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Supply Chain Structure and Performance of the Salted Fish Industry: Evidence from Baai Island, Bengkulu

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Abstract

Purpose - The salted fish supply chain on Baai Island, Bengkulu City, continues to rely on traditional management practices characterized by limited operational efficiency, low information transparency, and inadequate quality standardization, which constrain overall supply chain performance. This study aims to analyze the product, information, and financial flows within the salted fish supply chain and evaluate its overall performance.

Design/methodology/approach - This study combined observations, interviews, and questionnaires involving 49 purposively selected fishermen, processors, and traders to analyze product, information, and financial flows and to evaluate marketing margins and supply chain performance.

Findings - The results indicate that the product flow follows a sequential channel from fishermen to processors, traders, and ultimately consumers. Information flow remains limited, particularly regarding market prices and the availability of raw materials, while financial transactions primarily occur through direct cash payments between supply chain actors. Marketing margins varied across product types, ranging from IDR 5,000/kg to IDR 14,000/kg, with an average margin of IDR 8,333.33/kg. The overall supply chain performance achieved a performance index of 79.18%, indicating a good level of performance.

Practical implications - The findings provide practical insights for processors, traders, and local government agencies to improve supply chain efficiency through enhanced information sharing, stronger coordination among supply chain actors, and more transparent financial and marketing practices.

Novelty/Originality - This study develops an integrated assessment framework that simultaneously evaluates product flow, information flow, financial flow, marketing margins, and supply chain performance within a small-scale salted fish supply chain.

Keywords: Supply chain; salted fish; product flow; information flow; financial flow; supply chain performance.

Paper type: Research paper



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1. Introduction

The agricultural sector includes several subsectors that have the potential to be a source of competitive economic development, both now and in the future. One of the subsectors that has an important role is the fisheries subsector. The potential of the fisheries subsector in Indonesia is very large because it is supported by the vast area of waters owned. Indonesia has marine fish resources that cover about 37% of the total fish species in the world with a sustainable potential of 12.54 million tons of fish per year spread across various water areas. Some types of fish also have high economic value so that they can contribute to the national economy. Data shows that the fisheries subsector contributes 2.73% to the national economy in 2023, an increase compared to 2022 of 2.58%, which shows an increase in added value in the sector (Ministry of Maritime Affairs and Fisheries, 2024).

The city of Bengkulu is geographically located on the western coast of the island of Sumatra and has considerable and diverse coastal and marine resource potential. This is because most of the area of Bengkulu City is a coastal area. The potential resources of the coastal area can be used as one of the sources of regional economic growth if managed optimally (Bonodikun et al., 2015). The Bengkulu City Government has also designated the marine and fisheries sector as one of the region's leading sectors which is expected to make a significant contribution to regional original income (PAD). In fact, this sector is targeted to be able to contribute around 30 percent of PAD in the next few years (Marine and Fisheries Service, 2018).

One of the areas that has great potential in capture fisheries activities is the Baai Island area. This area is the center of marine fisheries activities in Bengkulu City with a fairly high production of catches. The fishing fleet owned by fishermen is also relatively adequate, even some fishermen catch up to more than 12 nautical miles from the coastline (Zamdial et al., 2020). The catch is then used not only for fresh consumption, but also processed into various processed fishery products, one of which is salted fish. The salted fish processing industry is one of the coastal resource-based agroindustries that has developed for generations in Bengkulu City. The process of processing salted fish is generally still carried out traditionally by utilizing simple technology that is easily obtained by the community (Bonodikun et al., 2015). Salted fish products also still have a fairly stable market demand because it is one of the food products that is widely consumed by the public.

However, based on the results of observations, the salted fish supply chain system on Baai Island is still traditional and not fully efficient. Some of the problems that are still faced include limited production facilities, distribution systems that are not optimal, limited market access, and lack of information disclosure between business actors. These conditions can affect the overall performance of the supply chain. Based on these problems, this study was conducted to analyze the product flow, information flow, financial flow, and performance of the salted fish business supply chain on Baai Island, Bengkulu City. This research is expected to contribute to the development of agribusiness science, especially related to supply chain management in traditional fisheries businesses, as well as become input for business actors and local governments in improving the efficiency and performance of the salted fish supply chain. Based on the description of the problem above, the author is interested in conducting

a research with the title "Supply Chain Structure and Performance of the Salted Fish Industry: Evidence from Baai Island, Bengkulu".

2. Literature Review

Supply Chain

A supply chain is an integrated network of organizations, resources, and activities involved in producing and delivering products or services from raw material suppliers to end consumers. Rather than functioning as isolated entities, supply chain members operate as an interconnected system in which coordination and collaboration determine the effectiveness of value creation and delivery. Modern supply chain management (SCM) therefore extends beyond the movement of goods to encompass the integration of material, information, and financial flows across multiple organizational boundaries.

According to Chopra and Meindl (2019), a supply chain includes all parties directly or indirectly involved in fulfilling customer demand, including suppliers, manufacturers, distributors, retailers, logistics providers, and final consumers. The effectiveness of a supply chain depends largely on the ability of these actors to coordinate operational activities and share strategic information in a timely manner. Similarly, Tsolakis et al. (2023) emphasized that SCM integrates procurement, production, transportation, inventory management, and distribution processes to improve operational efficiency, visibility, and collaboration throughout the network.

