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Technical Report

MARKETING AND TRADE OF SHARKS AND RAYS IN KALIMANTAN, INDONESIA

2020

MARKETING AND TRADE OF SHARKS AND RAYS IN KALIMANTAN, INDONESIA



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FOREWORD

This survey seeks to understand the domestic utilization and marketing of sharks and rays in Kalimantan, Indonesia. The survey was funded by the Japanese Government through JTF VI Project namely “Research for enhancement of sustainable Utilization and Management of Sharks and Rays in the Southeast Asia Region”. The survey team have explored the status and trends of sharks and rays utilization, marketing and trade in four provinces in Kalimantan Island, namely West Kalimantan, South Kalimantan, East Kalimantan, and North Kalimantan. The findings are useful to serve as an essential basis for developing appropriate fisheries management policies and actions, and thereby promote national responsibility for sharks and rays resource management issues including Non-Detrimental Findings (NDFs). The findings from this survey will also be useful as a guideline in expending similar survey to Bali, Lombok, Sulawesi and other islands in the future.

The survey team would like to record their sincere thanks to the SEAFDEC Secretariat and Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD) for initiating the idea to conduct the survey in Kalimantan after successfully conducted the same survey in Java and Sumatera, Indonesia in year 2018. The survey was conducted by officers from Center for Fisheries Research, Ministry of Marine Affairs and Fisheries, Jakarta Indonesia with financial and technical support from SEAFDEC/MFRDMD.

We would like to express our sincere gratitude to various Indonesia Government Agencies and people that helped us during the survey. In particular, we are indebted to all officers from the Ministry of Marine Affairs and Fisheries and local officers based at all survey sites in Pontianak, Banjarmasin, Balikpapan and Tarakan for their continuous support and to facilitate our survey either in terms of information or leads, are highly appreciated. Without their support, it can be safely said this survey would have not been able to implement the field surveys and visits to landing centres and discussions with stakeholders. Their input serve as the core data for the survey.

We would like to thank Dr. Kom Silapajarn (Former Director-General of SEAFDEC), Mr. Raja Bidin bin Raja Hassan (Former Chief of SEAFDEC/MFRDMD), Dr. Kenji Taki (Former Deputy Chief of SEAFDEC/MFRDMD) and Dr. Masaya Katoh (Deputy Chief of SEAFDEC/MFRDMD) for their endless support to conduct this survey in Kalimantan. Special thanks to Dr. Lily Aprilya Pregiwati (SEAFDEC National Coordinator for Indonesian, MMAF) and Dr. Toni Ruchimat (Director of Center for Fisheries Research, Agency Research and Human Resources, MMAF) for their support in this survey.

Last but not least, we would like to thank Ms. Chan Li Yu and Ms. Corina Yeo Kiat Qie (undergraduate students of B.Sc Marine Biology) from Universiti Malaysia Terengganu who were actively participated in editing this publication during attachment for their industrial training from 28th June until 17th September 2020 at SEAFDEC/MFRDMD.

However, it was the readiness and warmness of the middlemen and traders at all survey sites to share with us their experiences, insights and information that touched us deep with appreciation and admiration. This report is also dedicated to them.

ABBREVIATION

BPSPL	Institute of Management Coastal and Marine Resource (Balai Pengelolaan Sumberdaya Pesisir dan Laut)
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
FAO	Food and Agriculture Organization of the United Nations
IDR	Indonesian Rupiah
MFRDMD	Marine Fishery Resources Development and Management Department
MMAF	Ministry of Marine Affairs and Fisheries
NDFs	Non-Detrimental Findings
SEAFDEC	Southeast Asian Fisheries Development Center

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KEY FINDINGS

- Zero waste; almost no parts of shark and ray were being wasted. Various products that produced from shark and ray excluding fins were meat, skin, cartilages, teeth, liver, intestine, and stomach. Low-price fins (mostly anal and caudal fins) were also used for human consumption. Every single part of shark and ray have value, for instance, the non-consumable stomach will be used as farmed crocodile food.
- Economic value; it generated massive livelihood for the community not on the direct benefit such as fishers, boat owners, exporters, collectors, wholesalers, retailers, and processors but also various labor workers at different levels such as port and transportation workers.
- Protein source; Indonesia as one of the main chondrichthyan producers known as important exporter of shark and ray fins. However, the amount of shark and ray meat being exported is less than the expected due to the higher domestic consumption than the export. In some areas, shark and ray meat is one of traditional delicacy especially poor people in the remote areas.
- High dependency; livelihood and source of protein has been significantly generated by shark and ray resources. The coastal communities totally depend on these resources as part of their livelihood and protein resources.

1. INTRODUCTION

Indonesia is known as the top producer of shark and ray resources in the world (FAO, 2018). The national production data has recorded 72,470 tons of shark and ray landings in 2016, however it was decreased to 35,701 tons in 2017 (DGCF, 2017). Jaiteh *et al.* (2016) reported that the decreased of landings was due to ‘unreported landings’ from small-scale fishers which appear to a significant contributor to shark and ray landings.

In 2010, 72% of shark and ray landings in Indonesia were by-catch using various fishing gears such as gillnets, droplines, bottom and drift longlines (Blaber *et al.*, 2009; Zainudin, 2011; Fahmi and Dharmadi, 2015).

On the other hand, high market demands and reasonable prices for shark and ray products at the global market have triggered overexploitation of these resources within Indonesian waters. In general, most of the shark and ray fishing is the by-catch of tuna fisheries that comes from artisanal fishing.

The shark and ray products such as fins and meat are preferred at the global markets, while meat products (both fresh and dried meat) are highly demanded locally. The export destination countries are South and Southeast Asia such as India, Sri Lanka, Bangladesh, Malaysia, and Singapore, while fresh and dried meat are sold locally especially in Java Island. Fins of *Rhynchobatus* spp. have high economic value in Indonesia and high demand in South Korea.

Since most of shark and ray catches were landed in many jetties across Indonesian, the marketing and trade chain becomes complicated. Based on this evidence, The Centre for Fisheries Research, Ministry of Marine Affairs and Fisheries, Republic Indonesia and SEAFDEC/MFRDMD have conducted surveys on marketing and trade of sharks and rays in Indonesia since 2018. The surveys were conducted in Java and Sumatera in 2018 (Dharmadi and Prasetyo, 2018) and Kalimantan in 2019. This technical report presents information collected during the survey conducted at four provinces in Kalimantan Island, namely West Kalimantan, South Kalimantan, East Kalimantan, and North Kalimantan.

2. PROBLEM STATEMENT

The CITES includes several species in its Appendix, which has an impact on the needs of regulation that control the wild capture of the species in all Indonesian waters. On the other hand, shark and ray fishery plays a vital role in the socio-economic dimension of the coastal and urban communities. Sharks and rays fishing have significant contribution to improve the economy of the community by accommodating workers or crew into the fishing fleets which employing millions of processing workers, and involving thousands of local traders.

The regulation on shark and ray trade products for CITES listed species should have come from data-information and scientific justification to ensure that the management's purpose has appropriately achieved. Currently, the data and information on the marketing and trade of sharks and rays in Indonesia, especially in Kalimantan are limited. These include the knowledge of species, demand and supply chain of raw products, type and price of products as well as information on marketing channels of processed products in Kalimantan.

All data and information gathered from this survey will be used as primary sources of the management strategy of shark and ray fishery in Indonesia, especially in Kalimantan, that eventually be part of sharks and rays conservation management as well as for preparation Non Detrimental Findings (NDFs) documents for Indonesia.

3. OBJECTIVES

The main objective of the survey is to collect information on socio-culture-economy, marketing, and trade data to support Indonesia for NDFs document preparation in the future. The specific objectives are:

- i. To survey the dependencies of fishers at selected landing sites in Kalimantan towards shark and ray;
- ii. To survey the impacts on socio-culture-economy of fishers after several shark and ray species listed in Appendix II CITES at selected landing sites;
- iii. To survey the major actors in domestic marketing of shark and ray especially CITES listed species in Kalimantan;
- iv. To survey shark and ray trade channels and practices at selected areas in Kalimantan; and
- v. To evaluate the international trade of shark and ray in survey areas.

4. METHODOLOGY

This survey had been carried out in four provincial capitals that are identified as major shark and ray markets in Kalimantan, namely: Pontianak, Banjarmasin, Balikpapan and Tarakan (Figure 1). Survey had been conducted from September 1-16, 2019, by collecting primary data through interviews with the processors and traders. Some secondary information, such as market and trade channels, had been collected by tracing the export-reports of shark and ray products that are available at Institute of Management Coastal and Marine Resource (BPSPL) office in Pontianak. All gathered data were analyzed descriptively while the survey areas were shown in Figure 1.

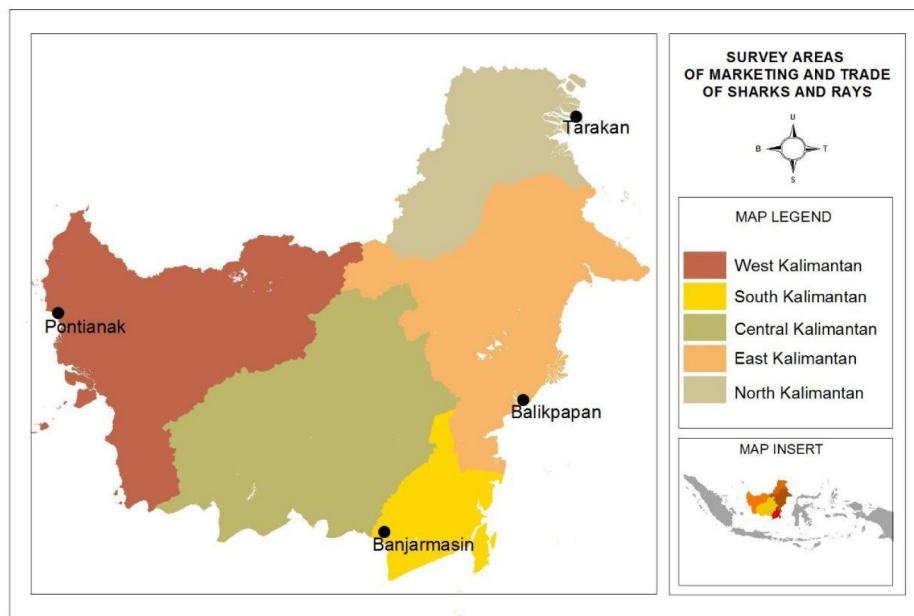
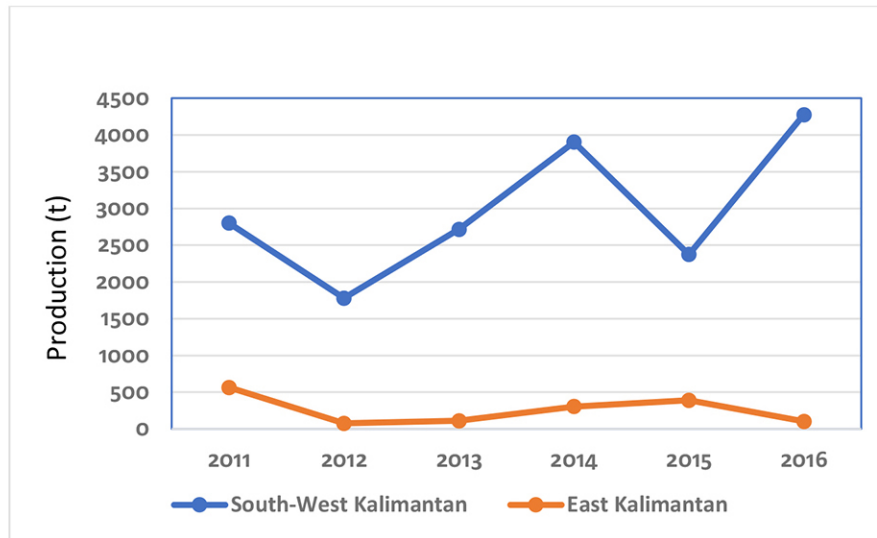


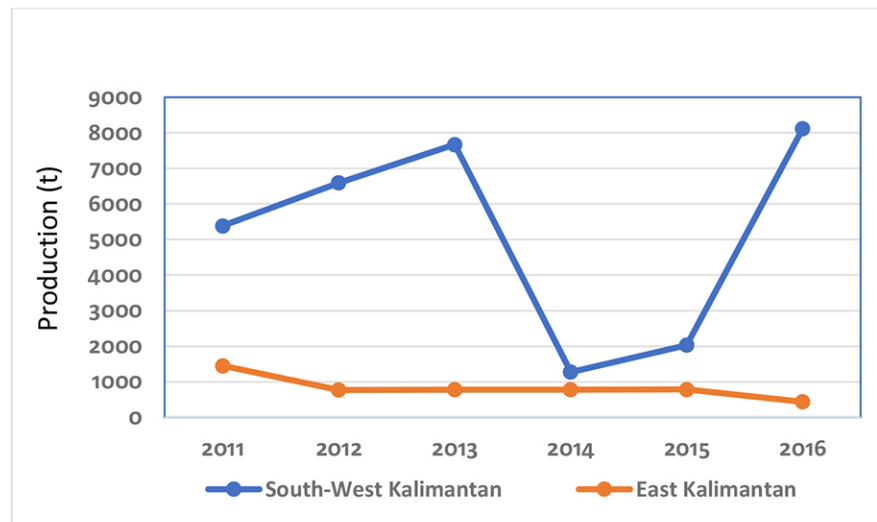
Figure 1. Survey areas of marketing and trade of sharks and rays in Kalimantan

5. PRODUCTION OF SHARKS AND RAYS IN KALIMANTAN

The sharks and rays production in Kalimantan were recorded in two regions namely South-West Kalimantan and East Kalimantan. In Figure 2, shark production in South-West Kalimantan showed increment by 35% in 2011-2016. However, in East Kalimantan, it dropped dramatically by 82% within the same period. For rays, production in South-West Kalimantan and East Kalimantan decreased by 51% and 70% respectively (DGCF, 2017).



(a)



(b)

Figure 2. (a) Trend production of sharks in Kalimantan; (b) Trend production of rays in Kalimantan

6. MARKETING AND TRADE SURVEYS

Survey areas were divided into West Kalimantan, South Kalimantan, East Kalimantan and North Kalimantan. Surveys were conducted in collaboration with local officers from BPSPL based at Pontianak, Banjarmasin, Balikpapan and Tarakan.

