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The Oceans and Fisheries Partnership (USAID Oceans)  
**ANALYSIS OF THE TUNA VALUE CHAIN  
IN BINH DINH PROVINCE, VIETNAM**



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*Cover photo: Tuna fishers in Binh Dinh Province, Vietnam, unload their catch. Credit: MCD*



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# ACRONYMS AND ABBREVIATIONS

ASEAN	Association of South East Nations
CDS	Catch documentation scheme
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
DECAFIS	Department of Capture Fisheries
D-FISH	Directorate of Fisheries
DPCIA	Dolphin Protection Consumer Information Act
DSTIC	Department of Science, Technology and International Cooperation
ECDT	Electronic Catch Documentation and Traceability
EU	European Union
EVFTA	EU-Vietnam Free Trade Agreement
GPS	Global Positioning System
IUU	Illegal, Unreported, and Unregulated
MARD	Ministry of Agriculture and Rural Development
MoD	Ministry of Defense
MoST	Ministry of Science and Technology
MPI	Ministry of Planning and Investment
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NOAA	The National Marine Fisheries Service
RIMF	Research Institute for Marine Fisheries
SIMP	US Seafood Import Monitoring Program
USAID	United States Agency for International Development
VASEP	Vietnam Association of Seafood Exporters and Producers
VCFTA	Vietnam-Chile Free Trade Agreement
VFRS	Vietnam Fisheries Resources Surveillance
VIFEP	Vietnam Institute of Fisheries Economics and Planning
VHF	Very High Frequency
VINATUNA	Vietnam Tuna Association
VJEPA	Vietnam-Japan Economic Partnership Agreement
VMS	Vessel Monitoring System
VND	Vietnamese Dong
WCPFC	The Western and Central Pacific Fisheries Commission

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The study "Analysis of tuna value chain in Binh Dinh Province, Vietnam" was conducted by MCD from December 2019 to April 2020 in the framework of the initiative "Pilot technology application to reduce illegal, unreported, and unregulated (IUU) fishing, towards sustainable fisheries management for the period 2019-2020" with the endorsement of the Vietnam Directorate of Fisheries, and through financial support provided in partnership from the Oceans and Fisheries Partnership Project (USAID Oceans), as funded through the Regional Development Mission for Asia of the United States Agency for International Development (USAID).

## EXECUTIVE SUMMARY

This value chain analysis (VCA) focuses on the mapping of supply chains of three tuna species: Bigeye tuna (*Thunnus albacares*), Yellowfin tuna (*Thunnus obesus*) and Skipjack tuna (*Katsuwonus pelamis*) in Binh Dinh Province in Vietnam. The VCA identifies the flow of products, types of products, the relationships and linkages among actors in the chain, relevant institutional policies and regulations, abilities to apply eCDT traceability in the tuna chain, as well as evaluating the value chain linkages. The VCA is undertaken as part of an eCDT learning site in Vietnam under the support of USAID Oceans. The tuna VCA in Binh Dinh is divided into two analyses of yellowfin/bigeye and skipjack. Both chains in general involve multiple actors including fishers, middle-actors, transporters, processing and export companies, international trading companies, wholesalers/retailers and consumers.

The product flow is different between the two supply chains. About 30 percent of the catch of yellow fin/big eye went through processing and export companies in Binh Dinh, 62 percent is sold to provincial import and export companies in Khanh Hoa and Phu Yen province, 3 percent in Ho Chi Minh City and about 5 percent is consumed (fresh) in domestic wholesale markets. For the skipjack, about 60 percent of the productions were purchased by processing companies from outside the province. The remaining 40 percent is consumed domestically. Over 95 percent of processed products of the tuna chains are exported to foreign markets, especially the United States (US) and European Union (EU). Major processed products of yellowfin and bigeye tuna are either frozen or fresh chilled, while the skipjack are mostly exported as canned products and as pre-cooked frozen fillets.

Most tuna vessel owners in Binh Dinh are fishers directly involved in catching tuna (90%). Each fishing vessel consists of 6-7 crew members, of which 3-4 crew members are hired laborers. Net profit is usually divided at a ratio of 50:50, in which the owner gets 50 percent and the remaining 50 percent is divided among the crew members. Tuna caught are sold to export processing companies and/or for domestic consumption through the local middle-actors. Usually the vessel owners and middle-actors have an “interdependent” relationship in supplying loans and input materials and purchasing outputs. This relationship is based on “trust” rather than a contract signed.

In general, fishers are fishing oriented, very few are concerned about the fisheries resources and food safety due to the open access situation. They have less power in the negotiation on the prices of products. They have limited knowledge and skills on the logbook and traceability of product.

Middle-actors are local traders who play a key role in the tuna supply chain in Binh Dinh in the context of small -scale fisheries. In the tuna industry, the middle-actors mostly act as local purchasing agent for the processing plants at a set price and receive a commission on the buying volume. However, in addition to purchasing, the middle-actors also play a role of providing loans and inputs for fishers, thus they have a certain “influence” on purchasing tuna from fishers. In this context, the middle-actors might be one of the key drivers that can have an influence on changing the practices of fishers (e.g for e-logbook and traceability systems) and help processing plants develop and operate a better traceability system if incentives were provided (e.g. premium prices and a more stable price for traceability products).

Processing plants can be seen as one of the most powerful actors in the tuna supply chain. This actor is the one who sets the price and the purchasing volume for the tuna. However, due to small catches of individual vessels (given the nature of small-scale fisheries), most of the processing plants have to rely on the local middle-actors to obtain raw materials. They have often established links to the

purchasing agents/middle-actors through an agreement (but not contracts). Most of the processing plants are concerned about the market requirement and traceability, food quality and food safety certification (including EU, USA, and Japanese markets).

There are some challenges and gaps in the tuna value chain analysis and eCDT requirements in Binh Dinh province: (i) *There is a lack of supply chain management*: processing plants or exporting companies depend on the middle-actors (to gather raw materials) and they could not develop their own supply chain where they can control the quality of post-harvest. (ii) **There is still not yet transparency among the actors in the value chain.** The quality of tuna is not yet classified and paid at the highest value. Limited access to market development and standards. (iii) *The certification of fishing origin is not a concern of fishers* but of the processing and import-export companies because the companies need to make certificates for ensuring the export quality of their product and (iv) *Limited awareness and capacity of the small-scale fishers to comply with the requirements of log-book and traceability.*

Recommendations are proposed as following to improve the value chain of tuna and address the gaps of eCDT requirements:

- (i) **Improve the supply chain management and business model development**: Cooperation between actors in the supply chain should be strengthened through improved cooperation mechanisms to coordinate the system and improve food safety and traceability. The processing plant may be the main unit to coordinate the system, but the current capacity is not met and there is a need for pressure and motivation from the buyers.
- (ii) Strengthen the capacity and compliance of fishers and relevant actors in the regulations on the logbook/VMS data: Fishers need to comply with the processes of traceability of seafood products: Vessel owners are equipped with VMS as prescribed in law; the captain must write correctly and fully in the fishing logbook. Select technologies and devices and pilot electronic fishing logbook that are convenient for use by vessel owners and captains and support fishers for easily recording and accessing data.
- (iii) Improve the catch documentation scheme (CDS) including log-book and origin of catch certification that would help efficiently manage the production and traceability. There is a critical need for Vietnam and Binh Dinh to improve and shift from paper-based system to an electronic system, supporting more transparency and sustainability for fisheries management.
- (iv) **Manage tuna resources sustainably through setting up and implementing quotas and supporting the implementation of regulations**: As the new 2017 fisheries law and Decree 26 has provided guidance for developing a quota for each province for the capture fisheries, it is important for quota setting up and management for key fisheries products including tuna. This will help different actors to get shared values across the value chain and to make it more responsible and sustainable in terms of environmental and social issues.
- (v) Reorganize fishing groups to become more independent and empowered in sustainable production and application of the traceability and catch the tuna sustainably. Co-management in the small-scale tuna fisheries would help to reduce overfishing and develop a win-win strategy for cooperation, sharing costs and benefits in the production system. It is advisable to develop a legal link between fishers groups, middle-actors and processing companies in order to harmonize the catch with market demand, thus avoiding redundancy and price pressure.



# I. INTRODUCTION

## I.1 Background

Capture fisheries are one of two primary production sectors of Vietnam's seafood industry, with a long history of development and high diversity of fishing gears and seafood products. The wild-catch volume has increased an average of 5.94 percent per year recently, significantly contributing to the overall development of Vietnam's fisheries industry as well as promoting socio-economic growth in the country's coastal areas.

Tuna, concentrated mainly in three South Central coastal provinces of Binh Dinh, Phu Yen and Khanh Hoa, is among the target species for export in Vietnam with 03 major species including Yellowfin tuna (*Thunnus albacares*), Bigeye tuna (*Thunnus obesus*) and Skipjack tuna (*Katsuwonus pelamis*). Over 2009-2018, the annual average growth rate of tuna catches and export turnover reached 16.9 percent and 15.08 percent, respectively (Directorate of Fisheries 2019). Currently, Vietnam's tuna export market has expanded to over 101 countries and territories, of which EU and US are the two largest markets (approximately 60 percent of total export value). In 2018, the tuna export was 653 million USD, accounting for 22 percent of the country's total marine seafood export value and 7.5 percent of total seafood export turnover (Vietnam Association of Seafood Exporters and Producers [VASEP], 2019).

Tuna industry development during last two decades has significantly contributed to creating livelihoods for about 35,000 local laborers, generating a source of foreign exchange earnings, and promoting socio-economic growth in the central coastal provinces. However, the development of the tuna industry in recent years is limited due to the fishing grounds are far from the shore compared to some countries in the region. This has revealed several shortcomings that lead to low production efficiency, lack of sustainability and weak competitiveness in the export market. Current production in the tuna industry is largely small-scale and dispersed with less developed technology. The chain linkages both horizontal and vertical, from fishing, collecting/purchasing, processing and trading, are still very limited. The presence of traders plays an important role in the tuna supply chain, while also creating the dominance or privilege of this actor in the chain. As a result, there are issues of information transparency, traceability, and benefit sharing among chain actors. The recent EU's Yellow Card, US's Dolphin Safe regulation and increased standard requirements from import markets also pose more challenges for Vietnam's tuna industry.

Given the limitations and challenges, improvement of the fisheries in general, and tuna in particular, has recently been paid much attention by Vietnam's government through a number of projects/programs<sup>1</sup> such as reorganizing and restructuring the marine capture fisheries sub-sector, organizing of the tuna supply chain, etc. In this context, it is necessary to conduct studies to evaluate and propose practical solutions to improve the tuna fisheries towards developing more efficiency and

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<sup>1</sup> Decree 375/2013/QĐ-TTg on approving the program "Reorganizing marine capture fisheries"; Decree 2760/2013/QĐ-BNN-TCTS on approving the program "Restructuring the fisheries sector towards increasing added value and sustainable development"; Decree 3465/2014/QĐ-BNN-TCTS; Decree 2760/2014/QĐ-BNN-TCTS on approving pilot program "Organizing of the fishing, purchasing, processing and consuming of tuna in chain".

sustainability, removing the EU yellow card, as well as better responding to market requirements. This study aims at analyzing the tuna value chain in Binh Dinh province, the largest tuna production province in the country, to explore key chain actors, their position, power and influence on the chain, and the relationships among them. Institutional arrangement and policy analysis related to the tuna industry will also be carried out to find gaps for interventions.

### Brief profile of Binh Dinh Province

Binh Dinh, has a coastline of over 134 kilometers, a territorial sea of 2,500 km<sup>2</sup>, and an exclusive economic zone of 40,000 km<sup>2</sup>. It is a South-Central coastal province where the offshore fisheries, particularly the tuna fishing, is the most developed in Vietnam, and mostly concentrated in Hoai Nhon districts and Quy Nhon city (Figure 1). Binh Dinh currently has three large fishing ports including Quy Nhon, De Gi and Tam Quan, which are in the list of MARD’s designated fishing ports<sup>2</sup> for certifying the fishing origin.

The fisheries industry plays an important role in the economic development of Binh Dinh province, creating jobs and income for a significant portion of the province's labor force. In 2019, Binh Dinh has 6,115 fishing vessels, of which more than 50 percent have a length of over 15m, with some major fishing gears including longline/handline, purse seine, gillnet and trawling. According to Binh Dinh Department of Fisheries (DARD), the total catch in 2019 reached 245,000 tons (5 percent more than in 2018), equivalent to 402,674 USD, and accounting for about 4 percent of the total value of agricultural production (1,065,275 USD).

The tuna fishery, introduced since 1998, has now been considered as a key production sub-sector of the fishing industry in Binh Dinh. In 2019, Binh Dinh has more than 2,100 tuna fishing vessels, mainly distributed in Hoai Nhon district, of which over 60 percent are handline fishing for yellow fin and big eye tuna. The rest are purse seine (34%) and gillnet (3%) for catching skipjack tuna. Tuna fishing grounds are mainly in the Central region and the middle of the South China Sea, particularly around “Hoang Sa” and “Truong Sa” islands.

The tuna fishing season usually starts in November and ends in June of the next year (following the lunar calendar). Each fishing trip lasts for 20-22 days, usually starting on the 17th of the lunar month and ending around the 10th of the next lunar month.



Figure 1: Administrative map of Binh Dinh

Tam Quan Bac commune (Hoai Nhon, Binh Dinh), having about 1,150 offshore fishing vessels with more than 6,000 fishers involved in catching tuna is the "capital" of the tuna fisheries in Vietnam. Annual average catches of Oceanic Tuna (*Yellow Fin and Big Eye*) is about 10,000 tons with the value of over 1,000 billion VND.  
*(Binh Dinh's DARD 2019)*

<sup>2</sup> Decree 3621/2019/QĐ-BNN-TCTS on announcing the list of designated fishing ports with sufficient system for certifying the origin of aquatic products from fishing.

According to Binh Dinh's DARD, over the last five years the annual average catches was about 9,700 (9,000-11,000 tons) for oceanic tuna (yellow fin and big eyes) and 47,000 tons (45,000-50,000 tons) for skipjack tuna. The value of annual exports is about 30 million USD, mainly in the US and EU markets.

## 1.2. Research objectives

### *General objectives*

The overall objective is to analyze the Tuna value chain in Binh Dinh province in order to propose recommendations/interventions for developing/improving the effectiveness and sustainability of the tuna industry.

### *Specific objectives:*

1. Mapping and describing key actors in the tuna value chain, including the flow of products;
2. Evaluating relationships/linkages within and between actors in the tuna value chain.
3. Reviewing institutional arrangement, regulations and policies related to development and management of the Tuna industry in Binh Dinh province and Vietnam.
4. Proposing recommendations/solutions to improve the Tuna value chain and product traceability towards the effective and sustainable development of the tuna industry.