In the fisheries industry, effective supply chain management is particularly critical because fishery products are highly perishable and require rapid handling, temperature-controlled transportation, and coordinated distribution. Inefficient coordination among supply chain actors may increase product deterioration, distribution costs, and delivery delays, ultimately reducing customer satisfaction and business competitiveness. Consequently, successful fisheries supply chain management relies heavily on the effective management of product, information, and financial flows.

Product Flow

Product flow refers to the physical movement of products throughout the supply chain, beginning with the procurement of raw materials and continuing through processing, storage, transportation, and final delivery to customers. Efficient product flow ensures that products are delivered in the required quantity, quality, location, and time while minimizing waste and operational costs (Simchi-Levi et al., 2020).

In fisheries supply chains, product flow management plays a particularly important role because seafood products are highly susceptible to quality degradation. Maintaining product freshness requires efficient logistics, cold chain infrastructure, and synchronized distribution activities. Mangla et al. (2018) argued that improvements in product flow efficiency enhance product quality, reduce spoilage, lower distribution costs, and ultimately strengthen supply chain competitiveness. Therefore, optimizing product flow contributes directly to operational performance and customer satisfaction within fisheries supply chains.

Information Flow

Information flow represents the exchange of operational and strategic information among supply chain participants to facilitate planning, coordination, and decision-making. Such information typically includes customer demand forecasts, inventory levels, production schedules, pricing, transportation status, and product availability (Dolgui et al., 2020). Timely, accurate, and transparent information sharing enables organizations to reduce uncertainty and respond more effectively to dynamic market conditions.

Kache and Seuring (2017) highlighted that integrated information systems improve supply chain visibility and coordination by enabling real-time communication among supply chain partners. Enhanced information sharing not only reduces the bullwhip effect and operational inefficiencies but also strengthens collaboration and responsiveness across the supply chain. In industries characterized by short product life cycles and demand uncertainty, such as fisheries, effective information flow becomes a key determinant of supply chain resilience and performance.

Financial Flow

Financial flow refers to the movement of financial resources among supply chain participants, including payments, credit arrangements, transaction settlements, and cash flow management. Efficient financial flow ensures liquidity, supports business continuity, and strengthens long-term relationships among supply chain partners (Ivanov & Dolgui, 2020).

According to Gelsomino et al. (2016), financial flow management encompasses payment mechanisms and financing arrangements that facilitate commercial transactions throughout the supply chain. Transparent and efficient financial processes reduce transaction risks, improve trust among business partners, and enhance overall supply chain stability. Particularly in fisheries supply chains, where transactions often involve multiple intermediaries and fluctuating market prices, effective financial management is essential for maintaining operational sustainability and minimizing financial uncertainty.

Supply Chain Performance

Supply chain performance reflects the ability of a supply chain to achieve its operational and strategic objectives efficiently while satisfying customer requirements. Performance is commonly evaluated through multiple dimensions, including reliability, responsiveness, flexibility, cost efficiency, quality, and customer service (Gunasekaran et al., 2017). High-performing supply chains are characterized by effective coordination, efficient resource utilization, and the capability to adapt rapidly to changing market conditions.

Recent studies suggest that supply chain performance is strongly influenced by the integration and synchronization of product, information, and financial flows. Tsolakis et al. (2021) argued that well-integrated supply chains improve operational efficiency, accelerate market responsiveness, reduce logistics costs, and enhance overall competitiveness. Likewise, effective coordination among supply chain actors contributes to improved product quality, delivery reliability, and customer satisfaction. Therefore, the effective management of product, information, and financial flows constitutes a fundamental driver of superior supply chain performance, particularly in industries dealing with perishable products such as fisheries.

Based on the preceding theoretical discussion, product flow, information flow, and financial flow are expected to play significant roles in enhancing supply chain performance. The proposed conceptual framework illustrating these relationships is presented in Figure 1.