6.1. West Kalimantan

A survey of marketing and trading of shark and ray products in West Kalimantan has conducted on September 1-3, 2019. Six respondents have been interviewed using guidelines as in Appendix 1. The six respondents are as follows:

- Case 1 (Respondent 1)

Respondent 1 is a seafood trader who involved in processing of sharks and rays, sea cucumber, and seahorses in Pontianak. He has started the business since 1999. The major products of his business are sharks and rays. He bought dried fins from other traders and the purchasing price varies based on species, sizes and quality of fins. The prices of fin after processed are shown in Table 1.

Table 1. Prices of dried shark and ray fins sold by Respondent 1

Species	Local Names	Product	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	< 15	300
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	15-20	500
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	20-30	700
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	30-40	1,000
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	> 40	12,000-1,300
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	15-19	300
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	20-29	600
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	30-39	1,100-1,500
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	≥ 40	1,800-2,100

He generally takes about 1.5% profit margin of purchasing price. Each trader is allow to export not more than 60 kg of dried fins every month. Traders will select and sort the fins purchased from fishers according to sizes and species. During sorting process, the small fins will be further processed as ‘hisit’ (a transparent sliced-meat that shredded from the cartilage part of the boiled-fins). By-products of ‘hisit’ process are dried cartilage. Another product widely processed from skin is called ‘udon’ (skin of sharks/rays but commercially called fish lips). The prices of processed products are ranged from IDR 5,000-2,000,000 per kg. The price of products sold by Respondent 1 is shown in Table 2.

Table 2. Prices of fin and skin products of shark and ray sold by Respondent 1

Species	Local Names	Products	Price/kg (x IDR 1,000)
<i>Carcharhinus</i> spp.	Hiu hitam	Hisit (henci) (*)	2,000
<i>Rhynchobatus</i> spp.	Pari kemejan	Hisit (henci)	2,000
<i>Carcharhinus</i> spp.	Hiu hitam	Dried head cartilage	30
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried head cartilage	30
<i>Carcharhinus</i> spp.	Hiu hitam	Waste of fin after making hisit	5
<i>Rhynchobatus</i> spp.	Pari kemejan	Waste of fin after making hisit	5
<i>Rhynchobatus</i> spp.	Pari kemejan	Udon (*)	100

(*) Hisit is the final product of fin; Udon is the processed skin of sharks/rays but commercially called fish lips

One kg of dried fins could produce 150-200 gm of ‘hisit’. Besides ‘hisit’, the waste product that yielded from skin scrapping also has good value and can be sold up to IDR 5,000 per kg. The detailed process of how to make hisit is shown in Figure 3.

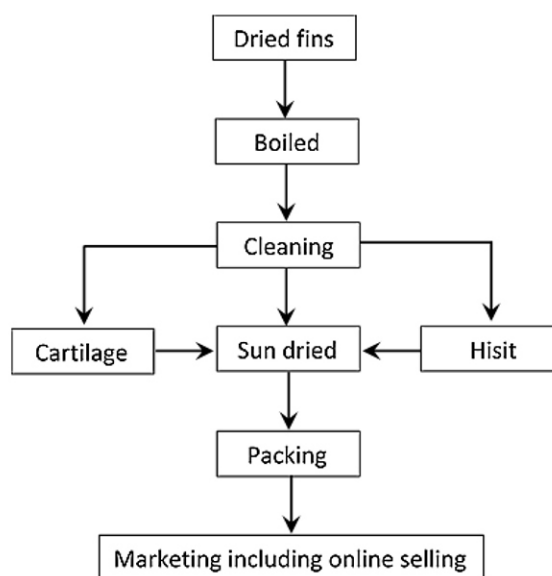


Figure 3. Processing flow of dried fins into ‘hisit’ by Respondent 1

Currently, the demand for derivatives products from wedgefishes are higher than requiem sharks (*Carcharhinus* spp.). Traders are commonly selling their products by common way and by online marketing and trade through website link <https://myjualbelisiriphiutripang.blogspot.com/>. He also obtained raw materials from several regions such as Sorong (Papua), Ambon (Maluku), Manado (Sulawesi), and Riau

Islands. All end products are sold locally in Pontianak as well as in Java and Sulawesi. Marketing flow of raw materials and destination of end products is shown in Figure 4.

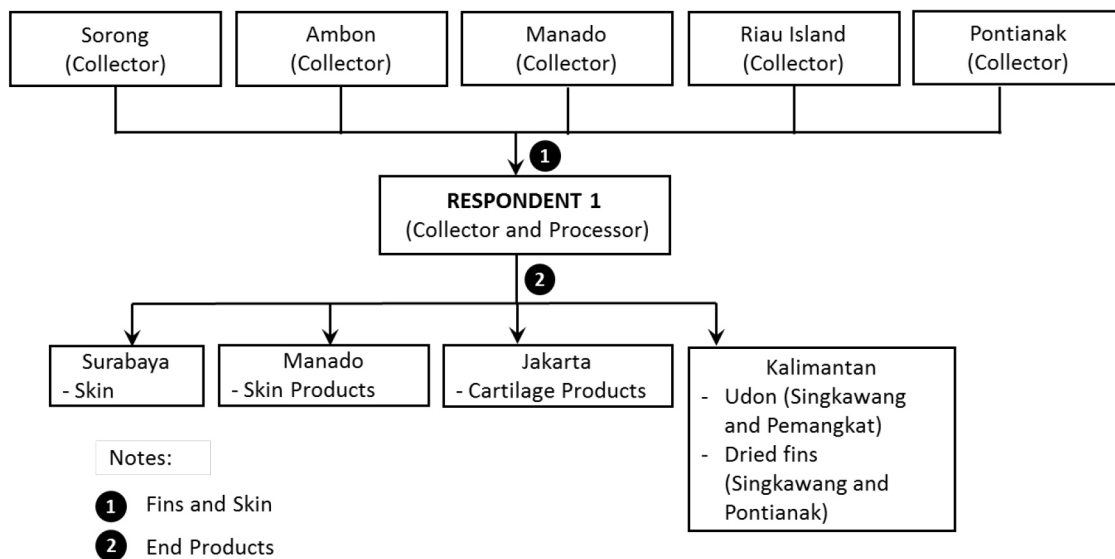


Figure 4. Marketing flow of raw materials and destination of end products by Respondent 1

- Case 2 (Respondent 2)

Respondent 2 is one of the well known trader in West Kalimantan. Several products that are traded including salted meat, cartilage and fins. He got supply from 19 fishing vessels to fulfill the demand. Nine of these vessels belong to him while the other ten vessels are owned by other owners. List of shark and ray species that caught is shown in Table 3. Wedgefishes (*Rhynchobatus* spp.) is the dominant ray species caught using bottom gillnets. The fishing ground covered West Kalimantan (North Natuna Sea) with a trip duration of 27 days. However, fishing activities only conducted for 24 days.

Table 3. Species of shark and ray traded by Respondent 2

No.	Species	Local Names
1	<i>Glaucostegus</i> spp.	Pari kikir
2	<i>Rhynchobatus</i> spp.	Pari kekeh (*)
3	<i>Pastinachus</i> spp.	Pari bendera
4	<i>Gymnura</i> spp.	Pari kelelawar
5	<i>Taeniurops meyeri</i>	Pari babi
6	<i>Aetobatus</i> spp.	Pari elang
7	<i>Maculabatis gerrardi</i>	Pari batu (*)
8	<i>Gymnura poecilura</i>	Pari kelelawar (*)

9	<i>Rhina ancylostoma</i>	Pari barong
10	<i>Stegostoma fasciatum</i>	Hiu belimbing
11	<i>Nebrius ferrugineus</i>	Hiu bodoh
12	<i>Carcharhinus sorrah</i>	Hiu hitam
13	<i>Galeocerdo cuvier</i>	Hiu harimau
14	<i>Hemipristis elongata</i>	Hiu monas

(*) dominant species

The quantity of fresh shark and ray products, and other dried products (fins and salted meat) that marketed are about 100 kg and 5,000 kg per month respectively. Price of products range between IDR 10,000-2,000,000 per kg. The highest price is for wedgefishes. Details are shown in Table 4.

Table 4. Prices of shark and ray products sold by Respondent 2

Species	Local Names	Products	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried meat	-	25
<i>Rhynchobatus</i> spp.	Pari kemejan	Fresh meat	-	12
<i>Carcharhinus</i> spp.	Hiu hitam	Dried meat	-	20
<i>Carcharhinus</i> spp.	Hiu hitam	Fresh meat	-	10
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried head cartilage	-	20
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	< 10	200
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	10-20	300
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	20-25	600
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	25-35	800
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	> 40	2,000
<i>Rhina ancylostoma</i>	Pari kupu-kupu	Dried fins	All size	400
<i>Glaucostegus</i> spp.	Pari kikir	Dried fins	All size	600
<i>Carcharhinus</i> spp.	Hiu hitam	Dried caudal fins	All size	11-19
<i>Carcharhinus</i> spp.	Hiu hitam	Dried pelvic fins	All size	50
<i>Carcharhinus</i> spp.	Hiu hitam	Dried dorsal fins	All size	200
<i>Carcharhinus</i> spp.	Hiu hitam	Dried pectoral fins	All size	200

The main market destinations are Pontianak, Jakarta and Surabaya. The marketing flow is shown in Figure 5.

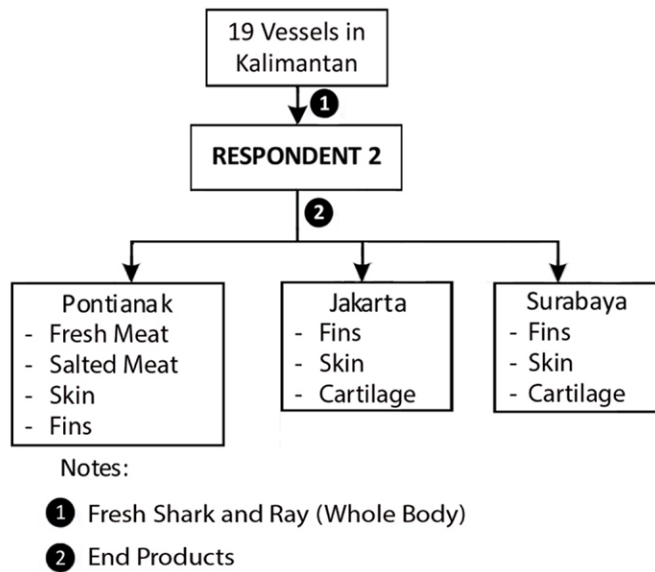


Figure 5. Marketing flow of raw materials and shark and ray products by Respondent 2

About 1-2 shipments of products from Kalimantan to outside Kalimantan per month were done. The prices of these products have increased significantly within the last five years. For instance, the price of the dried fins was IDR 1,500,000 per kg for the last four years, but significantly increased to IDR 2,000,000 per kg in 2019. Although the price showed increasing trend but the demand for dried fins has declined due to the unstable political situation with several demonstrations to protest the government policy by local people in Hong Kong. This is because Hong Kong is the primary export destination for shark and ray products for Indonesia.

The sharks and rays that purchased from fishers are generally without fins because they normally separated the fins from the body. The fins are usually sun dried on decks during fishing while the whole body part is stored into the ice box to maintain the quality of its meat. After arriving at the port, fresh sharks and rays are directly sold to the local traders, while the other low quality meat will then further processed into salted fish. The process of fish handling from fishers to traders are shown in Figure 6.

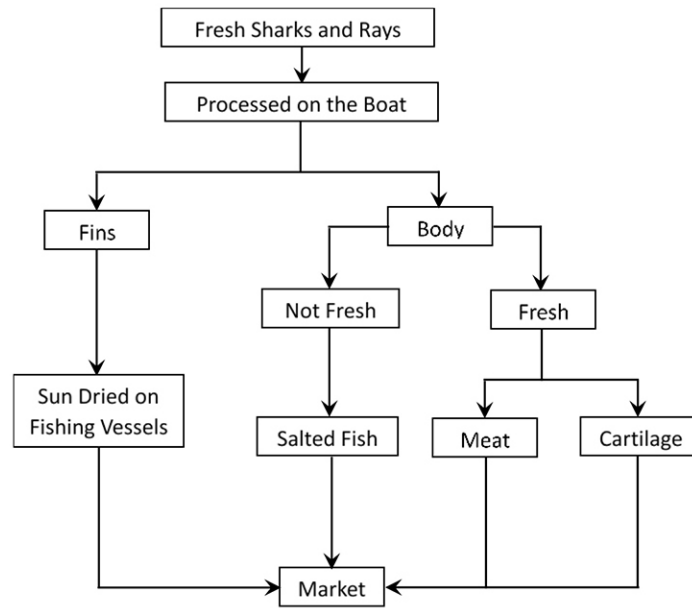


Figure 6. Processing flow of shark and ray products by Respondent 2

- Case 3 (Respondent 3)

Respondent 3 is a seafood product trader that specialized in selling dried wedgefish fins (*Rhynchobatus* spp.). The fins that purchased are categorized into small (< 20 cm), medium (20-30 cm), and large (> 30 cm). The range of prices for fin products are shown in Table 5.

Table 5. Prices of dried wedgefish fins sold by Respondent 3

Species	Local Names	Product	Categories	Price/set (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	Small	200-250
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	Medium	500
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	Large	1,000

During peak season, the supply of dried fin products could reach around 200 kg per month. Most of them have sold to Surabaya, Jakarta, and Manado (North Sulawesi). Throughout the year, dried fins are the cheapest in June and July due to the low fins consumption. This is because these two months are the unpreferable months to have parties and events that serve dried fins. Dried fins are usually served and consumed as dishes at parties or receptions, particularly during Chinese New Year celebration. During that time, the demand for the processed fin products significantly increases. The trading of fin products are mostly paid in cash after negotiation by both parties.

Ray products that mostly sold were dried fins, medium-dried fins and wet/fresh fins. Fresh fins could reduce 50% of its weight during drying process. The shipping time from Kalimantan to Java takes about seven days and it may affect the quality of the products. Therefore, airline shipping is the best shipping method that is at low risk and can avoid the potential of quality loss. Currently, only one air flight cargo that serves the shipment from Kalimantan to Java, but the shipping cost is relatively expensive. For example, shipping cost from Pontianak to Surabaya is IDR 32,000 per kg and IDR 30,000 per kg for shipment to Jakarta.