## II. METHODS

### 2.1 Study methods

Value chain analysis (VCA) is an approach to understanding the scope of activities performed within a company or between companies to create a given output. Access to a wide-scale value chain assessment begins with a system of raw material production and moves along links with other businesses and entities involved in business, processing, assembly, transportation and all other relevant processes. This broad approach reviews all the activities of a specific product, such as yellowfin tuna, as well as all the before and after linkages from the raw materials to final consumers. Conducting a value chain analysis involves the determination of how actors work, what is happening between actors in the chain, what connects these actors, what information is shared, what relationships exist between actors, and how relationships develop.

This research applies VCA approach and connected market tools including each series of closely linked activities to identify the inputs and functions required from actors from the production to the consumption of products or services.

#### **(i) Desk based study**

Use secondary data and information collected from 2015-2018, including:

- Statistical data on fishing vessels, fisheries laborers, catches and value of fishing, purchasing and processing tuna collected from the Directorate of Fisheries (Department of Capture Fisheries), Binh Dinh Department of Fisheries (provincial), Vinatuna, Vietnam Institution of Fisheries Economics and Planning (VIFEP) and VASEP;

- Documents, research reports, and scientific articles related to the tuna industry from research institutes, schools, scientific journals, etc.

## (ii) Field study

Collect primary data on the fishing fleet; gear; fishery laborers; production activities such as catches, costs, and selling prices; and data and information on purchasing, processing, consumption and other relevant processes in the chain.

The primary data for this study was collected using the following methods: (i) Consultation with experts; (ii) Group discussion with fishers and key actors; (iii) Key informant interviews; and (iv) In-depth interviews using questionnaires.

**Table 1. Survey sample structure**

Interviewees	Quantity
Fishermen	15
Services provider	1
Buying / Middlemen	5
Processing & exporting companies	2
<b>Total</b>	<b>23</b>

Chosen interviewees participate in the tuna value chain in Binh Dinh province as input providers for fishing, fishers, middle-actors and enterprises, more specifically (Table 1).

Experts with experience in relevant fields were also contacted and interviewed in order to obtain additional information.

## 2.2 Scope of study

### (i) Scope of content:

The study focuses on the supply chains of Bigeye tuna (*Thunnus albacares*) Yellowfin tuna (*Thunnus obesus*) and Skipjack tuna (*Katsuwonus pelamis*). It identifies the flow chart of products, types of products, the relationships and linkages among actors in the chain, relevant institutional policies and related regulations and abilities to apply electronic traceability in the tuna chain (from fishing to first buyers in Binh Dinh), as well as evaluates the value chain linkage models

The study explores the linkages and evaluates the value chains of the main tuna species in Binh Dinh province, from catch to consumption. Both value chains (one for bigeye and yellowfin, one for skipjack) also identify the fishing locations, methods and fishers and then factors, methods and locations traveled through. The main variables in question following primary research are the transport methods between actors, the number of tuna catches at sea and the geographic location of the tuna as it moves along the chain.

### (ii) Scope of space:

The study was conducted in Binh Dinh province with a focus in Hoai Nhon district for information related to tuna fishing and purchasing activities and in Quy Nhon city where tuna processing and exporting-importing companies are located (i.e. Mai Tin and Bidifisco companies). Information about companies processing and consuming tuna products concentrated in Khanh Hoa, Binh Dinh, Long An and Ho Chi Minh City was gathered through exchange and consultation with Vinatuna.

### III. RESULTS

#### 3.1. Supply chain analysis of yellowfin and bigeye tuna<sup>3</sup>

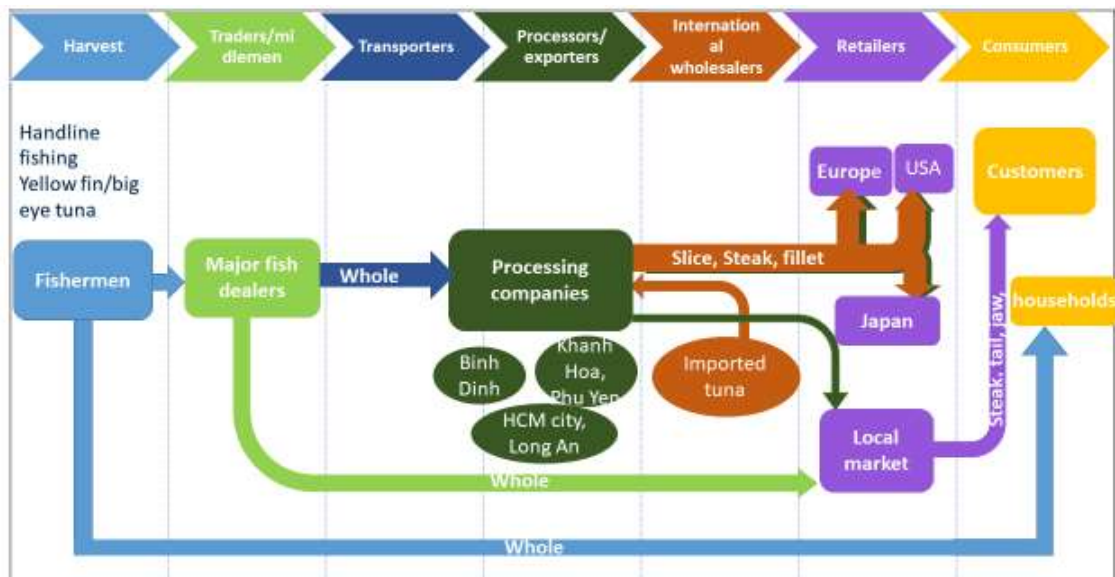
##### 3.1.1. Mapping the tuna supply chain

In Vietnam, due to the nature of small-scale fisheries, most of the seafood supply chains involve many groups of actors. Tuna, from catching to end users, goes through several stages including: preliminary processing and storing on board, purchasing by the middle-actors at fishing ports, transportation to factories, processing and packaging at factories, distributing domestically to domestic dealers and/or exporting to foreign markets, and distributing to end consumers.

Similarly, the tuna supply chain in Binh Dinh includes seven actors including fishers, middle-actors, transporters, processors and/or exporters, international and/or wholesalers, retailers and consumers (Figure 2).

**Fishers** are the first primary production actor in the *yellowfin and bigeyes tuna* supply chain who are either individual or group of fishers. This actor is mainly engaged in handline fishing (> 98%)<sup>4</sup>. Each tuna fishing vessel, mainly wooden hull with a length of 15m-24m, has about 4 fishing rods with two hooks each. A fishing team consists of 6-7 people including a captain, a head engineer, 1 mechanic, and 3-4 crew members (hired labor/fishers). It should be noted that the captain is usually the owner of a fishing vessel (>60%). Other vessel ownership arrangements are the parents or wives are the owners' or the captain and crew are hired by vessel owners (investor in vessels and fishing gears).

**Figure 1. Stages and corresponding actors in the yellowfin and big eye tuna supply chain**



<sup>3</sup> In this study, value chain and supply chain are used interchangeably

<sup>4</sup> In recent years, the longline fishing is not effective (e.g. higher production costs, difficulties in management), so most of the fishermen have switched to handline fishing.

All fishers are males from 18-50 years old with secondary education. Women, like other fisheries, participate in the tuna fishery as an actor to provide support to the fishing team such as preparing food on board or selling products at the port, etc. Currently, tuna fishing activities in Binh Dinh are mainly organized in groups of 3-5 fishing vessels. The main purpose of group production is to exchange information on fishing experiences, fishing grounds, selling price, and to support each other at risks.

Tuna, immediately after catch, is shocked by an electric shocker before being loaded on board. The fish is then pre-processed by removing its viscera, cleaning and putting into a cold storage. Most fishing vessels in Binh Dinh currently use traditional preservation method with mainly crushed ice. The cold storage is quite rudimentary, usually made of wood with insulating rubber and waterproof sponge, so it is difficult to ensure the quality of fish. Recently, the vessels in the group have made arrangements to bring tuna onshore early, shortening the storage time on board.

In addition, since the end of 2019, the Nano Ultra Fine Bubble preservation technology has been successfully researched by the Research Institute for Marine Fisheries (RIMF) and initially transferred to some tuna fishers in Hoai Nhon. This new technology promises to greatly improve the quality of tuna catch.

The *yellow fin and big eyes* tuna are mainly purchased by the local middle-actors at the fishing port. A small number of fishers sell directly to the processing plant or to wholesalers outside the province. The sale of products is often based on "interdependent" relationships rather than formal contracts. Vessels owners usually take advances of credit and/or fuel and ice for their fishing trip from the middle-actors, and in exchange they will sell the tuna to these middle-actors. As a result, fishers will be weak in price bargaining, especially when there is no information transparency.

*"Fishermen cannot control the selling price. Usually, middlemen give the price and fishermen have to sell at that price"* – Vessel owner

The following Table 2 describes the ownership and cost sharing between the different type of vessel owners and capital contributors. There are two types of fishing vessel owners: (i) Fishing owners are the head of the household/family and their children, and (ii) fishing owners are the capital contributors/investors. In case of capital contributors/investors, there are two types: (i) several investors in the fishing vessels, and one of them is the captain and (ii) Fishing owners are hiring the captain who will be paid an additional management fee during the fishing trip.

**Table 2. Types of ownership and cost sharing of tuna fishing vessels**

Types of ownership	Percent (%)	Labor	Cost bearing
Vessel owner is a fisher fishing at the sea	50	-Captain: vessel owner, family member	<ul style="list-style-type: none"> <li>• Operating costs: 60%</li> <li>• Labor costs: 40% (6 labor)</li> <li>• Captain: 10%; Owner: 10% (Captain is also an owner: 20%)</li> <li>• Crew: 5%/person (4 labors) = 20%</li> </ul>
Vessel owner is a fisher's parent or spouse (family owners)	30	-Labors: hired	
Vessel owner is a group of fishers (usually relatives or close relations)	10	-Captain: the biggest capital investor  -Labors: some are investors, and some are hired	<ul style="list-style-type: none"> <li>• Operating costs: 60%</li> <li>• Labor costs: 40% (6 labor)</li> <li>• Captain: 10%;</li> <li>• Owner: 10% (dividing accordingly to the proportion of the capital contribution as member)</li> <li>• Crew: 5%/person (4 labors) = 20%</li> </ul>
SUBTOTAL: vessel owners are fishers	90		
Vessel owners are not fishers  (capital investors who hire fishing labors and bear operational costs)	10	-Captain: hired/small capital contributor  -Labors: hired	<ul style="list-style-type: none"> <li>• Operating costs: 60%</li> <li>• Labor costs: 40% (6 labor)</li> <li>• Captain: 10% + additional management fee</li> <li>• Owner: 10% (dividing accordingly to the proportion of the capital contribution as member)</li> <li>• Crew: 5%/person (4 labors) = 20%</li> </ul>
TOTAL: all vessel owners	100		

**Table 3. Detailed yellowfin and bigeyes fishing trip**

No	Indicator	Unit	Average	Note
1	Number of crew members	person	6	1 captain, 1 head engineer, 1 mechanic, and 3-4 labors; All involved in fishing activities at the sea
2	Number of fishing days	day	20	
3	Fishing ground			mainly in the Central region and the middle of the South China Sea, particularly around “Hoang Sa” and “Truong Sa” islands
4	Catch volume	kg	1,500	Yellowfin and Big eyes
5	Price at port	VND/kg	100,000	Usually, price is given by processing plant that varies by fishing seasons and market demand
6	Production cost	mill.VND/person	98	Including investment and operating costs
7	Production revenue	mill.VND/person	165	
8	Net profit	mill.VND/person	67	
9	Income per capita	mill.VND/person	7	Including additional income from other fishes

**Purchasing agent/ middle-actors** plays an important role in the tuna supply chain because they have a significant influence on forward and backward actors in the chain. The main function of middle-actors is to purchase tuna from individual vessel owners, then sell directly to processing companies and/or supply to the domestic market in case of low quality or product volume.

The middle-actors are either individual household or company. The survey shows the majority of tuna middle-actors in Binh Dinh undertake two roles: providing loans/credit and fuel and ice to vessel owners; and purchasing tuna from these vessel owners to supply to the processing companies. Most middle-actors act as purchasing agents of the processing plants through contracts. In this case, they undertake the purchasing of tuna from the fishers at the price set by the company and receive a certain percentage of the commission on the purchased output.<sup>5</sup> In Binh Dinh, there are currently 12 middle-actors for purchasing *yellow fin and big eye* tuna, of which 11 of them are in Hoai Nhon and 01 is in Quy Nhon.

The purchasing price of tuna has a big difference between quality types. Tuna is purchased at the fishing port, classifying into 03 categories by weight: less than 20 kg per fish (type 3); from 20-30 kg

<sup>5</sup> For example, Phuoc Tien Ltd company (Tam Quan Bac – Hoai Nhon) is currently acting as a purchasing agent for processing plants in Khanh Hoa province.



per fish (type 2); and over 30 kg (type 1). Based on type of weight, meat quality assessment will be performed by the plant's quality management staff (Quality Control). Tuna that meet the weight and meat quality required by the factory will be purchased at the set price. If the fish is of lower quality, it will receive a lower price or/and subtracting a certain amount of weight (3-5kg) from the fish's overall weight, and thus a lower overall price, by the middle-actors. This will therefore lead to disadvantage for fishers because they depend entirely on the judgment of the middle-actors/QC.

**Transporters** are logistic service companies who have specialized freezer trucks. Most of the processing plants are linked/subcontracted third-party transportation companies to carry raw tuna materials from middle-actors to the factory. Some processors may have their own freezer trucks/containers to transfer smaller quantities of tuna from landing sites to processing plants.

**Processing and exporting plants** are key actors that create value-added products in the exported tuna value chain. These actors are also the most powerful actor as they are one who set the price and the purchasing volume on purchasing tuna. Currently, Binh Dinh has 2 yellowfin and bigeye processors<sup>6</sup> with a purchase volume accounting for 20–30 percent the province's total catch. The other relevant processors are located in Khanh Hoa, Ho Chi Minh City and Long An. The main products are frozen whole round and filleted tuna (loin, steak, saku, and cube).

Due to the lack of domestic raw materials to supply for processing, especially from July to October each year (the off-season), tuna processing and exporting plants in Vietnam in general, and in Binh Dinh province in particular, must import tuna from other countries such as Indonesia and the Philippines.

In Vietnam, there are two types of tuna processing and exporting plants:

- (i) **Domestic owned processing and exporting plants:** These companies are wholly Vietnamese owned, both state and private, producing and supplying tuna products according to orders from foreign distributors/wholesalers such as Japan, America, and Europe. A small number of companies distribute products in the domestic market
- (ii) **Foreign owned processing and exporting plants (Foreign Direct Investment enterprises):** These companies are wholly owned by foreign investors and corporations, but they set up manufacturing plants in Vietnam. These companies purchase, process and distribute finished products in foreign markets and sign orders directly from foreign markets to transfer products directly to those markets. For example, Mai Tin (EverTrust) is 100 percent Japanese capital based in Khanh Hoa, exports most of its products directly to Japan. In Binh Dinh province Mai Tin's has newly established its branch and it is expected to sell 40-50 percent of total products to the US and 3-10 percent to the domestic market.
- (iii) **Distributors/retailers:** After being imported by international wholesale companies, tuna is sold to retailers in those national markets and distributed to consumers via supermarkets, shops, restaurants, local markets, etc.

