficiency

The marketing efficiency ratios for all three channels are presented in Table 6.

**Table 6. Marketing Efficiency Analysis Results by Channel**

Channel	Total Marketing Cost (Rp/kg)	Consumer Price (Rp/kg)	Efficiency Value (%)	Criterion
I	19,625	60,000	32.71	Efficient
II	15,024	60,000	25.04	Efficient
III	14,390	50,000	28.78	Efficient

Source : Primary data processed (2026)

All three marketing channels are classified as efficient based on the Soekartawi (2002) criterion ( $E_p \leq 50\%$ ). However, the efficiency values differ substantially, reflecting variation in cost structures, distribution volumes, and market segments served. Channel II demonstrates the highest marketing efficiency ( $E_p = 25.04\%$ ), Channel III ranks second ( $E_p = 28.78\%$ ), and Channel I is the least efficient of the three ( $E_p = 32.71\%$ ), though still within the efficient range.

Channel II achieves the best efficiency because it combines a relatively short distribution chain with a regular and stable distribution schedule. The consistent use of available transport capacity at predictable frequencies reduces per-kilogram operational costs—transport waste, idle trips, and scheduling overhead are minimized. This finding aligns with Firmansyah and Darmawi (2021), who established that shorter marketing channels tend to exhibit higher efficiency, and with Wahyuni and Ginting (2022), who demonstrated that distribution regularity positively affects marketing performance in fisheries contexts.

Channel III achieves  $E_p = 28.78\%$ , despite being structurally longer than Channels I and II. The counterintuitive result a longer channel outperforming a shorter one in cost efficiency is explained by the bulk pricing mechanism. Large volume sales to institutional consumers enable the wholesaler to distribute costs across greater quantities, reducing per-kilogram costs to Rp14,390, which is lower than Channel I (Rp19,625) and Channel II (Rp15,024). The lower absolute consumer price (Rp50,000/kg versus Rp60,000/kg) does not reduce efficiency because the  $E_p$  formula divides costs by consumer price: the denominator is smaller, but so is the numerator, resulting in a favorable ratio. This mechanism supports Khan *et al.* (2021), who demonstrated that large-volume distribution improves per-unit marketing efficiency in inland fisheries systems.

Channel I records the least favorable efficiency ( $E_p = 32.71\%$ ) due to high per-kilogram distribution costs attributable to small-volume distribution, irregular scheduling, and variable transportation modes driven by seasonal road conditions. The inability to consolidate loads or standardize transport schedules means that fixed and semi-variable costs are spread over fewer kilograms per trip, raising the cost-to-value ratio.

Beyond channel-specific factors, overall marketing efficiency in Kalinapu Village is constrained by structural geographic conditions. The  $\pm 30$  km distribution route to Tamiang Layang Market traverses terrain whose condition changes seasonally: dry-season motorcycle paths become impassable in the wet season, redirecting distribution to slower, higher-cost river transport. The lack of cold chain infrastructure further prevents cost reduction through production scheduling and batching, since immediate sale is dictated by product perishability rather than market timing. Improvement of road infrastructure and provision of cold storage facilities could substantially reduce marketing costs across all three channels, improving the overall efficiency of the snakehead fish marketing system in Kalinapu Village.

Taken together, these results support Hypothesis 3 with qualification. In general, shorter channels are more efficient: the average  $E_p$  of the two short channels (Channels I and II) compared directionally with the longer Channel III confirms the hypothesis at the aggregate level. However, Channel III is more efficient than Channel I, demonstrating that transaction volume is a modifying factor that can override the advantage

of channel shortness. Overall, Channel II is identified as the most efficient marketing channel ( $E_p = 25.04\%$ ) and is recommended as the primary distribution pathway for fishers in Kalinapu Village.

#### IV. CONCLUSION

Three marketing channels were identified for snakehead fish (*Channa striata*) in Kalinapu Village: Channel I (fisher–collector Umar–retailer–consumer), Channel II (fisher–collector Khusasi–retailer–consumer), and Channel III (fisher–collector Khusasi–wholesaler–consumer). Channel formation is influenced by distribution targets, sales volumes, and the geographic characteristics of the study area.

Marketing costs, margins, and farmer's share vary across channels. Channel I records the highest marketing cost (Rp19,625/kg), marketing margin (Rp30,000/kg), and farmer's share of 50%. Channel II has marketing costs of Rp15,024/kg, a margin of Rp30,000/kg, and farmer's share of 50%. Channel III achieves the lowest marketing cost (Rp14,390/kg), the lowest margin (Rp20,000/kg), and the highest farmer's share (60%). These differences are driven jointly by channel length, transaction volume, and distribution regularity.

All three channels are classified as efficient under Soekartawi (2002) criteria ( $E_p \leq 50\%$ ), with values of 32.71% (Channel I), 25.04% (Channel II), and 28.78% (Channel III). Channel II is the most efficient overall and is recommended as the primary marketing pathway. Channel III offers the highest farmer's share, but its sustainability is contingent on production consistency. To improve long-term efficiency and farmer welfare, priority should be given to: (1) infrastructure improvement to Kalinapu Village to reduce transportation costs; (2) provision of cold chain facilities to reduce production urgency and strengthen fisher bargaining power; and (3) support for fishers to access price information and distribution options beyond the collector network.

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