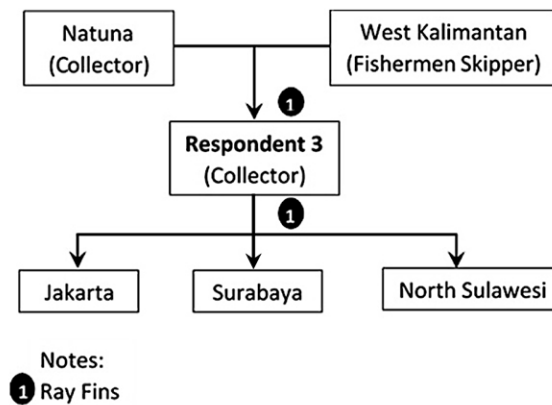


Figure 7. Marketing flow of ray fins by Respondent 3

- Case 4 (Respondent 4)

Respondent 4 has started his business in trading of shark and ray products since 2007. Most of raw materials were available throughout the year since many fishermen have caught *Rhynchobatus* spp. as targeted species. The main supplier is Respondent 2. About 90-95% of the products sold are processed fins and skin of *Rhynchobatus* spp.. These species, also called wedgefishes, has higher economic value compared to other shark species. For the shark fin products, he occasionally produces the processed-fins from *Carcharhinus* spp. (locally named ‘hiu hitam’ or requiem shark). All fin and skin products purchased are in dry condition. These processed fins are then re-sold to buyers or shark fin traders in Jakarta. For tanning skin products, he cut the skin into small pieces (locally named as ‘udon’) and then sold to Pontianak and Singkawang (Figure 8).

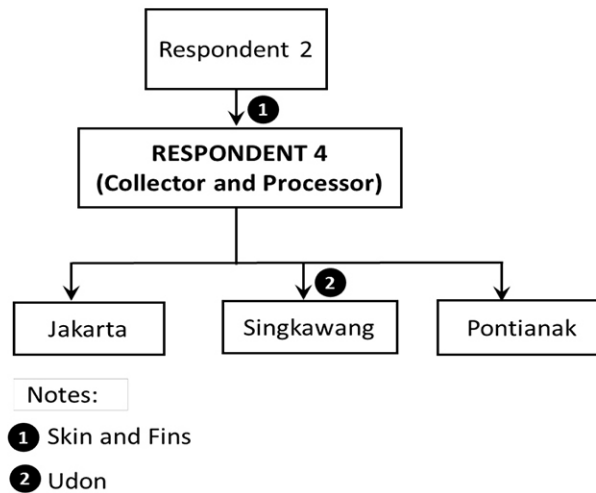


Figure 8. Marketing flow of raw materials, fin and skin products by Respondent 4

Table 6 shows the selling price of all products. Based on the interview, he got 5% profit margin of product (about IDR 5,000 per kg). The payment is made in cash once the buyer receives the fins, skin and ‘udon’. However, buyer often determines the price in most transactions. According to Respondent 4, the total volume of sales for ray fresh meat and processed products could reach one ton just within one month.

Table 6. Prices of *Rhynchobatus* spp. products sold by Respondent 4

Species	Local Name	Products	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	> 50	3,000
<i>Rhynchobatus</i> spp.	Pari kemejan	Udon	All size	100
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried skin	< 100	20-25
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried skin	> 100	45-50

- Case 5 (Respondent 5)

This respondent is a fishery product trader who focuses on selling swim bladders of pike conger fishes. Trading of wedgefishes (*Rhynchobatus* spp.) is his side business since 20 years ago. Dried fins are usually purchased directly from fishers at fishing jetty in Pontianak. All fins were dried during fishing trip. Apart from fishers, he also got supply of dried fins from traders who bought wet fins from anglers in the areas around Kakap River, Kubu Raya in West Kalimantan. Most of the products that bought are half-dried fins since most of the fins were purchased directly from fishers at jetty. Since fins were sun-dried on

the boat during fishing trip therefore, most of fins still have high moisture content. All payments are made in cash. Table 7 shows variety of dried-fins price based on its size.

Table 7. Prices of *Rhynchobatus* spp. fins sold by Respondent 5

Species	Local Name	Product	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	20-24	500
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	25-29	600
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	30-34	800
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	35-39	1,100-1,200
<i>Rhynchobatus</i> spp.	Pari kemejan	Dried fins	≥ 40	1,600-1,700

All dried ray products bought by him were already cleaned and processed. It is estimated that about 90% of the traded fin products came from *Rhynchobatus* spp.. In the past, cartilage also have good demand. However, since 2018, the demand for these products drop significantly. In the last 3-4 months, the price of the wedgefsh products had also decreased. This thought to be influenced by trade war issue between China and the United State of America. After going through drying and cleaning process, the fins were sold to Jakarta and Pontianak. Figure 10 shows the marketing flow of fins by Respondent 5.

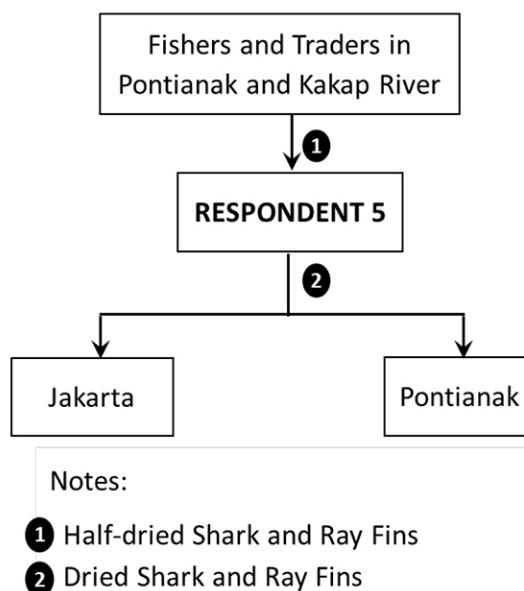


Figure 9. Marketing flow of raw materials and fin products by Respondent 5

- Case 6 (Respondent 6)

Respondent 6 is a fishery products' entrepreneur who focuses on dried shark and ray products in West Kalimantan Province since 1990. He bought raw materials from 10 local fishers in Pontianak. About 80% of the dried fins are from wedgefishes (*Rhynchobatus* spp.) and the rest are *Carcharhinus* spp.. Table 8 shows the species of sharks and rays traded by Respondent 6.

Table 8. Species of shark and ray traded by Respondent 6

No.	Species	Local Names
1	<i>Rhynchobatus</i> spp.	Kemejan (*)
2	<i>Glaucostegus typus</i>	Pari kikir
3	<i>Rhina ancylostoma</i>	Pari kupu-kupu
4	<i>Galeocerdo cuvier</i>	Hiu macan
5	<i>Carcharhinus</i> spp.	Hiu hitam

(*) dominant species

The dried fins that processed from wedgefishes are the most preferred products that traded in the area. The price and demand are significantly higher than dried fin products of *Carcharhinus* spp.. The lowest price for dried fins of wedgefish is IDR 500,000 per kg compared to IDR 300,000 per kg for *Carcharhinus* spp.. Table 9 shows range of prices for dried fins based on species and size.

Table 9. Prices of shark (*Carcharhinus* spp.) and ray (*Rhynchobatus* spp.) fins bought from fishers by Respondent 6

Species	Local Names	Product	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	15-19	500
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	20-24	500
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	25-29	700
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	30-34	1,100
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	35-39	1,200
<i>Rhynchobatus</i> spp.	Kemejan	Dried fins	> 40	2,000
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	< 14	200
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	15-24	300
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	25-29	400
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	30-34	700
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	35-39	800
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	>40	1,000-1,200

The selling price of small size shark and ray fins (plen) varies between IDR 600,000-650,000 per kg. These products usually sold in small quantities in local markets near Pontianak. The profit margin for each product is between IDR 50,000-100,000 per kg. During peak season, other traders often send their products to Jakarta directly up to 300 kg per shipment. Currently, due to the shortage supply of dried fins, Respondent 6 is rarely sold these products to Jakarta. His last shipment of 78 kg dried shark fins to Jakarta was in the past few months. According to Respondent 6, the good quality fin products not only sold to Jakarta but also to Surabaya and Pontianak. Figure 10 shows marketing channel for Respondent 6.

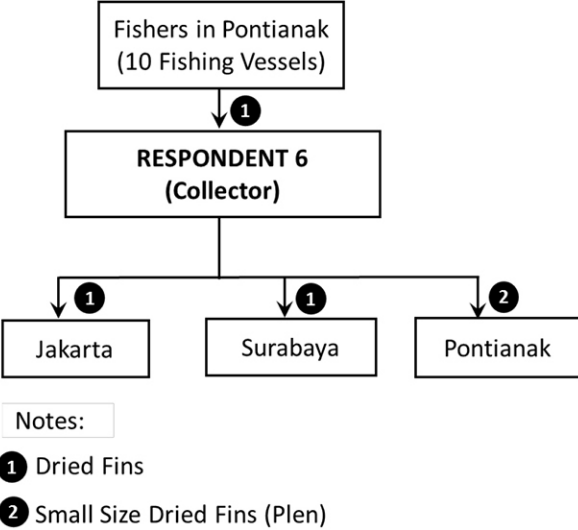


Figure 10. Marketing flow of raw materials and fin products by Respondent 6

One of the challenges in shark and ray fins trading is the price volatility where it can fluctuate up to 40% within a short period. Another problem is the availability of shipments since only one air freight is available. Most traders prefer air freight shipment since sea shipment has high risk. For example, sea shipment from Kalimantan to Jakarta requires 5-6 days, while air freight shipment took only few hours for delivery. Short time of shipping would maintain the quality of the products.

6.2. South Kalimantan

The field survey in South Kalimantan was carried out on September 5-6, 2019. Four respondents who are shark and ray merchants have been interviewed.

- Case 1 (Respondent 7)

Respondent 7 is one of the traders and brokers of fish products who is officially registered and routinely followed the trade recommendation permits issued by the Institute of Management Coastal and Marine Resource (BPSPL) Pontianak Regional Office in Banjarmasin. He started his business since 20 years ago. He bought pike conger fishes, rays, sharks, and other fish species. He bought fresh fish in large amount and sold to money lenders who are also traders in Surabaya. Although it is not the dominant species of fish that shipped to buyers, sharks and rays remain routinely traded because they have high economic value. Table 10 shows the purchase price of sharks and rays by species and size.

Sharks and rays purchased from fishers sold to buyers in Surabaya are mostly in whole-body (without removing fins or other organs). In Banjarmasin, ray products is the predominant item shipped to the Surabaya markets that could consist of 90-100% of shipment. Cowtail stingrays (*Pastinachus* spp.), *Pateobatis* spp. and *Hemistrygon* spp. considered as dominant species were sold to Surabaya. Cowtail stingrays has a lower value compared to *Pateobatis* spp. and *Hemistrygon* spp. due to low quality of skin and meat yields.

Table 10. Prices and species of shark and ray products bought by Respondent 7

Species	Local Names	Products	Sizes (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Kemejan	Whole body	13-25	15
<i>Rhina ancylostoma</i>	Pari kupu-kupu	Fresh meat	-	10
<i>Hemistrygon akajei</i>	Pari lumpur	Fresh meat	-	10
<i>Pateobatis uarnacoides</i>	Pari lumpur	Fresh meat	-	10
<i>Himantura undulata</i>	Pari bintang	Fresh meat	-	10
<i>Himantura leoparda</i>	Pari macan	Fresh meat	-	10
<i>Maculabatis gerrardi</i>	Pari lumpur	Fresh meat	-	10
<i>Pastinachus</i> spp.	Pari bendera	Fresh meat	-	8
<i>Cacharhinus sorrah</i>	Hiu pelen	Fresh meat	-	11

He receives fresh sharks and rays from ten fishers in his group member. They used bottom longlines that mainly targeted on rays and demersal fish. Based on the interview, fishers got that bottom longline gears from a seafood trader in Surabaya who also become permanent buyer of him. All fishers only can sell their catch to Respondent 7 since all fishing equipment were provided by him.

He bought various species of shark and ray, but rays dominate the purchasing. During the fishing season, collectors could supply many species and various size of rays. Volume was ranged between 300-1,000 kg per month. The peak fishing season of sharks and rays occurred from October to December while July to September is considered as off season.

Most fishers are from the area of Barito Estuary while others from the Aluh-aluh area, Bakambat Village, Sungai Musang Village (Bajar Regency) and Tabunganan (Barito Kuala Regency). They are small scale fishers mostly used a small boat, locally known as 'klotok' or 'compreng'. Fishers set and install the longline in the afternoon and collect the catch in the next morning.

All payments are in cash at the fish landings. The value of fishes was paid by him after the deduction of loan debt borrowed by anglers. Collectors will get paid once the catch has been graded, sorted, and keep in a fiber glass ice box. All catches that already packed were sent to Surabaya using sea freight shipment. It is estimated that each fiberglass ice box contained about 30 kg of fish. The delivery from Banjarmasin to Surabaya mostly took two days. Figure 11 shows the marketing flow of shark and ray products in Banjarmasin.

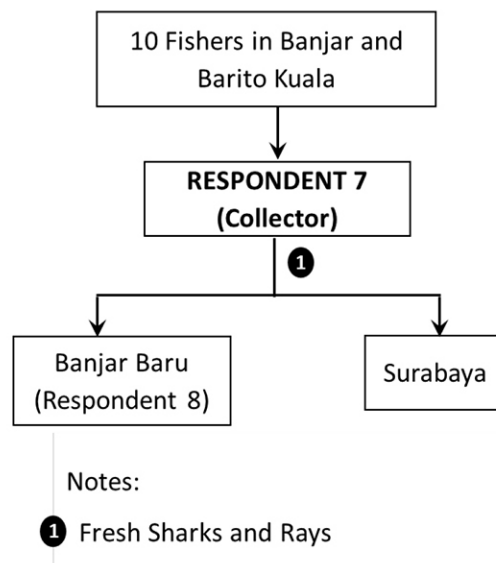


Figure 11. Marketing flow of fresh sharks and rays by Respondent 7

- Case 2 (Respondent 8)

Respondent 8 is the only trader who buys smoked and fresh sharks and rays from fishers around Sidomulyo Selatan Village, Sub District of Liang Anggang since 2015. He buys fresh sharks and rays from anglers then sells it to buyers in Surabaya through sea freight

shipment. Smoked sharks and rays were sold locally in the Banjarmasin market. Table 11 shows species of shark and ray and range of prices.