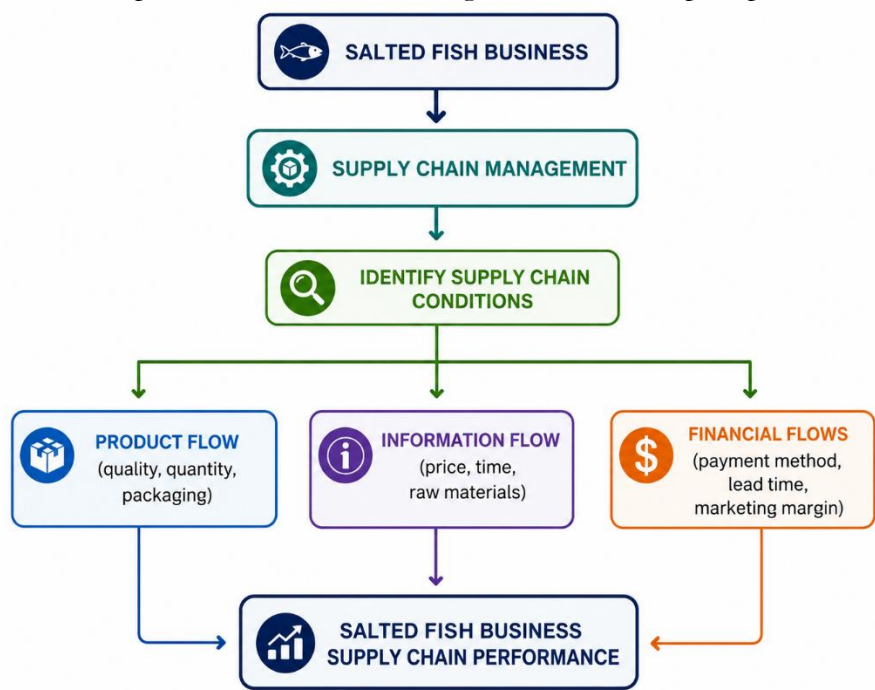


Figure 1. Frame of Mind

3. Method

This research was conducted on Baai Island, Bengkulu City, which is a salted fish business center with active supply chain activities. The location was chosen *purposively* based on the involvement of business actors and access to available information. The research implementation period lasts from August to September 2025, including observation, interviews, documentation, and data analysis, with flexible scheduling following field conditions.

In this qualitative research, data collection is focused on efforts to obtain in-depth and comprehensive information on the condition of the salted fish business supply chain, including the flow of products, information, and finance between actors(Scott, 2019). In this study, there are two types of data used, namely primary data and secondary data, which are collected through two different methods. The selection of respondents in this study uses purposive sampling techniques, which are deliberately based on certain criteria, such as direct involvement in the salted fish business and at least one year of experience.

The data analysis method used in this study aims to explain and evaluate activities in the salted fish business supply chain, which includes product flows analyzed in a qualitative descriptive manner, information flows are also analyzed qualitatively descriptive, financial

$$MP = Pk - Pf$$

flows are carried out with qualitative and quantitative descriptive approaches, the formulas used in marketing margin analysis include:

Description:

MP = Marketing Margin (Rupiah/kg)

HP = Price paid by consumers (Rupiah/kg)

Pf = Producer price (Rupiah/kg)

Meanwhile, the performance of the supply chain analysis of the salted fish supply chain to determine the performance of the salted fish supply chain, the analysis was carried out by calculating the results of respondents' assessment of several indicators in product flow (quality, quantity, packaging), information flow (price, time, raw materials), and financial flow (payment method, waiting time, marketing margin). The range of values can be calculated with the following formula (Jonathan, 2017) and (Hasanah, 2018):

$$\begin{aligned} \text{Interval} &= x \, 100\% \frac{(\text{Total skor maksimum}) - (\text{Total skor minimum})}{\text{Jumlah kategori}} \\ \text{Interval} &= \frac{100 - 25}{4} \\ &= 18.75 \end{aligned}$$

Where:

- a. Top score = Maximum score (4) x Number of questions
- b. Bottom score = Minimum score (1) x Number of questions

Category:

- 1. Very Not Good = 25 – 43.74
- 2. Not good = 43.75 – 62.4
- 3. Good = 62.5 – 81.24
- 4. Very Good = 81.25 – 100

4. Results and Discussion

Product Flow, Information Flow, Financial Flow, on the Salted Fish Supply Chain on Baai Island, Bengkulu City

The salted fish supply chain on Baai Island involves several main actors, namely fishermen as suppliers of fresh fish raw materials, salted fish processors as production actors, collectors, retailers, and end consumers. Each actor has an interconnected role in ensuring the availability of salted fish in the market.

In this supply chain, there are three main streams, namely product flows, information flows, and financial flows, which run simultaneously and affect each other. Product flow is related to the movement of fish from fishermen to consumers in the form of salted fish, information flow includes the exchange of information regarding prices, market demand, and the availability of raw materials, while financial flows are related to the payment process between business actors and marketing margins. These three streams are important factors that determine the efficiency, sustainability, and smooth distribution of salted fish on Baai Island, Bengkulu City.

Salted Fish Supply Chain Product Flow

The flow of products in this study describes the physical movement of salted fish products starting from raw materials to the end consumer. The flow of salted fish products on Baai Island, Bengkulu City, includes the process of fishing by fishermen, salted fish processing by processors, to distribution and marketing by traders or retailers. The types of salted fish studied in this stream of products were limited to scallops, scallops, and tongue-tongued fish, which are the most widely processed and traded types of fish at the research site.

To clarify the flow of products in the salted fish supply chain on Baai Island, Bengkulu City, a picture of the flow of products is presented showing the stages of fish transfer from fishermen, salted fish processors, traders or retailers, to end consumers, with the types of fish that are breeberan, scallops, and tongues as the main commodities studied.

