LIÈGE université
Gembloux
Agro-Bio Tech

An economic and gender analysis in the Vietnamese tuna value chain- Policy implications for sustainable small-scale fisheries management

Nguyen Dang Hoang Thu

Dissertation originale présentée en vue de l'obtention du grade de docteur en sciences agronomiques et ingénierie biologique

COMMUNAUTÉ FRANÇAISE DE BELGIQUE

UNIVERSITÉ DE LIÈGE – GEMBLOUX AGRO-BIO TECH

AN ECONOMIC AND GENDER ANALYSIS IN THE VIETNAMESE TUNA VALUE CHAIN-POLICY IMPLICATIONS FOR SUSTAINABLE SMALL-SCALE FISHERIES MANAGEMENT

Dang Hoang Thu NGUYEN

Dissertation originale présentée en vue de l'obtention du grade de docteur en sciences agronomiques et ingénierie biologique

Promoteur: Professor Philippe LEBAILLY
Co-promoteur: Doctor Thi Minh Hang LE
October, 2022

Abstract

NGUYEN Dang Hoang Thu (2022). An economic and gender analysis in the Vietnamese tuna value chain-Policy implications for sustainable small-scale fisheries management. (PhD Thesis) Gembloux, Belgium, University of Liège, Gembloux Agro-Bio Tech, 198p., 24 tabl., 29 fig.

Abstract

Vietnam is one of the three leading exporting countries of fish and fishery products worldwide and has small-scale fisheries. Vietnamese small-scale fisheries play significant roles in the livelihoods, employment, and income of employees in coastal communities. However, there are many challenges that fisheries managers have to cope with in order to ensure the sustainable development of small-scale fisheries. The global commercialization of fish and fishery products does not benefit the most vulnerable, such as fishers and women. In addition, fisheries managers'capacity and management systems in Vietnam are still weak and inconsistent with the trend of developing fisheries management policies and practices, aiming at sustainable small-scale fisheries. Especially as Vietnamese fish and fishery products are introduced into the global market, they have to be subjected to the principles established by international agreements, which include provisions on appropriate safeguards for the rights of vulnerable actors along the fishery value chain.

In recent years, there has been increased interest in applying value chain analysis in small-scale fisheries in order to suggest policies that help support different actors, especially the most vulnerable ones on the chain. This thesis focuses on applying value chain analysis theory in the tuna sub-sector as a case study of Vietnamese small-scale fisheries'typical value chain. It analyses the economic and gender issues in the Vietnamese tuna value chain to propose policies toward improving the socio-economic life of fishers as well as women in the chain for developing sustainable tuna fisheries in particular and Vietnamese small-scale fisheries in general.

In the first study of this thesis, the map of the Vietnamese tuna value chain is established with core processes, key actors and activities, material flows, knowledge and flows of information, the volume of tuna materials, number of actors and jobs, values at different levels along the chain, and relationships between the actors on the tuna value chain. Fishers are the most disadvantaged actors as they are price takers, financially dependent on traders/middlemen, and do not have access to public and transparent market information. The low education level, a lack of mutual trust and strong linkage with other actors, outdated fishing vessels and traditional fishing methods, long sea trip duration, and unguaranteed logistics services harm fisher's income.

In the second study of this thesis, an overview of the economic efficiency of the whole tuna value chain is shown through the analysis of the financial performance of three key economic actors, including shipowners, middle-persons, and processors. Within the entire chain, processing enterprises achieved the highest net income with 79% and 96% of total net income for one kilogram and total volume of tuna traded in

a month, respectively. In contrast, fishers attained the lowest percentage explaining one percent of the total monthly net income of the chain. The Gini coefficient and Lorenz curve are used to measure the market concentration (market structure) of the actors on the chain. The results show that the shipowners'market structure tends to be perfectly competitive. Meanwhile, the market structures of the processors and the middle persons tend to be in monopolistic competition. Several factors that negatively impacted the fishers'financial performance are identified, such as monopolistic competition, small and scattered production scale, lack of access to market information, and business loans.

In the third study of this thesis, the gender difference between male and female purchasing actors in productive, reproductive, and community managing roles are analyzed. Despite being bound by traditional norms and values, middle-women and female traders still play a leading role in the tuna business in productivity, financial investment for tuna vessels, and business skills. The gender analysis shows that women are still more disadvantaged than men in the tuna purchasing stage. Women do not have enough time for recreation, sleep/rest, participation in fisheries organizations, community activities, and business skills training programs. Furthermore, women's reproductive role is unpaid, and they do not receive any incentives/benefits during pregnancy and child-rearing. Moreover, women play a secondary role in community managing roles, consult their husbands in significant business decisions, and are not the final decision makers in the family.

In conclusion, this dissertation points out the vulnerabilities that fishers and women have to endure along the tuna value chain and proposes policies to improve the socio-economic life of these actors. Policies to support fishers should target four main areas: Technical training, infrastructure requirements, financing, and research and development. Meanwhile, policies to support women need to focus on improving gender equality and women's empowerment.

Keywords: tuna, mapping value chain analysis, market structure, market performance, gender analysis, Vietnam

Résumé

NGUYEN Dang Hoang Thu (2022). Une analyse économique et de genre dans la chaîne de valeur du thon vietnamienne - Implications politiques pour la gestion durable de la pêche à petite échelle. (Thèse de doctorat) Gembloux, Belgique, Université de Liège, Gembloux Agro-Bio Tech, 198p., 24 tabl., 29 fig.

Résumé

Le Vietnam est l'un des trois premiers pays exportateurs de poisson et de produits de la pêche dans le monde et possède une pêche à petite échelle. La pêche artisanale vietnamienne joue un rôle important dans les moyens de subsistance, l'emploi et les revenus des employés des communautés côtières. Cependant, les gestionnaires des pêches doivent relever de nombreux défis pour assurer le développement durable de la pêche artisanale. La commercialisation mondiale du poisson et des produits de la pêche ne profite pas aux plus vulnérables, comme les pêcheurs et les femmes. En outre, les capacités des gestionnaires des pêches et les systèmes de gestion au Vietnam sont encore faibles et incompatibles avec la tendance à développer des politiques et des pratiques de gestion des pêches visant une pêche artisanale durable. D'autant plus que le poisson et les produits de la pêche vietnamiens sont introduits sur le marché mondial, ils doivent être soumis aux principes établis par les accords internationaux, qui incluent des dispositions sur les garanties appropriées pour les droits des acteurs vulnérables tout au long de la chaîne de valeur de la pêche.

Ces dernières années, il y a eu un intérêt accru pour l'application de l'analyse de la chaîne de valeur dans la pêche artisanale, suggérant des politiques qui aident à soutenir différents acteurs, en particulier les plus vulnérables de la chaîne. Cette thèse se concentre sur l'application de la théorie de l'analyse de la chaîne de valeur dans le sous-secteur du thon en tant qu'étude de cas d'une chaîne de valeur typique du secteur de la pêche artisanale vietnamienne. Il analyse les questions économiques et de genre dans la chaîne de valeur du thon vietnamienne pour proposer des politiques visant à améliorer la vie socio-économique des pêcheurs et des femmes de la chaîne pour développer une pêche thonière durable en particulier et la pêche vietnamienne en général.

Dans la première étude de cette thèse, la carte de la chaîne de valeur du thon vietnamienne est établie avec les processus de base, les acteurs et activités clés, les flux de matières, les connaissances et les flux d'informations, le volume de matières thonières, le nombre d'acteurs et d'emplois, les valeurs à différents niveaux et les relations entre les acteurs de la chaîne de valeur du thon. Les pêcheurs sont les acteurs les plus défavorisés lorsqu'ils sont des preneurs de prix, financièrement dépendants des négociants/intermédiaires et n'ont pas accès à des informations publiques et transparentes sur le marché. Le faible niveau d'éducation, le manque de confiance mutuelle, les liens étroits avec les autres acteurs, les navires de pêche et les méthodes de pêche traditionnelles obsolètes, la longue durée des sorties en mer et les services logistiques non garantis nuisent aux revenus des pêcheurs.

Dans la deuxième étude de cette thèse, un aperçu de l'efficacité économique de l'ensemble de la chaîne de valeur du thon est présenté à travers l'analyse de la performance financière de trois acteurs économiques clés, à savoir les armateurs, les intermédiaires et les transformateurs. Dans l'ensemble de la chaîne, les entreprises de transformation ont réalisé le revenu net le plus élevé avec 79 % et 96 % du revenu net total pour un kilogramme et le volume total de thon commercialisé en un mois, respectivement. En revanche, les pêcheurs ont atteint le pourcentage le plus faible représentant un pour cent du revenu net mensuel total de la chaîne. Le coefficient de Gini et la courbe de Lorenz sont utilisés pour mesurer la concentration du marché (structure du marché) des acteurs de la chaîne. Les résultats montrent que la structure du marché des armateurs tend à être parfaitement concurrentielle. Pendant ce temps, les structures de marché des transformateurs et des intermédiaires tendent à être en concurrence monopolistique. Plusieurs facteurs qui ont eu un impact négatif sur la performance financière des pêcheurs sont identifiés, tels que la concurrence monopolistique, la petite échelle de production dispersée, le manque d'accès aux informations sur le marché et les prêts aux entreprises.

Dans la troisième étude de cette thèse, la différence de genre entre les acteurs-acheteurs masculins et féminins dans les rôles de production, de reproduction et de gestion communautaire est analysée. Bien qu'elles soient liées par des normes et des valeurs traditionnelles, les intermédiaires et les commerçantes jouent toujours un rôle de premier plan dans le commerce du thon en termes de productivité, d'investissement financier pour les thoniers et de compétences commerciales. L'analyse par sexe montre que les femmes sont encore plus défavorisées que les hommes au stade de l'achat du thon. Les femmes n'ont pas assez de temps pour les loisirs, le sommeil/le repos, pour participer aux organisations de pêche, aux activités communautaires et aux programmes de formation en compétences commerciales. En outre, le rôle reproductif des femmes n'est pas rémunéré et elles ne reçoivent aucune incitation/avantage pendant la grossesse et l'éducation des enfants. De plus, les femmes jouent un rôle secondaire dans la gestion communautaire, elles consultent leurs maris dans les décisions commerciales importantes et ne sont pas le décideur final dans la famille.

En conclusion, cette thèse pointe les préjudices subis par les pêcheurs et les femmes tout au long de la chaîne de valeur du thon et propose des politiques pour améliorer la vie socio-économique de ces acteurs. Les politiques de soutien aux pêcheurs ciblent quatre domaines principaux : la formation technique, les besoins en infrastructures, le financement et la recherche et le développement. En même-temps, les politiques de soutien aux femmes se concentrent sur l'amélioration de l'égalité des sexes et de l'autonomisation des femmes.

Mots-clés: thon, analyse cartographique de la chaîne de valeur, structure du marché, performance du marché, analyse de genre, le Viêt-Nam

Acknowledgements

After a period of more than five years, I would like to express my sincere gratitude to all of the individuals in Belgium as well as in Vietnam, who have supported me throughout my Ph.D. studies and have provided valuable, precious guidance for me to complete my doctoral thesis. I am deeply grateful to my supervisors: Professor Philippe LEBAILLY, my principal supervisor, Dr. Thi Minh Hang LE, my co-supervisor, for their expert guidance, academic support, valuable advice, and constant encouragement.

I would like to especially express my deepest gratitude to Prof. Philippe LEBAILLY, who has assisted me in completing my doctoral thesis. The professor gave me an overview of research directions, dedicated instructions, and helped me clarify the research methodology and content that I needed to follow. I would also like to thank Dr. Thi Minh Hang LE, Vice Dean of the Faculty of Business Administration, University of Economics, University of Danang for guiding me in the methodology of value chain analysis for the poor as well as research experiences.

I gratefully acknowledge my PhD committee members, Prof. Philippe BURNY Prof. Baudouin MICHEL, and Prof. Fabio BERTI for their insightful comments, and dedicated advice to improve the quality of this thesis. I also thank Dr. Ho Thi Minh Hop and Ms. Nadine STOFFELEN for assisting me in completing the administrative procedures related to my reseach at Gembloux.

I am incredibly grateful to Prof. Jean MARCHAL, Professor Emeritus, Honorary Vice-rector for International Affairs, the University of Liege since he introduced me to Prof. Philippe LEBAILLY, who helped me study and complete my Ph.D. program at Gembloux, University of Liege. I am extremely grateful to Associate Prof. Thi Nang Thu TRAN, Vice Dean of the Faculty of Fisheries, Vietnam National University of Agriculture, who introduced me to participate in the state-level science and technology project led by Dr. Le Quyen CAO. From the bottom of my heart, I would like to express my sincere gratitude to Associate Professor Nang Thu, who has always encouraged and motivated me during my research.

I am highly grateful to Dr. Le Quyen CAO - Deputy Director of the Fisheries Economics and Planning Institute. She allowed me to be a Ph.D. student in a state-level scientific project. During the process of participating in the project with her, as well as her brothers and sisters in the Institute of Fisheries Economics and Planning, I had the opportunity to conduct field surveys at research sites in three South Central provinces, including Binh Dinh, Phu Yen, and Khanh Hoa. With her rich experience in conducting research in the fisheries sector, she guided me on how to organize the poper survey so that usable data can be collected as well as having suitable analytical methods for data processing for this study. In addition, I would like to thank my colleagues in the Institute of Fisheries Economics and Planning for accompanying me in the process of collecting and processing data for this thesis. Furthermore, I would like to thank the National Science and Technology Research Project of Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam, Project code: KC.09.24/16-20; 2018-2020 for their data providing, technical

guidances and necessary supports to compile my PhD thesis. Finally, I would like to thank Ms. Rachel SUNDAR RAJ for accompanying me in the data collection and processing for the topic of gender analysis on the tuna value chain, the third research of my thesis.

Special thanks to the staff at the local fisheries sub-departments, the fishers, the middle-persons/traders, and the processing business owners in the three provinces of Binh Dinh, Phu Yen, and Khanh Hoa, who have cooperated effectively and enthusiastically on our data surveys. They did not hesitate to devote their time and effort to help me collect the necessary data. Other special thanks that I would like to send to the leadership and lecturers of the Faculty of Project Management for creating favorable conditions for me to study a doctoral program, and the Ministry of Education and Training for granting a scholarship for my research program.

Last but not least, I would like to express my gratitude to the members of my extended family. I have been very fortunate to have the encouragement of my four parents/in-laws, as well as my extended family. In particular, I would like to gratefully thank my mother-in-law, who sympathized with and supported me in taking care of my family. For my small family, my husband and my daughter have always been by my side and encouraged me, shared difficulties, and brought me joy and happiness, helping me to complete this doctoral program. I love you very much!

Dang Hoang Thu NGUYEN

Gembloux, Belgium, October 2022.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CBI	Center for the Promotion of Imports
D-FISH	Vietnam Directorate of Fisheries
DoFIs	Provincial Departments of Fisheries
Custom	The General Department of Vietnam Customs
VASEP	Vietnam Association of Seafood Exporters and Producers
VINATUNA	Vietnam Tuna Association
RIMF	Research Institute for Marine Fisheries
VIFEP	Vietnam Institute of Fisheries Economics and Planning
VAAS	Vietnam Academy of Agricultural Sciences
FGDs	Focus Group Discussions
KIIs	Key Informant Interviews
VCA	Value Chain Analysis
SCP	Structure - Conduct - Performance model

1

CHAPTER 1. GENERAL CONTEXT

1. Current status of global fisheries production and consumption, economic and social performance of fisheries in the World

1.1.Current status of global fisheries production and consumption

1.1.1. Current status of global fisheries production

In 2018, the global fishery production reached 178.5 million tonnes, of which the total capture fisheries production accounted for 96.4 million tonnes, and the total aquaculture production contribusted 82.1 million tons. Of the total global fishery production, 156.4 million tonnes were used for human consumption, equivalent to an estimated annual supply of 20.5 kg per capita. The global total fishery exports in 2018 were 67.1 million tonnes (accounting for 37.6% of total fishery production volume), with total fishery export value of 164.1 billion USD (Table 1-1).

Table 1-1: World fisheries and aquaculture production, utilization and trade

	World Fisheries and Aquaculture Production, Utilization and Trade					
	1986-1995	1996-2005	2006-2015	2016	2017	2018
	Average per year			(million tonnes, live weight)		
Production						
Capture						
Inland	6.4	8.3	10.6	11.4	11.9	12.0
Marine	80.5	83.0	79.3	78.3	81.2	84.4
Total capture	**86.9**	**91.3**	**89.8**	**89.6**	**93.1**	**96.4**
Aquaculture						
Inland	8.6	19.8	36.8	48.0	49.6	51.3
Marine	6.3	14.4	22.8	28.5	30.0	30.8
Total aquaculture	**14.9**	**34.2**	**59.6**	**76.5**	**79.6**	**82.1**
Total world fisheries and aquaculture	**101.8**	**125.5**	**149.4**	**166.1**	**172.7**	**178.5**
Utilization						
Human consumption	71.8	98.5	129.2	148.2	152.9	156.4
Non-food uses	29.9	27.1	20.3	17.9	19.7	22.2
Population	5.4	6.2	7.0	7.5	7.5	7.6
Per-capita apparent consumption (kg)	13.4	15.9	18.4	19.9	20.3	20.5
Trade						
Fish exports-in quantity	34.9	46.7	56.7	59.5	64.9	67.1
Share of exports in total production (%)	34.3	37.2	37.9	35.8	37.6	37.6
Fish exports-in value (USD billions)	37.0	59.6	117.1	142.6	156.0	164.1

Source: (UN et al., 2019)

The long-term trend of global capture fisheries production has been more and less static since the late 1980s, with the number of total catches ranging between 86 million tonnes and 93 million tonnes per year (Figure 1-1). However, the global production of fish by capture fisheries attained a new peak of 96.4 million tonnes in 2018, with an increase of 5.4 percent compared to the average production of the previous three years. The increase was mainly driven by marine capture fisheries, which rose from 78.3 million tons in 2016 to 84.4 million tons in 2018 (Table 1-1).

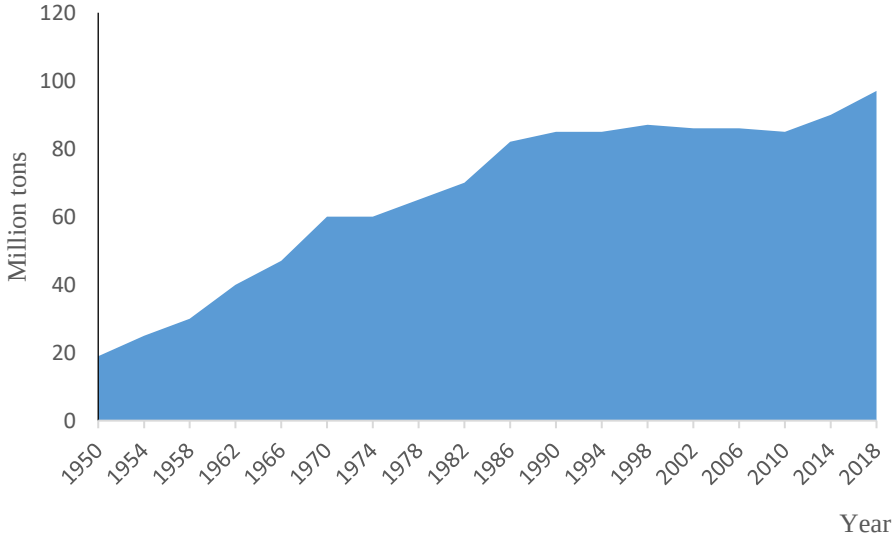


Figure 1-1: Trends in global capture fisheries production

Source: (FAO, 2020a)

In 2018, China was the world's largest capture fisheries producer, accounting for 15% of global catches. The top ten countries with the world's top capture producers include China, Indonesia, Peru, India, the Russian Federation, the United States of America, Vietnam, Japan, Norway, and Chile (Figure 1-2).