A small portion of tuna product is sold to nearby Vietnamese domestic seafood markets whenever the catches are not enough to be sold to processing plants. From seafood markets, tuna is sold to restaurants or consumers (usually filleted). Another portion of the products are brought back by the

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<sup>6</sup> Vietnam has 30 tuna processors, with 12-13 processors located in Khanh Hoa province

fishers for family use (the amount is very small and usually only consists of the fish less than 20 kg in weight).

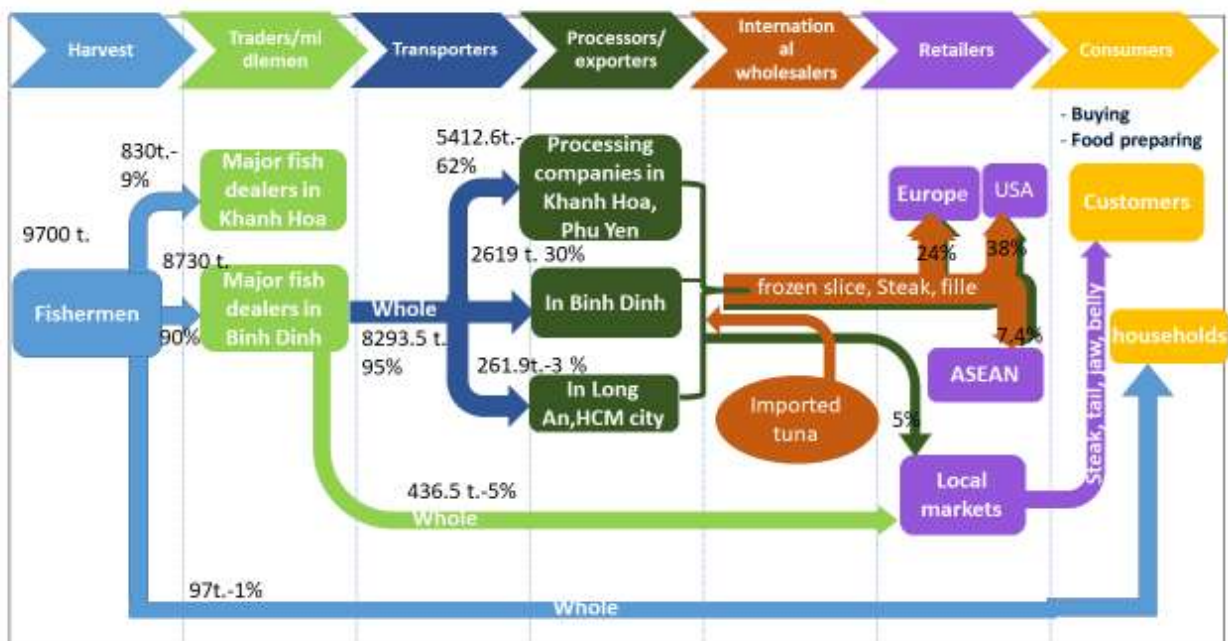
### The physical flow of tuna product

Figure 2 shows the flow of yellowfin tuna and bigeye tuna in Binh Dinh province. According to the Binh Dinh Sub-Department of Fisheries, catches in the past five years fluctuate from 9,000 to 11,000 tons per year, with an average of 9,700 tons per year. Around 90 percent of tuna catches in Binh Dinh are purchased by middle-actors in Binh Dinh.

The remaining 9-10 percent are purchased by middle-actors in Khanh Hoa. The amount of tuna brought home by fishers is not much, accounting for up to 1% (estimated through interviews with fishers in Hoai Nhon).

From purchasing middle-actors in Binh Dinh province, about 30 percent of the tuna is sold to provincial processing and import and export companies, 62 percent is sold to provincial processing and import and export companies in Khanh Hoa province, 3 percent in Ho Chi Minh City, and about 5 percent is consumed (fresh) in domestic wholesale markets.

**Figure 2. Flow chart for yellowfin and bigeye tuna in Binh Dinh**



Processed tuna is exported mainly to the US market (38%), Europe (24%), Japan (4%) and Southeast Asia (7.4%) (VASEP, 2017). Domestic consumption for processed tuna is low, at 5 percent of production. Tuna products are exported directly to international markets, mostly via international ports in Ho Chi Minh City (the products are mostly exported directly under processing companies' name and transited through Ho Chi Minh City).

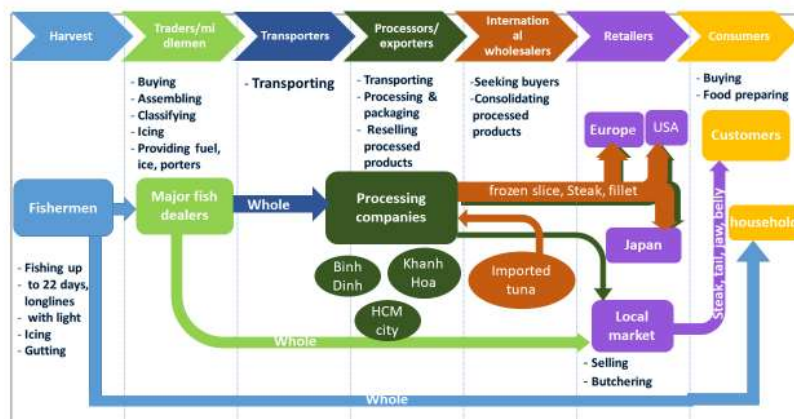
In terms of product form, tuna is kept as whole round until it is taken to the port and sold to middle-actors and wholesalers, then transferred to processing factories or domestic markets. At these locations, depending on the requirements of the consumer market, that tuna will be processed into the form of chunks or fillets. The biggest difference between export and domestic products is in the processing: domestic products are almost "fresh", while export products often have to be frozen and processed according to strict internationally recognized standards.

### 3.1.2. Analysis of relationships, linkages and services in the chain

In Hoai Nhon district, Binh Dinh province, households involved in tuna fishing usually own 1-2 fishing vessels. The majority of vessel owners are directly involved in the fishing trips, employ laborers (crews) and account for 60 percent of the total number of vessels in the province. The crew members mostly work for 1-2 vessel owners. In order to attract and retain laborers<sup>7</sup>, the vessels owners usually give each employee an advance payment (advance salary) of 3 to 5 million VND for each fishing trip. This advance is used by fishers for their daily family expenses as well as to get some personal necessities before the trip.

In addition, the relationship between the vessel owners and the crews is based on the vessel owners providing resources (usually loans) in necessary cases (such as funerals, medical treatment) for the crews' families. In recent years, the number of fishing vessels has increased; however, the number of laborers has not increased because young people looking for other jobs that are not heavy work like fishing. The crew members are now selecting the fishing vessel owners and they are not contracting. The selection of fishing vessel owners depends on the relationship, such as the family relative or they have some privilege from them such as receiving advances, or loans supporting their daily living costs.

**Figure 3. The relationships between services, partnerships and agreements in the chain**



<sup>7</sup> Shortage of fishing laborers is quite common nowadays because the majority of young laborers goes to either school or work in industrial zones. Recent FAO studies have also shown an aging trend in fishing communities in Asian countries

Vessel owners do not have enough capital before each fishing trip, so they often get resources such as fuel and ice from the purchasing middle-actors in advance with agreements to sell the catches to them at the end of each fishing trip. Such circumstances create a relatively stable relationship between vessel owners and middle-actors/wholesalers. About 50 percent of vessel owners in Hoai Nhon use this arrangement.

In the long term, this supporting relationship becomes a necessary condition for many middle-actors, especially newly emerging ones, to purchase fish. One of the disadvantages for the middle-actors in this situation is the risk of unsuccessful fishing trips, small catch quantity or vessel owners losing their money and being unable to return the cost of fuel and ice or larger loans. If the debt advances to 60 million VND, the vessel owners/captain will no longer be approved for advanced deposits.

In addition, there are capital investors who own a certain number of fishing vessels but do not directly participate in fishing activities. They hire captains and crew members to go fishing. They are responsible for capital investment for all fishing costs, maintenance, etc.



Vessel owners/captains often have long-term middle-actors who sell the tuna catch for them. Most of the loading and unloading agreements take place by Radio VHF (Very High Frequency) from sea or phone call (close to the shore) and are only completed when the vessels arrive at the port.



Photo: Pre-processing & processing of oceanic tuna at Binh Dinh SJC

The quality of fish is tested on a sensory basis, using a fish meat dipstick. When fish meat is below the standard level, the fish is still bought, but will have to deduct about 5 kg of the total weight of the fish.

For a small purchased quantity, some companies, especially processors located in Binh Dinh province, will have their own trucks to transfer tuna from landing

sites to processors. Most of companies will hire a third-party transportation company to transfer larger quantities of purchased fish to processors. At processing plants, the fish are cleaned, heads are cut off, skin and bones are removed, then filleted as loin, steak or other products.

### 3.1.3. Cost-profit analysis

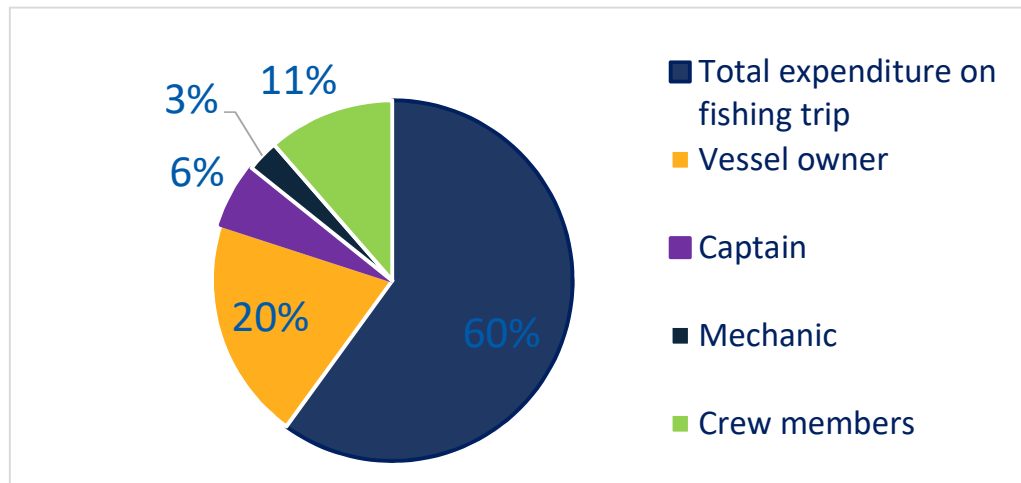
Tuna fishing activities occur from October to August each year. The remaining months are in the stormy season, so vessels often



Photo: Checking tuna quality

stay at home. The estimated cost of each tuna fishing trip ranges from 100 to 110 million VND, including: fuel costs, preservation costs (e.g. ice, blended ice), food costs, labor costs (e.g. payment of employees, crew members' insurance), bait costs, depreciation expenses, and loan interest payments. Fuel accounts for the majority, about 2/3 of the total cost of each trip.

**Figure 4. Average costs and profits per yellowfin/bigeye fishing trip**



On average, each successful fishing trip yields about 1,500-2,000 kg of fish, producing an income of over 200 million VND. After deducting expenses, the profits are divided as follows: half to the vessel owner and the remaining half is divided between the captain and crew members. The captain is entitled to double the remuneration compared to a crew member. In case the vessel owner is not directly involved in the operation, an additional amount will be paid by the vessel owner to the captain, not directly to the remaining crew members. In the case of loss, the vessel owners shall bear all costs, including wages that are advanced to the captain and fishers. When unloading the fish from the vessels to the port and giving it to the middle-actors, vessel owners will be the one who pays the cost of unloading the fish to the porter at the price of 10,000 VND per fish. Additionally, although the target species is tuna, other fish products such as mahi mahi, flying fish and mackerel are caught and are normally divided equally between the captain and the crew. Those secondary products actually contribute a large amount of income to fishing crews, usually valued at about 4 to 6 million VND per person.

As of January 2020, yellowfin tuna weighing 30 kg or more will be sold at 120,000-130,000 VND per kg. The market price is regulated and can fluctuate from time to time - the lowest can be reduced to 95,000 VND per kg. The fishers, vessel owners and buyers always maintain the same price, and the difference between middle-actors is very small. Fish with low quality will have 5 kg deducted from the total weight (according to the fishers's interview). The selling price for middle-actors and the selling price for processing plants are completely the same, so middle-actors only receive a "commission" by percentage from the processing companies. Recently, with the desire to establish a supply chain, Mai Tin company in Binh Dinh province has agreed to pay a price higher than the minimum of 2,000 VND per kg for vessels and middle-actors who take part in the chain and guarantee reliable supplies as well as quality and traceability of catch.

The economic efficiency among actors in the tuna value chain in Binh Dinh province is different. This is the result obtained from field interviews and research of the tuna value chain of VIFEP.

Table 4 below shows Costs and profits of key actors in the bigeye/yellowfin tuna value chain. Regarding the economic efficiency, with the average selling price of 100,000VND/ kg of bigeye/yellowfin tuna, fishers need to spend 52,500 VND input cost, the added value of the product is about 47,500 VND / kg. The net profit is about VND 25,000 / kg of tuna. However, “the average fishery production of each vessel is about 13.3 tons / vessel / year, with the average selling price of VND 96, 500 /kg, each fishing vessel has an average annual revenue of about 1,278.6 million VND/ship/year. After deducting the production cost of VND 1,035 million/year, the average profit of each fishing vessel is VND 243.6 million/vessel/ year”. Each fishing vessel has about 6 members, so the average income of tuna fishers is about 40.6 million VND/year or about 6.7 million VND/person/month for fishing at the sea (yellowfin tuna big eyes season is about 6 months).

For the purchasing agent/middle-actors, the profit is about VND 2000 per kg of processed product. After deducting the costs of hiring porters, transporting ice costs net profit of about VND 1000 per kg. In Binh Dinh, the average purchasing agent/middle-actors is about 700 tons / year, after deduction of the cost of each purchasing facility is getting about 700 million / year. (According to the study on Tuna Value Chain, VIFEP, 2017). Regarding tuna processors, after processing the product, the added value of the product is increased to 25.000 VND/kg; and after deducting expenses, net profit of about 4.000 VND/ kg. On average, each processor produces about 2,338 tons/year, with an average selling price of 355,300 VND/processor/kg, every year each enterprise has an average revenue of about 830.69 billion VND/processor/year, after deducting expenses and production cost of 818.72 billion/year, on average each processor has a profit of about 11.96 billion/processor/year. (According to the study on tuna value chain, VIFEP, 2017).