Salted Fish Supply Chain Product Flow

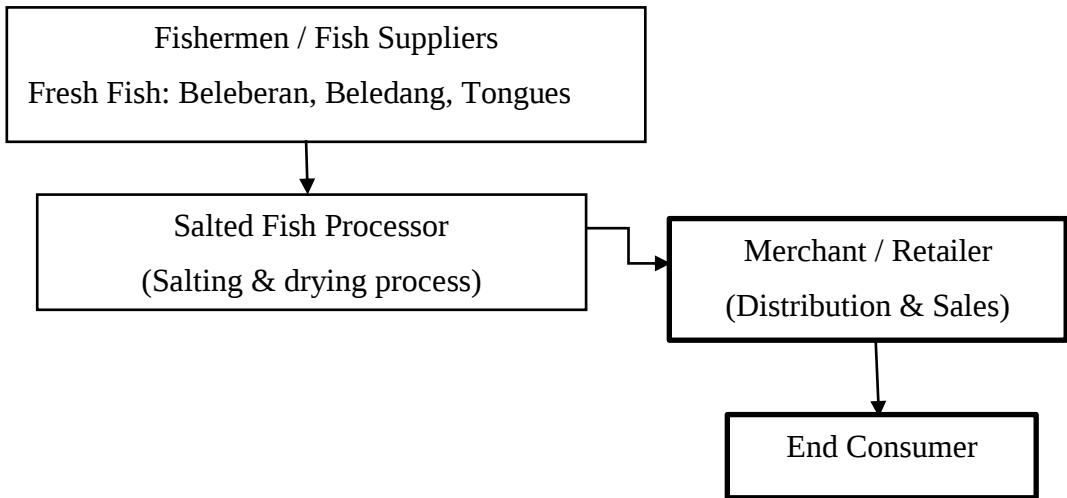


Figure 2. Product Flow

Figure 2. shows the flow of products in the salted fish supply chain on Baai Island, Bengkulu City, which lasts simply and relatively shortly. The flow of products starts from fishermen as suppliers of fresh fish raw materials, then continues to salted fish processors who carry out the traditional processing process, then distributed by traders or retailers until they reach the end consumer.

The types of salted fish that flow in this supply chain include beef, slab fish, and tongue-tongued fish, which are the main commodities that are most processed and traded on Baai Island because the availability of raw materials is relatively stable and has a fairly high market demand. This relatively short flow of products shows that there is a close relationship between actors in maintaining the sustainability of the salted fish business on Baai Island, Bengkulu City. in line with the research of Kaur and Singh (2021).

Product Flow of Beleberan Salted Fish

The product flow of beleberan salted fish begins with fishermen who catch fresh fish in the waters surrounding Baai Island and supply them directly to local processors. The

availability of beleberan fish is relatively stable because it is one of the dominant fish species landed in the area, ensuring a consistent supply of raw materials for processing activities.

At the processing stage, fresh fish undergo cleaning, salting, and sun-drying using traditional methods. Although the processing technology remains simple, the resulting salted fish generally exhibits acceptable quality, characterized by its distinctive flavor and consumer preference. Nevertheless, product quality is strongly influenced by drying duration and weather conditions, which affect moisture content and shelf life. After processing, the products are distributed to traders who maintain product quality during storage and marketing until they reach final consumers.

Packaging practices remain relatively basic throughout the supply chain. Fresh fish are transported in baskets or plastic containers, while processed products are packed in transparent plastic bags without labels or branding. Although this packaging adequately protects the product during storage and transportation, it provides limited value addition and does not enhance product differentiation or market competitiveness.

Product Flow of Suledang Salted Fish

The product flow of suledang salted fish follows a similar distribution channel, beginning with fishermen who supply fresh fish directly to processors. Compared with beleberan fish, suledang fish are larger and possess firmer flesh, requiring careful selection to ensure product quality. Because of their greater size and thickness, the drying process takes longer, resulting in a denser texture and higher market value.

Unlike beleberan fish, the production volume of suledang salted fish depends heavily on the seasonal availability of raw materials. Limited catches and longer processing times reduce production capacity, leading to lower product availability at the trader level. Consequently, supply fluctuations directly influence market availability and selling prices.

Packaging practices remain conventional across the supply chain. Fresh fish are transported using baskets or buckets, whereas processed products are packaged in transparent plastic bags or small sacks without product labels. Although this packaging is sufficient to maintain cleanliness and protect the products during distribution, it offers minimal support for product branding, traceability, or market value enhancement.

Tongue-in-cheek Salted Fish Product Flow Quality

The flow of salted fish products started from fishermen as suppliers of fresh fish raw materials obtained from the waters around Baai Island. Tongue fish used as raw materials are generally still in fresh condition with a good meat texture and suitable for processing. At the processing stage, tongue fish has a special treatment, namely cleaning the skin before the salting process. The relatively thick skin of the tongues must be cleaned first so that the quality of the salted fish produced is better, the texture is smoother, and the taste is preferred by consumers. After that, the fish goes through the traditional salting and drying process. Processed salted fish tongues have a distinctive taste and texture, so even though the production is limited, the quality of this product is quite in demand by consumers.

Quantity

In terms of quantity, the availability of tongue fish is greatly influenced by the fishing season, so the amount of raw materials obtained by fishermen is not always stable. This condition causes the production of salted fish on the tongues is relatively less than salted fish and salted fish in the tongue. In addition, the additional process in the form of cleaning the fish skin makes the processing time longer. This has an impact on the amount of salted fish produced by the processor in one production process.

Packaging

The packaging of salted fish on tongues is generally still simple. At the fishermen's level, fresh fish is brought using containers such as baskets or buckets without special packaging treatment. After processing, the salted fish is packaged using simple clear plastic without labels. The packaging serves to protect the product from dirt during storage and distribution. However, this packaging limitation is still an obstacle in increasing the attractiveness and competitiveness of products at the merchant level. At the merchant or retailer level, tongue-in-cheek salted fish is marketed in relatively limited quantities, but it has a fairly high selling value because it is considered a typical product and has its own demand in the market.