In terms of marine capture fisheries production, in 2018, China remained the world's leading producer of marine captures with 12.68 million tonnes, occupying 15% of the total global marine capture fisheries production, followed by Peru (8%), Indonesia (8%), the Russian Federation (6%), the United States of America (6%), India (4%), and Vietnam (4%). In 2018, the world's top seven fishery producers accounted for almost 50% of global total marine capture fisheries production, whereas the top 25 producers constituted almost 80% of total global marine capture fisheries production (Table 1-2).

Table 1-2: Marine capture production: major producing countries and territories

Country or territory	Production (Average per year)			Production				Percentage of total, 2018
	1980s	1990s	2000s	2015	2016	2017	2018	
	(million tonnes, live weight)							
China	3.82	9.96	12.43	14.39	13.78	13.19	12.68	15
Peru (total)	4.14	8.10	8.07	4.79	3.77	4.13	7.15	8
Indonesia	1.74	3.03	4.37	6.22	6.11	6.31	6.71	8
Russian Federation	1.51	4.72	3.20	4.17	4.47	4.59	4.84	6
United States of America	4.53	5.15	4.75	5.02	4.88	5.02	4.72	6
India	1.69	2.60	2.95	3.50	3.71	3.94	3.62	4
Vietnam	0.53	0.94	1.72	2.71	2.93	3.15	3.19	4
Japan	10.59	6.72	4.41	3.37	3.17	3.18	3.10	4
Norway	2.21	2.43	2.52	2.29	2.03	2.38	2.49	3
Chile	4.52	5.95	4.02	1.79	1.50	1.92	2.12	3
Philippines	1.32	1.68	2.08	1.95	1.87	1.72	1.89	2
Thailand	2.08	2.70	2.38	1.32	1.34	1.31	1.51	2
Mexico	1.21	1.18	1.31	1.32	1.31	1.46	1.47	2
Malaysia	0.76	1.08	1.31	1.49	1.57	1.47	1.45	2
Morocco	0.46	0.68	0.97	1.35	1,43	1.36	1.36	2
Republic of Korea	2.18	2.25	1.78	1.64	1.35	1.35	1.33	2
Iceland	1.43	1.67	1.66	1.32	1.07	1.18	1.26	1
Myanmar	0.50	0.61	1.10	1.11	1.19	1.27	1.14	1
Mauritania	0.06	0.06	0.19	0.39	0.59	0.78	0.95	1
Spain	1.21	1.13	0.92	0.97	0.91	0.94	0.92	1
Argentina	0.41	0.99	0.94	0.80	0.74	0.81	0.82	1
Twain Province of China	0.83	1.05	1.02	0.99	0.75	0.75	0.81	1
Denmark	1.86	1.71	1.05	0.87	0.67	0.90	0.79	1
Canada	1.41	1.09	1.01	0.82	0.84	0.81	0.78	1
Iran	0.11	0.23	0.31	0.54	0.59	0.69	0.72	1
Total 25 major producers	**51.1**	**67.7**	**66.5**	**65.1**	**62.6**	**64.6**	**67.8**	**80**
Total all other producers	**21.0**	**14.2**	**15.1**	**15.4**	**15.7**	**16.6**	**16.6**	**20**
World total	**72.1**	**81.9**	**81.6**	**80.5**	**78.3**	**81.2**	**84.4**	**100**

Source: (FAO, 2020a)

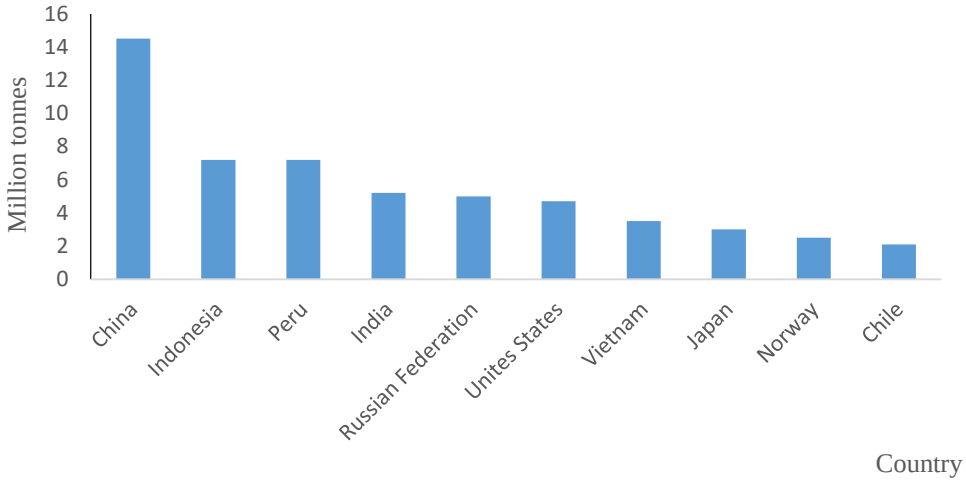


Figure 1-2: Top ten global capture producers, 2018

Source: (FAO, 2020a)

Regarding the main captured species, anchoveta catches reached the top species with over 7.0 million tonnes in 2018. Alaska pollock came second with 3.4 million tonnes, whereas skipjack tuna ranked third with 3.2 million tonnes. The catch of tuna and tuna-like species continues to increase year-on-year, reaching its peak in 2018 with more than 7.9 million tonnes, mainly due to catches in the Western Central Pacific (with more than 3.5 million tonnes). In addition, the catches of skipjack and yellowfin tuna explained about 58% of the total catches of these species in 2018 (FAO, 2020a).

In 2018, the world aquaculture production accounted for 82.1 million tonnes, of which freshwater aquaculture reached 51.3 million tonnes (accounting for 62.5%), and marine aquaculture attained 30.8 million tonnes (accounting for 37.5%) (Table 1-1). The world's aquaculture production is mainly in Asia, accounting for 89% of the total aquaculture market share during the past two decades. China is the world's largest producer of aquaculture, followed by Egypt, Chile, India, Indonesia, Vietnam, Bangladesh, and Norway (FAO, 2020a).

1.1.2. The current status of fish consumption in the world

In 2018, about 88% (156 million tons) of global fish production was used for direct human consumption and the remaining 12 percent (22 million tons) was for non-food purposes, of which 82 percent (or 18 million tons) was distributed to the production of fish meal and fish oil (Table 1-1). The total food fish consumption had an annual growth rate of 3.1 percent on average between 1961 and 2017, nearly doubled the annual rate of world population growth (1.6 percent) in the same period, and higher than the protein intake of all other animals (meat, dairy, eggs) with its average growth rate of 2.1 percent. The increase in global fish and fisheries product consumption results from a variety of many factors such as the growth of seafood production,

technological developments in processing, cold chains, transportation, delivery, and distribution, the increase of worldwide incomes, strongly correlated with the increasing demand for fish and fisheries products, the reducion of loss and waste, and better awareness of the health benefits of fish among consumers (FAO, 2020a).

The global consumption of fish and aquatic products has an upward trend among regions and countries. In developed countries, fish consumption has increased markedly from 17.4 kg per capita in 1961, peaking at 26.4 kg per capita in 2007, and decreasing gradually to reach 24.4 kg in 2017 (Table 1-3). Similarly, in developing countries, fish consumption has increased significantly from 5.2 kg per capita in 1961 to 20.7 kg in 2017 (Table 1-3), at an annual average rate of 2.4 percent. Meanwhile, in low-income food-deficit countries (LIFDCs), fish consumption doubled from 4.0 kg in 1961 to 9.3 kg in 2017 (Table 1-3), at a steady annual average rate of about 1.5 percent (FAO, 2020a).

Table 1-3: Total and per capita apparent fish consumption by region and economic grouping, 2017

Region/economic grouping	Total food fish consumption (million tonnes live weight equivalent)	Per capita food fish consumption (kg/year)
World	152.9	20.3
Africa	12.4	9.9
North America	8.1	22.4
Latin America and the Caribbean	6.7	10.5
Asia	108.7	24.1
Europe	16.1	21.6
Oceania	1.0	24.2
Developed countries	31.0	24.4
Least developed countries	12.4	12.6
Other developing countries	109.5	20.7
Low-income food-deficit countries	23.6	9.3

Source: (FAO, 2020a)

1.2. Economic performance of global fisheries

International trade is a significant feature of the economic performance of global fisheries (Cochrane, 2020). Fish and fishery products remain one of the most widely traded commodities. In 2018, two hundred twenty-one countries and territories reported fish trade activities, explaining that seventy-eight percent of fish and fishery products participated in international trade (FAO, 2020). In 2018, 67.1 million tonnes of fish and fisheries products were traded internationally, accounting for 37.6% of total capture and aquaculture production (Table 1-1). In general, from 1976 to 2018, the value of global fish and fisheries products exports increased from $7.8 billion to a peak of $164 billion, an annual rate of 8 percent in nominal interest and 4 percent in real interest (FAO, 2020a).

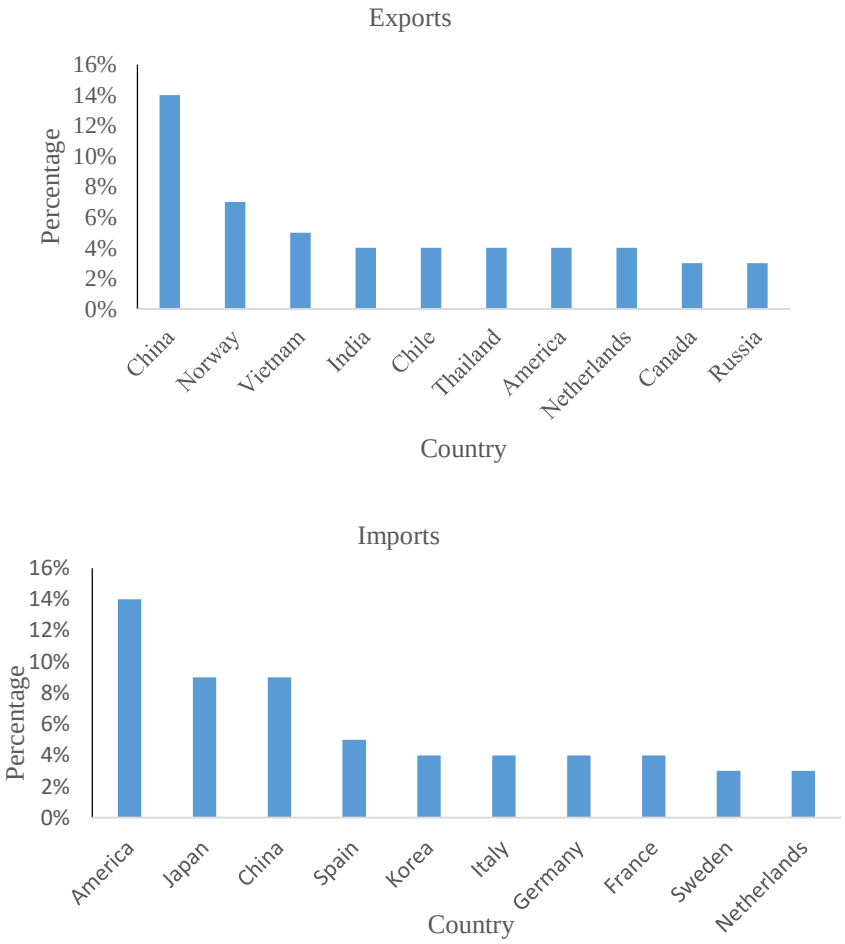


Figure 1-3: Top exporters and importers of fish and fish products in terms of value, 2018

Source: (FAO, 2020a)

In addition to being the leading fish producer, China has been the world's largest fish exporter since 2002, and since 2011 it has been the world's third-largest fish importer in terms of value. Norway has been the second-largest exporter since 2004, followed by Vietnam (since 2014), India (since 2017), and then Chile and Thailand (Figure 1-3). In recent decades, the three major markets which have accounted for a large share of total fish imports, include the European Union, the United States, and Japan (Figure 1-3). In 2018, the European Union was the largest fish import market organization (34% of the total value of global fish imports), followed by the United States (14%) and Japan (9%) (FAO, 2020).

Regarding the development trend of international fish trade, markets in developed countries still dominate fish imports, while consumers and producers of fish and fisheries products increase steadily in developing countries. In 2018, the average

import value of fish and aquatic products of developed countries was 3.4 USD per kilogram, while the corresponding figure for developing countries was 1.6 USD per kilogram. In addition, Oceania, and the developing countries of Asia, Latin America, and the Caribbean region remained solid net fish exporters. Meanwhile, countries in Europe and North America had fish trade deficits characteristics. African countries were net importers in volume but exporters in value. In addition, urbanization, improved disposable income, and an expanding middle class have spurred the growing demand for fish and fisheries products in developing countries. In 2018, fish imports in the developing countries accounted for 31 percent of the total global value and 49 percent in quantity (live weight), compared with 12 percent and 19 percent, respectively, in 1976 (FAO, 2020a).

1.3. Social performance of global fisheries

The characteristics of the workforce directly engaged in fisheries are one of the crucial indicators to represent the social performance of fisheries (Cochrane, 2020). In 2018, 59.51 million people got involved in the capture fisheries and aquaculture sectors, of which about 38.976 million were employed in the capture fisheries sector, and about 20.532 million were worked in the aquaculture sector (FAO, 2020a). In addition, the number of people working in the capture fisheries and the aquaculture sectors varies by region. In 2018, the share of workers involved in the fishing and aquaculture industries was highest in Asia (85%), followed by Africa (9%), the Americas (4%), and Europe and Oceania (1 percent for each continent) (Figure 1-4).

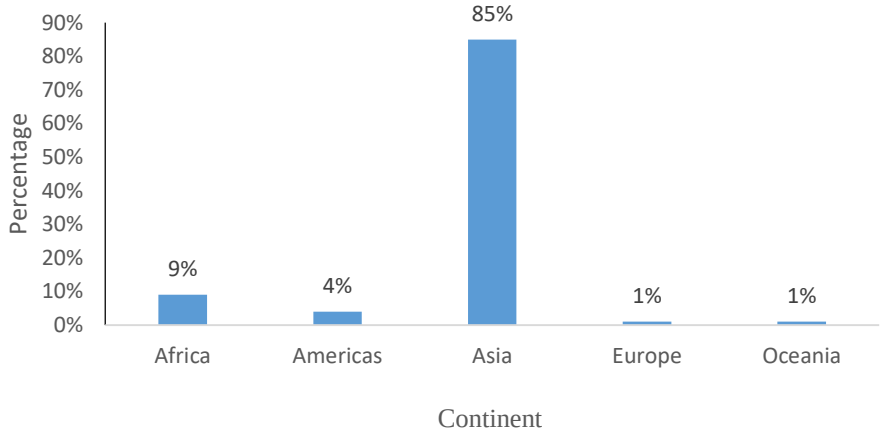


Figure 1-4: Regional share of employment in fisheries and aquaculture, 2018

Source: (FAO, 2020a)

Globally, more than 90 percent of fishers and fish farmers work in the small-scale fisheries and aquaculture industries, and most of them are from the developing world. The main categories of jobs in the fisheries sector are not considered equal in terms of occupation, the form of employment, and duration of participation. The employees in fishing and aquaculture industries often work in precarious jobs combined with

forced labor and slavery (FAO, 2020a). Women accounted for 14 percent of the total workforce in the primary fisheries sector, 19 percent of the total aquaculture workforce, and 12 percent of the total capture fisheries employees. If the primary and secondary fisheries sectors are included, the proportion of female workers is estimated at 50% of the total fisheries workforce (FAO, 2020a). Figure 1-5 provides a regional analysis using the sex-disaggregated data of capture fisheries.

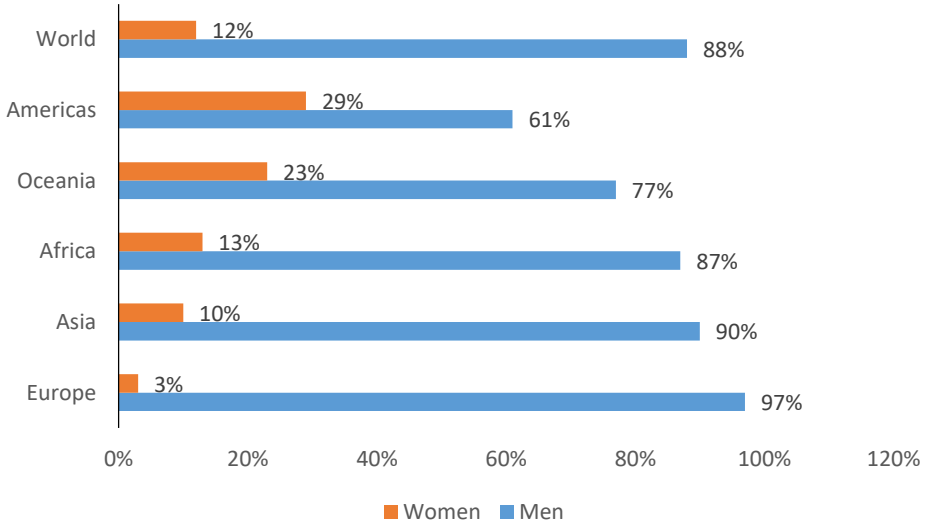


Figure 1-5: Sex-disaggregated data on employment in capture fisheries, 2018

Source: (FAO, 2020a)

Overall, women play a significant role throughout the fisheries value chain, providing labor in artisanal and commercial fisheries. Women are often fish traders, small processors at the household level, and often operate in the countryside. In general, women often contribute to the production, trade, food security, and livelihoods of the fisheries sector. However, current gender analysis data do not adequately reflect the status and actual positions of female employees in different industry segments. In particular, this data does not accurately and adequately reflect women's roles and responsibilities, access and control of resources, assets, credit, training information and technology, and power decision-making, and access to leadership by women. Therefore, it is necessary to establish gender lenses along the value chain for data collection to research the power interactions and complex relationships between women and men in fisheries and aquaculture (FAO, 2020a).

2. The significant roles of small-scale fisheries and aquaculture

In general, there is no precise definition for small-scale fisheries and aquaculture concepts, and the meaning of each term varies widely according to country and region (Bjorndal et al., 2014). As can be seen document from (WorldBank et al., 2010), it gave some significant criteria such as the size of fishing craft /vessel /engine, type of craft/vessel, fishing unit, ownership, time commitment, fishing grounds, disposal of catch, utilization of catch, knowledge, and technology and integration into the economy to identify the characteristics of small-scale and large-scale fisheries. According to this document, small-scale fisheries often use ships of small size (<24 meters), with low power engines (< 375 kw), usually wooden ships, a small number of ships owned by one individual or a family. The small-scale fisheries'products are usually fresh and traditionally processed for household consumption or sales in the local, national, and international markets. Similarly, (FAO, 2015b) defined that small-scale fisheries, which are traditional fisheries, employ fishing households (as opposed to commercial companies), use relatively small amounts of capital and energy, and involve small fishing vessels. In addition, (Smith and Basurto, 2019) define that small-scale fisheries conjure images of fisheries up low-tech equipment and require labor-intensive fishing methods. Spatially, small-scale fisheries are often confined to the tropical waters of developing countries, in contrast to large-scale fisheries (industrial fisheries, large capital investments), which are common in developed countries (Martin, 2005). A complete definition of small-scale fisheries encompasses all activities along the value chain, including stages of pre-harvesting, harvesting, and post-harvesting, which are undertaken by men and women, and play a significant role in food security and nutrition, poverty alleviation, and equitable development (FAO, 2015b).

For aquaculture, (Martínez-Espinosa, 1997), (Edwards, 1999) defined small-scale aquaculture as characterized by fish farming with low inputs and outputs. In addition, (Shrestha and Pant, 2012) claimed that small-scale aquaculture depends on a range of variables such as: socioeconomic and level of technological innovation. Specifically, (Martínez-Espinosa, 1997) argued that small-scale aquaculture is a complex combination of food security, income generation, livelihood enhancement, and poverty alleviation, while large-scale aquaculture serves the aim of profit, business, and employment with often longer value chains. Furthermore, (Shrestha and Pant, 2012) defined that small-scale aquaculture involves enterprises where fish is produced with the involvement of family members of the farm owner. Finally, (Bjorndal et al., 2014) concluded that many definitions of small-scale aquaculture had been proposed, based on the level of aquaculture technology and socioeconomic conditions of specific sectors, focusing on the capacities of farmers and families involved in operating the technology.