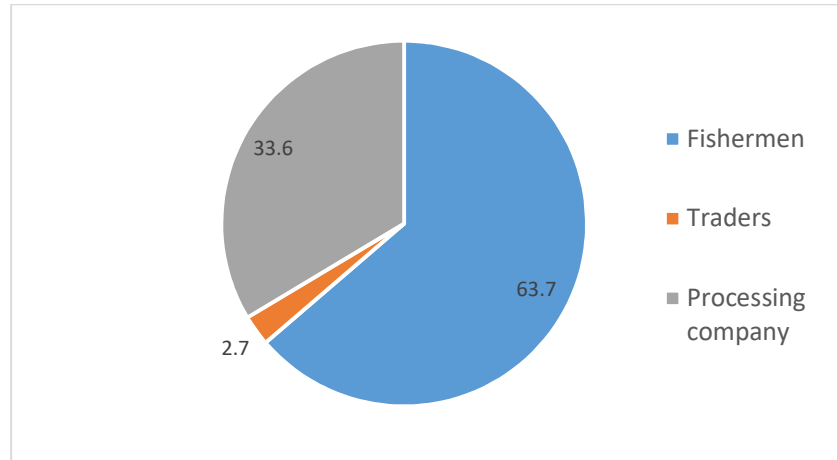
**Table 4. Costs and profits of key actors in the bigeye/yellowfin tuna value chain per kg**

No.	Items	Fishers	Middle-actors	Processor	Total
1	<b>Selling price</b>	<b>100,000</b>	<b>102,000</b>	<b>200,000</b>	<b>402,000</b>
	Input costs	52,500	100,000	175,000	327,500
	Added costs	22,500	1,000	21,000	44,500
2	<b>Added Values</b>	<b>47,500</b>	<b>2,000</b>	<b>25,000</b>	<b>74,500</b>
	Proportion %	63.76	2.68	33.56	100.00
3	<b>Net Added Values</b>	<b>25,000</b>	<b>1.000</b>	<b>4.000</b>	<b>30,000</b>
	Proportion %	83.33	3.33	13.34	100.00

Source: Author’s calculation based on data collected by the research team and VIFEP; Note: Calculation per unit of product with processing factor: 1kg of fillet product = 1.7kg of raw material

In the whole value chain, net profit/kg of processed products is quite different (Figure 6). Fishers: 63.6 percent, middle-actors are nearly: 3 percent, processors: 33.6 percent. However, the quantity of labor cost in making 1kg of processed product is different, therefore, added values of the processors and middle-actors is much higher compared to fishers’ value.

**Figure 5. Net profits of key actors in the bigeye/yellowfin value chain**



As per the interview conducted by the survey team, yellowfin and bigeye tuna in Binh Dinh was purchased in the form of mass buying (buying all at the same price). The cost export processing companies pay for transportation from the middle-actors to the factory is estimated at 500 VND per kg and the production cost is about 22,000-23,000 VND per kg, excluding depreciation of poor-quality fish. The price of processed tuna (post-factory) depends on the type of product, ranging from 15 to 20 USD (according to the processor’s interview) per kg for frozen loin, steak, cubed and the highest for saku.

In summary, the main actors in the yellowfin and bigeye tuna supply chain in Binh Dinh province are fishers, middle-actors, transporters, tuna processing and export-import companies, international trading companies, wholesalers/retailers and consumers. Most of the agreements, relationships between harvesting factors and raw material purchasing factors in the supply chain are based on reputations in business and do not have any clear or permanent written contracts. However, tuna processing and export-import companies and middle-actors have clear agreements about commission for the volume of purchasing. Some inadequacies and limitations of the current supply chain are the price is highly dependent on the volume of tuna landing, creating price pressure when the volume of tuna landings at the same time is high. Most of the time, the quality of fish is not classified carefully and clearly, resulting in the middle-actors buying all the fish for the same price which is not fair for the fishers and not suitable for the value of each tuna.

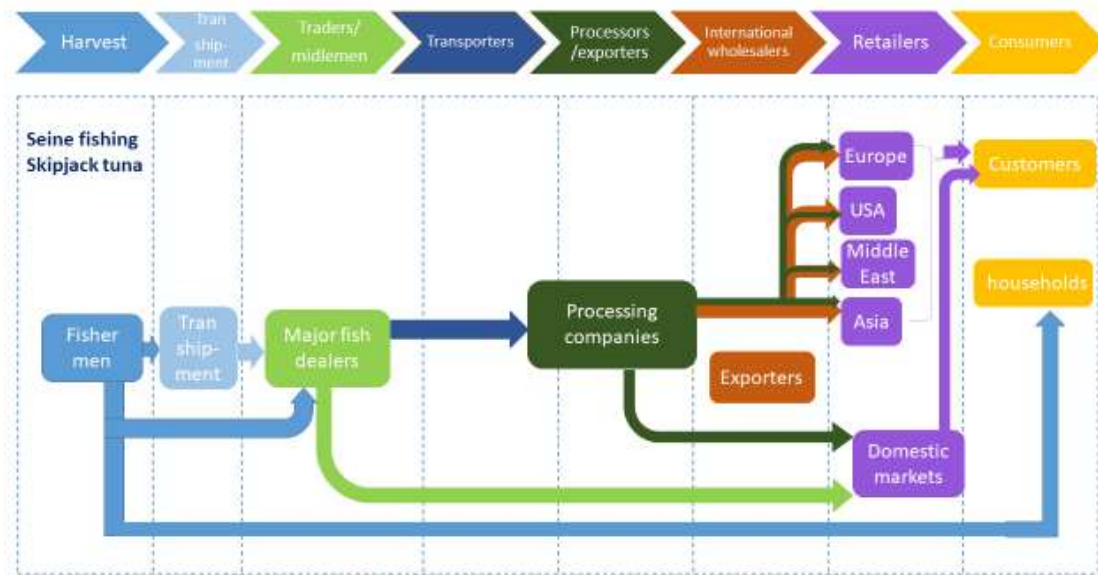
## 3.2. Supply chain analysis of skipjack tuna

### 3.2.1. Mapping the supply chain of skipjack tuna

The skipjack tuna, mostly caught by the purse seine, is one of the important offshore fishing species in Vietnam. Currently Binh Dinh has about 726 skipjack tuna vessels, concentrated in Hoai Nhon district.

Similarly, to other tuna supply chains it consists of several actors including fishers, middle-actors, transporters, processing plants, international trading companies, wholesalers/retailers and consumers (Figure 7).

**Figure 6. Actors and production flows of skipjack products**



**Fishers:** Skipjack is harvested throughout the entire year. Fishing trips can last from 15 to 22 days, usually starting on the 17<sup>th</sup> lunar day of every month and ending around the 10<sup>th</sup> of the next month. All fishers who join in fishing operations are male. Purse seine vessels usually have a larger size than handline vessels, with a length from 18 to more than 20 meters. The investment required for purse seine fishing gear and equipment is also more costly. The purse seine fishery is known as a group that helps each other with fishing operations and financial issues. The groups of fishing vessels enhance the effectiveness of fishing, increase the profitability of fishing trips, minimize risks, and ensure the safety of fishers and vessels at sea. The financial benefits of each fishing trip increase with communication, well-managed logistics, extended fishing trips because of transshipment, and reduced fuel and ice usage. In Hoai Nhon district, 40 percent of vessel owners work directly on fishing



*Photo: Purse seine vessels*

According to experienced fishers, skipjack purse seine vessels often spend 3 days to travel from the fishing port to the fishing grounds. Skipjack live in herds, so fishers can use wood and other floating objects that create shadows to attract the fish; the fish gather around the shadow(s) (called “FAD”).

**Transshipment “logistic support” vessels:** When the volume of fish exceeds the capacity of a vessel, the fishers can call for other vessels in their group to fish together or for transshipment vessels to come transport the fish to a fishing port. In the case that vessel owners do not work directly on board, the captain will call the vessel owner to make a decision. The transshipment vessels in Binh Dinh province often only have a transportation function such as “logistic services” providers, not like the transshipment vessels in the south of Vietnam that make transactions as well. Thus, tuna transshipment processes in Binh Dinh province do not cause any changes to the price of tuna at the fishing port.



**Table 5. Detailed skipjack trip information**

No	Indicator	Unit	Average	Note
1	Number of crew members	person	12	01 captain, 01 head engineer, 01 mechanic, and 8-9 labors; All involved in fishing activities at the sea
2	Number of fishing days	day	17	
3	Fishing ground			mainly in the middle of the South China Sea, particularly around “Truong Sa” island
4	Catch volume	kg	12.000	
5	Price at port	VND/kg	21,000	Usually, price is given by processing plant that varies by fishing seasons and market demand
6	Production cost	mill.VND/person	135	Including investment and operating costs
7	Production revenue	mill.VND/person	294	
8	Net profit	mill.VND/person	117	
9	Income per capita	mill.VND/person	8	Including additional income from other fishes

**Middle-actors:** Binh Dinh has 6 middle-actors in Quy Nhon and Hoai Nhon. Skipjack, after being weighed at the middle-actors point, is sold to tuna processing companies (50%-60% of the volume) and the rest to the domestic market (30-40% of the total volume).

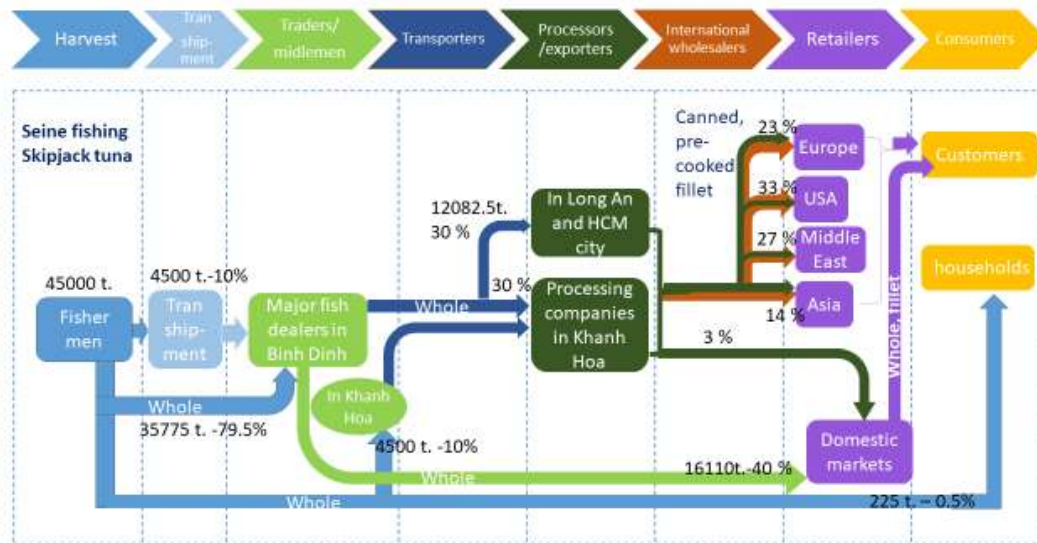
Some skipjack vessels are landed at Khanh Hoa and sell to middle-actors there. Transaction agreements can happen via phone call from the sea. The landing volume in Khanh Hoa province is estimated to be 10 percent of the area’s total skipjack catch.

**Transportation:** Most processing companies are linked/subcontracted to the transportation company to transport tuna in frozen containers from the middle-actors point to the processor. Some companies have their own refrigerated trucks to transport fish in case the quantity is not very large.

**Processing and exporting companies:** Currently, there is no skipjack processing company in Binh Dinh. The skipjack processing and exporting companies are mainly located in Ho Chi Minh City and Long An (accounting for 67 percent of the purchasing volume) and Khanh Hoa (accounting for 33 percent of the purchasing volume).

Similar to yellowfin and Bigeye tuna, there are two types of Vietnamese owned and foreign owned processing and exporting companies for skipjack tuna. After processing and packaging skipjack into final products, Vietnam owned tuna processing companies sign a transaction contract through international trading companies to sell their product in international markets like the U.S. (accounting for 33 percent of total export volume), Europe (around 23 percent) and the Middle East and Asia including China, Hong Kong, Taiwan and Thailand (just accounting for 14 percent). Only a small portion of skipjack final products is sold to domestic markets (2-3 percent of the total volume). Skipjack final products are sold as canned or as pre-cooked frozen fillets. Figure 6 describes the production flow.

**Figure 7. Production flows of skipjack product in Binh Dinh province**

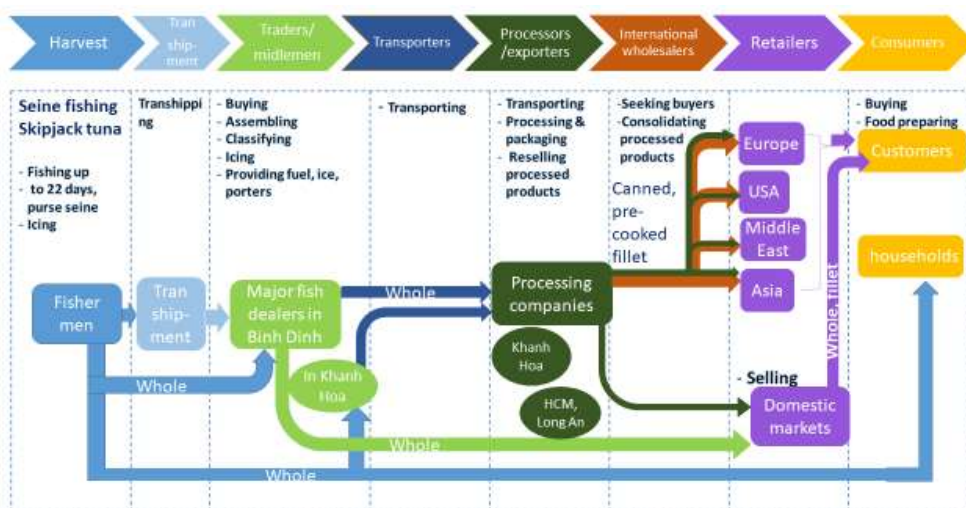


**The wholesaler/retailer:** After importing products via international wholesaler, products are sold to retailers in their country and are distributed to consumers through supermarket chains, chain stores, restaurants, markets, etc.

A small portion of skipjack tuna products is sold to nearby domestic seafood markets in the area. From the seafood market, tuna is cut into fillets or left as whole round to sell to restaurants, consumers, etc. Skipjack is mostly sold as whole round to processing plants and domestic markets in the area. After being processed, the final products are exported and distributed to international markets as canned or pre-cooked products. The skipjack products are mostly exported directly under processing companies' name and transited through Ho Chi Minh City. Additionally, a small portion (0.5%) of the total skipjack tuna catch is brought home by fishers to meet their family demands.

### 3.2.2. Analysis of relationships, linkages and services in the chain

**Figure 8. Services and correlation between skipjack supply chain's factor in Hoai Nhon district, Binh Dinh province**



Regarding the skipjack tuna fishery in Hoai Nhon district, Binh Dinh province, a large portion (about 60%) consists of vessel owners with jointly invested capital who own their vessels but do not work directly at sea. They hire a captain and workers for fishing operations. Vessel owners are responsible for paying trip costs, maintenance costs, etc.