Table 11. Purchase and sale prices of shark and ray species by Respondent 8

Species	Local Names	Sizes (kg)	Purchase Price/kg (x IDR 1,000)	Sale Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Kemejan	All size	12	15-16
<i>Pastinachus</i> spp.	Pari bendera	> 5	12	15-16
<i>Pateobatis uarnacoides</i>	Pari lumpur	> 5	12	15-16
<i>Maculabatis gerrardi</i>	Pari lumpur	> 5	12	15-16

Cowtail stingrays (*Pastinachus* spp.) are commonly used to process as smoked fish. Only fishes larger than 5 kg per individual are used to process as smoked fish. Normally smoked fish lost 50% of wet weight after smoke process completed. In the local market, the price of smoked fish is around IDR 30,000 per kg. Smoked ray meat are marketed locally and in wet market at Banjarmasin. Fresh sharks and rays obtained from the primary collector. The business model among Respondent 8 and fishers is unique. For example, Respondent 8 can buy the fish from fishers without full payment. He only pay the balance after all products sold out at the market. This fact shows the trust relationship still exists among local traders and fishers.

All parts of shark and ray are fully utilized and have high economic value. For instance, the waste during making smoked fish were used as feed for duck. Respondent 8 sells his products directly to the local traditional markets in Palangkaraya, Banjarmasin, Banjarbaru (Ulin Market), and Banjar City.

The skin products made from ray are marketed around Banjarmasin and Kota Baru. These markets could accept all supplies of fresh and smoked meat from local traders. Prices are determined based on the width of the meat. The price for skin less than 20 cm (width) is sold at IDR 15,000 per kg, while for those larger than 20 cm can reach IDR 65,000 per kg. Ray skin are usually processed to become fish crackers. In the past, Respondent 8 had processed ray and shark skin to become crackers, but this activity had stopped due to less demand.

Besides of ray skin products, Respondent 8 also sells whole-body of sharks and rays to Surabaya at IDR 15,000-16,000 per kg. However, most of sharks and wedgefishes are sold without fins. So far, selling of shark and ray products to Surabaya is still on going as usual

without any rejection from buyers. Some fresh fish that not sold at local market will be processed as smoked meat. Figure 12 shows the marketing flow of shark and ray products by Respondent 8.

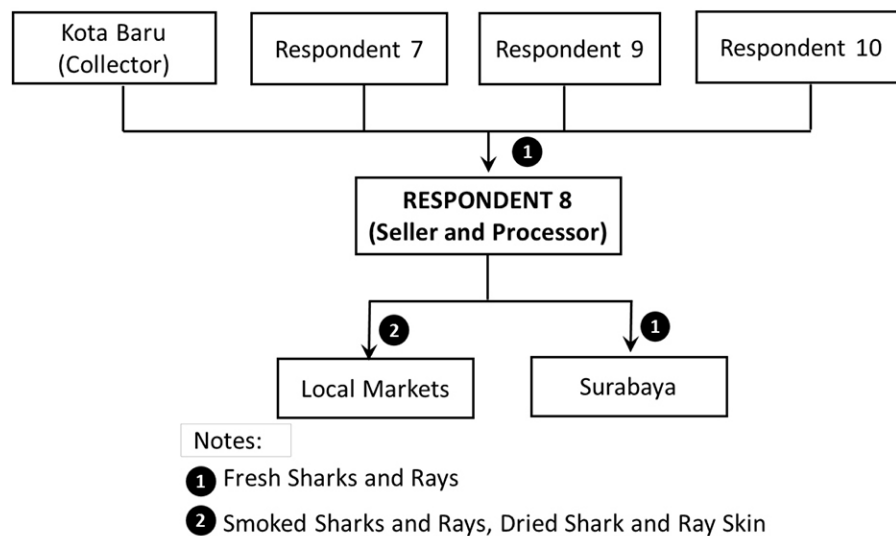


Figure 12. Marketing flow of raw materials, shark and ray products by Respondent 8

One of the major challenges for Respondent 8 is inconsistent supply of raw materials. During the planting season, most of fishers switched their job to become paddy farmers. Another challenge is the moneylender relationship among anglers and buyers. Fishers are not allowed to sell their catches to other buyers except to the buyer who lends money to them.

- Case 3 (Respondent 9)

Respondent 9 is one of the sharks and rays collector and trader who live in Banjar Baru Regency. According to the interview, he has started his business four years ago. He got his daily supply of fresh sharks and rays from fishers who landed the catches in Tanipah Village, Aluh-aluh district, Banjar Regency. Besides trading of shark and ray products, he also sells pike conger fishes (locally known as ‘ikan malong’) to Surabaya traders. The most valuable part of pike conger fishes is swim bladder which can be sold at a very high price (traders can get a reasonable price up to IDR 3 million per kg of dried swim bladder). Table 12 shows species of shark and ray traded by Respondent 9.

Table 12. Purchase and sale prices of sharks and rays traded by Respondent 9

Species	Local Names	Product	Purchase Price/kg (x IDR 1,000)	Sale Price/kg (x IDR 1,000)
<i>Rhynchobatus springeri</i>	Kemejan	Fresh meat	7	11-12
<i>Pateobatis uarnacoides</i>	Pari lumpur	Fresh meat	10-11	14
<i>Pastinachus</i> spp.	Pari bendera	Fresh meat	8	10-11
<i>Maculabatis gerrardi</i>	Pari lumpur	Fresh meat	8	10-11
<i>Carcharhinus sorrah</i>	Hiu pelen	Fresh meat	8	10-11

The supply of raw materials mostly obtained from 13 fishers of his group members. Each member received financial allocation and a set of bottom longline gear locally named as ‘rawai senggol’ which contains 5,000 hooks. Fishing activities are carried out using a small wooden canoe that is operated by two peoples. Hauling and setting are done at night until the next morning (one-night fishing). Figure 13 shows the marketing flow of shark and ray products.

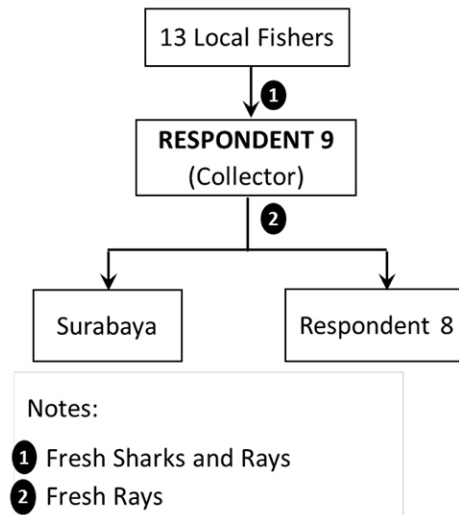


Figure 13. Marketing flow of raw materials, shark and ray products by Respondent 9

- Case 4 (Respondent 10)

Respondent 10 is a fish commodities trader who sells the whole body of sharks and rays bought from the primary market to Surabaya and Lamongan in East Java. His product, like smoked-meat ray, is marketed in cities around Banjarmasin (Figure 14). He had started the business for the last 4-5 years ago. The high business competition of other fish commodities among traders had make him remains in shark and ray products trading.

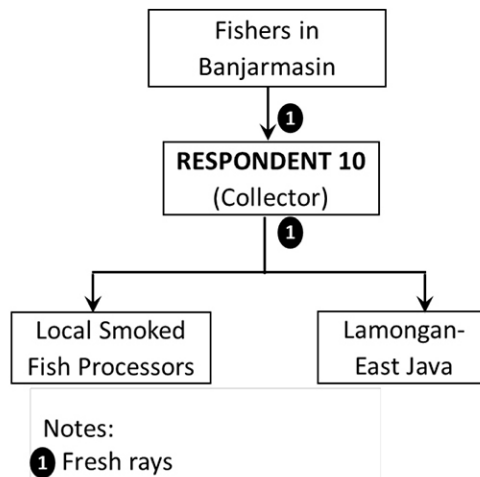


Figure 14. Marketing flow of fresh rays by Respondent 10

Table 13 shows the selling price by Respondent 10. The fresh rays will be shipped to Surabaya routinely when reached the quota of 1,300 kg. Buyers in Surabaya will then processed the whole fresh meat to become smoked-ray meat. Actually, buyers in Surabaya also preferred sharks and wedgesfishes, but these species are rarely caught by fishers in Banjarmasin.

Table 13. Prices of ray species sold by Respondent 10

No.	Species	Local Names	Price/kg (x IDR 1,000)
1	<i>Pateobatis uarnacoides</i>	Pari lumpur	18
2	<i>Pastinachus</i> spp.	Pari bendera	11-12
3	<i>Dasyatis</i> spp.	Pari batu	12

To get a regular supply, he has ten fishers who got technical assistance and debt from him as he also acts as the moneylender and the trader. The partnership model is that he provides initial capital to the fishers in form of fishing gears. In the simple agreement, the anglers were obligated to sell their catches to him as the moneylender, where he often determined the buying price. Each of the fishers got a set of bottom longline that consists of 10,000 hooks, which equal to IDR 13,000,000. There is no shark has been caught by the fishers since most of them used the bottom longline (or locally called ‘rawai senggol’).

One of the challenges in trading of ray products is the shortage of raw material supplies from fishers. Fishers normally fishing only during peak season but switched to become paddy farmers during off season. Fishers also often change their gears to other types such as gill nets during shrimp season. The products are sea shipped to Surabaya, with cost about

IDR 3.5-5 million per shipment for six tons package. It requires 70 ice blocks to maintain the freshness of products during three days journey from Banjarmasin to Surabaya. If the product quantity is less than six tons, he sends by using fiberglass ice box container that cost about IDR 200,000 per box per shipment.

6.3. East Kalimantan

A survey of market and trade of shark and ray products in East Kalimantan was carried out on September 8-10, 2019. A total of eight respondents who are sharks and rays' traders and its derivative products have been interviewed according to the interview guidelines in Appendix 1. The profile and the details of their business are as follows:

- Case 1 (Respondent 11)

Respondent 11 is a trader of shark and ray products who began his business ten years ago. He bought the dried fin products from Sulawesi fishers and whole-body of fresh sharks from Balikpapan anglers. The shark and ray species that commonly purchased by him are described in Table 14. He only able to purchase shark fins from Sulawesi fishers, since the local fishers have to sell their catches to local traders who act as moneylender. They are only allowed to sell the whole-body of sharks or other species to specific traders. Fishers are predominantly used long lines, so that the common catches are sharks. Sabakatai Island and Ambo Island in Makassar Strait are their fishing ground.

Table 14. Species of shark and ray bought by Respondent 11

No.	Species	Local Names
1	<i>Carcharhinus</i> spp.	Hiu hitam (*)
2	<i>Sphyrna</i> spp.	Hiu martil
3	<i>Rhina ancylostoma</i>	Pari kupu-kupu
4	<i>Rhynchobatus</i> spp.	Pari lontar (*)
5	<i>Glaucostegus</i> spp.	Pari kikir
9	<i>Prionace glauca</i>	Hiu karet
10	<i>Rhizoprionodon oligolinx</i>	Hiu pisang

(*) dominant species

He purchases fresh whole body of sharks and rays from local fishers and dried fins from Respondent 15. He is also a moneylender for local fishers. Fishers need to sell their catches

to him. However, few traders may approached same fishers to buy the catches and bargain the price. So, fishers may allow to sell the catches to traders who offer the highest price.

Local fishers mostly use gill nets with mesh size of 60 cm that targeted for wedgefishes (*Rhynchobatus* spp.). Their fishing grounds cover the Grogot, Tanjung Aru, Handil, and Muara Pasir waters. Since they go fishing with a small canoe, most of them fishing daily with the initial cost of about IDR 350,000 or equal to 50 liters of diesel. On average, they able to catch 1-2 individuals of rays daily. Price of wedgefishes is higher than sharks. Table 15 shows the information on purchasing price per species, while Table 16 displays the selling price by Respondent 11.

Table 15. Prices of shark and ray products bought by Respondent 11

Species	Local Names	Products	Sizes of Fin (cm)	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Kemejan	Fish with fins	≥ 50	4,000*
<i>Rhynchobatus</i> spp.	Kemejan	Fish with fins	45-49	3,500*
<i>Rhynchobatus</i> spp.	Kemejan	Fish with fins	40-44	2,500-2,600*
<i>Carcharhinus</i> spp.	Hiu hitam	Wet fins	< 25	100-200
<i>Carcharhinus</i> spp.	Hiu hitam	Wet fins	25-34	200
<i>Carcharhinus</i> spp.	Hiu hitam	Wet fins	35-40	350
<i>Himantura</i> spp.	Pari	Fresh meat	-	40

(*) Price/individual with fins attached

The dorsal fin of wedgefish with size more than or equal to 50 cm height usually has a body weight around 100 kg. For 45-49 cm dorsal fin height, its body weight is about 80 kg and for 40-44 cm height its body weight is about 40 kg.

Table 16. Prices of shark and ray products sold by Respondent 11

Species	Local Names	Products	Sizes of Fin (cm)	Price/kg (x IDR 1,000)
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	< 25	150
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	25-34	500
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	35-40	800
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	40-44	1,600-1,700
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	45-49	1,800-1,900
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	≥ 50	2,000
<i>Rhynchobatus</i> spp.	Pari lontar	Wet fins	≥ 50	4,000-5,000*
<i>Rhynchobatus</i> spp.	Pari lontar	Fresh meat	-	8-10

(*) Price/set (comprising of one dorsal fin, two pectoral fins and caudal fin)

Each product has different market areas. The main market for dried shark and wedgefsh fins are in Surabaya, while for wet fin of wedgefshes are in Makassar. The main market for fresh meat is around Balikpapan city (Figure 15).