Small-scale capture fisheries and aquaculture play an essential role in food security, employment, economic growth, and income (Bjorndal et al., 2014). First, fish and aquatic products contribute directly to food security. Specifically, they provide animal

protein, contributing up to 16 percent of the average animal protein intake of the world population and accounting for 6.5 percent of the total amount of protein intake (FAO, 2012). In 2017, fish accounted for about 17 percent of all animal protein and 7 percent of all kinds of protein consumed globally. Furthermore, fish provide about 3.3 billion people with almost 20 percent of their animal protein per capita. In some countries, such as Bangladesh, Cambodia, Gambia, Ghana, Indonesia, Sierra Leone, Sri Lanka, fish accounted for 50 percent of total animal protein intake (FAO, 2020a).

In addition, fish and aquatic products also provide high-quality protein, essential amino acids, fatty acids, minerals, and essential micronutrients such as iron, zinc, vitamin A, which are good food sources for permanent, irregular, or seasonal human consumption (Bjorndal et al., 2014), (FAO, 2020a). In 2017, fish and fishery products provided an average of 35 calories per person per day, while fish consumption and fishery products already exceeded 100 calories/person/day in countries where fish was a traditional and long-lived food. Besides, they are sources of high-quality animal protein and essential micronutrients to the diet. Furthermore, fish often represents an affordable source of animal protein and is necessary for the diets of some densely populated countries, particularly low-income and under-wage countries (FAO, 2020a). Moreover, increasing fish consumption could directly reduce malnutrition rates and correct unfairly high-calorie intake in many developed and developing countries. In addition, the consumption of whole fish parts such as meat, head, bones, and skin helps reduce waste and increase global food security. Besides, many studies have shown that regular consumption of fish has many health benefits for pregnant women and children, significantly contributing to cognitive development for unborn children or children 1 to 3 years old. Finally, fish consumption benefits mental health, preventing cardiovascular diseases, stroke, and age-related macular degeneration (FAO, 2020a).

Furthermore, small-scale fisheries and aquaculture employ 90 percent of fishers and fish farmers, produce nearly half of the world's fish, and provide the largest consumption quantity of fish in developing countries (Assembly, 2012). Moreover, domestic and international seafood trade can help generate livelihoods, jobs, and income through harvesting, processing, and marketing for approximately 250 million people (Berkes et al., 2001), (FAO, 2005b), (Jentoft and Chuenpagdee, 2015). In the domestic seafood trade, small-scale fisheries and aquaculture produce more fish, making products much more available and accessible to local populations for consumption. Regarding the international seafood trade, fish exports help generate foreign exchange and are the primary source of income for developing countries (Bjorndal et al., 2014). Indeed, the fish export value of developing countries accounts for 50 percent of the total value of global exports, and the annual fish export turnover of these countries exceeds USD 25 billion (FAO, 2012b). Besides, the international fish trade also brings employment and income in the primary and secondary sectors (Bjorndal et al., 2014). In short, small-scale fisheries and aquaculture play a substantial role in supporting the socio-economic development of employees in the fisheries sector in developing countries (Purcell et al., 2017).

3. The development of policies and practices in fisheries management in the World and Vietnam for the sustainable development of fisheries and aquaculture

In the fisheries sector, the development can be defined as a process of change in which the quality of life of all or most members of society will be improved sustainably and equitably (Bailey and Jentoft, 1990). In 1987, the World Commission on Environment and Development of the United Nations defined sustainable development as development that meets the demands of the current generations without degrading the ability of subsequent ones in meeting their own demands (WCED, 1987). In 1991, the FAO Committee on Fisheries defined sustainable development as an attainment of a workable balance between present and future human needs in terms of satisfaction, including achieving economic and social needs and conserving natural resources (FAO 1991). In 1992, delegates at the United Nations Conference on Environment and Sustainable Development in Rio de Janeiro reaffirmed the concept of sustainable development as encompassing environmental, economic, and social sustainability (UN, 1992). Besides, in 1995, FAO developed a code of Conduct for Responsible Fisheries to set out principles to ensure sustainable exploitation of marine resources and meet the common goals in the report of FAO on Sustainable Development of Fisheries in 1991 (FAO, 1995). Furthermore, FAO sent questionnaires on implementing a code of conduct for responsible fisheries to members and fisheries authorities in countries at the regional and global levels. Responses to the questionnaires in these countries indicated an increase in the mechanisms through which small-scale fishers and fish workers can contribute to the decision-making processes, and more than three-quarters of these mechanisms are related to the promotion of the active participation of women (FAO, 2020).

The Sustainable Development Goals kept being mentioned in the United Nations Conference on Sustainable Development in Brazil in 2012 (UN, 2012). In October 2015, The United Nations General Assembly adopted the resolution on the global sustainable development until 2030. Among the development goals of this program, there was Goal 14 on the conservation and sustainable usage of the oceans, seas and marine resources, and Goal 5 on the achivement of gender equality and empowerment for all females. These two goals are directly aimed at the sustainable development goals of the fisheries (UN, 2015). The 2030 Agenda is a solid commitment to leave no one behind, and SDG 14 focuses on small-scale artisanal fishers to be provided with access to marine resources and markets (FAO, 2020). Also, in June 2017, the first United Nations Ocean Conference was held in the United States with the aim to call for actions focusing on specific recommendations, action directions, and voluntary commitment to the implementation of SDG 14 (UN, 2017). Furthermore, (UN, 2017) confirms that the FAO Code of Conduct for Responsible Fisheries in 1995 is the foundation for international instruments in the fisheries and aquaculture to support the 2030 Agenda for Sustainable Development.

Regarding the sustainable development of fisheries in Southeast Asia in November 2017, the Southeast Asian Fisheries Development Center (SEAFDEC) adopted a Resolution on Vision, Mission, and Strategy for Fisheries Development in the Region to 2030 (SEAFDEC, 2017). Strategic directions to ensure the sustainability of fisheries and aquaculture in Southeast Asia were adopted, including (i) Ensure the sustainability of fisheries to contribute to food security, poverty alleviation, and the livelihood of citizens in the region; (ii) Support the sustainable growth of aquaculture to offset fisheries catch and contribute to food security and livelihood of citizens in the region; (iii) Ensure food safety and quality of seafood and fisheries products in Southeast Asia.

One of the other significant agreements, the "FAO's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication" in 2015, has affected the governance and performance of fisheries globally, especially in developing countries in recent times (FAO, 2015b). This guideline has been adopted by more than 4000 representatives of government, small-scale fishers, fishing workers, and their organizations from more than 120 countries in 6 regions and more than 20 civil society organizations. It is intended to support the visibility, recognition, and improvement of the critical role of small-scale fisheries in supporting responsible fisheries and sustainable economic and social development for the benefit of present and future generations. In particular, this guideline focuses on small-scale fishers, fishing workers, and other vulnerable and marginalized actors. In addition, it also describes some discrimination against women in small-scale fisheries and argues that gender mainstreaming is an integral part of small-scale fisheries policy. In general, this guideline helps to promote a human rights-based approach and emphasizes voluntary principles on a global scale, especially for the needs of developing countries.

Last but not least, it is increasingly recognized in the literature that environmental sustainability is linked to and depends on the economic and social sustainability of the fishing communities in the coastal area over the long term (FAO, 2020). The livelihoods of many people, especially the poor in the rural area, are based on accessing and managing secure and equitable fisheries and aquaculture resources. Furthermore, (FAO, 2020) stated that sustainability, tenure, access, and user rights on fisheries resources form the basis for the cultural and social wellbeing, livelihood, and sustainable development of the fisheries and aquaculture communities, including women and men.

In order to meet the needs and the requirements of international organizations and markets on the development of sustainable and responsible fisheries, the Amended Fisheries Law 2017, taken effect from January 1, 2019, is a significant turning point in transforming Vietnamese fisheries from a free-fishing approach towards responsible and sustainable fisheries. The provisions of this law have tried to focus on managing and using sustainable fisheries resources, responsible fishing, and taking measures to combat illegal, unreported, and unregulated fishing. According to this law, while Vietnamese fisheries focus on investigating and managing sustainable resources and reorganizing fishing activities at sea, the state encourages activities of

organizing production according to value chains, linking and cooperating models, and fisheries activities to ensure the benefits of sharing responsibilities among organizations and individuals benefiting from fishing (Vietnam, 2017).

4. The significant challenges facing fisheries managers in developing countries, especially in Vietnam, and the essential to have effective fisheries policies aiming at the sustainable development of small-scale fisheries and aquaculture

Small-scale fisheries and aquaculture play a significant role in the livelihoods, employment, and incomes in developing countries; however, there remain crucial challenges facing fisheries administrators in these countries to ensure sustainable fisheries development.

The first obstacle mentioned is the globalization of fish trade, which may not benefit the most vulnerable people and the food insecure persons unless causes of inequalities in fisheries and aquaculture would be addressed (WorldFishCenter, 2011). These inequalities can be found in power relationships, often between producers and buyers, fishers and processors/exporters, and between men and women participating in the fisheries sector. These power inequalities lead to unequal distribution of benefits among the different actors involved in the fisheries and aquaculture value chains (Bjorndal et al., 2014). Furthermore, (Bjorndal et al., 2014) argue that society can benefit from exports, but the exports themselves can be detrimental to fishers and other vulnerable actors in the fisheries since actors gain from the global seafood trade do not compensate for others loss of benefits. A recent World Fish Center study investigated exports and per capita domestic fish consumption in fourteen countries over thirty years. The study result found that an increase in the international fish trade could negatively affect the domestic fish supply of the countries with high domestic fish consumption, growing populations, and persistent poverty. This study also affirmed that some of the revenue from fish exports was held by the private sector and government elites and then spent on imported luxury goods rather than on poverty alleviation (WorldFishCenter, 2011).

Moreover, (Wentink et al., 2017) affirm that the international fish trade positively or negatively impacted local fisheries' livelihood, economy, and ecology. In particular, fishers of small-scale fisheries are often marginalized in global fisheries value chains since they are not competent to negotiate and are financially dependent on middle-persons or traders (Ponte, 2008), (Bjorndal et al., 2014). In addition, fishers, especially in Southeast Asia, often have poor marketing strategies, poor product-holding infrastructure, difficulties meeting quality standards, and incomplete market information (Pomeroy et al., 2016). Besides, they are less able to comply with the requirements for product traceability, ecological certification, and food safety certification in the globalization of trade context (Béné, 2006), (Pérez-Ramírez. M. et al., 2012), (Bailey et al., 2016). Moreover, fishers of small-scale fisheries are

vulnerable to a lack of information transparency on prices, incomes, and benefit flows among various actors in the fisheries value chain (Purcell et al., 2017). Furthermore, there seem to be oligopolistic phenomena among wholesalers in seafood value chains in developing nations (Pomeroy et al., 2016). In addition, traders and processors often have a monopoly on market information (Jacinto and Pomeroy, 2011) and sometimes form an exploitative social relationship with fishers (Bailey et al., 2016), (Ferrol-Schulte et al., 2014), (Crona et al., 2010),(Nurdin and Grydehoj, 2015)

The next challenge for small-scale fisheries and aquaculture in developing nations is the capacity for managing fisheries and management systems (Cochrane, 2020). The ability to manage capture fisheries in these countries is weak governance structures, corruption, lack of participation, poor enforcement, weak institutional capacity, overfishing, incomplete information, illegal, unreported, and unregulated (IUU) fishing, and maritime insecurity (Pomeroy et al., 2016). Furthermore, several studies such as (Wilson and Boncoeur, 2008), (WorldFishCenter, 2011) suggested that some choices on certain fisheries policies can increase inequality in the countries with weak governance and poor track record. Revenues from fisheries and aquaculture in these countries increased but did not effectively spend to develop the national economy and poverty reduction. Furthermore, fisheries management systems in developing countries are also inadequate, for example, open access and inappropriate rights-based fisheries, pursuit of short-term social and economic objectives at the expense of long-term sustainability (Cochrane, 2020), lack of reliable data and information on fisheries (Rosales et al., 2017), and overlooked gender dimension in fisheries policies and research (Diamond et al., 2003), (Harper et al., 2013).

Vietnam is a developing country and one of three top exporting countries of fish and fisheries products globally with small-scale and artisanal fisheries. Currently, the significant issues facing fisheries managers in Vietnam are similar to critical challenges facing fisheries administrators in developing countries mentioned above. Moreover, Vietnamese fish and fisheries products need to be subject to the principles, rights, and obligations established by World Trade Organization and other relevant international agreements when these products are introduced in the global market. Thus, Vietnamese fisheries policies, programs, and practices related to fish trade do not result in adverse social or environmental degradation, presented in article 6 of the general principles of the literature (FAO, 1995). Concurrently, (FAO, 2012b) recognizes the importance of capacity building for small-scale fisheries and aquaculture management and emphasizes the need to take appropriate measures in countries safeguarding the rights of fishers, fish farmers, and other vulnerable actors in the sector.

In general, it is essential to have an effective economic, social, and environmental policy framework for managers to develop sustainable Vietnamese small-scale fisheries and aquaculture in response to the growing international demand for fish and fishery products. This thesis is part of a Ministry of Science and Technology-funded national research project on fisheries value chain entitled “Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam” carried out from 2018 to 2020 (hereafter referred to as DFCPSFDV Project in the thesis). It

mainly focused on economic and social dimensions, referred in (Angel et al., 2019) to suggest effective fisheries policies for the sustainable Vietnamese fisheries development. In particular, the economic dimension is considered by analyzing the Vietnamese tuna value chain's economic efficiency and equity factors, whereas the social dimension is examined by analyzing gender analysis in the chain. An analysis of the economic efficiency and equity and the roles of women and gender analysis in the tuna value chain is an interesting case study to suggest socio-economic policies to help Vietnamese fisheries, especially tuna fisheries, develop sustainably. It is noted that the following parts of this thesis are the contents related to the analysis of economic and gender issues on the Vietnamese tuna value chain. The results of this thesis provide a scientific background helping suggest policies to improve the socio-economic life of fishers and women on the chain, aiming for the sustainable development of Vietnamese tuna fisheries.

5. The sustainability of the Vietnamese tuna resource at present and the current status of the development directions of Vietnamese government regarding the protection of the tuna resources

In order to suggest policies aiming for the sustainable development of Vietnamese tuna fisheries, it is necessary to have an overview picture introducing the current sustainability of the tuna resource in Vietnam and the development directions of the Vietnamese government regarding the protection of the tuna resources.

5.1. The sustainability of the Vietnamese tuna resource at present

- **General characteristics of oceanic tuna**

Oceanic tuna, including yellowfin tuna (Thunnus albacares), bigeye tuna (Thunnus obesus), and skipjack tuna (Katsuwonus pelamis), are large pelagic species of the mackerel family. These are a large herd, long-distance migratory species, and have a wide distribution range from 35^0 N to 35^0 S in the Eastern Pacific and 40^0 N to 35^0S in the Midwest Pacific, and 63^0 N - 47^0S, 180^0W-180^0E for skipjack tuna [(RIMF, 2019) citing (Collette and E.Nauen, 1983)]. The distribution depth of yellowfin tuna is 50-270 m, bigeye tuna is 50-350 m, and skipjack tuna is 20-260 m. The distribution of tuna is greatly influenced by sea temperature, with the optimum temperature for yellowfin tuna being 18^0C-28^0C, bigeye tuna 17^0C-22^0C, and skipjack 15^0C-30^0C. The main diet of tuna is fish, crustaceans, and cephalopods of the surface and middle layers. [(RIMF, 2019) citing (Collette and E.Nauen, 1983)].

Oceanic tuna has a fast spawning rate and short life cycle, averaging about 6-7 years old for yellowfin tuna and 10-12 years old for bigeye tuna and skipjack tuna. The maximum size for yellowfin tuna can reach 239 cm, bigeye tuna is 250 cm, and skipjack tuna is 110 cm [(RIMF, 2019) citing (Collette and E.Nauen, 1983)]. In Vietnam, yellowfin tuna mainly distributes in the Central and Eastern seawater of

Vietnam and lives in the big school on the marine surface. Meanwhile, bigeye tuna is mainly found in offshore waters of Binh Dinh, Phu Yen, and Khanh Hoa provinces. In addition, skipjack tuna highly distributes in offshore waters of Central and Southern provinces (Thanh and Nguyen, 2012).

➢ **The general overview of the oceanic tuna fisheries in Vietnam**

Oceanic tuna fisheries were introduced to Vietnam in 1994, although it was formed at the last time. It plays a significant role in the Vietnamese fisheries sector and is widespread in all 28 coastal provinces with various scales and patterns. The tuna catch can be landed at over 60 landing sites along the coastal line of 28 coastal provinces. Meanwhile, oceanic tuna are mainly landed in nine provinces, including Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, and Ba Ria - Vung Tau. Among these provinces, the three South Central provinces of Binh Dinh, Phu Yen, and Khanh Hoa yield the highest oceanic tuna catches (Vu, 2018). There are three tuna fisheries, including handline/longline fisheries for catching yellowfin tuna and bigeye tuna and purse seine and gillnet fisheries for catching skipjack tuna. In Vietnam, oceanic tuna fishing ground is mainly the offshore waters of Vietnam's Central and Southeast regions (RIMF, 2019).

➢**The overview of oceanic tuna stocks in Vietnam in 2020**

In 2020, the total number of tuna fishing vessels was 7,439 units, a decrease of 3.2% compared to 2019, including 2,921 units for handline/longline fisheries, 1,821 units for gillnet, and 2,697 units for purse seine fishery. The total number of tuna fishing vessels in 2020 decreased since the gillnet fishing vessels of Quang Ngai province switched to other types of fisheries. All tuna fishing vessels in Vietnam are small-scale and operate only in Vietnamese Exclusive Economic Zone (Vietnamese EEZ) (WCPFC, 2020).

In 2020, the total tuna caught in Vietnamese EEZ was 102,326 tons, of which skipjack tuna contributed 81,009 tons (79%), 17,587 tons of yellowfin tuna (17%), and 3,730 tons of bigeye tuna (4%). The total tuna catch of Vietnamese tuna fishing vessels in 2020 is still lower than the maximum sustainable yield level (more than 200,000 tons) (WCPFC, 2020).

Overall, Vietnam is working to improve its fisheries management system, such as establishing and implementing tuna data collection and enhancing the effectiveness of fisheries conservations and management measures. The fisheries regulations have been revised towards harmonizing with the specific regional and international regulations, e.g., WCPFC, UN, FAO (WCPFC, 2020). In order to serve the fisheries management, formulate development strategies for the fisheries sector, and plan for the exploitation and protection of aquatic resources, the Directorate of Fisheries cooperates with the Research Institute for Marine Fisheries to implement the two projects. Those are ''General survey of biodiversity and aquatic resources in Vietnam's waters'' and ''Planning and building a system of marine protected areas for sustainable development.'' However, these projects are still in the implementation stage, not yet completed (RIMF, 2020)

5.2. The development directions of the Vietnamese government regarding the protection of the fisheries resources in general, tuna resources in particular.

Decision 339/QD-TTg 2021 of the Vietnamese government outlines the strategy for the growth of Vietnam fisheries to 2030, with a vision to 2045, issued on 11 March 2021 (Minister, 2021). This decision presents some strategies regarding the protection of fisheries resources in general and that of tuna resources in particular, including several contents as follows:

➢**The development orientations for the protection of aquatic resources:**

First of all, fisheries managers will focus on investigating and evaluating aquatic resources as a scientific background for the protection for sustainable exploitation of these resources. Secondly, fisheries managers will improve the database system for aquatic resources in the direction of digital transformation, providing a forecast on fishing grounds and resources. Thirdly, fisheries managers will establish marine protected areas, protecting aquatic species'breeding and migration routes (Minister, 2021).