The other vessel owners (40%) who directly take part in fishing trips only hire crew members.

Most crew members work for 1-2 vessel owners. Vessel owners usually pay crew members an advance of 2-3 million VND before a fishing trip commences. Additionally, the relationship between owners and workers is based on the willingness of owners to provide an amount of money to the crew's families for urgent needs (e.g., when they need money for hospital fees, school tuition,).

Fishers are mainly males, they do not sign labor contracts with ship owners. When vessel owners do not have enough capital for fishing trip preparations, they usually get an advance for fuel and ice costs from the middle-actors with an agreement for selling the products to them after the trip. Such cases create a mutually beneficial, relatively sustainable relationship between middle-actors. Approximately 60 percent of vessel owners are in this type of relationship. In the long term, this relationship inadvertently becomes a necessary condition for many middle-actors, especially those who are new in the area. One disadvantage for middle-actors in this situation is the risk they face should vessels have unsuccessful fishing trips, catch a small number of fish, do not have enough money to pay fishing costs or cannot pay back the cost of fuel and ice or larger loans to the middle-actors; middle-actors can then be short money for a long time.

Vessel owners/captains often have long-term relationships with middle-actors to whom they sell their products. The majority of transaction agreements occur by phone when vessels are coming back to the fishing port and are carried out when vessels arrive at the port.

Middle-actors, as a purchasing agent, purchase skipjack from the fishers for the tuna processing companies. The volume purchased is depending on the companies' requirements for skipjack raw materials. Most companies hire third-party transportation to transport large volumes of fish to processing plants. A small number of companies have freezer trucks to transport materials to the company.

At processing plants, raw materials are cleaned then canned or filleted, pre-cooked and frozen. The main products are canned tuna, pre-cooked fillets and additional flavors of canned tuna (e.g. oil soaked, in tomato sauce).



*Photo: Mr. Ninh, an experienced fisher, after stopping directly working at sea, has invested in 16 skipjack purse seine vessels, directly managing the fleets and creating jobs for many fishermen in the area.*

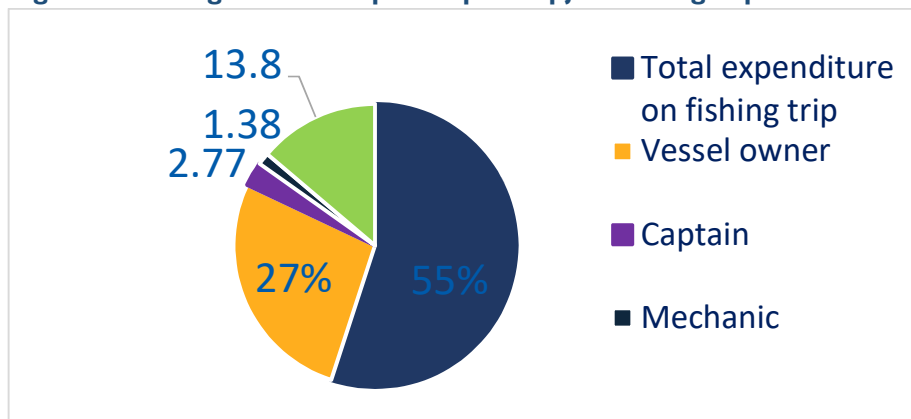


*Photo: Purchasing skipjack at middlemen point in Binh Dinh*

### 3.2.3. Cost–profit analysis

It is estimated that the cost of each purse seine fishing trip ranges from 80-140 million VND. Similar to handline fishing, the main costs for a skipjack fishing trip include fuel (which accounts for about two-thirds of the total cost), paying workers, food, purchasing ice, maintenance of fishing gear, lighting, and other costs such as medicine and cigarettes.

**Figure 9. Average costs and profits per skipjack fishing trip**



Each successful fishing trip yields about 10-25 tons, earning a revenue of more than 200 million VND. After deducting expenses, the profit is divided as follows: 60 percent of the profit goes to the vessel owner and the remaining 40 percent is divided between the captain and crew members. The captain will be paid twice as much as the crew. In case the vessel owner is not involved in the fishing operations at sea, an extra payment will be made by the vessel owner to the captain. In the case of unsuccessful trips, vessel owners take a loss, including the wages of the captain and crew members.

The vessels contact middle-actors to sell fish before coming back to the fishing port. Depending on the time and price, skipjack are consumed in different markets. The price of skipjack depends on the quality (freshness) and size. The middle-actors sell to tuna processing companies when the price of skipjack ranges from VND 25,000–30,000 per kg. According to middle-actors owners, when the price of skipjack is over VND 25,000 per kg, the processors will not buy from them because it is not profitable for them. At that time the middle-actors will sell to domestic markets or direct consumers. According to the research of Cao Le Quyên (2018), good quality skipjack will be brought to domestic markets for local consumers. Bad quality fish, if inedible, is provided to feed mill processing companies.

Economic efficiency among the actors in the Skipjack Tuna chain is different. Table 6 below shows that the selling price through different actors has changed, in which the added value from middle-actors to export processing enterprises is the highest. According to Cao Le Quyên (2017), on average each vessel harvests about 83 tons/vessel/year and with an average selling price of VND 28,500/kg. Each vessel has an average annual revenue of about VND 2,364.5 million/vessel/year, after deducting production costs of 1,764.8 million VND/vessel/year, the average profit of each vessel is about 599.6 million VND/vessel/year.

For middle-actors, on average each middleman collects about 1,200 tons /middleman/year, with an average selling price of 30,500 VND/kg, each middleman has an average revenue of about 36,600 million VND/middleman/year, after deducting production costs of 36,000 million

VND/middleman/year, on average each middleman has a profit of about 600 million VND/middleman/year.

For processing enterprises, there are 3 skipjack tuna processing enterprises located in Khanh Hoa, Ho Chi Minh City and Long An Province. On average, in each of the 3 provinces, each enterprise can process approximately 7,333.3 tons/enterprise/year, with the average selling price of 72,900 VND/kg. The average revenue is about 534,282.2 million VND/enterprise/year and after deducting production costs of 506,716.7 billion VND /enterprise/year, the average profit of each enterprise is about 27,565.6 million VND/enterprise/year.

**Table 6. Costs and profits of key actors in the skipjack tuna value chain per kg.**

No	Item	Fishers	Trader/ middle-actors	Processing enterprises	Total
<b>1</b>	<b>Selling Price</b>	<b>28,500</b>	<b>30,500</b>	<b>72,900</b>	<b>131,900</b>
	Input cost	13,000	29,400	37,500	79,900
	Increased cost	7,000	600	7,600	15,200
<b>2</b>	<b>Added value</b>	<b>14,700</b>	<b>1,100</b>	<b>11,400</b>	<b>27,200</b>
	Percentage (%)	54%	4%	42%	100%
<b>3</b>	<b>Net Added values (Profit)</b>	<b>7,100</b>	<b>500</b>	<b>2,500</b>	<b>10,100</b>
	Percentage (%)	<b>70%</b>	<b>5%</b>	<b>25%</b>	<b>100%</b>

Source: Author's calculation based on data collected by the research team and VIFEP; Note: Calculation per unit of product with processing factor: 1kg of processed product = 1.5kg of raw material

Processing-export companies often export to international markets pre-cooked and frozen skipjack fillets or canned tuna and canned tuna with tomato sauce. The average price ranges from 22,000 to 35.000 VND/185g can for tuna chunks in oil.

In summary, the main actors in the skipjack tuna chain in Binh Dinh province are fishers, transhippers, middle-actors, transporters, processing and import-export companies, international trading companies, wholesalers/retailers and consumers. The transshipments of skipjack do not occur often and does not have a transaction function in Hoai Nhon District, so there is no change in price when it occurs. Most of the agreements and relationships between fishers and middle-actors in the supply chain are based on business prestige and trust, there are no written agreements, though there are contractual agreements between processing import-export companies and middle-actors regarding commission (in percentage). The middle-actors sell the fish to processing companies based on their requirements on the quality and size, and normally middle-actors got a profit of VND 1.000-2.000/kg after the cost deduction. Some inadequacies and limitations of the current supply chain are the price of tuna is highly dependent on the volume of tuna landing, creating price pressure when the volume of tuna landings is high. Most of the time, the quality of fish is not classified carefully and clearly, resulting in the middle-actors buying all the fish at the same price which is not fair for the fishers and not suitable for the value of each one.

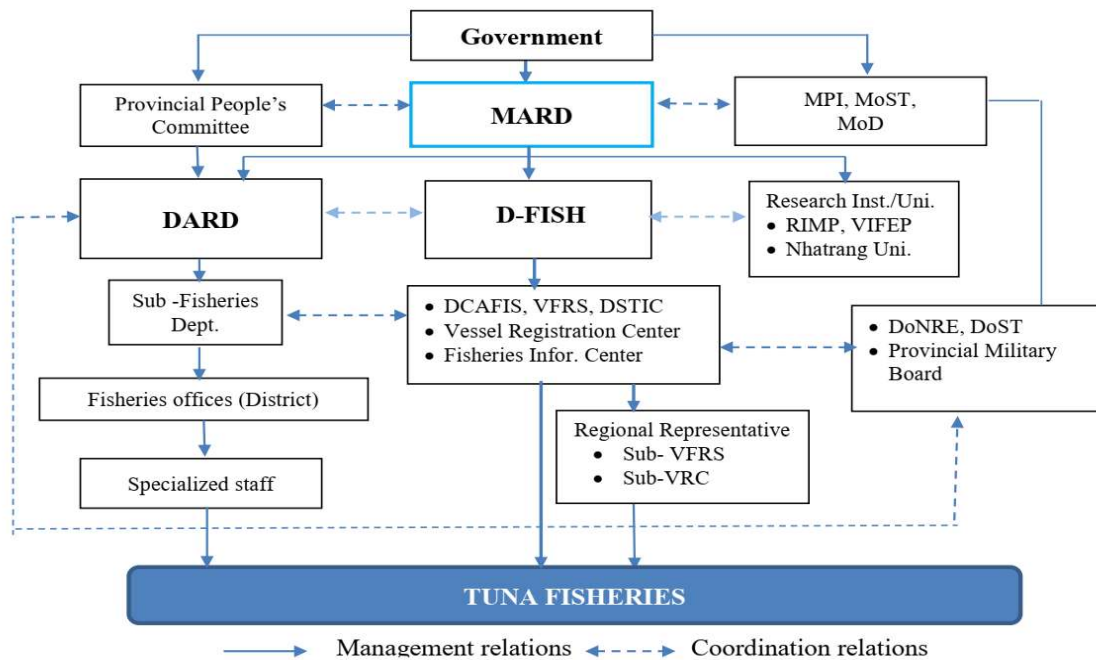
### 3.3. Governance and policies in tuna fishery management in Vietnam

#### 3.3.1 Institutional framework

The institutional framework for governing the fisheries sector in Vietnam in general and in the tuna fisheries in particular is outlined in the Figure 11. In this framework, the tuna fisheries is managed under direct management and coordinated management relations.

For the national fisheries development, the government administers all affairs mainly via the Ministry of Agriculture and Rural Development (MARD)<sup>8</sup>. MARD controls all institutions in its sector in order to fulfill annual, five-year, and long-term development plans and strategies, which are handed by the national assembly or the central government. It has the right to issue legal documents in order to implement decisions made by the national assembly and the central government (*Article 2, Session 10, Decree No. 15/2017/ND-CP*).

**Figure 10. Government structure on tuna fisheries management in Vietnam**



Under MARD, the Directorate of Fisheries (D-Fish) is a focal body that directly oversees the management of fisheries and aquaculture<sup>9</sup> nationwide. Its responsibilities lie in strategic planning for the development of fisheries and aquaculture in the country and enforcement of law and regulations related to seafood production and conservation of aquatic resources. D-Fish is also responsible for

<sup>8</sup> MARD has been established in 1995 by combining the Ministry of Agriculture and Food Industry, the Ministry of Forestry and the Ministry of Irrigation. In 2007, the Ministry of Fisheries was also merged into MARD. Its latest functions, tasks and organization are defined in Decree No. 15/2017/ND-CP, dated 17 February 2017.

<sup>9</sup> D-Fish was established in 2010 under Decision No. 05/2010/QĐ-TTg. Its latest functions, tasks and organization structure are defined in Decree No. 27/2017/QĐ-TTg, dated 03rd July 2017.

collecting and compiling data on fisheries and aquaculture production throughout the country. Within D-Fish, there are professional departments in charge of various fields, in which the Department of Capture Fisheries (DECAFIS) is a specialized unit assigned to help D-Fish perform the state management of the capture fisheries.

At local level, Departments of Agriculture and Rural Development (DARD)<sup>10</sup> is a professional agency of the Provincial People's Committee (PPC) that performs the functions of advising and assisting the PPC in state management of agriculture and rural development, including aquaculture. DARD is also under the direction, inspection, professional guidance of MARD.

Based on the MARD's direction, DARD is responsible for management and development of fisheries and aquaculture in each province in order to fulfill their tasks at lower levels. The management system at the provincial and district levels is similar to that at the national level. Under the new Fisheries Law, their role could increase according to recent legislative changes.

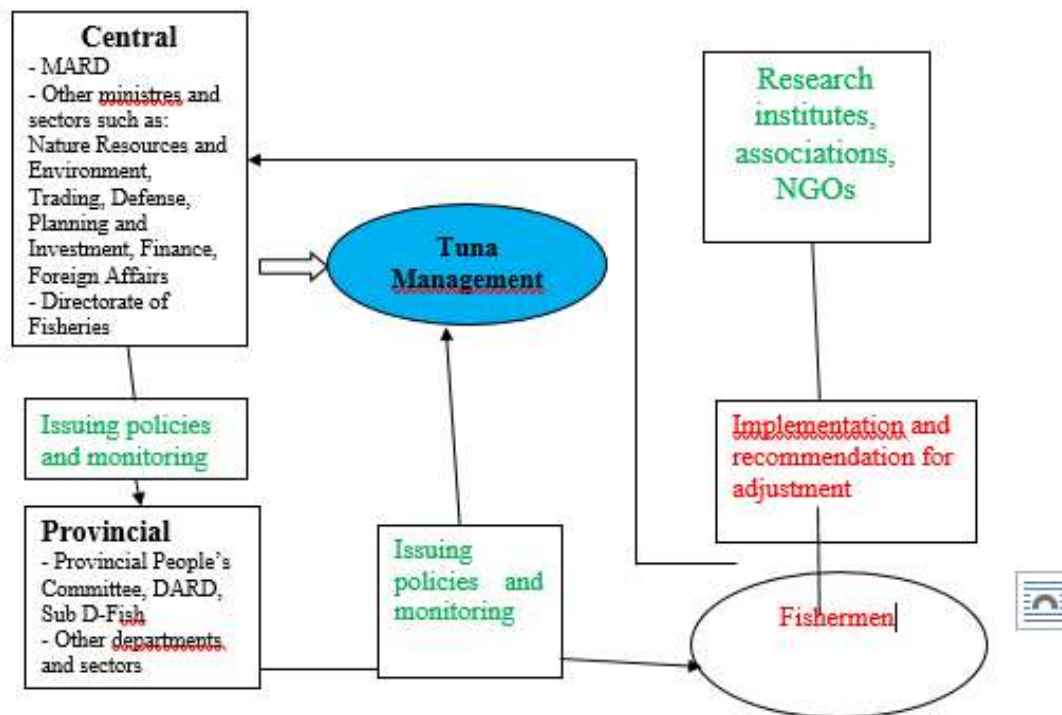
In addition to the state management bodies, there are also relevant agencies and organizations who indirectly support fisheries sector management and development such as: RIMF, VIFEP; Universities and Colleges (Nha Trang University); Viet Nam Fisheries Association; Viet Nam Tuna Fisheries Association (VINATUNA), VASEP; National Agriculture Extension Center.