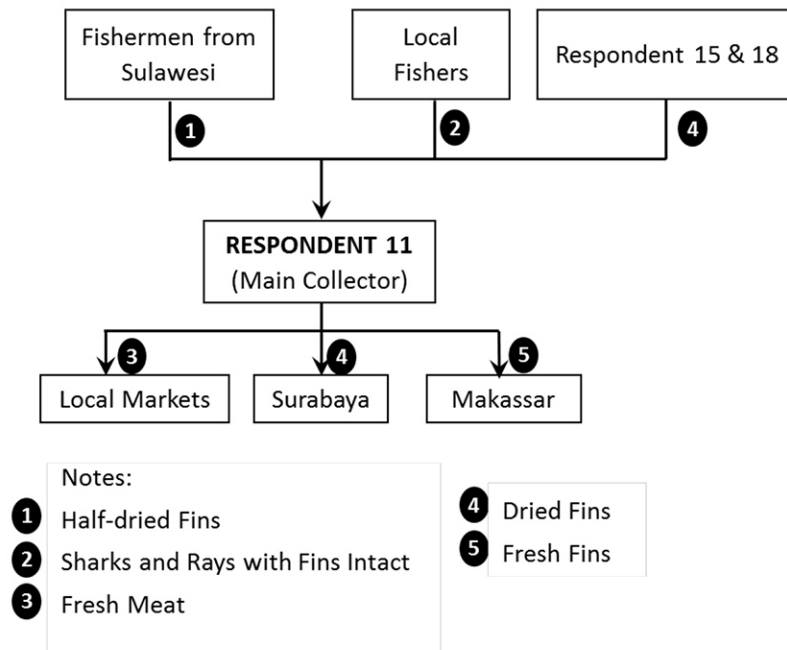


Figure 15. Marketing flow of raw materials and fin products by Respondent 11

There is only one air freight is available to ship the dried fins to Surabaya with cost about IDR 22,000 per kg. The buyers in Surabaya need to settle the payment in advance before the products were delivered. This aims to minimize the risk of payment not be made by buyers after consignment received. If demand is high, buyers in Surabaya only takes profit margins about 3-4%.

During low season in August to September, he could deliver 100 kg of wedgefsh fins (as many as 50 set of fins; one set comprising of two dorsal fins and a caudal fin) and 200 kg of shark fins to the buyers in Surabaya. In October, the supply could increase up to 300 sets of shark fins. Although there is a significant increase in shark fins exportation during October, but in general total exported of fins have decreased since last year. This is due to the low demands of shark fin products as an impact of its high price over the years.

According to him, the price of dried fin products based on the Surabaya traders' price has slightly decreased over the months. The uncondusive export process to China and Hong Kong triggers this situation, as these countries are the primary market of shark fin products. On the other hand, the new Decree of the Ministry of Marine Affairs and Fisheries No.5/2018 to ban export products of silky shark and hammerhead shark might have a direct impact on the price

of all requiem shark products, including fins. It is noted that the dried fins price had dropped almost 50% after the implementation of the Decree.

- Case 2 (Respondent 12)

Respondent 12 is one of the sharks and rays trader in Balikpapan. His main products are smoked meat made from various shark and ray species. However, not all ray species can be used to make smoked meat. The ray species that locally known as ‘pari bubuk’ is not suitable to process as smoked meat due to its high moisture content. Yet, wedgefishes are the primary source for making the smoked meat. Table 17 shows the shark and ray species that processed to make smoked meat.

Table 17. Species of shark and ray processed by Respondent 12

No.	Species	Local Names
1	<i>Rhynchobatus</i> spp.	Pari lontar (*)
2	<i>Carcharhinus</i> spp.	Hiu hitam (*)
3	<i>Alopias</i> spp.	Hiu tikus
4	<i>Hemigaleus microstoma</i>	Hiu kacang
5	<i>Stegostoma fasciatum</i>	Hiu belimbing
6	<i>Pateobatis</i> spp.	Pari burung
7	<i>Neotrygon orientalis</i>	Pari totol
8	<i>Pastinachus</i> spp.	Pari bendera
9	<i>Himantura leoparda</i>	Pari macan

(*) dominant species

In general, purchasing price for whole fresh sharks and rays are more expensive (IDR 10,000 per kg) compared to those without fins (IDR 8,000 per kg). Figure 16 shows the process of making smoked meat products.

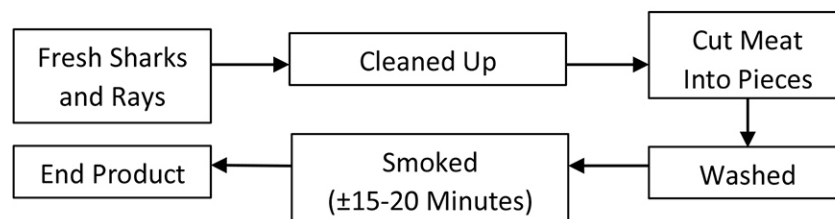


Figure 16. Processing flow of smoked fish by Respondent 12

In making smoked meat, stomach contents, cartilage, gills, head, and skin which have no economic value are removed. About 100 kg of fresh fish could produce 50 kg of smoked meat. During high season, local fishers could supply 2-3 tons per day, but due to the limited capacity of his processing area, he only manage to process around 200 kg per day. Table 18 shows the selling price of the products by Respondent 12.

Table 18. Prices of shark and ray products sold by Respondent 12

Species	Local Names	Products	Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari lontar	Smoked fish	60-80
<i>Carcharhinus</i> spp.	Hiu hitam	Smoked fish	60-80
<i>Dasyatis</i> spp.	Pari	Dried skin	40
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins (<25 cm)	120

He got supply of raw materials from local fishers and Respondent 11. All end products such as smoked meat, dried skin and fins were marketed locally in Balikpapan. Figure 17 shows the marketing flow of raw material and products by Respondent 12.

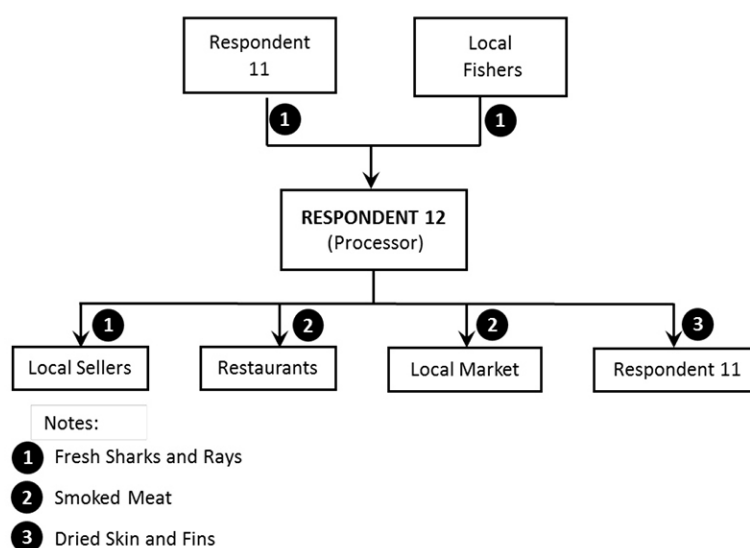


Figure 17. Marketing flow of raw materials and end products by Respondent 12

- Case 3 (Respondent 13)

Respondent 13 is a local fish trader. His business has been started about nine years ago. He provided capital to seven fishers in the form of fuel and as the consequences, all fishers are agreed to sell their catch to him. He also obtain supply from another 13 fishers who routinely sell their catches to him without any agreement.

The most common shark species purchased are *Carcharhinus* spp., blue shark (*Prionace glauca*) and tiger shark (*Galeocerdo cuvier*). The marketing flow of raw materials and shark and ray products shown in Figure 18.

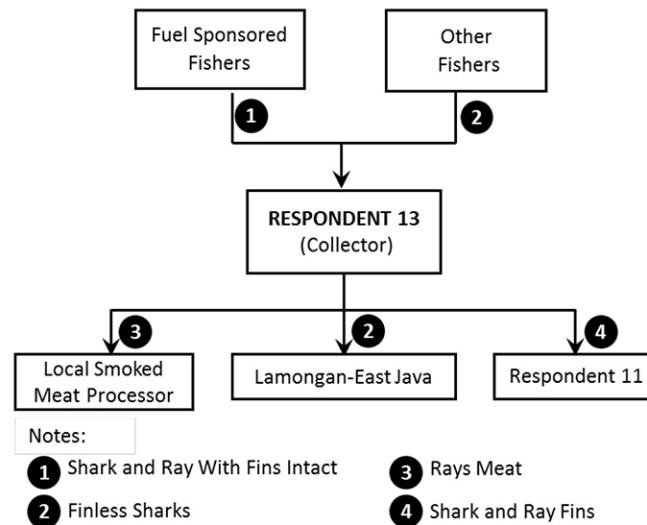


Figure 18. Marketing flow of raw materials and shark and ray products by Respondent 13

He bought raw materials at around IDR 8,000 per kg from local fishers then sold back to buyers in Lamongan, East Java, at around IDR 12,000 per kg. The smoked meat sold by local smoked fish processors in Balikpapan is about IDR 10,000 per kg. He and the seller from Lamongan will share 50% of the shipping cost (IDR 8,000,000 per shipment) respectively. The truck to Lamongan can load 4-5 tons per trip. For each consignment, about 50 ice blocks weight about 30 kg were used to keep products in fresh. The shipment could reach as much as six tons per month during high season (April to June) and only one ton per month during off season.

- Case 4 (Respondent 14)

Respondent 14 is a trader of various species of live fish, including groupers, lobsters, sharks, and rays. He started his business since 2016. Several species of shark and ray that traded has shown in Table 19. He got supply of live fish from local fishers who are specialize in catching live fish for trade. He only make the payment to suppliers after fishes survive in his adaptation tank for one-day. This is to minimize the lost of live fishes after purchased. The same practice also applied when Respondent 14 selling his live fish to exporters in Jakarta and Bali. Although live fish trading is a high risk business, but it could take significant margin profit for both buyers and sellers.

Table 19. Species of live shark and ray traded by Respondent 14

No.	Species	Local Names	Sizes (cm)	Purchase Price/individual (x IDR 1,000)	Sales Price/individual (x IDR 1,000)
1	<i>Stegostoma fasciatum</i>	Hiu belimbing	80-120	800	2,000
2	<i>Stegostoma fasciatum</i>	Hiu belimbing	121-150	1,500-2,000	4,500-5,000
3	<i>Nebrius ferugineus</i>	Hiu bisu	80-120	500	2,000
4	<i>Nebrius ferugineus</i>	Hiu bisu	121-150	1,000	3,000
5	<i>Chiloscyllium punctatum</i>	Hiu kacang	80-120	200	800
6	<i>Chiloscyllium punctatum</i>	Hiu kacang	121-150	500	1,000
7	<i>Rhina ancylostoma</i>	Pari kuku-kupu	80-110	1,500	4,000
8	<i>Rhina ancylostoma</i>	Pari kuku-kupu	> 110	3,000	7,000
9	<i>Rhynchobatus laevis</i>	Pari lontar	> 80	300	700
10	<i>Carcharhinus melanopterus</i>	Hiu hitam	> 80	200	600

He uses airline cargo to deliver his live fish to buyers in Jakarta and Bali and Johor, Malaysia. The delivery costs is about IDR 35,000 per kg. Figure 15 shows the marketing flow of the live sharks and rays by Respondent 14.

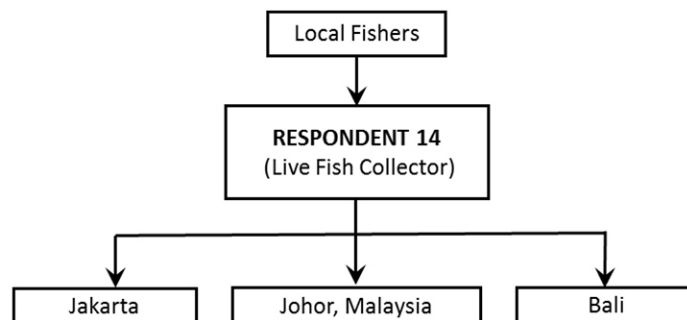


Figure 19. Marketing flow of live sharks and rays by Respondent 14

- Case 5 (Respondent 15)

Respondent 15 is a trader of shark and ray products, and fish swim bladder. His business was established in 1990s. Table 20 shows shark and ray species traded by him.

Table 20. Species of shark and ray traded by Respondent 15

No.	Species	Local Names
1	<i>Carcharhinus</i> spp.*	Hiu hitam
2	<i>Chiloscyllium punctatum</i> **	Hiu batu
3	<i>Mustelus manazo</i> **	Hiu kacang
4	<i>Hemipristis elongata</i> **	Hiu monas
5	<i>Hemigaleus microstoma</i> **	Hiu kacang
6	<i>Rhizoprionodon</i> spp.**	Hiu pisang
7	<i>Shpyrna</i> spp.***	Hiu tanduk
8	<i>Rhina ancylostoma</i> ***	Pari kupu-kupu
9	<i>Rhynchobatus</i> spp.*	Pari lontar
10	<i>Glaucostegus</i> spp.***	Pari kikir

(* dominant species; (**) common species; (***) rare species

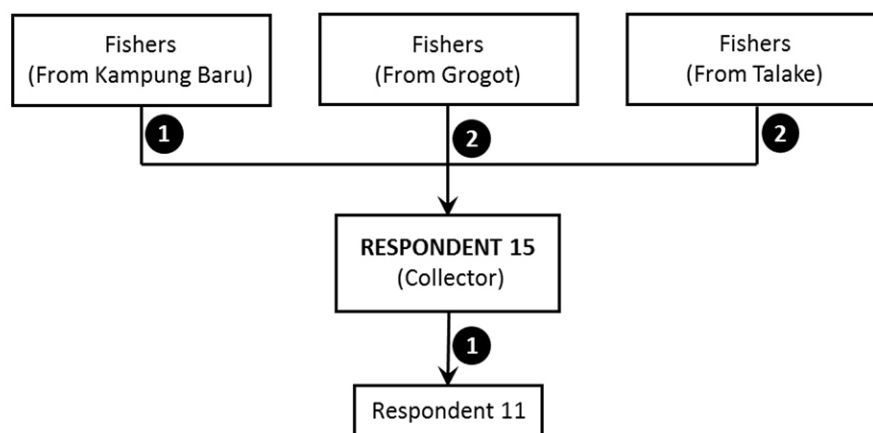
Unlike other traders, he buys fins from fishers based on the size of fins. These fins including wedgefishes (*Rhynchobatus* spp.) are purchased in wet and dried conditions. Table 21 shows the purchasing price of shark and wedgefins by Respondent 15.