➢**The development orientations on fisheries help to protect aquatic resources:**

Firstly, fisheries managers have strategies to develop efficient and sustainable offshore fishing, based on gradually reducing the fishing force to ensure the reserve of aquatic resources. Second, fishers must comply with responsible fisheries codes, combating illegal, unreported, and unregulated fishing. Furthermore, the managers build a rational structure for the fishing occupations suitable for each region's natural conditions, aquatic resources, and socio-economic characteristics. Moreover, fisheries managers should have an appropriate fishing quota allocation strategy. These managers should have strategies to minimize and end fishing occupations that are destructive to aquatic resources, convert highly invasive occupations to resources, use much fuel, and switch to environmentally friendly occupations and aquatic resources (Minister, 2021).

2

CHAPTER 2. OBJECTIVE AND RESEARCH QUESTIONS

1. Statement of the problem

Tuna is one of the most important seafood products of Vietnam. Its export value has grown between USD 484 million in 2014 and nearly USD 653 million in 2018, a growth of nearly 35%. The proportion of tuna exports contributed from 21% to 22% of Vietnam's total seafood exports between 2014 and 2018 (Custom, 2018) (see Table 2-1). In 2020, the export value of tuna products obtained approximately USD 649 million, a decrease of nearly three percent year-over-year, which can be explained by the global impact of the COVID-19 pandemic. Despite the decline in 2020, tuna products still contributed the most considerable turnover to Vietnam's total export value of fishery products (Custom, 2020).

Like other small-scale global fisheries, Vietnamese tuna fisheries contribute a significant part to food security, income, and employment through fishing, trading, and processing activities. Most of Vietnam's tuna products are produced to supply mainly the export market, which helps to earn foreign currency revenue and improve the socio-economic life of citizens in coastal areas of Vietnam. However, there are still many limitations in the Vietnamese tuna fisheries, such as low product competition due to fishers'small and fragmented production scale, backward fishing techniques, ineffective tuna preservation methods, poor production efficiency, and unsustainability. In addition, the livelihood of tuna fishers remains precarious and challenging due to the high cost per sea trip and low prices of tuna materials (D-Fish, 2018b).

Table 2-1: Vietnamese tuna export and seafood export from 2014 to 2018

Vietnamese tuna export and seafood export (million USD)					
	2014	2015	2016	2017	2018
Tuna	484.235	454.972	509.786	592.873	652.905
Growth (%)	-8.1	-6	12	16.3	10.1
Seafood	2,201.39	2,159.84	2,296.38	2,757.81	2,986.04
Tuna/seafood (%)	22	21.1	22.2	21.5	21.9

Source: (Custom, 2018)

Especially in the context of globalization and deepening international integration as well as increasing international requirements for fish and fishery products, Vietnamese fisheries in general and tuna fisheries in particular need to achieve the sustainable and responsible fisheries development, which is mentioned in internationally recognized documents such as (FAO, 1995), (UN, 2015), and (FAO, 2015b). Therefore, Vietnamese fisheries managers should have adequate policies to ensure the livelihoods and well-being of employees working in the fisheries, especially vulnerable actors, for example, fishers and women, towards equitable and sustainable development for fishing communities in Vietnam. However, when comparing Vietnamese capture fisheries with other sixty fisheries in developing and

industrialized countries around the World from 2009 to 2013, sustainability indicators of Vietnamese fisheries are still low, especially in economic and social indicators (Anderson et al., 2015). Thus, it is necessary to carry out studies so as to put forward effective fisheries policies related to the socio-economic conditions of fishers and other vulnerable actors in the fishing communities, which indirectly proves the necessity of this study.

To create optimal conditions for fishers and other vulnerable actors, fisheries administrators should have appropriate policies and strategies for small-scale tuna fisheries in Vietnam, which depends on access to helpful information. However, the deficiencies of reliable data and information about different aspects of the tuna sector is a crucial motivation for researchers to study Vietnamese tuna small-scale fisheries for better understanding about various facets of this sector.

In the past few years, there has been rising interest in the fisheries value chains and the investigation of the linkages and relationships between different economic actors and agents along the value chains (Rosales et al., 2017). A value chain analysis can be understood either in a narrow or a broad approach (M4P, 2008). In the narrow sense, a value chain consists of a series of activities performed within a company to create specific outputs. In the broad approach, a value chain includes a complex range of activities performed by many different actors (primary producers, traders, processors, service providers) to bring a raw material through a different phases of production to delivery to final customers and disposal after use (R. Kaplinsky and M. Morris, 2001). Applying value chain analysis in the small-scale fisheries sector is significant because it provides insights into the characteristics of key economic actors, specific fisheries policies, and management frameworks (R. Kaplinsky and M. Morris, 2001). In addition, value chain analysis helps discover insights into the fisheries sector challenges caused by poor management or low competitiveness of small-scale enterprises and fishers in changing market conditions (Jacinto and Pomeroy, 2011). Furthermore, the value chain perspective applying small-scale fisheries identifies response strategies that improve the sustainability and competitiveness of the entire value chain and discover constraints influencing the sector (Rosales et al., 2017). Finally, it suggests management policies to support various actors, especially the most vulnerable, such as fishers and women (M4P, 2008), (Bjorndal et al., 2014).

This thesis focuses on applying value chain analysis theory in the tuna sub-sector as a case study of a typical value chain of the Vietnamese small-scale fisheries sector since tuna is one of the most significant seafood products in Vietnam, and most tuna products are exported to international markets. Therefore, the management policies of the Vietnamese small-scale tuna fisheries need to follow sustainability and responsibility principles mentioned in public international documents such as (FAO, 1995), (UN, 2015), and (FAO, 2015b). The application of value chain theory in analyzing the tuna fisheries in this thesis helps to suggest supportive policies for vulnerable actors on the chain, such as fishers and women, to ensure the welfare and livelihoods of these actors toward the sustainable and equitable socio-economic development for the tuna fishing community in the local area.

The first research in this thesis is to map the tuna value chain in Vietnam with the case study in the three South Central provinces, which is presented in chapter 3. This study aims to gain a basic overview of the tuna value chain serving as an essential background for in-depth studies of different aspects of the tuna value chain. Besides, it also identifies the fisher's position in the chain and provides policy recommendations to enhance the income for fishers.

After mapping the tuna value chain in the three South Central provinces, we find that fishers are the most disadvantaged actors in the chain. They are the price takers, financially depend on middle persons and traders, and do not access public and transparent market information. In contrast, the processing owner who has decided on buying price and the quantity of tuna raw materials is the most influential actor in the chain. On the other hand, (Mkunda et al., 2019) give that if a market structure exhibits high inequality in market share distribution among market participants, there is a likelihood that those who control the market affect market price; thus, others will be price takers. As such, inequality in the distribution of market shares (market structure) might result in the differences in position and power of the main actors in the chain and could affect the economic efficiency of the chain, which has not been fully explained in previous studies.

Some previous studies on economic analysis of the Vietnamese tuna value chain are mentioned in (Huy, 2018), (Cao et al., 2018), and (Nguyen and Jolly, 2018). First, (Huy, 2018) analyzed the economic efficiency of the yellowfin and bigeye tuna value chain in three South Central provinces of Vietnam from 2014 to 2015 to assess the current situation of tuna fisheries and analyze the limitations and the weaknesses of the Vietnamese tuna value chain, thereby suggesting solutions to upgrade the chain. In addition, (Cao et al., 2018) examined the economic efficiency of the skipjack tuna value chain in the Central region of Vietnam in 2016 and proposed some recommendations to improve the economic efficiency of the chain. Moreover, (Nguyen and Jolly, 2018) examined the structure, conduct, and performance of the yellowfin tuna value chain in Khanh Hoa province in 2013 to understand the dynamic movement of tuna products and its market efficiency. This study qualitatively analyzed the structure and the conduct of actors and quantitatively analyzed the financial performance of economic actors, which used the costs and margins analysis tool.

The second research of this thesis is to analyze the market structure and market performance of three main actors along with yellowfin tuna and bigeye tuna value chain in three South Central provinces of Vietnam in 2018, which are presented in chapter 4. This study provides an overview of the economic efficiency of the whole tuna value chain and examines whether the market structure and other potential factors affect the economic performance of the chain. In addition, it provides some policies to enhance the economic efficiency of the chain, especially for improving the financial performance of fishers. This research used the Gini coefficient and the Lorenz curve to measure the market concentration (one of the three main factors of market structure) of actors, and the cost, return, and distribution of cost and return techniques to analyze the financial performance of actors. Compared with previous studies on the economic

aspects of the Vietnamese tuna value chain, the novelty of this study is to quantitatively analyze the market structure of actors, identify the market structure and some other factors affecting the economic efficiency of the chain, and suggest some policies to improve the economic efficiency of the chain, especially for the fishers.

After completing the mapping and the economic analysis of the tuna value chain, we realize that fishers play a significant role but remain the most disadvantaged actors. In addition to fishers, women significantly contribute to world fisheries (Bennett, 2005), yet their social roles remain invisible to researchers and policymakers (Diamond, Squillate, & Hale, 2003; Harper et al., 2013). Lack of understanding about the role of women in the fisheries sector and lack of interest in gender dimensions of fisheries management can lead to the failure of policy interventions. Therefore, to achieve sustainable livelihoods at the community level, it is essential to integrate gender analysis into the fisheries sector, which provides gender information and data for policies, programs, and projects (EIGE, 2015).

Across the tuna value chain in Vietnam, women play as traders, middle persons, processors, and marketers of tuna products. According to secondary data from local fisheries sub-departments, the number of women, who are traders and middle-persons, is relatively high compared to other stages in the chain. Additionally, the number of men and women acting as traders and middle-persons is relatively equal. In contrast, only men are tuna fishers, and the number of men acting as processors is higher than that of women. Furthermore, men and women as purchasing actors play a significant role in the middle distribution between fishers and processors and help distribute raw tuna smoothly. Moreover, they have solid economic potential and financial support for fishers before each voyage; thus, they influence fishers when purchasing raw tuna. It can be said that purchasing actors might be one of the key drivers who can influence changing the practice of fishers, assisting local managers in implementing effective fisheries policies for the tuna fishing community. Although purchasing actors, especially women, have critical roles in the tuna value chain, there is no any indication of their roles in the fisheries policies until now.

Gender analysis of tuna purchasing stage in Binh Dinh province was carried out as a case study on gender analysis in tuna value chains of three South Central provinces based on time and budget limitations. This research, presented in chapter 5 of the thesis, analyzes the gender disparities between men and women as purchasing actors in productive, reproductive, and community management roles. It suggests policy recommendations to improve gender equality and women's empowerment and promote sustainable tuna fisheries management in the region.

To sum up, this thesis focuses on economic and gender analysis in the tuna value chain. It is part of the outputs of DFCPSFDV Project, implemented during the period 2018-2020. For the reader to effectively grasp the information, the research objectives, research questions, analytical background, thesis scope, and general structure are respectively presented in the following sections.

2. Objectives

2.1. General Objectives

The overall aim of this thesis is to analyse the economic and gender issues in Vietnamese tuna value chain to propose fisheries policies toward improving the socio-economic life of fishers and women in the chain for developing sustainable tuna fisheries in particular and Vietnamese fisheries in general.

2.2. Specific Objectives

The study is intended:

- To map the Vietnamese tuna value chain;
- To provide an overview of the economic efficiency of the tuna value chain. This objective is clarified by three sub-objectives including:
  - To quantitatively measure the market structure of key actors;
  - To analyze financial performance and financial positions of the actors;
  - To qualitatively assess whether the market structure and other factors affect actor's financial performance.
- To provide empirical evidence for gender analysis in the tuna value chain. This objective is divided by two sub-objectives including:
  - To analyse gender disparities between men and women in the chain;
  - To identify the roles of women and the gender inequality issues in the chain.
- To draw policy implications for improving equitable and sustainable socio-economic development for fishers and women in the chain.

3. Research questions

In order to attain the abovementioned research objectives, several research questions related to the economic and gender issues in the Vietnamese tuna value chain need to be addressed, including:

- What is the Vietnamese tuna value chain map? What are the roles and positions of the fishers in the chain? What are the disadvantaged factors that impact fishers' income?
- What is the economic efficiency of the tuna value chain? Which factors can affect the economic performance of the chain, especially for the financial performance of fishers?
- What are the gender issues in the tuna value chain? What are the roles and positions of the women in the chain? What gender inequalities do women suffer along the tuna value chain?
- What are policy implications for improving equitable and sustainable socio-economic development for vulnerable actors such as fishers and women in the chain?

4. Analytical framework

The following analytical frameworks are applied to suggest fisheries policies enhancing the socio-economic life of the fishers and women in the tuna value chain. Firstly, the eight successive steps of mapping the value chain listed in (M4P, 2008) are conducted to examine the tuna fisheries in Vietnam. Compared with previous

studies, our study used the full dimensions of the value chain mapping in (M4P, 2008) to provide a more comprehensive and complete overview of the Vietnamese tuna value chain.

After performing a mapping tuna value chain analysis in three South Central provinces of Vietnam, we found that fishers have low capital and financially depend on middle-persons and traders. They are the price receivers, have low bargaining power, and do not access comprehensive and public tuna market information. Meanwhile, processors are high capital-endowed actors and the most influential actors in the chain since they have the power to decide the purchase price and quantity of tuna raw materials, and access tuna market information comprehensively. The actions of the processors in the tuna value chain in the investigated provinces, such as setting prices, choice of products, access to market information, and the power to determine prices, are behaviors to maintain market control, related to structural positioning. According to (Pomeroy and Trinidad, 1995), (Justice, 2017), (Kimani et al., 2020) structural positioning affects the actions of actors which structural positioning refers to market structure, and the behavior of actors implies actor's conduct, and finally, market structure and the behavior of actors influence the financial performances of actors. Therefore, in studying the economic aspects of the Vietnamese tuna value chain, we integrated the Struct – Conduct – Performance (SCP) model into the tuna value chain analysis to investigate the financial performance of each actor and examine whether the market structure and other factors influence the actor's financial performance.

Although tuna fishers play a significant role in the raw materials supply, they are still the most vulnerable actor in the chain when they do not have the opportunity to negotiate prices and receive market share distribution equitably. Thus, reducing fishers' vulnerabilities requires policy interventions to consider operational aspects, such as actor structural positioning, actor's behaviors, and how these factors affect actor's financial performance. Therefore, the Structure-Conduct-Performance (SCP) framework of (Bain, 1951) and (Bain, 1956) is the foundation for the analysis of the market structure and market performance of each actor on the chain. The SCP model has three main components: market structure, actor's conduct, and actor's financial performance (Bain, 1956), in which the market structure can be changed to improve actor's conduct and financial performance (Williams, 1994). Integrating the SCP model into the tuna value chain analysis in the three South Central provinces of Vietnam allows policymakers to create an integrated assessment of whether the market structure and other factors can affect the actor's financial performance, especially the fisher's financial performance. The final purpose of the assessment is to offer appropriate solutions to improve the fisher's economic efficiency.

Extending the SCP model into the tuna value chain in this study is to quantitatively analyze the actor's market structure and the actor's financial performance in the local value chain segment. In particular, the actor's market structure is measured by the Gini coefficient and the Lorenz curve, and the actor's financial performance is based on cost and benefit techniques. The purpose of this study is to provide the scientific background for suggesting the interventions, helping to improve the socio-economic

life of the tuna fishers. In this study, the effect method and international parity prices are not used for the economic analysis of the tuna value chain since the study scope is limited to the tuna value chain stream in the local area, in which applying the SCP model into the value chain analysis is strength. Meanwhile, the effect method proposed by filière (Duruflé and Fabre, 1988) and the international parity prices suggested by (Gereffi and Korzeniewicz, 1994), (Kaplinsky, 1999) are used to assess the economic and financial aspects of the commodity value chain, including components related to international trade.

Finally, to study the social tuna value chain analysis, we used gender analysis tools such as Harvard, Moser, and USAID's six gender dimensions to identify gender differences in the roles, tasks, opportunities, and constraints of men and women as tuna purchasing actors in productive, reproductive, and community managing aspects. The Harvard and Moser approaches were chosen to identify gender differences in activity profiles and generates strategic and practical gender needs, while USAID'S six gender dimensions to assess gender differentials in access to assets, knowledge and perceptions, practices and participation, time and space, legal rights and status, and power and decision-making.

5. Scope of the thesis

In this study, three South Central provinces of Binh Dinh, Phu Yen, and Khanh Hoa, which yielded the highest oceanic tuna catches in Vietnam (D-Fish, 2018b), were chosen to investigate the Vietnamese tuna value chain. The research team conducted interviews in these provinces over the period 2018-2020. Between March and June in 2018, 435 key actors, including fishers, middlemen/traders, processing enterprises, wholesalers, and retailers, who were directly related to yellowfin, bigeye tuna, and skipjack tuna value chains, were interviewed to get data for analyzing the tuna value chain in three South Central provinces. It is noted that all fishers, middle-persons/traders, processors, wholesalers, and retailers, interviewed in the sample are shipowners, owners of tuna purchasing companies/businesses, owners of tuna processing companies, and owners of wholesale/retail businesses. We used the complete information of 435 respondents to map the tuna value chain in these provinces. We then selected the information of 315 respondents out of the 435 actors directly related to the yellowfin and bigeye tuna chain to analyze the economic performance of the actors in the tuna value chain. We only use the information of actors related to yellowfin and bigeye tuna to ensure higher reliability than the skipjack value chain. Due to time and financial constraints, we only interviewed 40 men and women, purchasing actors, directly related to yellowfin, bigeye, and skipjack tuna value chains in the Binh Dinh province in May 2020 to analyze gender analysis in the tuna value chain.

6. Structure of the thesis

This thesis has **five chapters**, outlined as follows:

The first chapter, **General Context**, states the research context of the thesis.

Chapter 2 states objectives and research questions, and thesis scope and structure.

Chapter 3, entitled "Mapping the tuna value chain: The Case of Tuna Value Chain in Three South Central Provinces of Vietnam", maps the Vietnamese tuna value chain to identify interventions in order to increase specific incomes for the most vulnerable actors.

Chapter 4, entitled "Market Structure and Market Performance of Tuna Value Chain: A Case Study of Yellowfin Tuna and Bigeye Tuna Value Chain in Three South Central Provinces of Vietnam." This chapter focuses on analyzing the market structure and market performance of actors in the chain to provide an overview of the economic efficiency of the whole chain, examine which critical factors can affect its economic efficiency, and suggest some recommendations to enhance the economic efficiency of fishers.

Chapter 5, entitled "Gender Analysis of the Tuna Value Chain's Purchasing Stage in the South Central Provinces of Vietnam-Case Study of Binh Dinh Province," identifies gender differences between men and women in the tuna purchasing stage in productive, reproductive, and community managing roles to propose some policy recommendations for improving gender equality, women's empowerment, and sustainable tuna fisheries management.

The final chapter **(Chapter 6)** summarizes the main results and put forward policy implications to improve the socio-economic position of the most vulnerable actors in the chain, especially fishers and women, aiming at the sustainable tuna fisheries in particular and Vietnamese fisheries in general.

3

CHAPTER 3. MAPPING TUNA VALUE CHAIN ANALYSIS: THE CASE OF TUNA VALUE CHAIN IN THREE SOUTH CENTRAL PROVINCES OF VIETNAM

Nguyen Dang Hoang Thu[1,2], Cao Le Quyen[3], Le Thi Minh Hang[4], Nang Thu Tran Thi[5] & Philippe Lebailly[2]

[1] Faculty of Project Management, The University of Danang – University of Science and Technology, Da Nang, Vietnam

[2] Economy and Rural Development Department, Faculty of Gembloux Agro-Bio Tech, Liege University, Gembloux, Belgium

[3] Vietnam Institute of Fisheries Economics and Planning, Ha Noi, Vietnam.

[4] Faculty of Business Administration Management, The University of Danang – University of Economics, Da Nang, Vietnam

[5] Faculty of Fishery, Vietnam National University of Agriculture, Ha Noi, Vietnam.

• Paper accepted for July 4, 2020

• Paper to be submitted to the Journal of Asian Social Science

(The thesis aims to analyze economic and social issues on the Vietnamese tuna value chain to propose fisheries policies to improve the economic and social lives of fishers and women for sustainable development of tuna fisheries in particular and Vietnam's fisheries in general. Chapter 3 is the first study in this thesis to map the Vietnamese tuna value chain to gain a basic overview of the value chain as a background for in-depth research on different aspects of the tuna value chain. In addition, it identifies the tuna fisher's position in the chain and suggests specific income-increasing interventions for them).