- (i) MARD, with the agency under MARD, and the agency under the Directorate of Fisheries, perform state management at the macro-level, issuing (or developing for the government to issue) policies on management and development assistance, impact at macro (sector) through regulatory documents.
- (ii) PPC, Provincial Department of Agriculture and Rural Development and Provincial Department of Fisheries are local authorities that disseminate and apply central policies and self-issue some local policies in their scope of authority and resources.
- (iii) Research institutes, associations and NGOs such as RIMF, VASEP and Vinatuna provide technical assistance for sustainable tuna fishing, business matching and development for companies and fishers and have an impact at the sectoral level through research, networking, capacity building, lobbying and etc.

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<sup>10</sup> DARD's functions, tasks and organization structure in province are available via Web pages <https://sonnptnt.soctrang.gov.vn/>

Figure 11. Diagram of stakeholders in tuna fishery management



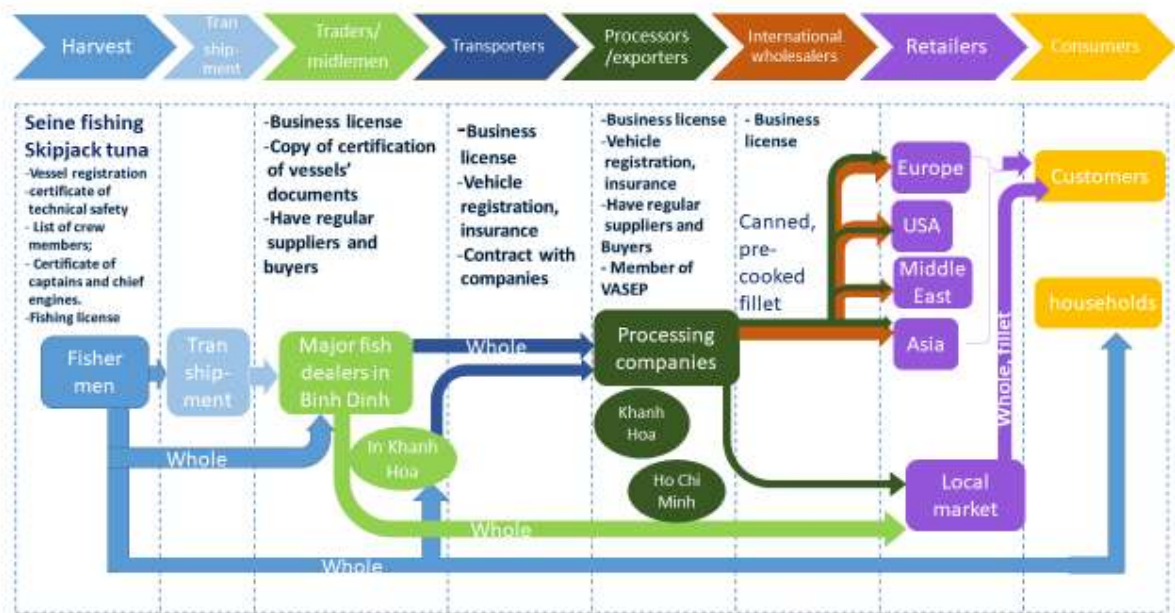
**Policies related to fishing activity's management:**

Under the revised Fisheries Law 2017, fishing vessels can legally operate in the high seas or waters and territories of other countries with the following documents:

- a) Certificate of fishing vessel registration;
- b) Fishing vessel technical safety certificate;
- c) List of crew members;
- d) Diploma of captain and chief engineer; and
- e) Fishing license.



**Figure 12. Implementation of regulations by each actor in the tuna supply chain**

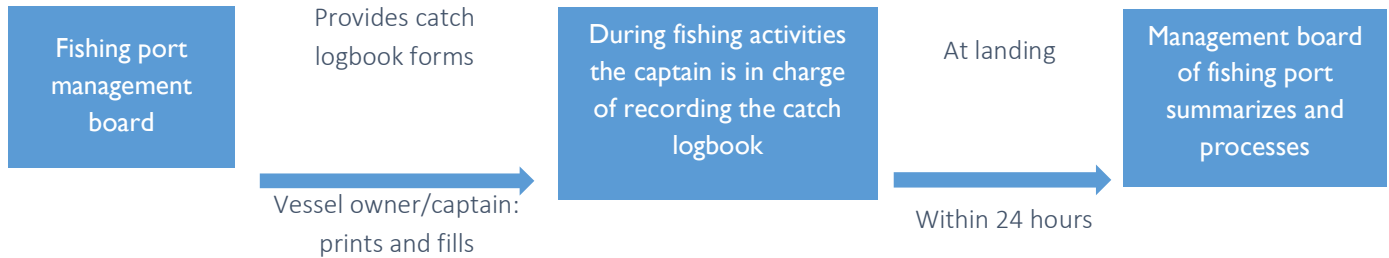


According to Article 44 of Decree 26/2019/ND-CP, fishing vessels with a maximum length of 15 m or more must install a vessel monitoring system (VMS). Binh Dinh province has 2 shore stations and long-range HF radio communication system with satellite devices (GPS) with 2,600 fishing vessels equipped with HF VX-1700 communication equipment and I Themis system under the project "Observation system for fishing vessels. Fishing areas and fish resources are equipped with Movimar satellite technology" with 385 fishing vessels installed Movimar equipment for the management and monitoring of fishing vessels operating at sea. The province has a policy that requires fishers to install VMS equipment certified by the Directorate of Fisheries and supports 50 percent of the cost of buying and installing equipment for fishers.

In 2018, MARD issued Circular 21/2018/TT-BNNPTNT on "Provisions on recording, submitting reports and fishing logbooks; officially announces list of fishing ports eligible for granting certificate of origin; list of illegal fishing vessels; catch certificate (CC), catch statements for marine caught". This is one of the regulations aimed at improving the efficiency of fisheries management, intensifying efforts to eliminate the yellow card on Vietnam's capture seafood products. Binh Dinh province is one of the coastal provinces that is currently implementing this circular to overcome the European Commission (EC)'s warning about IUU fishing regulations.

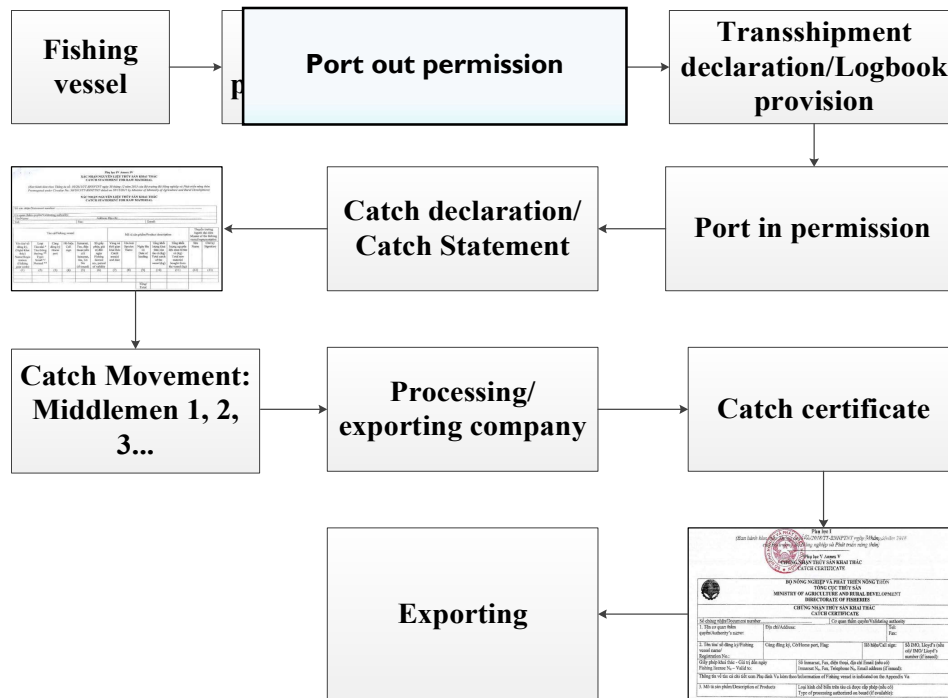
According to this regulation, the management board of fishing port will issue fishing logbooks to the captain of fishing vessels for use (writing and recording) during fishing operations. For vessels with a maximum length of 12 meters or more, the fishing logbook shall be used daily. When the ship arrives at the port, it must submit a fishing logbook to the management board of fishing port within 24 hours of completion of all loading and unloading of products. For ships with a length of between 6 and 12 meters, fishing logbooks must be submitted to the management board of fishing port once a week.

**Figure 13. Fishing logbook steps and requirements**



More specifically, Binh Dinh is implementing a CDS for tuna and fisheries products exporting to European countries and other required markets. The flowchart of full implementation process is indicated below:

**Figure 14. Catch documentation process**



Currently, most of the procedures are on paper-based process, which requires a lot of manpower and resources; presents many difficulties. For example, fishers often do not declare their fishing grounds, intentionally providing the wrong locations and coordinates of fishing spots, making it difficult to check and compare the catch documentation with the fishing vessel's itinerary. It is strongly required to have an electronic system to reduce unnecessary procedures and to more effectively manage CDS. Therefore, the province is making efforts to move its fisheries sector towards modernization in order to improve the system without increasing procedural burdens on local people and managers.

eCDT is recommended by USAID Oceans in ASEAN region across the value chain of fisheries products. eCDT is a new concept in Vietnam and currently being implemented through various means

- integrating Vessel Monitoring Systems (VMS) and testing independent electronic catch documentation and applications - to ensure the traceability of harvested products throughout entire value chains: fishing, conveying, landing, transporting, processing, storing, and packaging.

One notable issue is that fishing ports that are allowed to certify the origin of seafood products must meet the criteria of type I and II fishing ports according to Article 78 of the Fisheries Law 2017. For instance, many fishing ports nationwide, including major Vietnamese tuna fishing ports such as Tam Quan (Binh Dinh) or Dong Tac (Phu Yen) ports, have stopped issuing catch statement because they have not yet met the criteria of type I and II. The ports are therefore unable to confirm that tuna processing and export-import companies can buy raw materials there. This will make it difficult for businesses to complete export records when purchasing raw materials are not certified through statement of catch.

### ***Regional and international regulations regarding the export of tuna:***

In addition to national regulations, there are also international regulations: Vietnam's tuna mainly competes with similar products from Ecuador, the Philippines, Indonesia, Thailand and China.

On December 8, 2016, NOAA's National Marine Fisheries Service (NMFS) finalized the "Seafood Import Monitoring Program" or SIMP (81 FR 88975), establishing the first phase of traceability requirements for seafood imports into the United States, to be implemented beginning on January 1, 2018. The SIMP establishes, for imports of certain seafood products, reporting and recordkeeping requirements for the importer of record in order to prevent IUU fishing-caught and/or misrepresented seafood from entering U.S. commerce. The regulations require that certain at-risk species, identified as vulnerable to IUU fishing and seafood fraud and imported into US markets, be traced from the point of entry into U.S. commerce back to the point of harvest or production to verify that the seafood was lawfully harvested or produced.

On September 20, 2016, the U.S. Government finalized the rule titled, Trade Monitoring Procedures for Fishery Products; International Trade in Seafood; Permit Requirements for Importers and Exporters. The rule sets forth regulations to revise procedures and requirements for filing import, export, and re-export documentation for designated fishery products. NOAA NMFS sets forth regulations to integrate the collection of trade documentation within the government-wide International Trade Data System and requires electronic information collection through the automated portal maintained by the Customs and Border Protection (CBP).

## **THE EUROPEAN UNION**

The EU's regulation to prevent, deter, and eliminate IUU fishing entered into force on January 1, 2010 (European Commission Notice 1005/2008). This regulation established a community system to combat IUU fishing and to permit importation to only legal-caught fish.

The regulation:

- (i) Requires that all imports of marine fishery products are accompanied by a catch certificate validated by the vessel's 'flag State';
- (ii) Enables seafood imports to be banned from 'non-cooperating' countries and IUU fishing vessels; and

- (iii) Includes provisions on punishments for those involved in the fishing of, or the trade in, IUU fishery products.

Catch certification is an essential part of the EU Regulation, intended to help facilitate legal trade and prevent unfair competition from IUU fishing products in the EU market. It provides data on all points in the fishery product supply chain that will help to improve product traceability (from catch to importation, including processing and transport) and the effectiveness of controls used to support compliance with conservation measures.

CATCH is an IT system that aims to digitalize the currently paper-based EU catch certification scheme as laid down by the Regulation (EC) No 1005/2008. The objective behind CATCH is to develop a web-based application to support the management (issuance, control and verification) of official documents and to automate the related procedures as laid down in Regulation (EC) No 1005/2008 and its annexes.

Some international trade instruments might affect to tuna export to several markets and countries listed in the table below:

**Table 7. International trade instrument/regulation**

No.	International trade instrument/ Regulation	Possible impacts
1	CPTPP (effective from January 2019): almost all of Vietnam's exports, including tuna products to CPTPP member countries, will have import tax completely eliminated immediately or according to the roadmap.	
2	EVFTA: when EVFTA comes into effect, Vietnam's tuna will have a tax advantage (be removed immediately or gradually cut to 0 percent after 3-7 years or exempt from quotas) over countries like Thailand and China, Vietnam's major competitors holding large export market shares in the EU.	However, businesses still face many difficulties because of needed improvements to meet the requirements of trade and sustainable development, including labor and environmental issues related to the trade relationship between the EU and Vietnam.
3	Vietnam - Japan Economic Partnership Agreement (VJEPA): 2019 is the year to complete the tax reduction roadmap in the VJEPA Agreement and import tax of all seafood products from Vietnam to Japan has been reduced to 0%.	This also means that Vietnamese tuna exports to Japan will be more competitive (in price).
4	Free Trade Agreement between Vietnam and Chile (VCFTA): also has a positive effect on Vietnam tuna due to tax reductions. Specifically, in 2010, Vietnam's tuna export value to Chile was only 146,000 USD, but after Vietnam signed a free trade agreement with Chile in	This is an opportunity for Vietnamese tuna to reach more than 30 markets in Latin America, but the level of competition there is also quite large. Vietnamese tuna

No.	International trade instrument/ Regulation	Possible impacts
	2012, tuna export to this market increased by 212% after 5 years. In 2018, Vietnam's tuna export value to Chile had increased to nearly 10.2 million USD, up 633%.	exporters will have to make every effort to make the price and quality of Vietnamese tuna products competitive to maintain their share in this market.
5	<p>Since May 21, 2016, tuna products exported to the US must be labeled "Dolphin Safe" according to the regulations of the National Marine Fisheries Department (NMFS) to enforce the Information Law on the US dolphin protection (the Dolphin Protection Consumer Information Act (DPCIA).</p> <p>Some of the main barriers from international regulations and agreements: The US SIMP with 13 seafood species creates great pressure on export enterprises;</p>	This regulation significantly and directly affected Vietnam's tuna exports to the US. However, these regulations are being gradually implemented.
6	Canada exempts import tax on fresh, live and frozen tuna products and low import tax on canned tuna (Vietnam canned tuna exported to Canada is put to 4% tax, while Thailand was 5.8%).	This would make Canada a good export market for Vietnam's tuna enterprises at this time, especially since tuna import demand of major markets like the US and EU are unstable.