Table 21. Purchase prices of shark and wedgefins by Respondent 15

No.	Species	Local Names	Products	Sizes (cm)	Price/set fin (x IDR 1,000)
1	<i>Rhynchobatus</i> spp.	Pari lontar	Wet fins	20-29	70
2	<i>Rhynchobatus</i> spp.	Pari lontar	Wet fins	30-34	200
3	<i>Rhynchobatus</i> spp.	Pari lontar	Wet fins	35-39	300-350
4	<i>Rhynchobatus</i> spp.	Pari lontar	Wet fins	≥ 40	1,000
5	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	15-19	300
6	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	20-29	400-450
7	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	30-34	600
8	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	35-39	650
9	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	40-49	1,000
10	<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	≥ 50	1,500
11	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	10-19	100
12	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	20-24	300
13	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	25-29	350
14	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	30-39	450
15	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	40-49	900
16	<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	≥ 50	1,200

The profit margin is ranged between IDR 50,000-75,000 per set. He sold fin products to Respondent 11. A few years ago, he also sold fins to Surabaya, but due to limited supply

from fishers, this business has stopped since 2017. Figure 20 shows the marketing flow of the shark and ray fins by Respondent 15.



Notes:

- 1 Fresh Ray Fins and Dried Shark and Ray Fins
- 2 Dried Shark and Ray Fins

Figure 20. Marketing flow of raw materials and fin products by Respondent 15

- Case 6 (Respondent 16)

Respondent 16 is a trader of various fish species such as snappers, groupers, catfishes, as well as shark and ray products. His business was established over five years ago. Several species of shark and ray that traded by Respondent 16 is shown in Table 22.

Table 22. Species of shark and ray traded by Respondent 16

No.	Species	Local Names
1	<i>Isurus paucus</i> **	Mako sirip panjang
2	<i>Isurus oxyrinchus</i> **	Mako sirip pendek
3	<i>Hemipristis elongata</i> ***	Hiu kacang
4	<i>Carcharhinus</i> spp.*	Hiu hitam
5	<i>Galeocerdo cuvier</i> ***	Hiu macan
6	<i>Rhynchobatus</i> spp.**	Pari lontar
7	<i>Mustelus manazo</i> ***	Hiu kacang
8	<i>Hemigaleus microstoma</i> ***	Hiu pilus
9	<i>Prionace glauca</i> ***	Hiu biru

(* dominant species; (**) common species; (***) rare species

Most supply of shark comes from seven sponsored fishers those migrate from Muncar in East Java and now become permanent resident of Balikpapan. All sponsored fishers obtained capital from Respondent 16, so they have to sell the catch to him. The supply also comes from several fishers in Makassar, Penajam, and Balikpapan. Most of sharks and rays purchased are without fins. However, sharks and rays purchased from Muncar were in whole body. Figure 21 shows the marketing flow of shark and ray products by Respondent 16.

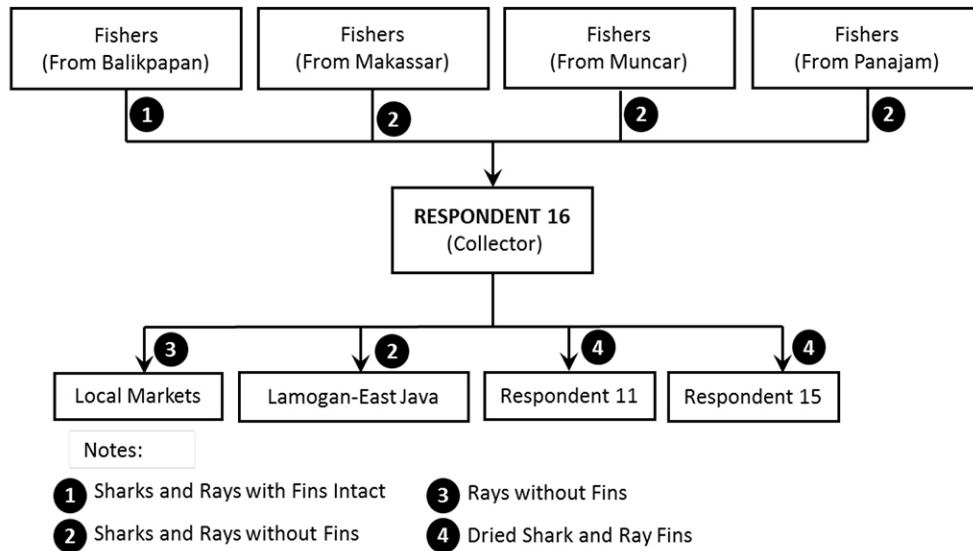


Figure 21. Marketing flow of raw materials and fin products by Respondent 16

The price of whole fish is between IDR 15,000-18,000 per kg and fish without fins is IDR 8,000 per kg. The purchased fish were then sold at local market in Balikpapan at IDR 9,000-10,000 per kg. Price in Java is slightly higher at about IDR 13,000-15,000 per kg. On the other hand, wet fins were mostly sold at about IDR 150,000-200,000 per kg, according to size and species. The volume of shark and ray meat for each shipment could be 3-5 tons. One to two tons from the shipment were marketed in Balikpapan, while the rest was sold to Lamongan. Payment is made by buyers after products have arrived and re-weighed.

- Case 7 (Respondent 17)

Respondent 17 has started his shark and ray business since 1993. His supplies come from eight local fishers. Each fisher usually gets fishing gears and fuels that worth IDR 70-100 million per boat per trip from him. In principal, all fishers must sell their catches to him. He also receives supply from other fishers come from Kota Baru. Table 23 shows shark and ray species traded by Respondent 17.

Table 23. Species of shark and ray traded by Respondent 17

No.	Species	Local Names
1	<i>Carcharhinus</i> spp.*	Hiu hitam
2	<i>Rhynchobatus</i> spp.**	Pari lontar
3	<i>Aetomylaeus nichofi</i> **	Pari burung
4	<i>Pateobatis uarnacoides</i> **	Pari kembang
5	<i>Himantura</i> spp.***	Pari kembang
6	<i>Glaucostegus</i> spp.***	Pari kikir
7	<i>Hemipristis elongata</i> ***	Hiu kacang
8	<i>Stegostoma fasciatum</i> ***	Hiu belimbing
9	<i>Prionace glauca</i> ***	Hiu biru
10	<i>Galeocerdo cuvier</i> ***	Hiu macan
11	<i>Sphyrna</i> spp.***	Hiu martil

(*) dominant species; (**) common species; (***) rare species

He usually purchased whole body of sharks and rays from fishers at IDR 9,000 per kg. He then sold between IDR 10,000-13,000 per kg. The purchased price of wedgefish at landing site is IDR 13,000 per kg, then re-sale in Lamongan at minimum price of IDR 16,000 per kg. Figure 22 shows the marketing flow of sharks and rays by Respondent 17.

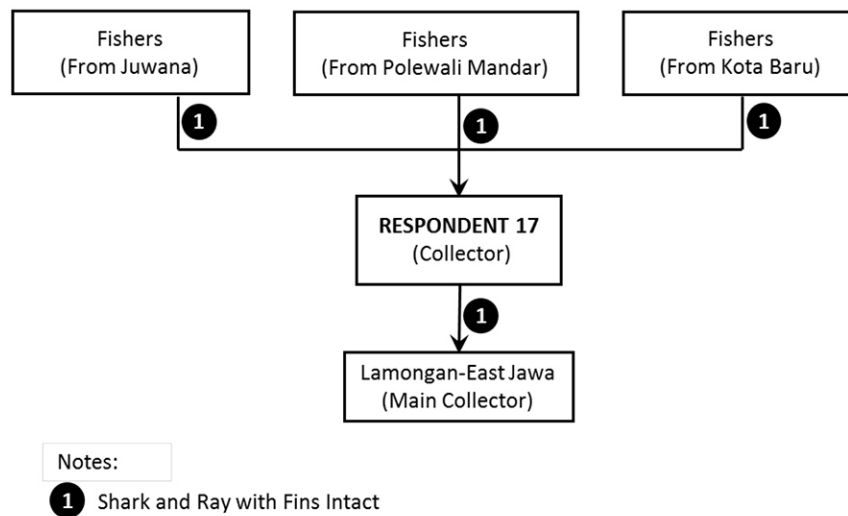


Figure 22. Marketing flow of sharks and rays by Respondent 17

Within a month, volume of sales of various shark and ray species to Lamongan in Java can reached 10 tons. In general, the composition is about 60-70% of sharks and 30-40% of rays.

- Case 8 (Respondent 18)

Respondent 18 is the only collector of ray skin products in East Kalimantan. However, at present, ray skin business is very slow due to less demand. He also sold dried ray fins to Respondent 11. The dried ray fins sized between 5-10 cm height that purchased from smoked-meat processors is between IDR 70,000-80,000 per kg. He got supply of ray skin from smoked-meat processors in Samarinda and Balikpapan. The skin products of *Pateobatis uarnacoides* and *Maculabatis gerrardi* are commonly traded by him. However, demand of *P. uarnacoides* is higher than *M. gerrardi*. Figure 23 shows the marketing flow of skin and fin products by Respondent 18.

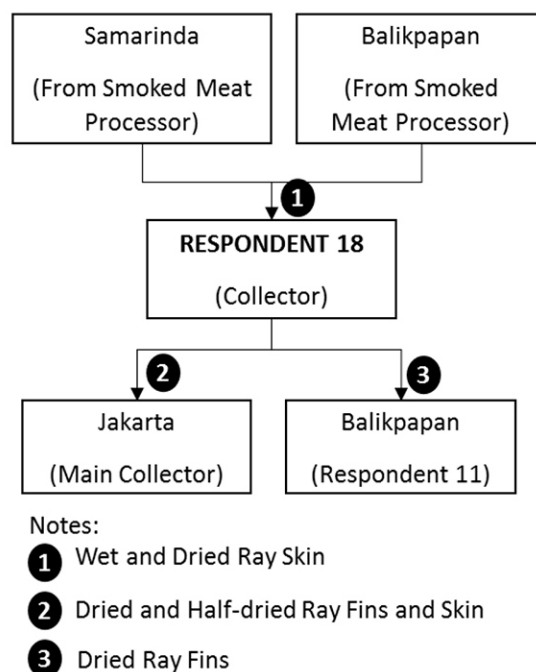


Figure 23. Marketing flow of ray skin and fin products by Respondent 18

There are two types of ray skin products traded namely dry salted-skin and dry unsalted-skin. The high demand of dry-unsalted skin products are used in making ‘udon’ while dry salted-skin products are used as raw material for making leather accessories such as wallets, handbags etc.

He usually buys dry unsalted-ray skin products at IDR 45,000-60,000 per kg that consist of 2-3 pieces of skin. These products then sold at IDR 100,000-120,000 per kg. During peak season, the volume of skin products supply can reach 100-120 kg per month. The main market of ray skin products is Jakarta. Shipment mostly done by air freight cargo services

three times per month. He received payment from buyers after products arrived in Jakarta. The price mostly determined by buyers.

Currently, the price of ray skin products decrease up to 30% over the years. High cost of shipping to Jakarta also become another challenges. It could cost about IDR 20,000 per kg. Minimum volume to get the profit for each shipment to Jakarta is about 120 kg.

6.4. North Kalimantan

The survey in North Kalimantan Province has been conducted from September 12-16, 2019. Eight traders and collectors were interviewed during the survey.

- Case 1 (Respondent 19)

Respondent 19 is a shark and ray trader who started his business in 1998. He purchased half-dried shark fins from fishers around Tarakan. He also got supply from fishers and brokers around Sebatik Island. Sebatik Island is closely located to Tarakan. All brokers received commission from traders based on number of fins he sold to traders. The brokers from Sebatik Island mostly got fin supplies from fishers. Sharks are considered as by-catch in Sebatik Island. In general, the peak season of fishing occurred from February to July every year. Local traders could collect 60-80 kg of dried fins per month during this season and about 40 kg per month during off season. Table 24 shows shark and ray fin products purchased by Respondent 19.

Table 24. Product of shark and ray fins purchased by Respondent 19

Species	Local Names	Product	Sizes (cm)	Price /kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	15-20	500-600
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	20-30	900-1,000
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	30-40	1,300-1,500
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	40-50	1,800-2,000
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	> 50	2,300-2,500
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	15-20	300-400
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	20-30	600-700
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	30-40	900-1,000
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	40-50	1,100-1,200
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	> 50	1,300-1,500

He gained 10% profit from trading dried fins. Considering the expensive cost of the shipping, he and his customers in Java share the shipping cost proportionally at 50%, respectively. If dried fins purchased from fishers contain about 50% moisture, the price will be reduced based on mutual agreement among fishers and him. In order to minimize the risk, he will only send his products to his customers in Jakarta once he received the payment. This type of payment mechanism proved that dried fin products is highly demand in Jakarta.

Some criteria have been applied when determining the price. The price of dried fins for shark depends on the length of pectoral fins, and height of dorsal and caudal fins. As for ray, the price was based on height of first and second dorsal fins, and length of caudal fin. Currently, sea shipment cost from Tarakan to Surabaya is about IDR 100,000 per 30 kg. This is cheaper compared to air freight cargo that costs about IDR 60,000 per kg. The delivery from Tarakan to Surabaya by sea usually takes 7-10 days, including unloading process at Subaraya Port.

Currently, dried shark fins demand in Jakarta is higher than supply. For example, he needs six months to collect 250 kg of dried shark fins. Marketing destinations are Jakarta, Surabaya, and Makassar. Details are shown in Figure 24.

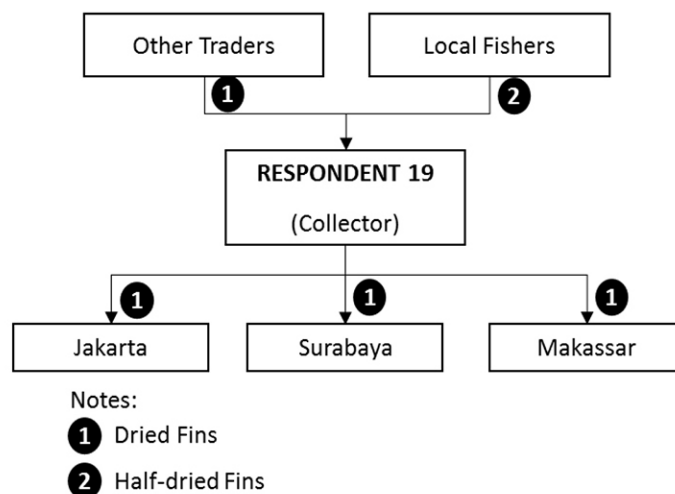


Figure 24. Marketing flow of fin products by Respondent 19

- Case 2 (Respondent 20)

Respondent 20 is a seafood trader and his main business is frozen milkfish. His side business including frozen meat and ray skin. Both products have been purchased from local

fishers in Tarakan. Fins of shark and ray purchased by him are not intacted. Table 25 shows the species of shark and ray purchased by Respondent 20.