Fish and fishery products remain one of the most traded commodities in the world. In 2018, two hundred twenty-one countries and territories reported fish trade activities, explaining that seventy-eight percent of fish and fishery products participated in international trade (FAO, 2020a). International trade plays a vital role in the economic performance of world fisheries (Cochrane, 2020). However, the globalization of the fish trade may not benefit the most vulnerable actors, who do not gain food security, unless the causes of inequities in fisheries and aquaculture are explained (WorldFishCenter, 2011).

Globally, more than 90% of fishers work in the small-scale fisheries sector providing the largest fish consumption in developing countries (Assembly, 2012). Fishers are critical actors in small-scale fisheries as they are both the exploiters and suppliers of fish for domestic and international markets. Nevertheless, they often work in precarious working conditions, and are often overlooked in the global seafood value chains (Bjorndal et al., 2014). In addition, trends in fisheries management policies and practices for sustainable development are becoming more and more widespread in countries worldwide. In particular, goal 14 of the 2030 agenda (UN, 2015) and the voluntary guidelines of (FAO, 2015b) focus on supporting the visibility, recognition, and improvement of small-scale fishers and vulnerable actors marginalized in small-scale fisheries. Therefore, to create optimal conditions for fishers, it is essential to have suitable policies and management strategies for small-scale fisheries, which depend on having access to helpful information. However, reliable data on small-scale fisheries is weak and deficient, so further research is needed to better understand the conditions, opportunities, and limitations of this sector (Rosales et al., 2017).

The tuna sub-sector is one of the most significant fisheries in Vietnam. Most tuna products are exported, and their export value accounted for 22% of total seafood export value in 2018. The international trade of tuna products generates foreign currency and creates many jobs for the workers in the central coastal fishing community; however, tuna fishers'lives are still difficult and precarious (D-Fish, 2018b). Moreover, when participating in the international market, Vietnamese tuna products need to comply with the principles, rights, and obligations prescribed in international organizations, including regulations on measures, appropriately protecting vulnerable actors' rights (such as fisher's rights). Thus, to improve the socio-economic life of tuna fishers, it is necessary to have appropriate policies and management strategies for small-scale tuna fisheries, which depend on access to reliable and valuable information. Nevertheless, there has not been a complete and in-

depth study on the Vietnam's small-scale tuna fisheries, especially research to propose policies to protect the rights and interests of small-scale tuna fishers.

Over the past years, there has been an increasing interest in value chains in fishery products in the context of global markets (Hart and Stringer, 2016), (Watson et al., 2017), (FAO, 2014). Many approaches can be used in value chain analysis, depending on the context and the research questions (Jimenez et al., 2020). Value chain mapping analysis, the most basic level among the value chain analysis methods, is a general and preliminary analysis that considers several activities required to bring a product or a service from conception through the various stages of production to the final consumers. In short, it is the study of systematic mapping of economic actors involved in the production, distribution, marketing, and sales of one or more specific goods or services. This analysis assesses the characteristics of economic agents, profit and cost structures, product flows through the chain, employee characteristics, and sales of domestic and international markets (Kaplinsky and Morris, 2001).

In the last decades, the value chain mapping method has been applied in some research in fisheries and aquaculture sectors, such as (Jespersen et al., 2014), (Rosales et al., 2017), (Wanga et al., 2019), (Jimenez et al., 2020), (Coronado et al., 2020). Researchers used different dimensions to map value chains, depending on the available resources, scope, and objectives of value chain analysis. First, (Jespersen et al., 2014) investigated what shapes selected aquaculture value chains originated from four Asian countries (Vietnam, Bangladesh, China, and Thailand) by analyzing forms of coordination, institutional frameworks, and overall value chain governance. Its results reflected the challenges of aquaculture sustainability and provided broad observations on food value chain governance. In addition, (Rosales et al., 2017) described eight value chains for eight distinct fish species in different locations in the Philippines by mapping actors, product flows, volumes, geographic flows, knowledge and information, governance, relationships, linkages and trust, as well as costs and profits. Its results provided a range of data and information, helping suggest recommendations for improved fisheries management in the Philippines.

Furthermore, (Wanga et al., 2019) focused on the organization of chain activities related to product flows, information flows, and relationships among chain members to map the value chain of imported shellfish in China. This study provided valuable input for global shellfish exporters and policymakers to develop effective marketing strategies and policies for their shellfish products in this country. Moreover, (Jimenez et al., 2020) analyzed the characteristics of small-scale fisheries along the Amazon coast in Amapa (Brazil) in order to identify the structure and organization of the value chain and to determine how fisheries connect and interact with national and international markets, the socio-economic drivers of the fisheries. The mapping dimensions used in this study include fisher's operation, the socio-economic context of the production process, production structure, processing, marketing, as well as actors and their roles. Its results help improve the knowledge required for sustainable management and governance of fisheries in the Amazon region. Lastly, (Coronado et al., 2020) analyzed the structure of the Mexican octopus fisheries production chain by mapping measures such as actors and their roles, types of social and business

arrangements operating among actors, and the strengths, challenges, and prospects for the chain. This study helped formulate policies to improve the fishing and trading practices of the octopus fishery in Mexico. To sum up, the studies mentioned above focused on using value chain mapping analysis in small-scale fisheries in developing countries in order to make policy recommendations for the sustainable development of small-scale fisheries.

Applying value chain mapping analysis in Vietnamese fisheries so far can list a few studies (Thi Minh Hop, 2012), (Duijin et al., 2012), (Huy, 2018), (Cao et al., 2018). First, (Thi Minh Hop, 2012) mapped the shrimp value chain in the Mekong Delta and focused on analyzing key drivers, trends, institutions, policy environment, and relationships between actors in the chain. Furthermore, (Duijin et al., 2012) modeled four distinct export value chains (shrimp, pangasius, tuna, clams, oysters, and mussels) to identify the main bottlenecks in each chain impeding exports and propose intervention strategies to overcome said bottlenecks. The mapping dimensions used in this study are key actors, supporting agents, and critical bottlenecks of each chain. Moreover, (Huy, 2018) and (Cao et al., 2018) described the main actors and their roles to describe the overview of the tuna value chain in Vietnam.

Chapter 3 uses the full range of value chain mapping tools suggested in (M4P, 2008) to provide a basic overview of the tuna value chain (yellowfin, bigeye, and skipjack tunas) in three South Central provinces, Vietnam. The primary focus of this chapter is to answer the following vital questions: (1) What are the core processes in the tuna value chain? (2) Who are the actors involved in these processes, and what do they do? (3) What are the flows of tuna product, information, and knowledge in the tuna value chain? (M4P)What are the volume of tuna products, the number of actors, and jobs? What types of relationships and linkages exist? (5) How does the value change along the tuna value chain? (6) What is the location and position of fishers in the tuna value chain? (7) What are the disadvantaged factors impacting fishers'income, and what are potential intervention policies to overcome these drawbacks? The answers to these questions will improve knowledge about the overview of the Vietnamese tuna value chain, which is updated with new data and information, and much more comprehensive than the previous research, and propose effective policies to help increase income for fishers.

Abstract

This paper presents the outputs of a Ministry of Science and Technology-funded national research project on fisheries value chain entitled "Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam" (DFCPSFDV Project) during the period (2018-2020). It was carried out to map the Vietnamese tuna value chain in terms of value chain description, including actors, material flows, volume, knowledge and information, relationships, linkages and trust, and values at different levels of the chain. The point of entry for undertaking this analysis was to identify specific income increasing interventions for fishers to achieve the project objective of better management of tuna fisheries and to improve socio-economic conditions of tuna fishing communities in Vietnam. Three South Central provinces of Binh Dinh, Phu Yen, Khanh Hoa were chosen for the investigation of the tuna value chain. This study was completed in four main phases, which consist of interview surveys, focus group discussions, individual key informant interviews, and a validation workshop. Four hundreds fishers, nineteen middlemen and traders, five processors, three wholesalers, and eight retailers were interviewed in the three investigated provinces during 2018. Several policy recommendations to increase the income and improve the position of fishers in the tuna value chain were proposed, which include (i) the collaboration among fishers to take advantage of purchasing input materials; (ii) the improvements on the handling and maintenance of tuna quality to increase fishers' income; (iii) the establishment of tuna auction center to decrease financial detriment to fishers, increase their access to public and transparent market information, and strengthen their position in the chain; (iv) the formulation of savings, credit, and microfinance schemes to diversify forms of capital access for fishers; (v) the suggestion on a fair share of profits among shipowners, captains and cruise workers to reduce the vulnerability of the poor and increase the incentive for properly managing the tuna fisheries in Vietnam.

1. Introduction

In most cases, international trade in fishery products has had a positive effect on local food security (FAO, 2004). It is known that fish exports are a significant source of income for developing countries. These exports can generate foreign exchange as well as create employment and income in the primary and secondary sectors. Overall, export activities likely bring out benefits to a society; however, fish exports may not result in gains for the most vulnerable population in the fishing communities (Bjørndal et al., 2015). Thus, appropriate policies and management strategies for the most vulnerable actors through effective fisheries management are necessary conditions to increase food security, improve the socio-economic position of fishing communities, and sustain international fish trade in the long term (FAO, 2004).

The tuna industry is one of significant fishing industries in Vietnam. Most Vietnamese tuna products are used for export, and are among the leading fishing products of the country's seafood export. The export value of tuna products has increased from USD 484 million in 2014 to nearly USD 670 million in 2019, an increase of nearly 38% (Custom, 2019). The rapid development of the tuna industry

has been contributing to local employment opportunities in the coastal provinces of Vietnam, generating foreign currency revenues for the country. Although Vietnamese tuna exports have increased over the years, the life of tuna fishers is remaining unstable and painful due to the higher cost of each voyage and lower price of raw tuna (D-Fish, 2018b). In order to facilitate optimal conditions for tuna fishers, it is essential to have appropriate policies and management strategies for small-scale tuna fisheries in Vietnam, which depends on access to useful information. However, one of the most significant barriers to decision-and policy-making concerning Vietnamese small-scale tuna fisheries is the lack of reliable data and information about various facets of the tuna sector. Therefore, it is necessary to further study tuna small-scale fisheries in Vietnam in order to better understand the conditions, opportunities, and constraints of the tuna sector.

In the last few years, there has been increased interest in the seafood value chains and in exploring the linkages and the relationship between different actors and economic representatives (individuals, companies, government) in the value chains (Rosales et al., 2017). The value chain consists of various stages that are required to bring a product or a service from the initial stage to the delivery to final consumers and disposal after use (Kaplinsky, 1999), (R. Kaplinsky and M Morris, 2001). Small-scale fisheries are defined as a growing sub-sector of fisheries that employs labor-intensive technologies to exploit marine and inland water fishery resources. Its activities aim to supply fishery products to local, domestic, and international markets (FAO, 2010), (Berkes et al., 2001), (Chuenpagdee et al., 2006), (Johnson, 2006). Small-scale fisheries provide diverse and extensive networks of supply and trade linking between producers and consumers, increasing income and employment level. This system helps reduce vulnerability and increase adaptive capacities of fishers and fishing communities (Jacinto and Pomeroy, 2011).

A research on the value chain in small-scale fisheries is necessary because it provides an in-depth understanding of the characteristics of key economic actors, particular fisheries policies, and management frameworks. Also, it helps explore the challenges of small-scale fisheries due to its weak governance or competitiveness of small firms and fishers in changing markets (Jacinto and Pomeroy, 2011). Furthermore, it can discover response strategies to improve the sustainability and competitiveness of the entire value chain as well as identify the binding constraints affecting the sector in a systematic manner (Rosales et al., 2017). Finally, it provides an opportunity to find policy and management positions to support different agents and relevant stakeholders, especially for the most vulnerable population on the chain (Bjørndal et al., 2015), (Rosales et al., 2017).

For Vietnamese tuna industry, there have been a few of studies that only concern the economic aspect of the value chain analysis (Cao et al., 2018), (Huy, 2018). Regarding the three aspects of economy, society and environment, (Duijin et al., 2012) used value chain analysis with sustainability as the leading principle to identify bottlenecks of the tuna sub-sector with the aim to advise CBI (Center for the Promotion of Imports from developing countries) for supporting Vietnamese tuna exporters to become successful ones in the European market. This paper presents the

outputs of DFCPSFDV Project from 2018 to 2020. The objectives of this study were to understand better, and report on, the tuna value chain in Vietnam. In particular, our study aimed to:

- Map the Vietnamese tuna value chain to describe the main actors, product flows, volume, number of actors and employees, knowledge and information, relationships, linkages and trust, and the value at different levels of the tuna value chain;
- Identify specific income increasing interventions for tuna fishers to achieve the project objective of better management of tuna fisheries and to improve socio-economic conditions of tuna fishing communities in Vietnam.

This paper is organized as follows: after the introduction, Section 2 provides a short review of previous works on value chain analysis that lead to this research. Section 3 describes the method of this study, and the results are shown in Section 4. Finally, discussions and conclusions are presented in Section 5.

2. Related Works on Value Chain Analysis

A value chain analysis can be explained in either a narrow or broad sense. In the narrow sense, a value chain comprises the range of activities performed within a firm to produce a particular output. The broad approach of defining a value chain examines the complex range of activities implemented by various economic agents to bring raw materials through a chain to the sale of final products. The definition of value chain includes the issues of organization and coordination, the strategies, and the power relationships of different economic agents in the chain (M4P, 2008). The concept of a value chain is usually combined with the notion of governance, which is crucial importance for fisheries because the analysis of value chains leads to the deeper understanding of social ties and traditional norms, which can be used to figure out the participation of the poor, and potential impact of value chain development on poverty reduction, food security, and fisheries management (Bjørndal et al., 2015), (Rosales et al., 2017). Value chain analysis allows for different entry points depending on the objective of the study. Conducting a value chain analysis involves an extensive examination of what is going to between the actors in a chain, what keeps these actors together, what information is shared, and how the relationships between actors is envolving (M4P, 2008). In other words, the mapping of actors and key linkages in a chain should be the focus of the analysis. Assessing these linkages in terms of governance issue helps give out better policy recommendations (Bjørndal et al., 2015), (Rosales et al., 2017).

In this study, the point of entry for undertaking the tuna value chain analysis is to identify specific income increasing interventions for fishers to achieve the objective of better tuna fisheries management and to improve the socio-economic conditions of fishing communities in Vietnam. Thus, we used the sequential steps of mapping the value chain listed in (M4P, 2008) to examine the chain as follows:

- Mapping the core processes in the value chain;
- Identifying and mapping the main actors involved in the processes;
- Mapping flows of products;
- Mapping the volume of products, numbers of actors and jobs;

- Mapping the value at different levels of the value chain;
- Mapping relationships and linkages between value chain actors;

Additionally, the governance of the chain is considered with the aim to examine the rules operating in a value chain, and the system of coordination, regulation, and control in which the value is generated along a chain (M4P, 2008).

3. Method

3.1. Study Sites

In Vietnam, the oceanic tunas, including skipjack tuna (Katsuwonus pelamis), bigeye tuna (Thunnus obesus), yellowfin tuna (Thunnus albacores), are mainly landed at nine provinces including Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, and Ba Ria - Vung Tau, among which three South Central provinces of Binh Dinh, Phu Yen, and Khanh Hoa yield the highest oceanic tuna catches (Vu, 2018). Thus, we chose these three provinces for the investigation of the Vietnamese tuna value chain. Figure 3-1 describes the fishing ground for catching oceanic tunas of the three chosen provinces.

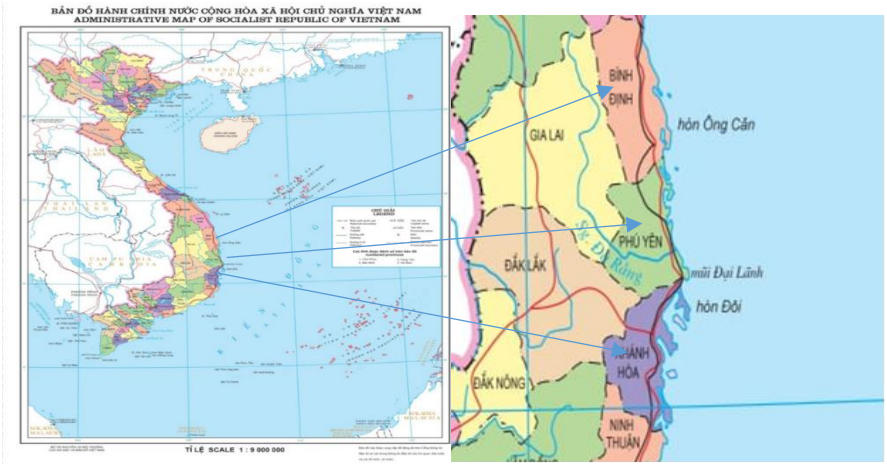


Figure 3-1: Fishing ground for catching oceanic tuna in three provinces of Binh Dinh, Phu Yen, Khanh Hoa

Source: (TheNationalOffice, 2017)

3.2. Data Collection

This tuna value chain study is based on both secondary and primary data. The secondary data was collected from various sources, including Vietnam Directorate of Fisheries (D-Fish), Provincial Departments of Fisheries (DoFIs) in Binh Dinh, Phu Yen, and Khanh Hoa provinces, the General Department of Vietnam Customs, Vietnam Association of Seafood Exporters and Producers (VASEP), Vietnam Tuna Association (VINATUNA), Research Institute for Marine Fisheries (RIMF), Vietnam Institute of Fisheries Economics and Planning (VIFEP), and Vietnam Academy of

Agricultural Sciences (VAAS). All data on mapping tuna value chain in the three South Central provinces of Vietnam presented in this paper belongs to the full calendar year 2018. The primary data collection was done using non-random sampling through interview surveys, focus group discussions (FGDs) with different actors in the tuna value chain, including fishers, middlemen, traders, processors, wholesalers, and retailers. Key informant interviews (KIIs) were also conducted with representatives from D-FISH, DoFIs, VINATUNA, VASEP, and VIFEP.

3.3 Study Phases

The study was completed in four main phases. During the first phase, interview surveys were conducted by the research team from March to June 2018 among groups of actors along the tuna value chain. Four structured questionnaires covering both qualitative and quantitative issues were prepared for fishers, middlemen/traders, processing enterprises, wholesalers/retailers. The contents of survey questions include general information on actors, raw tuna material flows/tuna product flows, knowledge and information, tuna's volume, number of actors and employees, the value at different levels along the tuna value chain, relationships and linkages between actors, and the governance of the chain. Each actor participating in the tuna value chain was interviewed by using a separate set of questionnaires with closed-ended questions and open-ended questions. All data were coded and entered into a Microsoft Excel spreadsheet for statistical analysis, primarily comprising simple descriptive statistics. Data were analyzed using cross-tabulation in order to compare data among pairs of actors (e.g., fishers and middlemen/traders, middlemen/traders and processing enterprises).

It should be noted that this study employed a non-probability sampling method, which is convenience sampling. The overall survey sample includes all actors participating in the tuna value chain in the three South Central provinces of Vietnam, including fishers, middle-persons, processors, wholesalers, and retailers. The research project leader decided the number of survey samples for each actor in each province based on her experiences and the allowable budget of the project. For fishers, only those who usually work offshore and be able to made appointments with the research team through prior acquaintances with local fisheries authorities were selected for interviewing. Similarly, the interviews for middle persons, processors, wholesalers, and retailers depends on such personal arrangements. Consequently, the convenience sampling method is appropriate for the study.

Among the three provinces being investigated, Binh Dinh has the largest number of actors involved in the tuna value chain, while Khanh Hoa and Phu Yen occupy the second and third positions, respectively. The initial survey sample was planned with 470 actors, among which 222 actors living in Binh Dinh, 123 actors living in Phu Yen, and 125 actors living in Khanh Hoa. Specifically, Binh Dinh has 200 fishers, ten middle-persons, five wholesalers, five retailers, and two processors to be interviewed; Phu Yen has 100 fishers, ten middle-persons, five wholesalers, five retailers, and three processors to be investigated; Khanh Hoa has 100 fishers, ten middle-persons, five wholesalers, five retailers, and five processors to be examined.