=> China tightens food safety controls, making it difficult for businesses to export to China to add products to the list of products approved for import; and especially the EU warning of the IUU fishing yellow card since October 2017 has caused the export of many seafood products to the EU to decrease by 4-20 percent (by 2018). Although the EU acknowledges Vietnam's efforts and progress in combating IUU fishing, the solutions are still unsatisfactory (i.e. the process of certification and certification of fishery products). According to the regulations mentioned in Circular 21 and 36 (mentioned above), IUU fishing regulations are still entangled. Therefore, the yellow card warning for Vietnam seafood has not been removed.

The Convention on the Conservation and Management of Offshore Migratory Species in the Central and Western Pacific is an agreement on regional fisheries management in the spirit of the United Nations Convention on the Law of the Sea in 1982 and the Offshore Migration Fish Agreement in 1995. In order to implement the provisions of the Convention, the Western Central Pacific Fisheries Commission (WCPFC) issued a number of conservation and management measures (CMM) that require official members, countries, territories and cooperating non-members (CNM) to comply. Vietnam is a cooperating non-member, so it is their responsibility to review the provisions of the Convention to ensure compliance.

The WCPFC manages offshore migratory species within the Convention's waters, including tuna, billfish (e.g. swordfish, marlin, sailfish), mackerel, and shark. The Convention sets out the principles of sustainable use, long-term conservation, effective monitoring, control and preventive approaches. Operators of fishing vessels engaged in fishing in the Convention's waters must record and report the location of the vessel, the catch volume of the target species and the bycatch species (including sharks and sea turtles). Vietnam has a responsibility to provide fishery data such as catch per unit effort (CPUE), effort and fishery data, consistent with requirements and standards set by the Convention.

***Vietnam Policies related to developing tuna value chain:***

On August 6, 2014, MARD issued Decision No. 3465/QD-BNN on approving the pilot program "Organizing of fishing, purchasing, processing and consumption of tuna in chain". The objective of the project is to improve productivity, quality and value of tuna in the direction of industry and modernity, combining fishing with purchasing, processing and consumption of products, and harmonizing interests between fishers and businesses. The main tasks of the project are planning management of oceanic tuna fisheries, developing modern tuna fishing fleets, organizing pilots of some models of value chain linkages, building synchronized logistics facilities for tuna fisheries and providing training and technical guidance for fishers. Next, the Directorate of Fisheries advised to the Ministry for promulgating plans to manage tuna fisheries in Vietnam (Decision 3562/QD-BNN-TCTS dated September 1, 2015).

The Binh Dinh Department of Agriculture and Rural Development issued Decision No. 4165/QD-SNN. The vessels applying Japanese technology have since been improved. Among the tuna fishing vessels using Japanese technology, the Binh Dinh Sub-Department of Fisheries has chosen the vessels sold to Ngoc Ha Co., Ltd. to build a supply chain. Currently, after a period of monitoring and evaluating the quality of tuna purchased in Binh Dinh, Mai Tin Food Co., Ltd. has decided to invest (100 percent of Japanese capital) in building a tuna processing factory in Binh Dinh.

## IV. CONCLUSIONS AND RECOMMENDATIONS

In summary, tuna fisheries, with 03 target species of yellowfin, bigeyes and skipjack is the main offshore fishing industry in Binh Dinh, making an important contribution to the socio-economic development of the province. Yellowfin and bigeye is dominated by handline fishing, skipjack is popularity caught by purse seine. The tuna value chain analysis in Binh Dinh is divided into two analyses of yellowfin/bigeye and skipjack. Both chains in general involve multiple actors including fishers, middle-actors, transporters, processing and export companies, international trading companies, wholesalers/retailers and consumers.

Most tuna vessel owners in Binh Dinh are fishers directly involved in catching tuna (90 percent). Although there is independent in terms of ownership, production activities and accounting, however, the fishing vessels usually organized in a fishing group of 3-5 vessels. Group members are often relatives or friends or in the same locality. Each fishing vessels consists of 6-7 crew members, of which 3-4 crew members are hired labors. Net profit is usually divided at a ratio of 50:50, in which the owner gets 50 percent and the remaining 50 percent is divided among other members. In order to retain labors, the vessel owners also allow their laborers to fish other species during the fishing trip for additional income.

The product flow is different between the two supply chains. About 30 percent of the catch of yellow fin/big eye went through processing and export companies in Binh Dinh, 62 percent was sold to processing plants outside the province (Khanh Hoa and Phu Yen), 3 percent in Ho Chi Minh City and about 5 percent is consumed (fresh) in domestic wholesale markets. For the skipjack, about 60 percent of the productions were purchased by a processing companies from outside the province because Binh Dinh does not have a factory for processing skipjack tuna. The remaining 40 percent is also consumed domestically. Over 95 percent of processed products of the tuna chains are exported to foreign markets, especially the US and EU. Major processed products of yellowfin and bigeye tuna are either frozen or fresh chilled, while the skipjack are mostly exported as canned products and as pre-cooked frozen fillets.

Tuna caught are sold to export processing companies and/or for domestic consumption through the local middle-actors. Usually the vessel owners and middle-actors have an “interdependent” relationship in supplying input materials and purchasing outputs. This relationship is based on "trust" rather than a contract signed.

In general, **fishers** are fishing oriented, very few are concerned about the fisheries resources and food safety due to the open access situation; they have less power in the negotiation on the prices of products. They have a limited knowledge and skills on the logbook and traceability of product.

**Middle-actors** are local traders who play a key role in the tuna supply chain in Binh Dinh in the context of small sale fisheries. They purchase tuna as well as other seafoods such as mackerel, billfish, squid; thus facilitate a large seafood consumption for many vessels that arrive in fishing port. In tuna industry, the middle-actors mostly act as local purchasing agent for the processing plants at a set price and receive a commission on the buying volume. However, in addition to purchasing, the middle-actors also play a role of providing loans and inputs for fishers, thus they have a certain “influence” on purchasing tuna from fishers.

In this context, the middle-actors might be one of the key drivers that can have an influence on changing the practices of fishers (e.g., for e-logbook and traceability systems) and help processing plants develop and operate a better traceability system if incentives were provided e.g. premium prices and a more stable price for traceability products.

**Processing plants** can be seen as one of the most powerful actors in the tuna supply chain. This actor is the one who sets the price and the purchasing volume for the tuna. However, due to small catches of individual vessels (given the nature of small-scale fisheries), most of processing plants have to rely on the local middle-actors for getting raw materials. They have often established links to the purchasing agents/middle-actors through an agreement (but not contract).

Most of the processing plants are concerned about the market requirement and traceability, food quality and food safety certification (including EU, USA, Japan market). In order to promote improving the quality of raw materials, some processing plants create a policy have incentive policies for fishers. An example of Mai Tin Company, they are now developing a value links and purchasing the higher prices of 2.000 VND/kg for the fishers to ensure a stable supply of raw materials.

There are some **challenges and gaps** in the tuna value chain analysis and eCDT requirements in Binh Dinh province:

- a. **There is a lack of supply chain management:** processing plants or exporting companies depend on the middle-actors (to gather raw materials) and they could not develop their own supply chain where they can control the quality of post-harvests. Meanwhile a single middleman might supply materials to more than one processing plant. Further, cooperation between actors in the supply chain (to improve the food safety and traceability) need to be enhanced in term of improvement of institutions or mechanisms available to coordinate the system. The processing plants could potentially be the key agency coordinating the system, but they have limited capacity currently for this. There is a need to enhance pressure from foreign retailers to influence the domestic supply chain.
- b. **The certification of fishing origin is not a concern of fishers,** but of the processing and import-export companies, because the companies need to make certificates for ensuring the export quality of their product. However, the influence of processing and import-export companies on the fishing operation and purchasing is not large. At the middle-actors point, they still purchase "different quality [tuna] at the same price" and the fish do not have a classification at that stage. Although a number of linkages between factories, middle-actors and fishers have been established, the above-mentioned problems have not been resolved.
- c. **There is still not yet transparency among the actors in the value chain.** The quality of tuna are not yet classified and paid at the higher value. Limited access to market development and standards. The price and quality of tuna is not valued. The fishers seem not in the position to access to market requirement and negotiate the price once they got a better quality of fish. Fishers have minimal impact on prices as storage facilities are rudimentary, i.e. they have to sell their goods quickly. They thus carry the highest risk of financial losses and are the vulnerable link in the supply chain - especially because they are often financially dependent on middle-actors who invested in their fishing gear and operational costs.
- d. **Limited awareness and capacity of the small-scale fishers to comply the requirement of log-book and traceability.** Since most of the fishers have a lower education and skill, therefore some efforts are needed to change practices: e.g. logbook on the daily basis, including training program and long-term commitment for the fishing owners and captain to



do that. Furthermore, labor force in the tuna fishing industry is not yet stable and there is a trend of lack of skillful captain and labor in the fishing vessels as they are not contracted, and normally not committed to work as long term for one fishing boat owner. This might be a challenge for implementation of product traceability system, as well as social issues such as health insurance and enforcement of labor regulations issued by the local government and ILO.

**Recommendations:** There are some proposed solutions and recommendations for the improving the supply chain of tuna and address the gaps of eCDT requirements in Binh Dinh province

1. **Improve the supply chain management and business model development:** Cooperation between actors in the supply chain should be strengthened through improved cooperation mechanisms to coordinate the system and improve food safety and traceability. The processing plant may be the main unit to coordinate the system, but the current capacity is not met and there is a need for pressure and motivation from the buyers. By observation, there are some potential ways to improve the tuna supply chain: (1) a contract system between processing plants and middle-actors (impacting the group of fishers to catch more responsibly for trade and food safety and (2) model B2B (business-business cooperation: foreign import companies and domestic export companies) to provide better quality of tuna products.
2. **Strengthen the capacity and compliance of fishers and relevant actors in the regulations on the logbook/VMS data:** Fishers need to be provided some skills training to improve their practices in compliance with the processes of traceability of seafood products. Vessel owners are equipped with VMS as prescribed in law; the captain must write correctly and fully in the fishing logbook. It is suggested to pilot electronic fishing logbook and select technologies and devices that are convenient for use by vessel owners and captain, provide support fishers for easily recording and accessing data and support authorities for easily and effectively monitoring, managing and certifying the origin of seafood.
3. Improve the CDS, including log-book and origin of catch certification that would help efficiently manage the production and traceability. There is critical needs for Vietnam and Binh Dinh to improve and shift from paper-based system to an electronic system, supporting more transparency and sustainability for fisheries management. This might require a national guideline/document and roadmap including several steps to be taken by the government and key stakeholders facilitating a sustainable production and tuna value chain development in Binh Dinh province.
4. **Manage tuna resources sustainably, setting up and implementing quotas and supporting the implementation of regulations:** Since tuna is migratory species and it is observed that the open access and the fisheries resources has might be declined, it is a good strategy for stable tuna supply chain management and business planning. As the new 2017 fisheries law and degree 26 has provided guidance for developing a quota for each province for the fisheries capture, it is important for quota setting up and management for key fisheries products including tuna. This will help different actors to get shared values across the value chain and to make it more responsible and sustainable in terms of environmental and social issues.

6. Reorganise fishing groups to become more independent and empowered in sustainable production and application of the traceability and catch the tuna sustainably. Co-management in the small-scale tuna fisheries would help to reduce overfishing and develop a win-win strategy for cooperation, sharing costs and benefits in the production system. The price of tuna depends on the size and freshness of the meat, so to avoid overfishing and ensure high economic efficiency for tuna, it is necessary to improve the preservation process on board and increase the rate of fish reaching export quality, thus optimizing the value of oceanic tuna (e.g. yellowfin/biegeye tuna). The fluctuation of tuna prices is based on the supply sources, so it is advisable to develop a legal link between fishers groups, middle-actors and processing companies in order to harmonize the catch with market demand, thus avoiding redundancy and price pressure.

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# APENDIX: INTERVIEW QUESTIONS

## QUESTIONNAIRE FOR FISHERS, VESSEL OWNERS/RENTERS

### THE CATCH

1. Do you fish skipjack, bigeye, or yellowfin tuna?
2. What is the fishing season for this type of tuna?
3. How many trips do you take per month and what is the average duration of a fishing trip during the season?
4. Where do you catch \_\_\_\_ tuna?
5. What is the average volume of \_\_\_\_\_ tuna that you catch each trip?
6. What is the size of the \_\_\_\_ tuna that you catch most of the time?
7. Do you fish for other species during the season? What species?
8. What do you do for live during off-season the season?
9. What is the sharing system for the catch?

### THE BOAT

10. What is the total length of your boat?
11. On average, how many crew members work at once?
12. Who owns the boat you work on?
13. How much are you paid for your labour?
14. What is the arrangement between the boat owner and crew?

#### IF OWNS THE BOAT

15. How much do you pay your labourers?
16. What is the arrangement between you and the crew?
17. How much money did you invest in your boat?
18. What is the estimated life of your boat?

#### IF RENTS THE BOAT

19. How much do you pay your labourers?
20. What is the arrangement between you and the crew?
21. What is the arrangement between you and the owner of the boat when it comes to a rental fee?
22. Who dictates the rental fee to be paid?
23. Do you pay a fixed rent, or does it depend on the volume of fish you catch?
24. How much rent do you usually pay for the boat?
25. Are you the only user of the boat or are there other fishers who rent the boat too?

### THE GEAR

26. What methods and gear do you use for fishing? Hook and line, fish aggregating devices, fish containers, others?
27. Who owns the fishing gear you use on the boat?