Salted Fish Supply Chain Information Flow

The flow of information in the salted fish supply chain plays an important role because it is the basis for decision-making for every business actor. The information in question includes information on prices, availability of raw materials, production time, and product distribution time. The smooth flow of information will greatly affect business sustainability, especially in maintaining a balance between the supply and demand of salted fish.

In the salted fish supply chain on Baai Island, the flow of information generally takes place simply and informally. More information is conveyed directly through verbal communication, such as face-to-face conversations, phone calls, or text messages. Although this method is relatively easy and fast, often the information received is not always uniform in each supply chain player, so it has the potential to cause price differences, inaccuracies in production time, and mismatches in the amount of raw materials available.

To clarify the flow of information in the salted fish supply chain on Baai Island, Bengkulu City, an image of the flow of information is presented that shows the process of conveying information between business actors, ranging from fishermen, salted fish processors, to traders or retailers. This information flow includes information on prices, transaction times, and the availability of raw materials for salted fish such as beleber, selenium, and tongues as the main commodities studied.

The information that flows between business actors includes price information, time information, and raw material information. Price information is used as a basis for determining the buying and selling price of fresh fish and salted fish between actors. Time information is related to the time of catching, processing, and distributing salted fish to traders and consumers. Meanwhile, raw material information includes the availability of fresh fish from fishermen which greatly determines the smooth processing process of salted fish.

The flow of information helps business actors in adjusting the activities of fishing, processing, and marketing salted fish so that business activities can run smoothly. Although

it is still simple and carried out directly, the exchange of information between business actors has supported the sustainability of the salted fish supply chain on Baai Island, Bengkulu City.

The results of this study are in line with the research of Yuliana (2019) who stated that the flow of information on the salted fish supply chain in coastal areas generally takes place directly between the main actors, with the dominant information including prices, availability of raw materials, and distribution times.

Salted Fish Beleberan

Pricing

Information on the price of the fish is conveyed directly by the fishermen to the processors and adjusts to the conditions of the catch. When the fish caught by fishermen is quite large, the price tends to be lower, while when the availability of fish decreases, the price increases. This condition affects the decision of the processor in determining the amount of fish to be bought to be processed into salted fish.

Time

Information on the time of catching and shipping of the eelberan fish is conveyed to ensure that the fish can be processed immediately after being received by the processor. The timeliness of delivery helps to maintain the freshness of the fish so that the salting and drying process can be done properly and produce the quality of salted fish in accordance with market needs.

Raw Materials

The availability of raw materials for beleberan fish is relatively easy to obtain because this fish is often caught in the waters around Baai Island. This condition supports the smooth running of processing activities and allows processors to run their business sustainably.

Salted Fish Suledang

Pricing

Blotter price information tends to be more stable and is determined based on the quality and size of the fish. The existence of an understanding between fishermen and processors in determining prices facilitates the transaction process and reduces price changes that are too frequent.

Time

Information on the time of catching and shipping of fluffy fish is an important concern so that the fish remains in a fresh condition before processing. Processors adjust the time of receiving fish so that the processing process can be carried out regularly and the quality of salted fish is maintained.

Raw Materials

The availability of raw materials for puffer fish is quite stable, although at certain times it can decrease. Therefore, processors adjust processing activities to the number of fish available so that the business continues to run efficiently.

Tongue-in-cheek salted fish

Pricing

Information on the price of tongue fish is more often talked about because the processing process requires special treatment. This fish has a skin that must be cleaned first before the salting process is carried out, so a price agreement is usually made at the beginning of the transaction.

Time

Information on the time of catching and shipping tongue fish is very much considered by processors. Fish must be cleaned and processed immediately after receiving it so that the quality of the salted fish produced remains good and marketable.

Raw Materials

The availability of raw materials for tongue fish is relatively more limited compared to other types of fish. This condition causes processors to adjust the processing schedule according to the information obtained from fishermen regarding the availability of fish.

Table 1. Salted Fish Supply Chain Information Flow

Supply Chain Actors	Price Information	Time Information	Raw Material Information
Fisherman	Convey the price of fresh fish according to the catch and quality	The time of catching and landing fish is usually about 5 days so the processor has to wait 5 days to obtain fresh fish as raw materials.	Quantity, types, and quality of fresh fish
Salted Fish Processor	Determining the price of salted fish based on production costs and quality	The processing, drying, and drying time of salted fish lasts about 2–3 days, depending on weather conditions	Determining the need for raw materials according to capacity
Merchant / Retailer	Set the selling price to consumers	Product pick-up and sale time	Availability of salted fish products
End Consumer	Receive market price information	Product purchase time	–

The flow of information in the salted fish supply chain on Baai Island takes place between actors ranging from fishermen to end consumers. Fishermen provide information on the price of fresh fish according to the catch and quality, and convey that the time of catching and landing fish is about 5 days so that processors wait for raw materials. Fishermen also conveyed the quantity, types, and quality of fresh fish available.