However, the total sample after the surveys were carried out includes 435 actors, among which 214 were from Binh Dinh, 108 were from Phu Yen, and 113 were from Khanh Hoa. Table 3-1 describes the number of samples for each group of actors interviewed in the three investigated provinces. Although the number of processors, wholesalers, and retailers in the surveys is relatively small, these survey results are guaranteed due to satifying the convenience sampling method used in this study.

Table 3-1: Number of samples for each group of actors interviewed in the three provinces.

Actor	Province			
	Binh Dinh	Phu Yen	Khanh Hoa	Total
Fisher	200	100	100	400
Middleman/trader	10	4	5	19
Processing enterprise	1	1	3	5
Wholesaler	1	1	1	3
Retailer	2	2	4	8
Total	214	108	113	435

In Phase 2, three FGDs were conducted with three main actor groups including fishers, middlemen/traders, and processing enterprises. The FGDs were directed at homogeneous groups and were conducted separately among these groups, allowing the participants to discuss issues limited within the survey structure. Furthermore, those FGDs were undertaken in order to surface issues and concerns that required depth and probing. Also, unclear answers in the survey interviews were discussed more lengthily during the FGDs. The open-ended questions discussed in the FGDs have similar contents with those questions in Phase 1. Table 3.2 presents the distribution of FGDs conducted in the three provinces in 2018.

Table 3-2: Distribution of FGDs conducted in the three selected provinces in 2018

FGD composition	Number of people in each group	Location
Fisher	12	Binh Dinh
Middleman	5	Phu Yen
Processor	3	Khanh Hoa

During Phase 3, we conducted individual KIIs with experts who are knowledgeable on the tuna value chain to complete and further clarify the results of the surveys and FGDs. The key informants were primarily the value chain enablers at both meso (e.g., associations and fisher groups) and macro (e.g., government units and agencies) levels. The study team conducted the KIIs in March 2019, following the completion of Phase 1 and Phase 2's surveys so that the interviewers could probe for any data and information gaps from these surveys. Table 3-3 presents the sets of questionnaire for the KIIs.

Table 3-3: Sets of questionnaire utilized for the KIIs carried out in March 2019

Set	Value chain members	Number of key informants
Set A	Representatives from government agencies such as D-FISH	1

(Macro)		
Set B (Macro)	Representatives from local government units such as DoFIs in Binh Dinh, Phu Yen, Khanh Hoa provinces	3
Set C (Meso)	Representatives from private associations and academic institutions involved in the tuna industry such as VINATUNA, VASEP, VIFEP	3

In the last phase, the validation workshop was conducted in Binh Dinh province in June 2019 to vet research results and validate findings of the mapping tuna value chain in the three South Central provinces of Vietnam. Thirty participants attended the validation meeting, including twenty tuna value chain players, five officers of D-FISH, and five officers of DoFIs in Binh Dinh, Phu Yen, Khanh Hoa provinces.

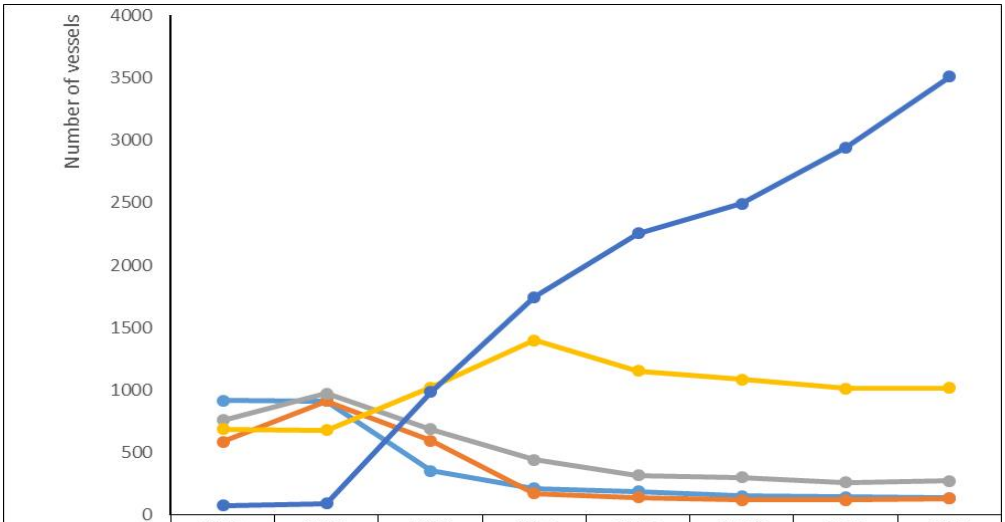
4. Results

4.1. Current Status of the Vietnamese Tuna Industry

In Vietnam, the oceanic tunas are mainly found in the offshore waters of the country's central and south-eastern regions (Vu, 2018). Although fishing activities had been carried out previously, oceanic tuna fisheries, which consist of longline/handline, purse seine, and gillnet, have been only officially introduced to Vietnam since 1994. They gain a rapid growth rate in the number of tuna fishing vessels, tuna catch, and tuna export/import, presented as follows.

4.1.1. Tuna Fishing Vessels

Figure 3-2 describes the evolution of the total number of tuna fishing vessels in Vietnam by capacities from 2011 to 2018. In 2018, there were 5,067 tuna fishing vessels with a capacity of higher than 50 horsepower (hp) in Vietnam, in which 3,509 vessels with a capacity of higher 400 hp were accounted for sixty-nine percent of the total number of vessels. Vessels higher than 400 hp in capacity have a sharp increase from 77 units in 2011 to 3,509 units in 2018, whereas vessels with smaller capacities have a decreased tendency over the years. Among provinces, Binh Dinh had the highest number of vessels with 2,010 vessels, while Phu Yen ranked at the second position with 657 vessels, and Khanh Hoa, the third with 539 vessels (D-Fish, 2018b).



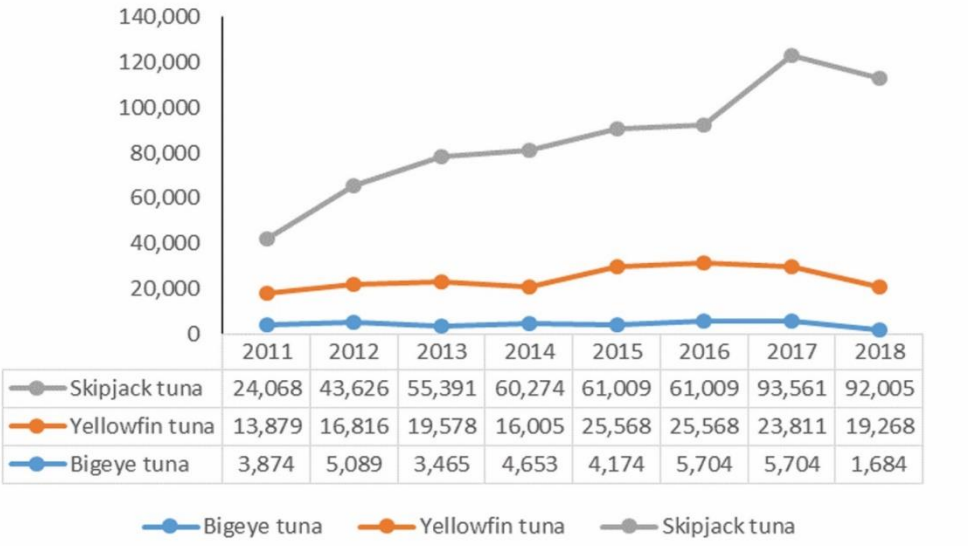
	2011	2012	2013	2014	2015	2016	2017	2018
50 - 89	917	914	352	212	190	153	145	137
90 - 149	587	912	594	172	141	120	119	133
150 - 249	759	972	688	441	316	301	260	273
250 - 399	689	680	1021	1399	1155	1084	1012	1015
> 400	77	90	986	1746	2255	2493	2942	3509

Figure 3-2: Number of tuna fishing vessels by capacity (in hp) during 2011-2018

Source: (D-Fish, 2018b)

4.1.2. Tuna Catch

Three tuna species include skipjack tuna, yellowfin tuna, and bigeye tuna caught in Vietnam's Exclusive Economic Zone (EEZ). Figure 3-3 describes total tuna catches estimated by species from 2011 to 2018. Skipjack tuna are caught by purse seine and gillnet fisheries all year round while yellowfin and bigeye tunas are caught by longline/handline fishery from November to May. In general, total tuna catches increased steadily throughout the duration, and the majority catch belonged to skipjack tuna. In 2018, skipjack tuna catch was 92,005 mt, accounting for eighty-two percent of total tuna catches, followed by yellowfin tuna with 19,268 mt (seven-teen percent), and bigeye tuna with 1,694 mt (one percent). In 2018, Binh Dinh had the highest tuna catch among provinces with 52,823 mt, followed by Khanh Hoa with 19,103 mt and Phu Yen with 8,616 mt (D-Fish, 2018b).



	2011	2012	2013	2014	2015	2016	2017	2018
Skipjack tuna	24,068	43,626	55,391	60,274	61,009	61,009	93,561	92,005
Yellowfin tuna	13,879	16,816	19,578	16,005	25,568	25,568	23,811	19,268
Bigeye tuna	3,874	5,089	3,465	4,653	4,174	5,704	5,704	1,684

Figure 3-3: Tuna catches by species (in mt) caught in Vietnam's EEZ from 2011 to 2018

Source: (D-Fish, 2018b)

4.1.3. Tuna Export and Import

Vietnam's tuna processing and export industry are growing, which contributes significantly to the country's seafood export growth. Table 3-4 describes the Vietnamese tuna product and seafood export from 2014 to 2018. The export value of frozen fillet tuna (code HS0304) increased remarkably from USD 193.180 million in 2014 to USD 310.315 million in 2018, an increase of 60.6 percent. Also, the export value of processed and canned tuna products (code HS16) went up by 31.8 percent, from USD 232.290 million in 2014 to USD 306.254 million in 2018. In addition, the turnover of total tuna export increased by 34.8 percent from USD 484.235 million in 2014 to USD 652.905 million in 2018. Tuna exports explained stably around 22 percent of total seafood exports during the period.

Vietnamese tuna products were exported to many foreign markets, of which several important ones are the US, the EU, Israel, ASEAN, Japan, China, Mexico, Canada, etc. Table 3-5 presents tuna export between 2014 and 2018, in which the US and EU were constantly the two leading importers of Vietnamese tuna products during the period.

In Vietnam, the tuna catch volume is not sufficient for the processing industry. In order to have enough raw material, processors have to import tuna materials from countries like Korea, China, ASEAN, Japan, the USA, the EU, and other markets. Table 3-6 presents Vietnamese tuna import markets in the period of 2014-2018, in which Korea and China were the first and the second leading exporters during this duration.

Table 3-4: Vietnamese tuna product and seafood export during 2014-2018 (in million USD)

Product type	2014	2015	2016	2017	2018	% increase (2014-2018)
1. Tuna with code HS03	251.944	246.123	284.181	322.558	346.652	37.6
Live tuna/fresh/frozen/ dried (with code HS03, except HS0304)	58.765	43.185	43.422	49.626	36.337	-38.0
Fillet tuna (with code HS0304)	193.180	202.938	240.759	272.933	310.315	60.6
2. Processed tuna with code HS16	232.290	208.850	225.606	270.314	306.254	31.8
Canned tuna (with code HS16)	177.018	150.399	153.032	179.110	173.305	-2.1
Other processed tuna (with code HS16)	55.272	58.451	72.574	91.204	132.948	140.5
Total tuna export (1 + 2)	484.235	454.972	509.786	592.873	652.905	34.8
Seafood export	2,201.390	2,159.840	2,296.380	2,757.810	2,986.040	135.6
Tuna export/seafood export (%)	22.0	21.1	22.2	21.5	21.9	

Source: (Custom, 2018)

Table 3-5: Vietnamese tuna export value (in million USD) from 2014 to 2018

Market	2014	2015	2016	2017	2018
USA	175.217	190.164	200.277	225.693	229.542
EU	135.215	97.375	115.316	141.936	158.274
Israel	20.872	17.349	26.001	44.260	62.982
ASEAN	34.985	38.366	43.394	43.862	50.058
Japan	22.564	20.426	19.361	24.396	24.808
Canada	11.958	9.931	10.09	11.769	16.042
Others	81.410	79.346	103.421	98.940	109.181
Total	484.235	454.972	509.786	592.873	652.905

Source: (Custom, 2018)

Table 3-6: Vietnamese tuna import value (in million USD) from 2014 to 2018

Market	2014	2015	2016	2017	2018
Korea	27.554	45.733	41.534	41.757	54.681
China	15.195	21.868	28.267	31.812	70.293
ASEAN	22.515	18.590	23.725	30.387	33.760
Japan	15.291	10.833	13.716	20.019	13.646
USA	19.839	13.363	10.131	12.990	24.207
EU	2.476	10.244	0.11	0.536	3.078
Other markets	81.123	94.249	99.427	132.443	182.770
Total	183.994	214.881	216.910	269.945	349.426

Source: (Custom, 2018)

4.2. Mapping Tuna Value Chain in Three South Central provinces of Vietnam

4.2.1. Mapping Core Processes in Tuna Value chain

We identified five core processes in the tuna value chain in the three investigated provinces of Binh Dinh, Phu Yen, Khanh Hoa, which are input provision, tuna exploitation, tuna purchase, tuna process, distribution and market. Input provision is the process of providing input materials, which are gasoline, oil, ice, fishing nets, machines, and equipment for fishers to catch tuna offshore. Tuna exploitation is the process of catching tuna by fishers, whereas tuna purchase is the process that traders/middlemen/processors buy tuna materials at fishing ports. Tuna processes are the conversion of raw tuna into frozen fillet, loin, or finished tuna products. Meanwhile, distribution and market is the process of selling tuna products to customers in export and domestic markets. These core processes are depicted in the top part of Figure 3-4.

4.2.2. Mapping Actors and Activities of Tuna Value Chain

The tuna value chain in the three South Central provinces of Vietnam is relatively simple. As shown in the bottom part of Figure 3-4, it includes four main actors described in details as follows.

1) Fishers include shipowners and cruise workers who work on tuna vessels for catching yellowfin, bigeye, and skipjack tunas. All fishers are men. The majority of shipowners are middle-aged men, are certified captains or deputy captains, and have accumulated enough experience and capital to manage all workers'activities, whereas most cruise workers are young and not professionally trained. Fishers' knowledge and understanding on tuna fisheries are mainly obtained through practice and mutual learning. Shipowners are full-time workers, whereas cruise workers are part-time workers. In general, the education level of shipowners and cruise workers is essentially low at primary and secondary school levels; thus, it is difficult for them to quickly access technical knowledge and information in catching and preserving tunas. Fishers are the first and also the most significant actors in the tuna value chain since they exploit and provide raw tuna to traders, or middlemen, or processors. However,

they have a relatively low position and a small influence in the chain. They depend heavily on traders, or middlemen for credit loans. Most shipowners get loans from traders, or middlemen before each voyage and sell caught tunas to these lenders afterwards, which is one of the primary causes for the low negotiation power of shipowners in tuna transactions.

2) Purchasing actors include traders and middlemen who are responsible for buying raw tunas and selling them to processing and exporting companies or for domestic consumption. Both middlemen and traders have much experience in tuna transactions, and are full-time workers. Traders buy tunas directly from fishing vessels, then selling most of them to middlemen or processors and selling the remainder at domestic markets. Meanwhile, middlemen purchase raw tunas directly from fishing vessels or traders and sell them to processors. Compared to traders, middlemen's buying volume is much bigger. Most of middlemen are men, while most of traders are women. Most middlemen have matured from traders and have the closest relationship with fishers. Purchasing actors play an intermediary role in the chain; however, they have a great influence on other actors, especially fishers. They provide finance on time for fishers and dictate the classification and price of raw tunas at fishing ports.

3) Processors are responsible for purchasing raw tunas from middlemen, or traders, or shipowners, then processing them into frozen fillet, loin, or finished tuna products, finally selling these products to export and domestic markets. They include frozen and canned tuna companies. Frozen tuna products consist of fillet tuna meat, whole and discarded frozen tuna, frozen tuna loin with and without CO, frozen slice (steak) with and without CO, frozen cut pieces (saku, cube) with and without CO, while canned tuna products include canned food, tuna in oil, and pickled tuna. Processors are the most substantial influencers in the tuna value chain since they have high negotiation power and decide the purchasing price of raw tuna. They have the closest relationship with middlemen/traders.

4) Wholesalers/retailers are responsible for distributing, marketing, and selling tuna products. Wholesalers are commercial enterprises who order tuna products from processors and sell them to retailers. Retailers are households who sell groceries or provide machines and equipment for fishers as well as tuna products for local consumers. These actors play an intermediary role in the chain, benefiting from the difference between buying and selling prices of tuna products. In addition to main actors directly involved in the tuna value chain, there are institutional stakeholders of the chain such as fisheries administration and management in the three South Central provinces of Vietnam, D-FISH, VASEP, VINATUNA, financial institutions, non-governmental organizations, and local tuna fisheries unions. Figure 3-4 describes the mapping of the main actors and their activities from the core processes of the tuna value chain.

Input provision	Tuna exploitation	Tuna purchase	Tuna process	Distribution & Market
Actors	Suppliers	Fishers	Purchasing actors	Processors	Wholesalers/retailers
Activities	Supply input: petrol and oil, ice, fishing, nets, food	Fishing and preserving tuna materials	Unloading and purchasing raw tuna from fishers and selling raw tuna to processors.	Processing raw tuna into tuna products; Exporting tuna products.	Distributing, marketing, and selling tuna products.
Institutional stakeholders of the chain: Fisheries administration and management in the three South Central provinces of Vietnam, D-FISH, VASEP, VINATUNA, Financial institutions, non-governmental organizations; tuna fisheries unions.				

Figure 3-4: Mapping main actors and specific activities undertaken by actors from core processes in tuna value chain

Source: (Data, 2018)

4.2.3. Mapping Material Flows

Mapping tuna material flows involves identifying materials at each stage of the process as they are transformed from inputs to raw and intermediate materials, and finally, to final tuna products. Mapping these flows creates a clear picture about what forms of products are handled, transformed, and transported at each stage of the tuna value chain. Table 3-7 depicts the process, input, and output forms of tuna material flows. Figure 3-5 classifies and assesses each activity in the material flows. The assessment of each activity aims to classify it into one of three categories: (V) the activity adds the value of the chain, (N) the activity is necessary but does not increase the value of the chain, and (W) the activity is unnecessary and wasteful. The assessment results were based on the validation workshop taken place in Binh Dinh province in June 2019, which was organized to validate research findings on the tuna value chain analysis in the three investigated provinces.

4.2.3.1. Material Flows from Input Suppliers to Fishers

Input suppliers provide petrol, ice, food, etc. for fishers to go offshore, which is necessary but does not add value to the chain. Fishers catch and preserve tunas, which are necessary activities and add value to the chain. Interviewed surveys in 2018 showed that most fishing vessels are made of wood, and most cold basements used for preserving tuna materials are made of styrofoam, which is not guaranteed for keeping cold. Also, most fishers use traditional methods to catch tuna. Typically, tunas are waving underwater before being pulled on the vessels, then have their heads beaten until their deaths by a rudimentary tool, making their meat sour. Most fishers do not perform gill hook and organ removal as well as do not make the body heat of tunas decrease gradually (i.e., they put the whole caught tunas in cold basements without any processing). Furthermore, the average length of a sea trip is from twenty to twenty-five days. All of these factors have negative impacts on the quality of tuna materials at landing ports.