#### IF OWNS THE GEAR

28. How much did you invest in the fishing gear?
29. How long is the estimated life of the fishing gear?

#### IF RENTS THE GEAR

30. What is the arrangement between you and the gear owner when it comes to a rental fee?
  31. Do you pay a fixed rent? Or does it depend on the volume of fish you catch?
  32. Who dictates the rental fee to be paid?
33. Are you the only user of the gear or are there other fishers who rent the gear too?
34. What are your major cost items for fishing \_\_\_\_\_ tuna?

35. How much do you need to spend on gas, food, ice, bait, first aid, and other items needed to fish?
36. Where do you purchase these supplies?
37. What is the remaining budget for investment in new fishing technologies? (e.g. eCDT)
38. What method(s) are used to handle and store the fish?

### **SELLING THE FISH**

#### IF TUNA IS NOT PROCESSED ON THE BOAT

39. Where is the \_\_\_\_ tuna processed?
40. Is all the \_\_\_\_ tuna catch sold or is a certain amount taken home for personal consumption?

#### IF SOME FOR PERSONAL CONSUMPTION

41. About how much \_\_\_\_ tuna is taken for personal consumption after each trip?
42. Is the quality of the \_\_\_\_ tuna taken home different from that sold to buyers?
43. Who decides the details when it comes to selling the \_\_\_\_ tuna (e.g. price, who to sell to)?
44. Where is the vessel's \_\_\_\_ tuna catch sold? At sea, landing site, other?
  45. What percentage of the vessel's total \_\_\_\_ tuna catch is sold on average in each location?
  46. Who is the \_\_\_\_ tuna sold to?
  47. Where do the buyers come from?
    48. What do you see as the benefits and costs that come with having a usual buyer?
    49. How would you find buyers if you do not have usual buyers?
    50. Is there a formal agreement (verbal or written contract) with the usual buyer?
    51. If the relationship with the usual customer was terminated, how would that affect you and the vessel's operations?
  52. What services does the buyer provide? (e.g. transportation, processing)
  53. What is the average price at which the \_\_\_\_ tuna is sold to them?
  54. How much does the quality of the tuna impact its price?

### **ORGANIZATION BETWEEN FISHERS, VESSEL OWNERS/RENTERS**

55. Are there any understandings or agreements between fishing vessels about the areas where they can fish?

#### IF YES

56. Is the arrangement formal (contract) or informal?
57. Are you currently a member of any organization of fishers?
58. What are the services of this organization?
59. What are the benefits and costs of being a member?

### **GOVERNANCE**

60. What permits do you need to secure and laws you need to follow in order to fish legally?
61. Who monitors the implementation of the regulation N21 about catch logbook or VMS installation?
62. What are difficulties in applying the mentioned regulations? What solutions can you suggest?
63. Where do you get information related to your work such as fish prices, latest trends, regulations, and standards?

### **CONCLUDING**

64. Are you aware of any illegal, unreported, or unregulated fishing occurring in the area(s) where you fish?
  65. What solutions do you think are needed to stop this?
66. Do you have any problems or concerns when it comes to fishing and selling \_\_\_\_ tuna? What solutions do you think are needed to solve the(se) problems?
67. Can you tell us some methods used to monitor fishing activities (if any exist)?
68. Is there anything else you would like us to know?

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## QUESTIONNAIRE FOR TRADERS/MIDDLE-ACTORS

### SCOPING

1. What is your name, age, address, phone number, education and qualifications, gender, years of working as a trader/middle-actors?
2. What activities/services do you do? (i.e. buying, processing, transporting, icing)
3. How much fish do you handle each trip on average? (from each seller and overall)
4. Do you specialize in skipjack, bigeye, or yellowfin tuna?
5. Do you buy and sell other species? What species?
6. What percentage of your business is tuna? What percentage is \_\_\_\_\_ tuna?

### BUYING

7. What is the average volume of \_\_\_\_\_ tuna that you handle each trip during the season? (from each seller and overall)
8. What is the size of the \_\_\_\_\_ tuna that you handle most of the time?
9. Where do you usually buy your \_\_\_\_\_ tuna? Why?
  10. Who from? Why? Where are they located?
  11. Do you ensure any standards of fishing are met before buying?
12. Do you have (a) usual supplier(s)?
  13. Where do they fish?
  14. Do you provide any services or arrangements to this supplier? What?
15. Is the fish processed before you receive it?
16. How much do you buy it for?
  17. Who sets this price? The supplier or you?
  18. How much does the quality of the tuna impact its price?

### OPERATIONS

19. How much do you pay for hired help each trip?
20. What method(s) do you use to handle and store fish?
21. How much do you need to spend for gasoline, food, ice, bait, and other things that you need to work (storage, boat, transportation, equipment)?
22. Where do you purchase these supplies?
  23. How much is the remaining budget for investment in new technologies?

### SELLING THE FISH

24. Do you sell all the \_\_\_ tuna or do you take a certain amount home for personal consumption?
  25. If yes, about how much \_\_\_\_\_ tuna is taken for personal consumption after each trip?
  26. Is the quality of the \_\_\_\_\_ tuna you take home different from that you sell to buyers?
27. What is the average price at which you sell the \_\_\_\_\_ tuna?
  28. Who sets this price? The buyer or you?
29. Who do you sell the \_\_\_\_\_ tuna to? Where are they located?
  30. How do you decide who to sell to?
  31. How much \_\_\_\_\_ tuna do you sell to each buyer?
  32. Do you have any arrangements with the buyers? (e.g. loans, services, family obligation)
33. Do you have (a) usual buyer(s)?
  34. What do you see as the benefits and costs that come with having a usual buyer?
35. What services does the buyer provide? (e.g. transportation, processing)
36. Besides the factories, do you have any other markets? (eg: seafood market)

### **ORGANIZATION BETWEEN TRADERS/MIDDLE-ACTORS**

37. Do you have any understandings or agreements with other traders/middle-actors about the area(s) or supplier(s) you can buy fish from?

IF YES

38. Is the arrangement formal (contract) or informal?

39. Are you currently a member of any organization of traders/middle-actors?

IF YES

40. What is the name of the organization?

41. What are the services of this organization?

42. What are the benefits and costs of being a member?

IF NO

43. Is there an organization?

44. Why aren't you a member?

45. What are the benefits and costs of being a member?

### **GOVERNANCE**

46. What permits do you need to secure and laws you need to follow in order to trade/buy and sell legally?

47. Who monitors the implementation of these laws and regulations?

48. Do other traders/middle-actors comply with them?

49. How do you obtain information relevant to your work, such as price, demand/quantity, quality/standards?

### **CONCLUDING**

50. Are you aware of any illegal, unreported, or unregulated fishing or below standard trading practices occurring in the area where you work?

51. Do you have any problems or concerns related to the industry, fishing, and trading of \_\_\_\_ tuna? If so, what are they?

52. Is there currently any method for tracking fish catch?

IF YES

53. Is it working? How do you think it could be improved?

54. Are there any activities/services you do as a trader/middleman that we have not talked about?

55. Is there anything else you would like us to know?

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## QUESTIONNAIRE FOR TRANSPORTERS/TRANSSHIPPERS

### SCOPING

1. What activities/services do you do? (e.g. icing, processing, buying, selling)
2. How much fish do you handle overall each trip on average? (each source and overall)
3. Do you specialize in skipjack, bigeye, or yellowfin tuna?
4. What is the fishing season for \_\_\_\_\_ tuna?
5. Do you transport other species during the season? What species?
6. What percentage of your business is tuna? What percentage is \_\_\_\_\_ tuna?
7. Do you work selectively in Binh Dinh province?
8. Do you have an employer (if so, who?) or are you self-employed? (i.e. do you buy and sell the fish yourself or do you do it for an employer)

### BUYING THE FISH

9. How often do you transport \_\_\_\_\_ tuna during the season?
10. What is the average volume of \_\_\_\_\_ tuna that you handle each trip during the season? (from each seller and overall)
11. What is the size of the \_\_\_\_\_ tuna that you handle most of the time?
12. Who do you/your organization usually source \_\_\_\_\_ tuna from? Why? Where are they located?
  13. Do you ensure any standards of fishing are met before buying?
  14. In what form is the fish when you receive it? Has it been processed in any way?
15. Do you/your organization have (a) usual supplier(s)?
  16. Do you/your organization provide any services or arrangements to this supplier? What?
  17. Who sets this price? The supplier or you/your organization? How much?
  18. How much does the quality of the tuna impact its price?

### OPERATIONS

19. What are your major operating costs?
20. How much do you pay for hired help each trip?
21. What method(s) do you use to handle and store fish?
22. How much do you need to spend for gasoline, food, ice, bait, and other things (vehicle, storage) that you need to work?
  23. Where do you purchase these supplies?

### SELLING THE FISH

24. Do you sell/deliver all the \_\_\_\_\_ tuna or do you take a certain amount home for personal consumption?

#### IF SOME FOR PERSONAL CONSUMPTION

25. About how much \_\_\_\_\_ tuna is taken for personal consumption after each trip?
26. Is the quality of the \_\_\_\_\_ tuna you take home different from that you sell to buyers?
27. What is the average price at which you or your employer sell the \_\_\_\_\_ tuna?
  28. Who sets this price? The buyer, (your employer), or you?
  29. How much does the quality of the tuna impact its price?
30. Who do you or your employer sell the \_\_\_\_\_ tuna to? Where are they?
  31. How do you or your employer decide who to sell to?
  32. How much \_\_\_\_\_ tuna do you or your employer sell to each buyer?
  33. Do you or your employer have any arrangements with the buyers? (e.g. loans, services, family obligation)
34. Do you or your employer have (a) usual buyer(s)?



- 35. What do you see as the benefits and costs that come with having a usual buyer?
- 36. Do you or your employer have a formal agreement (verbal or written contract) with the usual buyer?
- 37. If the relationship with the usual customer was terminated, how would that affect you and your operations?
- 38. How would you find buyers if you do not have usual buyers?
- 39. Where do the buyers take the \_\_\_ tuna they buy from you/your employer? Location? Type of facility?
- 40. How is the fish transported? By who?
- 41. What services does the buyer provide? (e.g. transportation, processing)

**ORGANIZATION BETWEEN TRANSPORTERS/TRANSSHIPPERS**

- 42. Do you or your employer have any understandings or agreements with other transporters about the area(s) or supplier(s) you can buy fish from?

IF YES

- 43. Is the arrangement formal (contract) or informal?
- 44. Are you currently a member of any organization of transporters?

IF YES

- 45. What is the name of the organization?
- 46. What are the services of this organization?
- 47. What are the benefits and costs of being a member?

IF NO

- 48. Is there an organization?
- 49. Why aren't you a member?
- 50. What are the benefits and costs of being a member?

**GOVERNANCE**

- 51. What permits do you need to secure and laws you need to follow in order to transport/trade legally?
- 52. Who monitors the implementation of these laws and regulations?
- 53. Do other transporters comply with them?
- 54. How do you obtain information relevant to your work, such as price, demand/quantity, quality/standards?

**CONCLUDING**

- 55. Are you aware of any illegal, unreported, or unregulated fishing or below standard transportation practices occurring in the area?
- 56. Do you have any problems or concerns related to the industry, fishing, and trading of \_\_\_ tuna? If so, what are they?
- 57. Is there currently any method for tracking fish catch?
- 58. Are there any activities/services you do as a transporter that we have not talked about?
- 59. Is there anything else you would like us to know?

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## QUESTIONNAIRE FOR PROCESSORS

### SCOPING

1. What activities/services do you do? (i.e. buying, processing, transporting, icing)
2. Do you specialize in skipjack, bigeye, or yellowfin tuna?
3. What is the total design capacity of the plant? What is the recent average efficiency?
4. What is the total number of workers (both managers) and their average income?
5. What are types of tuna products processed by your company? (e.g., canned in oil, fillet, tomato sauce)
6. Is the tuna caught in the province sufficient to meet the processing needs of the factory? If you need to import raw materials from another place (another province, another country), what is the percentage of imported materials?
7. What challenges in the tuna industry is your factory facing? Strategic orientation and market of the company in the near future?
8. How much fish do you buy overall each trip on average? (each source and overall)
9. What is the fishing season for \_\_\_^\_\_\_ tuna?
10. Do you buy and sell other species during the season? What species?
11. What percentage of your business is tuna? What percentage is \_\_\_\_\_ tuna?

### BUYING

12. Does your factory buy directly tuna from fishing vessels without any Traders/Middle-actors involved? If yes, what is the percentage/ quantity?
13. What is the size of the \_\_\_\_\_ tuna that you handle most of the time?
14. From whom do you often buy tuna ...? Why? Where do they sell fish?
15. Do you ensure any standards of fishing are met before buying?
16. Do you have (a) usual supplier(s)?
17. Do you provide any services or arrangements to this supplier? What?
18. Is the fish processed before you receive it?
19. How much do you buy it for?
20. Who sets this price? The supplier or you?
21. How much does the quality of the tuna impact its price?

### OPERATIONS

22. What is the annual Operating Costs to maintain major activities in your factory?
23. What method(s) do you use to handle and store fish?
24. How much do you need to spend for gasoline, food, ice, bait, and other things (boat) that you need to work?

### SELLING THE FISH

25. What is the average price at which you sell the \_\_\_\_\_ tuna?
26. Who sets this price? The buyer or you?
27. How much does the quality of the tuna impact its price?
28. Who do you sell the \_\_\_\_\_ tuna to? Where are they located?
29. How do you decide who to sell to?
30. How much \_\_\_\_\_ tuna do you sell to each buyer?
31. Do you have any arrangements with the buyers
32. Do you have (a) usual buyer(s)?
33. What do you see as the benefits and costs that come with having a usual buyer?
34. How would you find buyers if you do not have usual buyers?

35. Do you have a formal agreement (verbal or written contract) with the usual buyer?
36. If the relationship with the usual customer was terminated, how would that affect you and your operations?
37. How is the fish transported? Who is in charge of?
38. What services does the buyer provide? (e.g. transportation, papers)

#### **ORGANIZATION BETWEEN PROCESSORS**

39. Do you have any understandings or agreements with other processors about the area(s) or supplier(s) you can buy fish from?

IF YES

40. Is the arrangement formal (contract) or informal?
41. Are you currently a member of any organization of processors?

IF YES

42. What is the name of the organization?
43. What are the services of this organization?
44. What are the benefits and costs of being a member?

IF NO

45. Is there an organization?
46. Why aren't you a member?
47. What are the benefits and costs of being a member?

#### **GOVERNANCE**

48. What permits do you need to secure and laws you need to follow in order to buy, process, and sell legally?
49. Who monitors the implementation of these laws and regulations?
50. Do you have relationships/partnership with other processors?
51. How do you obtain information relevant to your work, such as price, demand/quantity, quality/standards?

#### **CONCLUDING**

52. Are you aware of any illegal, unreported, or unregulated fishing or below standard processing practices occurring in the area?
53. Do you have any problems or concerns related to the industry - fishing, trading, and processing of \_\_\_ tuna? In your opinion, what solution could be?
54. Is there currently any method for tracking fish catch?
55. Are there any activities/services you do as a processor that we have not talked about?
56. Is there anything else you would like us to know?