Salted fish processors convey product price information based on production costs and the quality of salted fish. In addition, the processor provides information on processing, drying, and drying time of about 2-3 days depending on the weather, as well as the need for raw materials according to production capacity. Traders or retailers convey information on selling prices to consumers, the time of picking and selling products, and the availability of salted fish in the market. The end consumer receives information on the market price and the time of purchase of the product. This flow of information occurs directly between actors so as to help the smooth production, distribution, and marketing of salted fish. This research is in line with the research conducted by Hidayati and Anwar (2021).

Salted Fish Supply Chain Financial Flow

The financial flow in the salted fish supply chain on Baai Island, Bengkulu City, moves from the end consumer to the previous actor, namely traders or retailers, salted fish processors, to fishermen as raw material suppliers. This financial flow occurs as a form of payment for salted fish products that are traded and becomes a source of income for every actor in the supply chain, both in salted fish, salted fish in the mud, and salted fish on the tongue.

At the fishermen's level, income is obtained from the sale of fresh fish to salted fish processors. For beluga fish, payments are generally made in cash because the price of fish is relatively affordable and the sales turnover is quite fast. In flaxseed and tongue fish, payments can be made in cash or with a delayed payment system according to the agreement, given the higher value of fish and the availability of raw materials that are not always stable.

At the processing level, financial flows are used to finance the salted fish production process, such as the purchase of fish raw materials, salt, labor, and processing equipment. Salted fish processors usually have a faster capital turnover due to the short production process and relatively large sales volume. Meanwhile, in the processing of salted fish and salted fish of the tongue, the need for capital tends to be greater because of the longer processing time and additional processes, such as skin cleaning of the tongue fish. The processor then receives payment from the merchant or retailer after the salted fish is sold.

Payment Methods

The payment method in the salted fish supply chain on Baai Island, Bengkulu City is generally done simply and is still traditional. This payment system applies to the three types of salted fish studied, namely salted fish, beledang, and tongues, with relatively the same payment pattern at each stage of business actors.

At the fishermen's level, payment is made by the salted fish processor after the fresh fish is handed over. For salted fish, payments are generally made in cash because the price of fish is relatively lower and the supply of raw materials is easier to obtain. For sulfur and tongue fish, payments are also mostly made in cash, but under certain conditions there can be delayed payments if the number of fish is large enough or the fisherman already has a good working relationship with the processor.

At the salted fish processing stage, payments from traders or retailers to processors are also generally made in cash after salted fish products are received. For salted fish, payments are usually made faster because the sales turnover is relatively high. Meanwhile, in salted fish

and tongues, payment can be made after the product is sold, mainly due to the higher selling price and the limited number of products marketed.

At the trader or retailer stage, payments are made by the end consumer directly and in cash at the time of the purchase of salted fish. This payment system applies to all three types of salted fish, both salted fish, slingshots, and tongues. Cash payments from consumers are then a source of funds for traders to make payments to processors.

In general, the payment method in the salted fish supply chain on Baai Island, Bengkulu City is still dominated by cash payments and simple payments based on trust between business actors. This system supports smooth financial flows, but on the other hand there is still a risk of late payments, especially for processors and fishermen if sales at the merchant level are slow.

Waiting Time

Payment waiting time is one of the important aspects in the financial flow of the salted fish supply chain because it is directly related to the smooth turnover of capital for each business actor. The difference in the position and role of actors in the supply chain causes variations in payment waiting times at each stage, ranging from fishermen, salted fish processors, to traders or retailers.

At the level of fishermen to salted fish processors, the waiting time for payment is relatively short. Most transactions are done in cash at the time the fresh fish is handed over to the processor. This cash payment system is implemented to maintain fishermen's trust and ensure the sustainable availability of raw materials. However, in certain conditions, such as limited processing capital or a large enough purchase volume, payments can be made delayed. However, the waiting time for payment at this stage is generally no more than 1–2 days after the fish is received. This short waiting time is important for fishermen because the revenue received is used to meet the operational needs of the next fishery.

In contrast to the previous stage, the waiting time for payment from salted fish processors to traders or retailers tends to be longer. In practice, traders often make payments after salted fish is successfully sold in the market. This payment system causes processors to have to wait for payment for a few days to about a week, depending on the speed of sales and market demand conditions. This pattern of delayed payments is generally based on long-standing cooperative and trust relationships between processors and traders.

The condition of longer payment waiting times at this stage has the potential to pose risks for salted fish processors, especially related to capital turnover and the ability to purchase raw materials. Processors must continue to incur costs for the purchase of fresh fish, salt, labor, and other operational costs, while the payment receipt has not been fully received. To overcome this, processors usually set production schedules in stages or use their own capital to keep business activities running.

Marketing Margins

Marketing margin analysis was conducted to identify the distribution of value added and price differences across each stage of the salted fish marketing channel, from producers to final consumers. This analysis provides insights into the efficiency of the marketing system by illustrating the share of margins captured by each intermediary involved in the distribution

process. A lower marketing margin generally reflects a more efficient marketing channel, whereas a higher margin may indicate greater marketing costs or unequal distribution of returns among market participants. The detailed marketing margin values for each marketing channel are presented in Table 2.