4.2.3.2. Material Flows from Fishers to Traders/Middlemen

The activities of purchasing tuna, unloading tuna from fishing ports to trucks, transporting tuna from fishing ports to processing enterprises are necessary but do not add value to the tuna value chain. However, that of preserving tuna from fishing ports to processors both is necessary and add value to the chain. The results of the surveys showed that some factors could negatively affect the activities in preserving tuna at fishing ports as follows:

1) The wharf at fishing ports have not roofs, making the quality of tunas be degraded when transporting tunas from vessels to fishing ports, especially in hot seasons;

2) Most middlemen do not have cold storages with temperatures from zero degrees Celsius to five degrees Celsius at fishing ports to put fresh tunas into storages immediately after purchasing;

3) The low quality of icing service harms tuna preservation.

4.2.3.3. Material Flows from Traders, or Middlemen to Processors

Raw tunas are stored in cold storages after being transported from fishing ports to processing enterprises, which is a necessary activity but does not add value to the tuna value chain. Activities take place during the process of transforming tuna materials into tuna products both are necessary and do add value to the chain.

4.2.3.4. Tuna Product Flows from Processors to Wholesalers/Retailers

Tuna products are stored in cold storages, then sold to oversea markets by exporters and to final customers in domestic markets by retailers/wholesalers. This activity is necessary but does not add value to the tuna value chain.

Table 3-7: Process, input and output forms of material flows in the tuna value chain

No	Process	Input form	Output form
1	Preparing and going to sea for tuna catch	Supplies, fuel, fishing gear, food, ice	Tuna materials: yellowfin tuna, bigeye tuna, skipjack tuna
2	Landing fishing ports and sorting tunas	Unclassified tuna materials: yellowfin tuna, bigeye tuna, skipjack tuna of mixed sizes	Classified tuna materials: yellowfin tuna, bigeye tuna, skipjack tuna of sizes in categories
3	Transporting and processing tuna materials	Tuna intact with head, tail, and fins	Fillet tuna meat, frozen tuna, canned tuna
4	Storaging and selling tuna products	Fillet tuna meat, frozen tuna, canned tuna	Tuna products in a vacuumed plastic package
5	Consuming tuna products	Tuna products in a vacuumed plastic package	Tuna products are ready for consumption

Source: (Data, 2018)

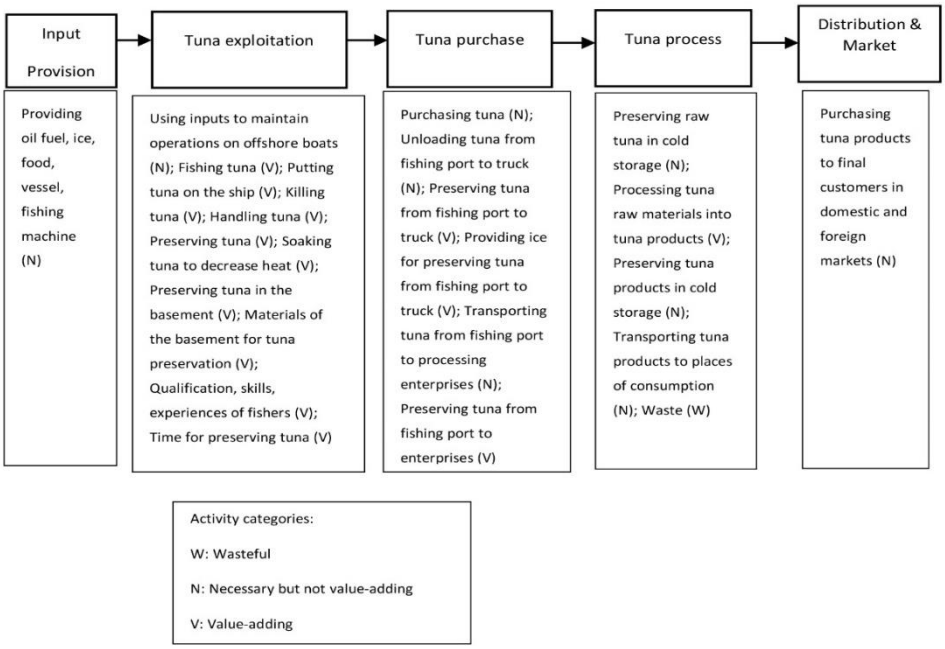


Figure 3-5: Mapping material flows in the tuna value chain

Source: (Data, 2018)

4.2.4. Mapping Knowledge and Flows of Information

4.2.4.1. Mapping Knowledge

1) Analyze the variation in knowledge, and skills in the separate processes in the tuna value chain

For tuna exploitation, fishers contribute to the effectiveness and efficiency of the chain by catching tuna in permitted sea areas with a considerable volume and a good quality. The surveys showed that most fishers use traditional technology to catch tuna, which is based on experiences from past generations. In addition, most fishers know and enforce illegal, unreported, and unregulated (IUU) principles and Dolphin Safe fishing. For tuna transactions, most middlemen and traders have many experiences in purchasing tunas. They can evaluate various types of tunas and classify them according to quality levels and sizes. For tuna processing, processors can understand various types of tunas, quality of tuna materials, tuna processing process, and the requirements on tuna products from export and domestic markets.

2) Determine and describe standards along the tuna value chain

Technical staffs of processing enterprises apply Vietnam's standards (Law, 2018) to evaluate raw tuna's quality at fishing ports. Relying on these standards, they determine grades of raw tunas when buying them from middlemen/traders/fishers. For traders and middlemen, they assess the quality of raw tunas based on their experiences rather than clearly specified criteria. Buying tunas in buckets, manipulating sizes and grades of raw tunas taking place regularly at fishing ports cause price disadvantage

for fishers and also make many shipowners reluctant to invest in advanced-equipped vessels and modern fishing methods to improve the quality of caught tunas.

All actors in the chain are concerned about the quality of raw tunas, but at different levels. Figure 3-6 describes the quality criteria for raw tunas along the chain. Both fishers and middlemen/traders are interested in catching/buying raw tunas with good quality, at least attaining sensory features. Nonetheless, the biggest concerns of fishers are how to catch large volumes and obtain the highest return from each voyage, while that of middlemen/traders is how to receive the highest profit either from the price differences between purchasing raw tunas from fishers and reselling them to processors or from the commissions resulted from buying large quantities of raw tunas for processors. They are these money-oriented concerns of the two above actors that places tuna quality is at a lower priority than tuna volume. Regarding processors, they comply with Vietnamese standards for raw tunas and export market standards for processed tuna products. All processed tuna products must ensure the microbiological, physicochemical, and histamine limits. However, the final goal of processing enterprises is to achieve the highest profit from their business, so they would like to buy raw tunas at a reasonable price.

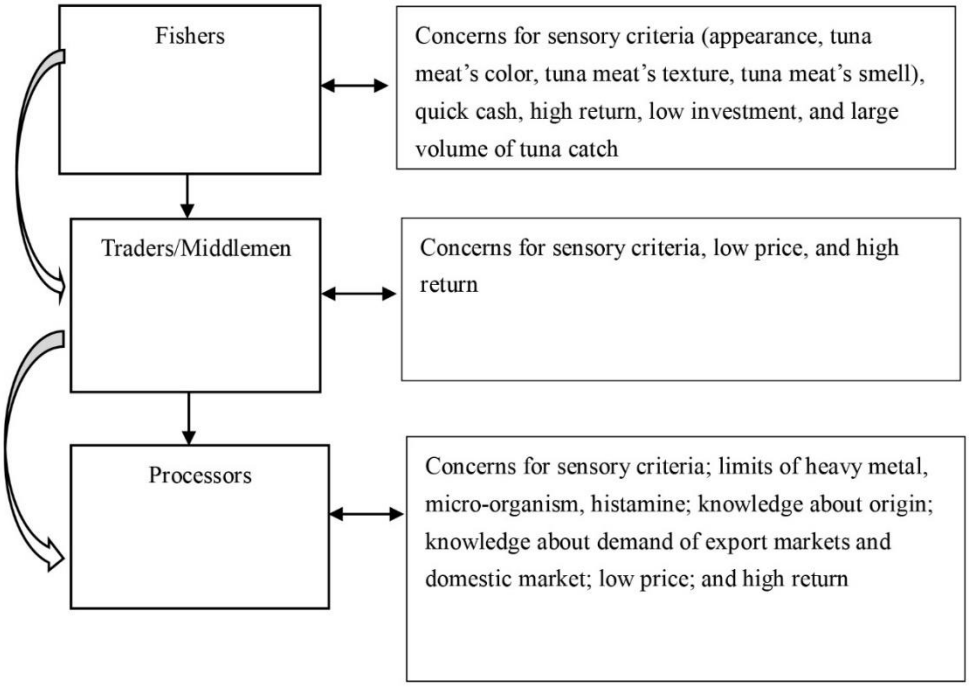


Figure 3-6: Quality criteria for raw tuna along the tuna value chain.

Source: (Data, 2018)

4.2.4.2. Mapping Information Flows

Mapping information flows through the tuna value chain is to consider what information and how information flows in the chain. Figure 3-7 summarizes the

characteristics of information flows along the tuna value chain. Four characteristics of information flows were investigated including contents, methods and frequency of information exchange, and levels of trust in sharing information. The contents of shared information include species of raw tuna, price, quantity, quality of raw tuna, and market information. However, there was a considerable difference in the proportion of contents of information shared between actors along the chain. Most fishers set the selling price as their highest priority, followed by the quantity and size of raw tuna. In contrast, most other actors place their focus on the quantity and size of raw tuna or types of tuna products since processing enterprises determine the price of raw tuna or tuna products beforehands. Regarding methods of sharing information, most fishers exchange with other actors through radios offshore and through face-to-face contacts and telephones at fishing ports. Meanwhile, other actors mainly communicate via telephones, and only meet face-to-face to deal with business problems. For frequency of information sharing, fishers communicate with each others less regular than other actors since the interested information of fishers is less complicated and fluctuated than that of other actors. While fishers only care about selling price, quantity and size of raw tuna when their ships are landed, other actors concern variations on the market of raw tuna/tuna products in order to respond promptly to business situations. In concern of trusting levels, most fishers are untrustworthy of information shared from other actors, especially the price of raw tuna. In contrast, other actors are quite confident in each others.

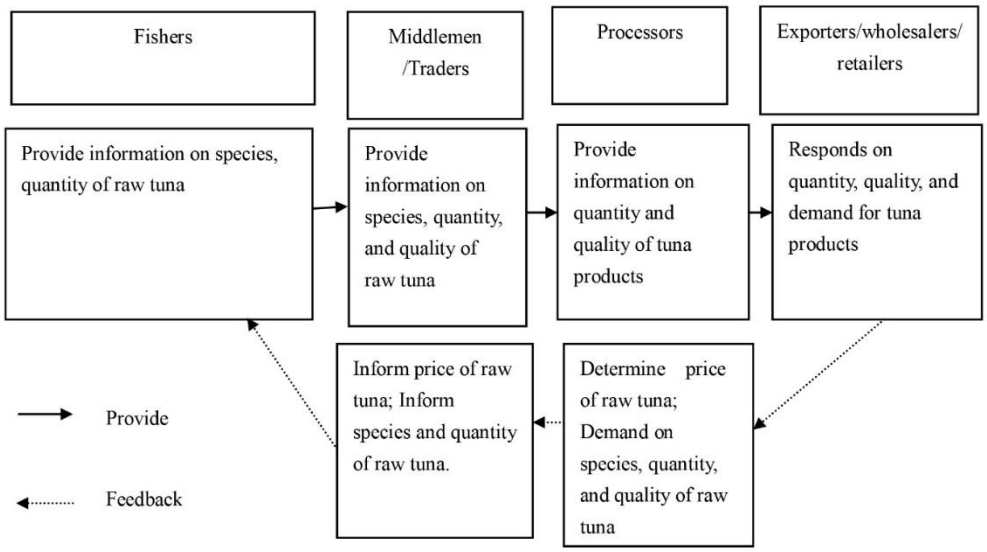


Figure 3-7: Characteristics of information flows in the tuna value chain

Source: (Data, 2018)

4.2.5. Mapping the Volume of Tuna Materials, Numbers of Actors and Jobs

4.2.5.1. Mapping the Volume of Tuna Materials

The tuna volume is closely related to mapping tuna materials. The dimension of tuna volume is added to following the tuna materials through the tuna value chain. Finding

out the volume of tuna materials makes it possible to have an overview of the size of different channels within the value chain. There are two tuna supply chains, which are (i) yellowfin and bigeye tuna supply chain, and (ii) skipjack tuna supply chain. Figure 3-8 depicts the supply chains and mapping volumes of yellowfin, bigeye, and skipjack tunas in the three South Central provinces of Vietnam in 2018. Total yellowfin and bigeye tuna catches were 17,082 mt, and those of skipjack tuna were 63,460 mt in the three investigated provinces (D-Fish, 2018b).

1) Supply Chain and Mapping Yellowfin and Bigeye Tuna Volume

Yellowfin and bigeye tunas are caught by fishers in the Central sea of Vietnam by long-line/hand-line fisheries, then are directed to four different channels served for export and domestic markets. The surveys showed that the processing factor of yellowfin and bigeye tunas is 1.7, i.e., 1.7 kilograms of raw yellowfin and bigeye tunas are processed into 1.0 kilograms of finished tuna products and 0.7 kilograms of by-products of tuna. In other words, one-hundred percent of fresh yellowfin and bigeye tunas are processed into fifty-nine percent for processed tuna products and forty-one percent for by-products. Four different channels of yellowfin and bigeye tunas are presented as follows:

- Channel 1 (fishers-processors-export markets): Products of this channel are whole tunas with guts and gills removed for exporting to Japan by airplane. Processors choose yellowfin and bigeye tunas with the best quality (A or B grades, as shown in Figure 2-8), but only with a small volume, for getting acquainted with the Japanese market. Exporting whole yellowfin and bigeye tunas to Japan are not so feasible at present since most fishers use traditional and out-of-date methods to catch and preserve tunas. In 2018, the yellowfin and bigeye tuna volume of this channel accounted for a tiny portion, at only one percent, of that of all channels, about 171 mt. Although this channel has the highest value of a product unit compared to others, its export value is low because just a small amount of raw yellowfin and bigeye tunas meet the strict requirements for exporting to Japan.
- Channel 2 (fishers–traders/middlemen-processors-export markets): Yellowfin and bigeye tunas with C grade are processed into frozen tuna fillets (HS 0304 code) to export to the US, the EU, Israel, ASEAN, Japan, Canada, China, Mexico, and other markets. There are eight types of frozen tuna fillets, including tuna loin, tuna loin CO, tuna steak, tuna steak CO, tuna cube, tuna cube CO, tuna Saku, and tuna Saku CO. In 2018, the export volumes of frozen tuna fillets were about 9,566 mt, accounted for fifty-six percent of total yellowfin and bigeye tunas in the three investigated provinces.
- Channel 3 (fishers-traders/middlemen-processors-wholesalers/retailers-domestic markets): Products of this channel are tuna fillets catering to hotels, restaurants in domestic markets. Its sale volume, about 342 mt, accounted for two percent of total amount of yellowfin and bigeye tuna.
- Channel 4 (fishers-traders/middlemen-processors-wholesalers/retailers-domestic markets): Products of this channel are by-products of tuna processing such as tuna plasticizers, tuna ribs, tuna eyes, tuna bones, tuna heads, consumed in domestic

markets. Its sale volume explained forty-one percent of the total volume of yellowfin and bigeye tunas (about 7,004 mt).

2) Supply Chain and Mapping Skipjack Tuna Volume

Skipjack tunas are caught by fishers in the Central sea of Vietnam by purse seine and gillnet fisheries, which can be divided into two different channels, serving for export and domestic markets. The surveys showed that the processing factor of skipjack tuna is 1.5, i.e., 1.5 kilograms of raw skipjack tunas are processed into 1 kilogram of finished products and 0.5 kilograms of by-products. This means that one-hundred percent of total raw skipjack tuna catches are produced into sixty-seven percent for finished products and thirty-three percent for by-products. Total skipjack tuna catches in Vietnam only meet fifty percent of the total demand of tuna materials for domestic processors. The remainder of the demand is imported from Korea, China, ASEAN, and other countries (Custom, 2018). Two main paths of the supply chain of skipjack tuna are described as follows:

- Channel 1 (fishers-traders/middlemen-processors-export markets): Four kinds of finished skipjack tuna products for export whose total volume is about 68,400 mt, including canned food, tuna in oil, pickled tuna, and frozen tuna, explaine fifty-seven percent of total skipjack tuna products.
- Channel 2 (fishers-traders/middlemen-processors-wholesalers-retailers-domestic market): ten percent of total skipjack tuna products, about 12,000 mt, are domestically consumed. All by-products of skipjack tuna (mainly tuna heads and tuna bone), about 39,600 mt and sold to fish sauce and animal feed processing facilities in Vietnam, explaine thirty-three percent of total skipjack tuna products.

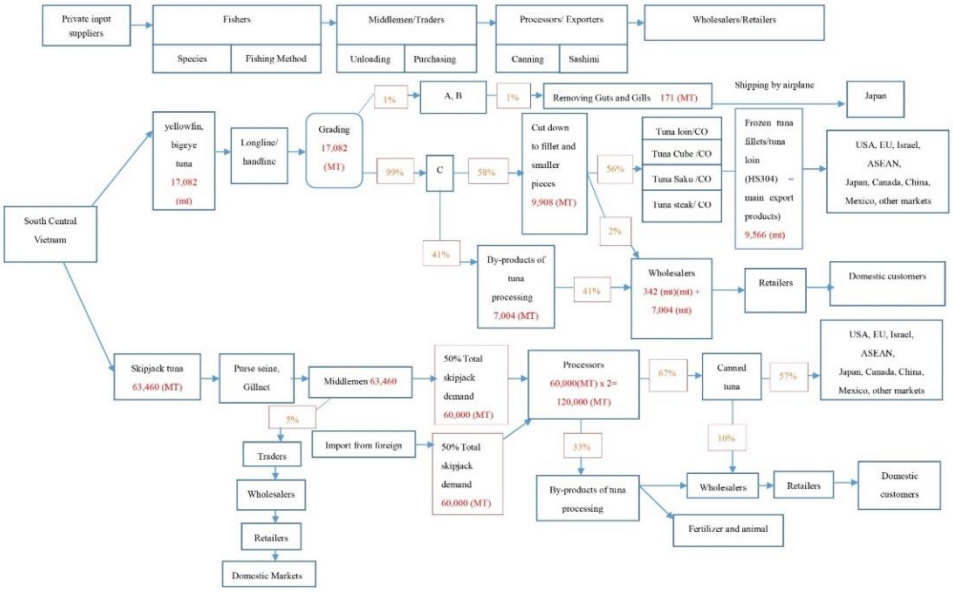


Figure 3-8: Supply chains and mapping volumes of yellowfin, bigeye, and skipjack tunas in the three South Central provinces of Vietnam in 2018

Source: (Data, 2018)

4.2.5.2. Mapping Number of Employers and Employees

Figure 3-9 describes mapping the number of employers and employees at each phase in the tuna value chain. The estimation of the number of employers and employees related with each actor of the chain was based on the secondary data from (D-Fish, 2018b) and the surveys in 2018, as presented below:

- For fishers, the total number of employers is 3,206 persons, inferred from the total number of vessels in three investigated provinces (D-Fish, 2018b). The number of employees, which are captains and cruise workers, is 25,169 persons, estimated based on summing of the products of the number of vessels in each tuna fishery with the corresponding average number of persons on every vessel. The total number of tuna fishing vessels of those provinces is 3,206 vessels, including 2,275 vessels for longline/handline, 693 vessels for purse seine, and 238 vessels for gillnet (D-Fish, 2018b). Meanwhile, the average number of on-board workers per vessel for longline/handline, purse seine, and gillnet is respectively 5.5, 15.0, and 9.5.
- For traders/middlemen, the total number of employers is 130 persons, including 98 traders and 32 middlemen in the three provinces (D-Fish, 2018b). Based on the surveys, the average number of employees associated with a trader and a middlemen is 6 and 16 persons, respectively. Thus, we estimated that the total number of employees is about 1,100 persons.
- Regarding processors, the total number of employers is 14, inferred from the total number of processing enterprises (D-Fish, 2018b). The surveys showed that the average number of employees in each enterprise is 720 persons. Thus, we estimated that the total number of employees is 10,080 persons.