Table 25. Species of shark and ray purchased by Respondent 20

No.	Species	Local Names
1	<i>Carcharhinus leucas</i> *	Hiu hitam
2	<i>Carcharhinus limbatus</i> *	Hiu hitam
3	<i>Carcharhinus sorrah</i> *	Hiu hitam
4	<i>Sphyrna lewini</i> **	Hiu martil
5	<i>Rhynchobatus australiae</i> *	Lontar
6	<i>Glaucostegus typus</i> *	Pari kikir
7	<i>Himantura undulata</i> *	Pari macan
8	<i>Maculabatis gerrardi</i> **	Pari bintang

(*) common species; (**) rare species

He only buys fresh fish from local fishers to make sure the quality of frozen meat and ray skin. His products are mostly marketed to Jakarta. Details on the price of shark and ray products are shown in Table 26.

Table 26. Purchase and sale prices of shark and ray species by Respondent 20

Species	Local Names	Products	Purchase Price/kg (IDR)	Sale Price/kg (IDR)
<i>Himantura</i> spp.	Pari	Skin	14,000	15,000
<i>Rhynchobatus</i> spp.	Pari lontar	Fresh meat	6,000	6,700-7,000
<i>Carcharhinus</i> spp.	Hiu	Fresh meat	6,000	6,700-7,000
<i>Himantura</i> spp.	Pari	Fresh meat	5,500	6,200-6,500

Unconsumable parts such as head has no market value and usually given free to crocodile farmers. Normally the farmers will come to collect at his processing plant. He uses 'air blast freezing' (ABF) for freezing process to maintain the quality of meat. It takes 18-24 hours at temperature -35°C. Once the ABF process completed, products are stored into 80 tons capacity of cold storage. Figure 25 shows the process of making frozen shark and ray meat.

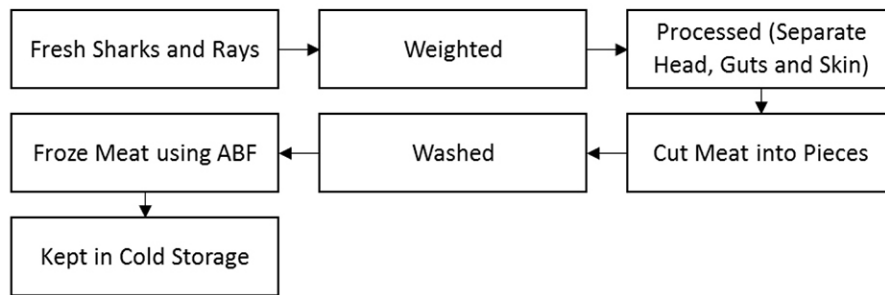


Figure 25. Processing flow of frozen shark and ray meat by Respondent 20

The main market of frozen meat and skin products is Muara Baru in Jakarta. A 20 feet frozen meat container with 13 tons capacity is used for shipping. Sometimes he mixed frozen meat and skin of sharks and rays with other seafood products to maximize the shipment. For example, the last shipment to Muara Baru contained three tons of shark, two tons of ray products, and eight tons of other fishes such as giant catfish, snappers and swordfish meat. The shipment often occurred once in 2-3 months and it costs about IDR 84,000,000 per shipment. The marketing flow of raw materials and frozen products is shown in Figure 26.

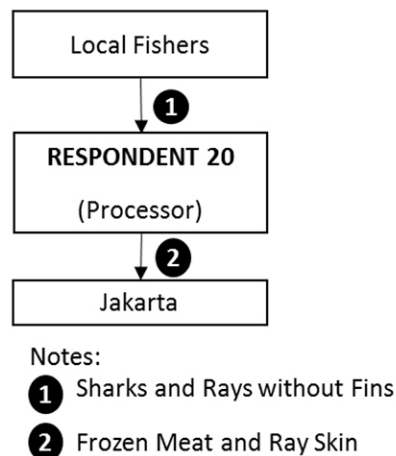


Figure 26. Marketing flow of raw materials and frozen products by Respondent 20

- Case 3 (Respondent 21)

Respondent 21 is a live fish trader who focus in live sharks and rays trading. His company was established in 1997. He sells various species of shark and ray such as zebra shark (*Stegostoma fasciatum*), tawny nurse shark (*Nebrius ferugineus*), bowmouth guitarfish (*Rhina ancylostoma*) and spinetail devil ray (*Mobula japonica*). He got supply from local fishers around Bunyuk waters in district of Bulungan. The purchased price of two ray species by Respondent 21 is shown in Table 27.

Table 27. Species of live ray purchased by Respondent 21

Species	Local Names	Sizes (cm)	Purchase Price/ individual (x IDR 1,000)
<i>Rhina ancylostoma</i>	Pari kuku-kupu	80-170 (total length)	300-1,500
<i>Mobula japonica</i>	Pari sapi	50 (disc width)	100

Payment to anglers only be made after the rays survived 2-3 days in adaptation tank. He will feed the rays with sliced-skipjack meat or fresh sardines. After the rays adapted with new environment, he sells to buyers in Bali and Sulawesi by air freight shipment. Water temperature during transportation is maintained at 20-21°C to minimize the stress.

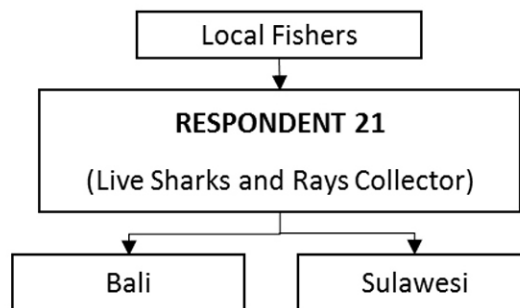


Figure 27. Marketing flow of live sharks and rays by Respondent 21

Generally, he bought live fish less than one meter to minimize packing and shipping cost. For instance, the shipment of live fish to Bali measured less than one meter by air freight cost about IDR 30,000 per kg but will be doubled if the size of fish more than one meter.

Other than the high shipping cost of live fish, survival rate, limited demand, and high maintenance cost during adaptation process also become the challenges. In order to minimize the risk, he only ask fishers to catch a particular species based on demand.

During 2018 and 2019, he only delivered two shipments a year to outside Kalimantan due to low demand. Documentations for exporting process are followed according to guideline provided by the Ministry of Marine Affairs and Fisheries.

- Case 4 (Respondent 22)

Respondent 22 is a fish trader who mainly sells ray skin and fillets. He got supply from his two fishing boats. His boats are operated by experienced skippers and crews from Java. He provided food for all fishing trips but gear used called ‘pancing senggol’ belong to

fishers. Each fishing trip will be completed within 4-7 days. An average catch is approximately 1-2 tons per boat.

Marketing destinations are Tarakan, Jakarta, Medan, and Kuala Lumpur (Figure 24). Recently, the company also value added ray products without using monosodium glutamate (MSG) as food flavor. He replaced MSG with ray cartilage powder. However, this product is not yet be commercialized.

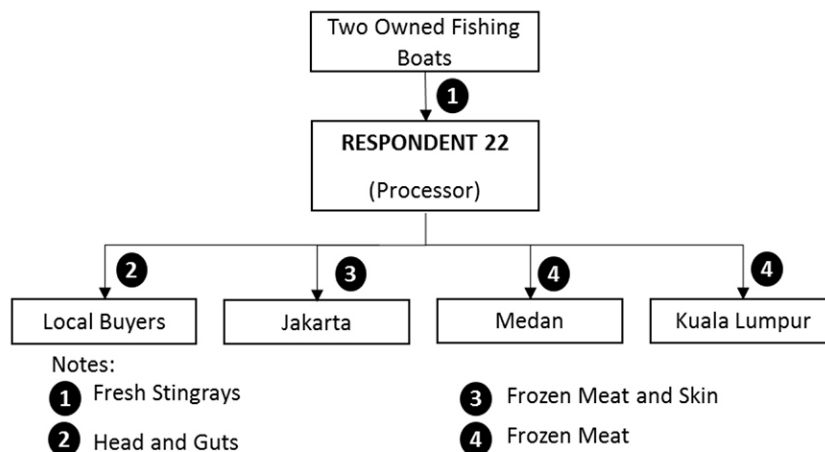


Figure 28. Marketing flow of raw materials and end products by Respondent 22

He shipped his products using a 40 feet container with a capacity of 20 tons of frozen fish products. The price of *Himantura* spp. and *Pastinachus* spp. skin is about IDR 30,000-60,000 per sheet. The minimum size of rays skin sold in market is about 13 cm. He bought ray meat at IDR 20,000 per kg (for the large size) and then sold at IDR 40,000 per kg. The selling price of *Pateobatis uarnacoides* meat is IDR 19,000-25,000 per kg. The waste product (stomach, gills and cartilage) has no economic value for human consumption and sold to crocodile farmers.

- Case 5 (Respondent 23)

Respondent 23 is a trader of sharks and rays, and fish swim bladder from leaftail croaker (*Johnius trachycephalus*) (local name: ‘kacap cina/gulamah’). His business has been established since 15-25 years back.

He got supply from local fishers in Tarakan, Nunukan and Berau in East Kalimantan. Requiem sharks (*Carcharhinus* spp.) and wedgefishes (*Rhynchobatus* spp.) are by-catch, while targeted species are mostly snappers and pomfrets. The most common fishing gears used are gillnets and bottom longlines. Table 28 shows the purchase price of shark and ray

fins. The marketing flow of raw materials and fin products by Respondent 23 are shown in Figure 29.

Table 28. Purchase prices of shark and ray fins by Respondent 23

Species	Local Names	Product	Sizes (cm)	Purchase Price/kg (x IDR 1,000)
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	8-14	175
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	15-19	275
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	20-24	325
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	25-29	425
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	30-34	600
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	35-39	700
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	40-44	1,000
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	45-49	1,250
<i>Rhynchobatus</i> spp.	Pari lontar	Dried fins	≥ 50	1,400
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	8-14	125
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	15-19	255
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	20-24	275
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	25-29	375
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	30-34	525
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	35-39	575
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	40-44	750
<i>Carcharhinus</i> spp.	Hiu hitam	Dried fins	≥ 45	900

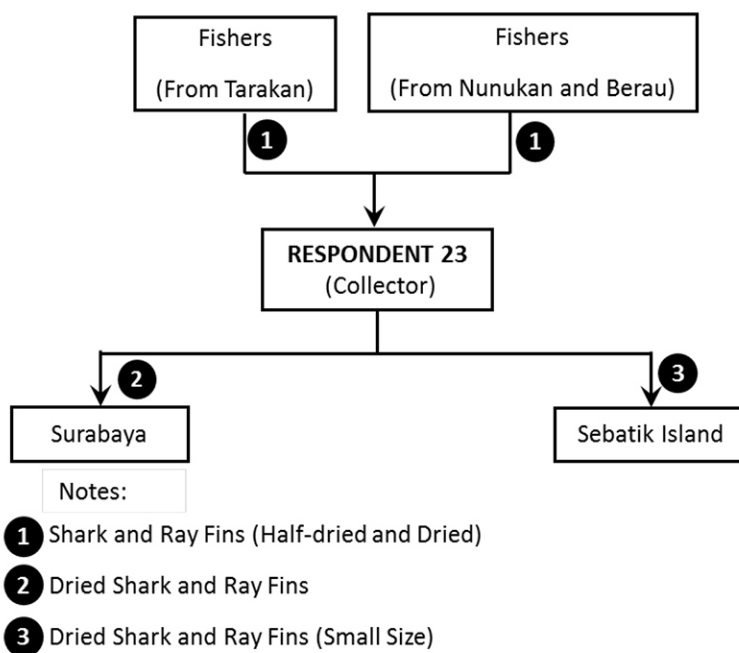


Figure 29. Marketing flow of raw materials and fin products by Respondent 23

- Case 6 (Respondent 24)

Respondent 24 is a salted fish processor and trader. Rays are bought from fishers who fishing in Tarakan waters with IDR 5,000 per kg. Rays are salted and sold at IDR 12,000-15,000 per kg. Two species of rays are commonly purchased namely *Gymnura* spp. and *Neotrygon orientalis*. Wet weight of fresh rays after salting process will reduce about 60%. Traditional sun-dried salting method is used which requires five days to complete (Figure 30).

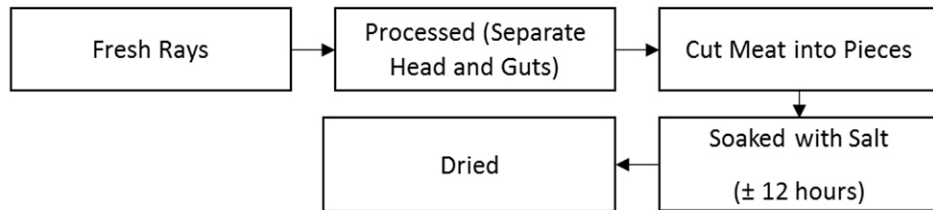


Figure 30. Processing flow of salted ray by Respondent 24

During salting process, rotten meat will be sold to crocodile farmers at IDR 1,000 per kg. Farmers will cover the transportation cost. There is no cartilage waste because cartilage in meat are not discarded during the salting. He has no problem to market this product because local demand is always high. The salted meat are marketed in Tarakan and Malino area. The marketing flow of salted fish is shown in Figure 31.