Table 2. Marketing Margins of Salted Fish Products

Salted Fish	Marketing Channel	Fisher (Rp/Kg)	Processor (Rp/Kg)	Merchant (Rp/Kg)	Consumer (Rp/Kg)	Absolute Margin (Rp/Kg)	Margin (%)
Beleberan	Fisher → Processor → Merchant → Consumer	6,000	11,000	16,000	16,000	5,000	45.45
Suledang	Fisher → Processor → Merchant → Consumer	11,000	21,000	27,000	27,000	6,000	28.57
Tonggus	Fisher → Processor → Merchant → Consumer	16,000	21,000	35,000	35,000	14,000	66.67

Based on Table 2, the marketing margins of salted fish products on Baai Island, Bengkulu City, vary according to the type of fish, reflecting differences in processing complexity, production costs, and market value. For salted fish, the price at the fisherman level is IDR 6,000/kg, while the consumer price is IDR 16,000/kg, resulting in a marketing margin of IDR 5,000/kg. This relatively low margin indicates that the product requires a simple processing method and the raw materials are readily available. For sted salted fish, the price increases from IDR 11,000/kg at the fisherman level to IDR 27,000/kg at the consumer level, generating a marketing margin of IDR 6,000/kg. The slightly higher margin reflects the larger fish size and the longer processing time required. Meanwhile, tongues salted fish records the highest marketing margin. The fisherman price is IDR 16,000/kg, while the consumer price reaches IDR 35,000/kg, resulting in a marketing margin of IDR 14,000/kg. This higher margin is associated with a more labour-intensive processing method, including skin cleaning, greater salt usage, and the product's higher market value. Overall, the total marketing margin for the three salted fish products is IDR 25,000/kg, with an average margin of IDR 8,333.33/kg. These findings indicate that value is added throughout the supply chain,

with each marketing intermediary contributing to processing and distribution activities before the products reach consumers.

Salted Fish Business Supply Chain Flow Picture

To understand how the distribution system and relationships between actors in the salted fish business on Baai Island are needed, a clear picture of the flow that occurs in the supply chain is needed. The salted fish supply chain involves several main actors, ranging from fishermen as suppliers of raw materials to consumers as end users of products. In it, there is a relationship between product flows, financial flows, and information flows that affect each other in the smooth running of business activities. Therefore, the flow of the salted fish supply chain on Baai Island can be described schematically as shown in the following figure 3.

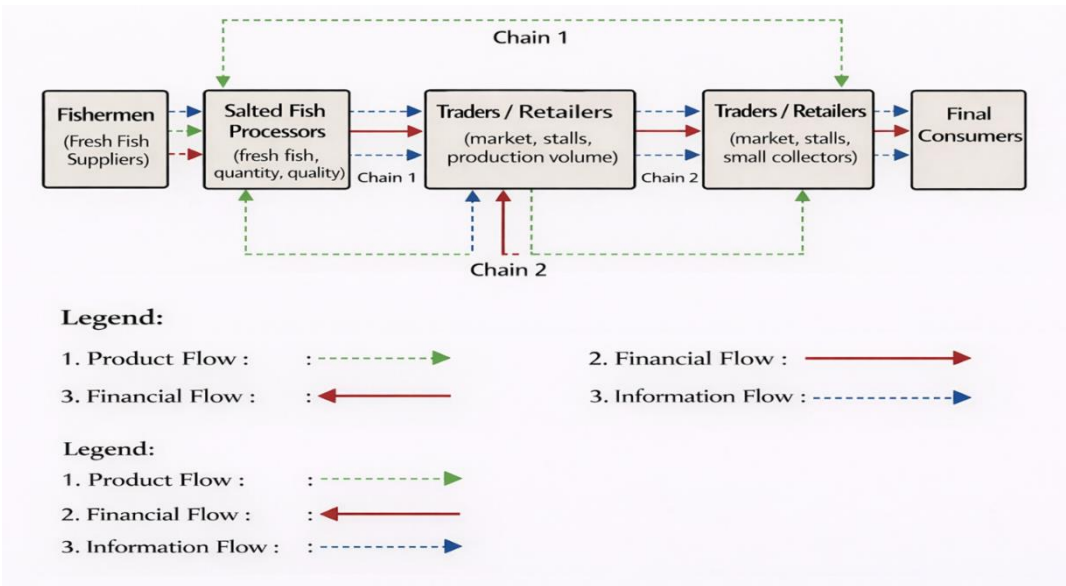


Figure 3. Salted Fish Supply Chain on Baai Island, Bengkulu City

Figure 3 illustrates the supply chain structure of the salted fish industry on Baai Island, Bengkulu City, involving four key actors: fishermen, salted fish processors, traders or retailers, and final consumers. The supply chain operates through three interconnected flows, namely product flow, information flow, and financial flow, which collectively support the movement of goods, market coordination, and value creation across the supply chain. The existence of these integrated flows demonstrates that the performance of the salted fish industry depends not only on the physical distribution of products but also on effective communication and financial transactions among supply chain participants.

The product flow begins with fishermen supplying fresh fish to salted fish processors, who transform the raw materials through cleaning, salting, drying, and packaging before distributing the finished products to traders or retailers. The products are subsequently sold to final consumers through two marketing channels. The first channel represents the conventional distribution pathway in which processors supply traders before the products reach consumers, while the second channel provides an alternative route that allows processors or small traders to market salted fish directly to consumers. These alternative

distribution channels improve market accessibility and enable processors to respond more effectively to variations in consumer demand.

Information flow occurs bidirectionally among all supply chain actors and plays a critical role in coordinating production and marketing activities. Information exchanged throughout the supply chain includes fresh fish and salted fish prices, production volumes, inventory levels, market demand, delivery schedules, and product availability. Fishermen communicate catch availability to processors, processors provide information regarding production capacity and product availability to traders, while traders relay market demand and price developments back to processors. This continuous exchange of information enables each actor to make informed decisions regarding production planning, pricing strategies, and distribution schedules, thereby enhancing supply chain responsiveness and reducing market uncertainty.

Financial flow moves in the opposite direction to the product flow, beginning with payments from consumers to traders or retailers, followed by payments from traders to processors and subsequently from processors to fishermen for the purchase of fresh fish. In addition to covering raw material costs, financial transactions also compensate processing activities, labor, transportation, packaging, and other operational expenses while generating profits for each business actor. Figure 3 further illustrates that financial transactions occur at every stage of the marketing process rather than through a single payment flow, reflecting the commercial relationships established among supply chain participants. In practice, these transactions are conducted through both cash payments and deferred payment arrangements based on long-term trust between processors and traders, indicating the importance of relational governance in sustaining business partnerships.

The increasing value of salted fish products along the supply chain reflects the value-added generated through processing, handling, storage, transportation, and marketing activities. Consequently, the price paid by consumers is substantially higher than the price received by fishermen for fresh fish, with each intermediary capturing a portion of the value created during the distribution process. This finding demonstrates that the supply chain not only facilitates product movement but also contributes to income generation for all participating actors through value-added activities.

The findings are consistent with those reported by Yuliana (2019, 2020), who found that the salted fish supply chain in coastal areas consists of fishermen, processors, traders, and final consumers connected through integrated product, information, and financial flows. Similar to the present study, product flows move downstream from fishermen to consumers, financial flows move upstream from consumers to producers, and information flows operate bidirectionally to support coordination regarding prices, product quality, production capacity, and market demand. Therefore, the results of this study reinforce previous evidence that effective integration of product, information, and financial flows is essential for improving supply chain efficiency, strengthening coordination among stakeholders, and enhancing the long-term sustainability of the salted fish industry in coastal regions.

Salted Fish Supply Chain Performance

The performance of the salted fish supply chain in this study was obtained from data on filling out questionnaires by fishermen, salted fish processors, and traders consisting of

several scores. The following is presented a table of the performance of the salted fish supply chain on Baai Island, Bengkulu City:

Table 3. Performance level

Score	Category	Number (People)	Percentage (%)	Performance Level
25 – 43,74	Very Not Good	0	0	
43,75 – 62,4	Not good	0	0	
62,5 – 81,24	Good	7	14,29	79.81 (good)
81,25 - 100	Very Good	42	85,71	
Quantity		49	100	79,81%

Source: Primary Data Processing, (2026)

Based on the average results obtained from the calculation of the salted fish business supply chain performance index on Baai Island, Bengkulu City is 79.81% and is included in the good category. This is in line with research(Yuliana, 2019), smooth Product Flow (quality, quantity, packaging), Information Flow (price, time, raw materials) and Financial Flow (payment method, waiting time, marketing margin) between business actors. The research shows that although the supply chain system is still traditional, integration and cooperation between actors can support the sustainability of the salted fish business.

The performance of the supply chain that is classified as good is influenced by the integration of product, information, and financial flows. In the product flow, performance is reflected in the quality of salted fish that is maintained, the adjustment of production quantity with the availability of raw materials, and packaging that is able to protect the product. In information flow, performance is supported by the exchange of information on prices, time, and raw materials between business actors. Meanwhile, in financial flows, performance was shown through a relatively smooth payment system, acceptable waiting times, and marketing margins that reflected increased added value.

In this study, there are 4 indicators with measurements carried out based on the answer scores of fishermen, salted fish processors, traders. The number of scores obtained is then calculated at intervals to find out the range of classes in the category to be determined and then the number of scores obtained is transformed into an index.

5. Conclusion

This study found that the supply chain of salted fish businesses in Bengkulu City involves fishermen, processors, traders, and consumers, with the flow of products from fishermen to consumers, as well as the flow of information and finance that runs in two directions between actors. The type of salted fish affects the processing process and marketing margin: salted fish is most produced with a margin of Rp5,000/kg, salted fish has a larger size with a margin of Rp6,000/kg, while salted fish with tongues requires a more complex processing process and produces the highest margin of Rp14,000/kg. The average marketing margin for all types of salted fish is IDR 8,333.33/kg. Overall, supply chain performance is relatively good with a performance index of 79.18%, showing that the system has been effective in supporting production, distribution, and marketing although there is still room for optimization.

Theoretically, this study strengthens the understanding of supply chain management in micro enterprises with different product characteristics, especially in the context of fisheries.

In practical terms, these findings provide a basis for processors and traders to improve efficiency, optimize margins, and improve information coordination, so that the performance of the supply chain and the economic value of the salted fish business can be further improved.

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