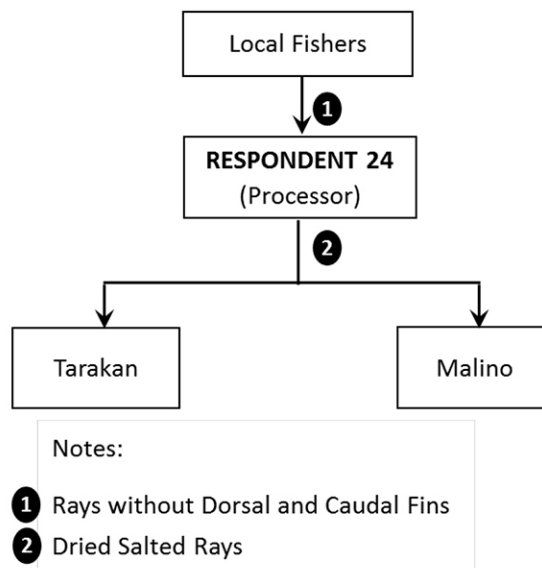


Figure 31. Marketing flow of raw materials and salted rays by Respondent 24

- Case 7 (Respondent 25)

Respondent 25 is the largest live fish trader in Kalimantan. Species traded are *Rhynchobatus* spp., *Stegostoma fasciatum* and *Rhina ancylostoma*. She got live fish from fishers around North and East Kalimantan. Usually, these fishes are for displays in aquariums and research purposes. The species traded is as shown in Table 29.

Table 29. Species of live shark and ray bought by Respondent 25

Species	Local Names	Sizes (m)	Purchase Price/individual (x IDR 1,000)
<i>Stegostoma fasciatum</i>	Hiu belimbing	1-1.5	1,500
<i>Rhynchobatus</i> spp.	Pari lontar	< 1	300-500
<i>Rhina ancylostoma</i>	Pari kupu-kupu	> 1	3,000

She tried to incubate zebra shark (*Stegostoma fasciatum*) eggs in tank but failed due to lack of knowledge and experience especially after hatching. She is looking for expertise on rearing zebra shark hatchling since this activity will become new opportunities in shark and ray live trade. She also worry about the diseases of live sharks and rays in captivity.

Currently, there are 25 individual of sharks and rays in her storage tank. These fish already have buyers. To reduce stress and ensure the survival during shipping, feeding process will be stopped for two days before deliver. The marketing flow of live sharks and rays by Respondent 25 is shown in Figure 32.

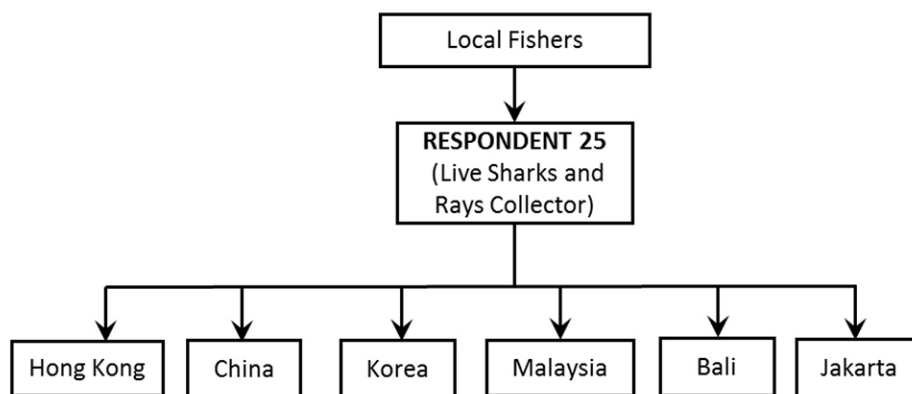


Figure 32. Marketing flow of live sharks and rays by Respondent 25

The re-packing for export live fish is often conducted in Tangerang-Banten. This is a critical step in transporting live fish to ensure them in healthy conditions and still alive at the destination. A few years ago, she exported live fish to United State of America but all were died when arrived at destination. She was responsible for all cost of this consignment.

- Case 8 (Respondent 26)

Respondent 26 is a sharks and rays trader and processor. His business has been established since 30 years ago. He got fins from local collectors in Tarakan. In the past, the supply was quite abundant but now is very limited.

After processed, end product of fins is called 'hisit'. This product is marketed in Tarakan. He also sold 'hisit' to Surabaya, Jakarta and Balikpapan. Marketing flow is shown in Figure 33.

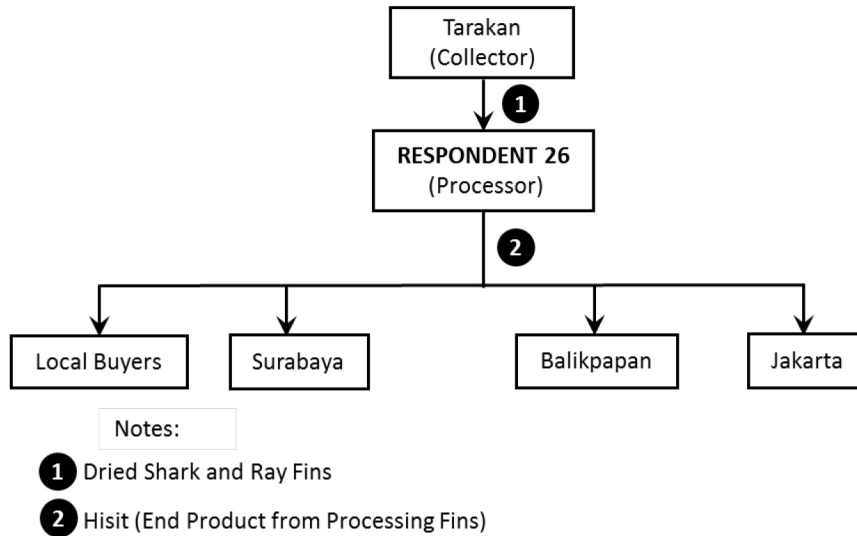


Figure 33. Marketing flow of raw materials and ‘hisit’ by Respondent 26

Shark and ray species commonly used to produce ‘hisit’ were wedgefishes (*Rhynchobatus* spp.), guitarfishes (*Glaucostegus* spp.) and requiem sharks (*Carcharhinus* spp.). The wedgefishes fins always sold at higher price compared to fins of requiem sharks. He usually processes small fins (≤ 25 cm) because the price of larger fins are more expensive. Market demand for small fins is better than larger fins. The price of shark fins sized 15 cm, 20 cm and 25 cm height is IDR 300,000, IDR 400,000 and IDR 500,000 per kg respectively.

7. CONCLUSION

Production of sharks and rays in Kalimantan is among the highest in Indonesia. The wedgefishes are widely caught and become the main target for fishers in Sungai Kakap Sub-district, Kuburaya District, West Kalimantan Province. Major fishing ground is in the western waters of Kalimantan (South China Sea). In the eastern part of Kalimantan, facing Makassar

Strait, landing of sharks is higher than rays. Two main destinations for marketing of sharks and rays from Kalimantan are Jakarta and Surabaya. Shark and ray fins are mostly for foreign markets, while meat are for local consumption in Kalimantan and Java. Most fresh meat were processed into smoked and salted meat. Live sharks and rays also targeted foreign markets. Two international airports namely Sukarno-Hatta Airport (Tangerang) and Ngurah Rai Airport (Denpasar) are always used by exporters to send their products.

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GLOSSARY

- Henci : The mixed sizes of hisit product
- Hisit : The end product of the processing of sharks and rays in the form of fine white fibers
- Hiu hitam : The name of the shark species for *Carcharhinus* spp. which has a black spot on the fin
- Kemejan : Local name of the ray species for *Rhynchobatus* spp.
- Kikir : Local name of the ray species for *Glaucostegus* spp.
- Lontar : Local name of the ray species for *Rhynchobatus* spp.
- Paredong : Local name of the ray species for *Rhynchobatus* spp.
- Udon : Small pieces of ray skin (called 'bibir ikan')
- Unyil : Small sizes of shark and ray

APPENDIX

1. Interview Guidelines

A Survey on Dependencies, Marketing and Trade of Sharks and Rays in Kalimantan, Indonesia (September 1-16, 2019)

Date :

Location :

Name of researcher :

Name of respondent :

Name of Company :

• General Questions

I. How long have you been in this business?

.....
.....

II. Who are the owners (individual, partners, or company)?

.....
.....
.....

• Products Carried

I. What are the main species of sharks/rays transacted in your fish marketing/trading business?

Species	Type of product	Size of fish (Big/Small)	Price (RM/kg)	Quantity (kg)/month	Demand (High/Medium/Low)

• **Sources**

I. Where are your main sources of supply (own vessels, intermediaries, imports)?

.....

II. Quantity and value?

Species	Quantity/month	Value/month

• **Processing**

I. Are you involved in processing?

- Dried
- Salted
- Frozen
- Smoked
- In brine
- Ready to use
- In airtight containers

II. What are the major processing products?

.....

III. Selling Destination (local market)

Species	Type of product	Who are buyers (wholesaler, retailer)	Destination

IV. Selling Destination (Export Market)

Species	Type of product	Who are buyers (exporter, wholesaler, retailer)	Destination	Volume of product (per month/year)

• Price

Species	Type of product	Price	Destination

- Cost production

.....

- Method of payment

.....

- **Promotion**

- Services (financial service such as credit)

.....
.....
.....

- **Inputs**

- Labor (local, foreigner, etc)

.....
.....
.....

- Capital (Bank Loan, Government subsidy, etc)

.....
.....
.....

- **Others**

Reasons to do a business of shark and ray products?

- **Physical Flow (Marketing Channel of Company)**

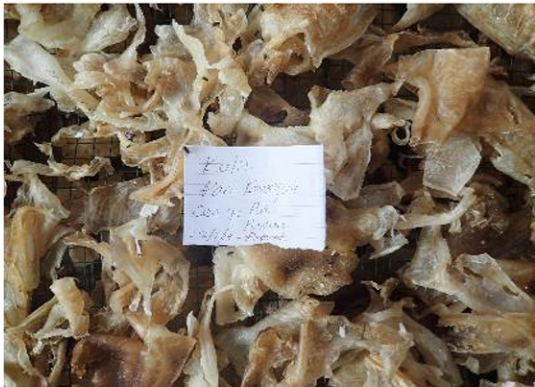
- Agent, intermediary (local, wholesaler, retailer, processor, exporter)
- Destination: intermediary, processor, exporter

- **COMPANY**

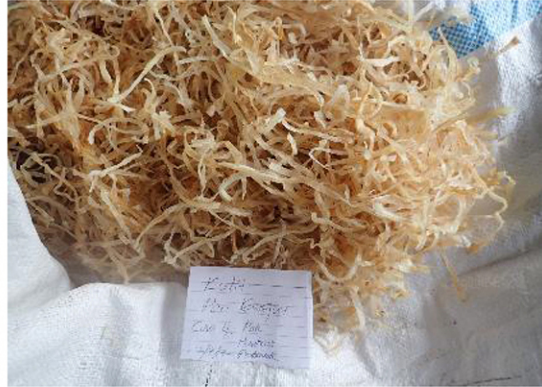
- Others

.....
.....
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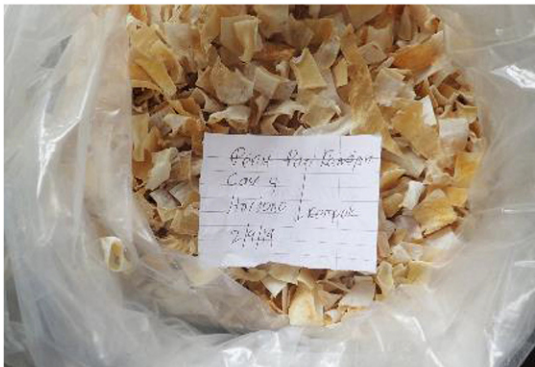
2. Documentations of Field Survey



Skin of wedgefishes



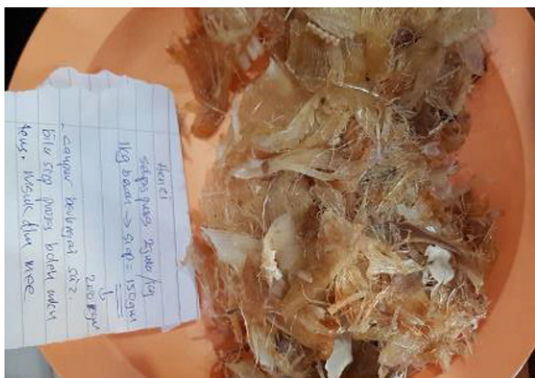
Wedgefish skin after cut into pieces (udon)



Dried wedgefishes belly skin



Hisit



Henci (Mixed of different sizes of hisit)



Dried ray skin



Pieces of fresh wedgefishes meat



Smoked ray meat



Dried shark and ray fins



Dried *Glaucostegus* spp. fins



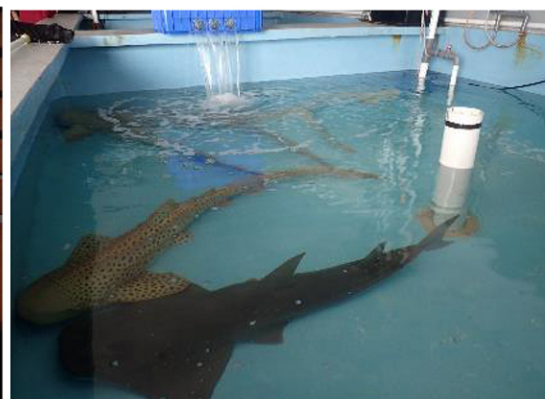
Dried tiger shark fins



Dried wedgefishes fins



Wedgefishes cartilage



Live shark and ray
(*Stegostoma fasciatum* and
Rhynchobatus australiae)

3. Documentations of Market Survey



Fresh wedgefishes meat



Salted wedgefish meat



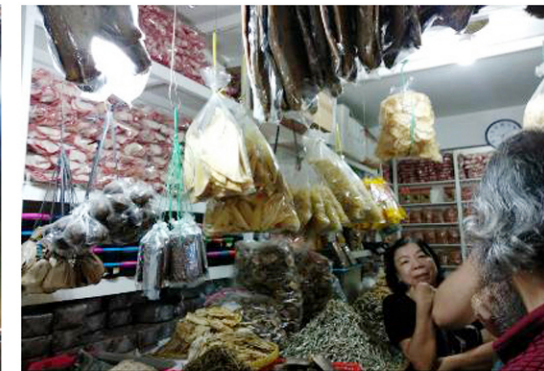
Dried shark fins and 'hisit'



Some products of shark and ray



Traditional market



Interview at traditional market

4. Interview Activities



Interview fins and skin processor



Interview smoked meat processor



Interview fins collector



Interview frozen fish processor



Interview rays and sharks collector



Interview live fish collector

5. Discussion Session



Discussion with field officer



Review of interview findings

6. Discussion with Local Government Officers



Discussion at BPSPL Pontianak



Photography session with local officers

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