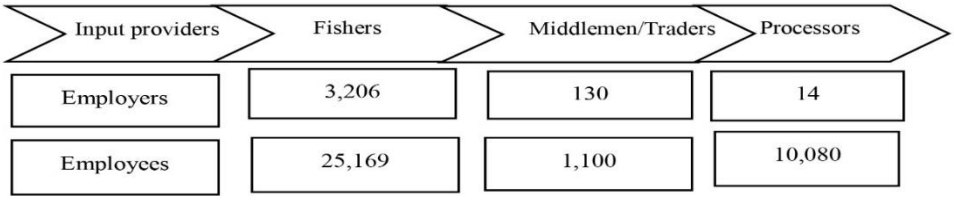


Figure 3-9: Mapping the number of employers and employees in the tuna value chain

Source: (Data, 2018)

4.2.6. Mapping the Value at Different Levels of the Tuna Value Chain

The indicator of value mapping is the price of tuna at each process level. Figure 3-10 describes mapping the value added through the chain obtained by the surveys in 2018. Traders/Middlemen only add small values to the prices of purchased raw tunas, VND 5,000 per kilograms (or 4.5%) for yellowfin and bigeye tunas and VND 3,000 per kilograms (or 10.3%) for skipjack tunas. Meanwhile, processors add much higher values to the prices of processed tunas, VND 241,000 per kilograms (or 209.6%) for yellowfin and bigeye tunas and VND 48,000 per kilograms (or 150.0%) for skipjack tunas.

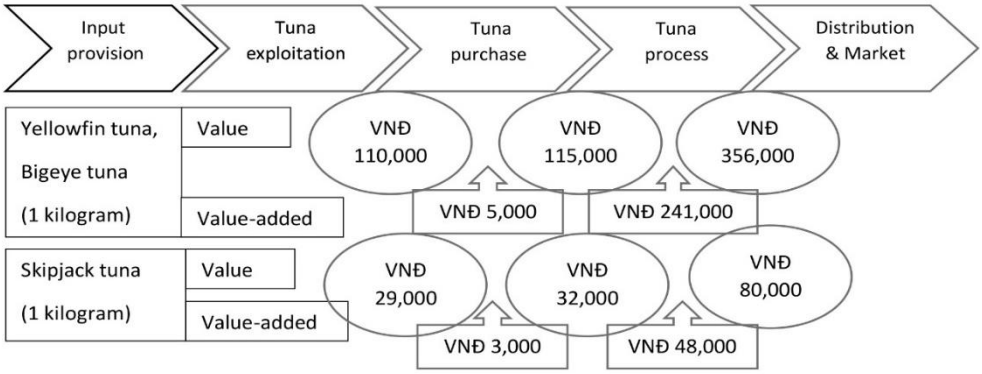


Figure 3-10: Mapping the value added through the tuna value chain

Source: (Data, 2018)

4.2.7. Mapping the Relationships and Linkages between Actors along the Tuna Value Chain

4.2.7.1. Mapping the Relationships between Actors

Figure 3-11 depicts the relationships between actors along the tuna value chain. Fishers/shipowners have a persistent relationship with input providers, which is a regular, long-term exchange relationship without signed contracts. Most fishers individually buy input materials from providers at retail prices, making the input expense increased compared to purchasing collectively at lower prices. Similar to the above relationship, the one between fishers and traders/middlemen is also persistent without sale contracts (i.e., there is no legal biding on commitments on species, price, quality, and quantity of raw tuna). Besides, there is a credit/marketing relationship between fishers and traders/middlemen, i.e., the latter give the former access to capital while the former provide the latter with a certain supply of raw tuna. On the contrary, the relationship between traders/middlemen and processors is persistent yet with sale contracts involving detailed commitments on raw tuna. Similarly, processors and retailers also have persistent relations with sale contracts with wholesalers. Finally, retailers have both of persistent and spot market relations with final customers.

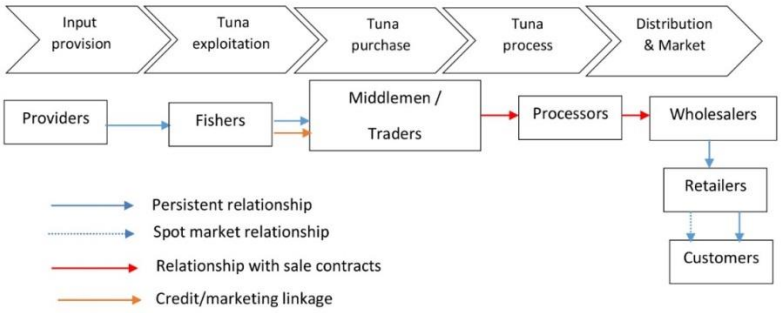


Figure 3-11: Mapping relationships between actors along the tuna value chain

Source: (Data, 2018)

4.2.7.2. Mapping the Linkages between Actors along the Tuna Value Chain

The linkages between actors along the chain can be categorized into vertical and horizontal linkages. Vertical linkages are the relationship between actors along the chain, for example, verbal agreements between fishers and traders/middlemen. On the other hand, horizontal linkages are the relationship between actors at the same level of the chain, for example, shipowners communicate with each other, or processors liaise with each other on the regular basis. In the following descriptions, we focus on fishers since they are of the most interest in this study.

In concern of vertical linkages, three features, including the nature and existed duration of the linkages, and the degree of mutual trust between actors are examined with emphasis on the differences between fishers and other actors. Regarding the linkage nature, most fishers have verbal agreements with input providers and traders/middlemen due to their long-term relationships while other actors have formal written contracts with each other. Mentioning the linkage duration, the relationship between fishers and their partners are rather short, whereas that between other actors are quite long. For example, fifty-five percent of interviewed fishers have the relations with traders/middlemen less than three years while ninety-five percent of middlemen keep the relations with processors from three years to ten years, and even over ten years. In terms of the mutual trust, most fishers have little trust on the other actors whereas the remaining actors have a high trust with other actors. One of the main reasons for explaining the little confidence of fishers is the buying habits of traders/middlemen, e.g. buying raw tuna in whole buckets, manipulating prices and tuna sizes or grades. Consequently, fishers are ready to change their old partners if obtaining more benefits from new ones.

In concern of horizontal linkages, the relationships between fishers can be divided into the one between shipowners and the interrelation of shipowners and their crew members. Regarding the relationship between shipowners, most shipowners are gathered and organized themselves in local fishing groups, each of which comprises from five to ten shipowners, which are usually relatives or neighbours who have close relationships. They support each other in finding fishing grounds, harvesting tuna, and dealing with difficulties and risks when being offshore. Many shipowners in the chain are the members of fisheries organizations such as VINATUNA and local fisheries associations. Mentioning the interrelation of shipowners and their crew members (i.e., captain and cruise workers), shipowners receive sixty percent of total returns while crew members keep the remainder in which captains obtain 1.5 times as much as cruise workers. Thus, cruise workers receive the smallest return among fishers. Based on the average number of on-board workers per vessel presented in Section 4.2.5.2, it can be estimated that the proportion of the total return given to each cruise worker is 6.7%, 2.6%, and 4.0% for longline/handline, purse seine, and gillnet fisheries, respectively.

4.2.8. Governance

The tuna fisheries belongs to the general management of fisheries in Vietnam. The governance of the tuna value chain in Binh Dinh, Phu Yen, and Khanh Hoa provinces

is found to be regulated by both national and local governments. At the national level, D-FISH, under the supervision of the Ministry of Agriculture and Rural Development, issues policies on fisheries management in general and on tuna fisheries management in particular. At the provincial level, the Departments of Agriculture and Rural Development and the DoFIs in the three investigated provinces deploy fisheries management policies to local fisheries stakeholders.

5. Discussions and Conclusion

5.1. Discussions

Many of upgrades or recommendations made in the tuna value chain analysis in the three South Central provinces of Vietnam are targeted to the improvements of Vietnamese tuna fisheries management, and are drawn from collected information about the tuna fisheries which has never been fully documented before, presented as follows:

- The research results show that the awareness level of fishers is still low and scattered. They still stand alone in the chain, and each individual buys input materials such as gasoline, oil, necessities, etc. at retail prices in the markets. Therefore, the production cost is often relatively high, having negative impact on the economic efficiency of each voyage. Thus, our value chain analysis (VCA) recommends that fishers should cooperate with each other to take advantage of purchasing input materials in bulk at cheaper prices;
- Several main reasons lead to the degradation of the quality of raw tuna, and affect fisher's income summarized as follows: (i) fishers use fishing vessels with backward facilities and traditional fishing method; (ii) the duration for one voyage from 20 to 25 days is so long; (iii) some logistics services at fishing ports are not guaranteed such as lack of cold storages, poor quality of icing services, etc. Thus, the VCA suggests the following corresponding measures: (i) upgrading vessel facilities and fishing techniques, and organizing short-term training courses for fishers to improve the handle and preservation of raw tuna; (ii) buiding logistics service fleets to buy raw tuna offshore (in addition to providing logistics services for tuna fishing vessels) to avoid preserving raw tuna on vessels for a long time; (iii) enhancing the quality of logistics services such as ship building and repairing service, icing service, cold storages at fishing ports. These recommendations help improve the handling and maintenance of fish quality in order to meet high demands of export markets, increase the quality and selling price of tuna, reduce post-harvest losses and resource waste, and increase income for fishers.
- Fishers are the most disadvantaged actors in the chain because of the following reasons: (i) fisher is the price taker and receive the smallest return compared to other actors; (ii) traders/middlemen usually buy in buckets, manipulate the size and price of raw tuna at fishing ports, causing significant financial detriment to fishers; (iii) fishers do not have access to public and transparent market information; (UN et al.) fishers lack mutual trust and strong linkage with other actors. Our VCA exhibits that it is necessary to establish a center for tuna auction transactions with the primary functions of determining the exact quantity, quality, size and price of raw tunas as well as

bidding for buying and selling them. The center is expected to regulate the standards on raw tuna and the amplitude of price fluctuation.

- The credit-driven relationship between fishers and middlemen/traders can be considered as both beneficial and exploitative. On the one hand, traders/middlemen provide financial assistance on time for fishers before each sea voyage. On the other hand, this relationship can be exploitative as fishers may be forced to overfish to manage their debt, or it worsens the poverty situation as fishers are price takers and obtain the smallest return in the whole tuna value chain. Buying in buckets and manipulating the size, and price of raw tuna regularly taking place at fishing ports are the consequence of this relationship between fishers and middlemen/traders. Whatever fishers harvest is used primarily to pay off their debts, allowing traders/middlemen to claim the classification and set the buying price of raw tuna. Therefore, savings, credit, and microfinance schemes should be appropriately investigated and developed for fishers.
- Results of the VCA show that the profit sharing scheme between shipowners and their crews is not reasonable as each cruise worker earns the smallest margin among fishers with 6.7%, 2.6%, and 4.0% of the total return for longline/handline, purse seine, and gillnet fisheries, respectively. More importantly, cruise workers do not know explicitly on the harvested volume and the total sale and return of each voyage, and are not satisfied with the lump sum paid by shipowners. The long offshore stay with high working intensity as well as the significantly inferior income compared to shipowners make cruise workers feel unfairly treated. Thus, there should be a mechanism or policy to ensure a fairer share of the profit between cruise workers and shipowners in order to reduce the vulnerability of the former and increase the incentive for properly managing the tuna fisheries in Vietnam.

5.2. Conclusion

This paper presents an analysis on the tuna value chain in the three South Central provinces of Vietnam in 2018. We have investigated how the actors in the chain operate, what happens between the actors, what relates the actors together, what information is shared along the chain, what linkages exist, and how the relationship between actors evolves. Due to the major participation of fishers, who are usually the poor, in the tuna fisheries, this value chain analysis can also be used for the identification of the role and position of the poor in the chain and the potential impact of value chain development on poverty reduction. Based on the analysis, a number of policy implications for tuna fisheries management with the aim to increase the income and improve the position of fishers were proposed, which include (i) the collaboration among fishers to take advantage of purchasing input materials in large quantities at lower prices; (ii) the improvements on the handling and maintenance of tuna quality to increase fishers' income through the upgradation of vessel facilities and fishing techniques, the organization of short-term training courses on fishing and preserving raw tuna for fishers, the establishment of logistics service fleets to buy raw tuna offshore, and the enhancement of the quality of logistics services at fishing ports; (iii) the construction of a tuna auction center to decrease finacial detriment to fishers,

increase fisher's access to public and transparent market information, and strenghen fisher's position and the linkages between fishers and other actors; (iv) the investigation and development of savings, credit, and microfinance schemes to make fishers have acess to a variety of capital sources; (v) the intervention to propose a fair share of profits among shipowners, captains and cruise workers which provides an incentive to properly manage tuna fisheries.

4

CHAPTER 4. MARKET STRUCTURE AND MARKET PERFORMANCE OF TUNA VALUE CHAIN: A CASE STUDY OF YELLOWFIN TUNA AND BIGEYE TUNA VALUE CHAIN IN THREE SOUTH CENTRAL PROVINCES OF VIETNAM

Nguyen Dang Hoang Thu[1,2], Cao Le Quyen[3], Le Thi Minh Hang[4], Nang Thu Tran Thi [5]& Philippe Lebailly[2]

[1] Faculty of Project Management, The University of Danang – University of Science and Technology, Da Nang, Vietnam

[2] Economy and Rural Development Department, Faculty of Gembloux Agro-Bio Tech, Liege University, Gembloux, Belgium

[3] Vietnam Institute of Fisheries Economics and Planning, Ha Noi, Vietnam.

[4] Faculty of Business Administration Management, The University of Danang – University of Economics, Da Nang, Vietnam

[5] Faculty of Fishery, Vietnam National University of Agriculture, Ha Noi, Vietnam.

Correspondence: Nguyen Dang Hoang Thu, Faculty of Project Management, The University of Danang – University of Science and Technology, Da Nang, Vietnam. Tel: 84-905-620-897. E-mail: ndhthu@dut.udn.vn

- Paper accepted for 28 October 2021.
- Paper to be submitted to the International Journal of Economics and Financial Issues.

(Analyzing the economic aspects of the tuna value chain is one of the significant contents of this thesis. Chapter 4 analyzes three key actors' market structures and financial performances in the yellowfin and bigeye tuna value chain in the three South Central provinces in 2018. This study aims to provide an overview of the economic efficiency of the tuna value chain and examine whether the market structure and other critical factors can affect the financial performances of actors. It also points out some causes leading to the economic inefficiency of fishers and suggests some policies to improve their economic efficiency.)

There is a global call for greater attention to integrating social welfare indicators into the value chain analysis of seafood products (UN, 2015), (Holt et al., 2016). It stems from goal 14 of the 2030 agenda (UN, 2015) and FAO's voluntary guidance (FAO, 2015b), focusing on supporting visibility, recognition, and the improvement of of small-scale fishers'roles. Through small-scale fisheries value chain analysis, researchers and managers can better understand the socio-economic issues that small-scale fishers face, especially in developing countries (Kronen et al., 2010), (Allison and Ellis, 2001). Nevertheless, whether the small-scale fisheries value chain is equitable for fishers and what policy interventions are particularly significant, delivering tangible benefits to a large proportion of fishers. These research questions have been answered in several studies on fisheries value chains in recent times (Wamukota et al., 2014), (Bjørndal et al., 2015), (Purcell et al., 2017), (Jueseah et al., 2020).

The general ideas of the studies in the previous paragraph are that they use costs, returns, and distribution of costs and returns techniques to provide an overview of the economic efficiency and distribution of economic benefits between actors in the fishery value chains. The cost is the amount an actor in the value chain contributes, whereas the return is the amount an actor receives after deducting costs. Knowledge of the costs, the returns, and the distribution of actors along the value chain allow researchers to determine each actor's financial performance and economic position in the chain. This knowledge helps conclude whether the actors, particularly the poor, can increase returns in a value chain by making the chain more efficient (decrease costs) and effective (increase value) (M4P, 2008).

Over the past decade, the techniques of costs, returns, and distribution of costs and returns have been widely applied in economic efficiency analysis for fisheries and aquaculture value chains worldwide, and particularly in Vietnam, such as (Abdel-Fattah et al., 2015), (Cao et al., 2018), (Huy, 2018). First, (Abdel-Fattah et al., 2015) assessed the economic performance of the aquaculture feed sectors'value chain in Egypt and identified several critical factors affecting the economic performance of the chain, such as inputs and feed production, fish farmers, financial services, and marketing. Furthermore, (Huy, 2018) analyzed the economic efficiency of the yellowfin and bigeye tuna value chain in the three South Central provinces (Binh Dinh, Phu Yen, and Khanh Hoa) between 2014 and 2015, then determined a few factors impacting the efficiency of the chain, such as equipment and techniques, human resources, financial capacity of actors, and fishing and preservation techniques. Moreover, (Cao et al., 2018) analyzed the economic efficiency of the

skipjack tuna value chain in the Vietnamese central waters in 2017 and identified several factors negatively affecting the economic efficiency of the chain, such as small and scattered production, outdated preservation methods, and monotonous processed skipjack tuna products. In general, the causes of the economic inefficiencies of the fisheries value chains in these studies are the factors increasing the chain costs and decreasing the chain values. Consequently, the researchers proposed solutions to help reduce the costs and increase the chain's value to improve its economic efficiency.

However, the results in chapter 3 showed that fishers are the price receivers, whereas processors decide the purchase price and quantity of raw tuna. In addition, (Mkunda et al., 2019) argued that if the market structure exhibits high inequality in market share distribution among market participants, there is a likelihood that those who control the market affect market prices; therefore, others will be price takers. Thus, the inequality in market share distribution (market structure) may be among the factors constituting the economic inefficiency of the tuna value chain in the three South Central provinces of Vietnam, which has not been fully explained in previous studies. Therefore, in this chapter, our study integrated the SCP (Structure, Conduct, Performance) model into the tuna value chain analysis to investigate the overview of the economic efficiency of the chain and consider critical factors affecting its economic efficiency.

The value chain integrated SCP framework is a promising way to formulate more specific strategic design ideas for a value chain segment in the local area in relation to the economic development of the chain as the center of development discussions (Lazzarini et al., 2001), (Figueirêdo Junior et al., 2014). The extended SCP framework for the fishery value chain in several countries worldwide has been mentioned in the literature, such as (Kimani et al., 2020), (Krishnan and Narayanakumar, 2011), (Mebrate and Worku, 2019), (Polymeros et al., 2010). In Vietnam, (Nguyen and Jolly, 2018) integrated the SCP model to analyze the yellowfin tuna value chain in Khanh Hoa province in 2013, in which actors'financial performances are investigated quantitatively, while the actors'market structures and the firm conducts are examined qualitatively.

In this chapter, cost and return analysis and cost and return distribution methods, introduced in the literature (M4P, 2008), are applied to measure the financial performance of crucial actors along the yellowfin and bigeye tuna value chains in three South Central provinces in 2018. In addition, the Gini coefficient and Lorenz curve are applied to measure the market structure of the actors quantitatively. In addition, market structure and several critical factors, which can reduce the economic efficiency of the chain, are identified. Finally, some policy interventions are suggested to help improve the economic performance of fishers. Compared with previous studies, the different points in our study are analyzing actors' market structures quantitatively and considering seasonality in the financial performances of actors. The major focus of this chapter is to answer the following questions: (1) What are each actor's costs (both fixed and variable costs) in an average month? (2) What are each actor's revenues in the tuna value chain in an average month? In other words, what are each actor's sale volumes and selling prices? (3) What are each actor's gross

margin, gross margin per kilogram, net income, net income per kilogram, marketing margin, marketing margin per kilogram? (4) How are costs, revenues, gross margins, net income, and marketing margins divided between actors in the tuna value chain? (5) How are total costs, total revenues, and total net incomes divided between actors in the chain? (6) What are the underlying causes affecting the economic efficiency of actors in the chain? (7) How to measure the market structures of actors in the chain? (8) What do potential factors affect the financial performance of actors along the tuna value chain? (9) Which are the policy interventions that help to increase the economic efficiency of fishers?

Abstract

A value chain integrated Structure Conduct Performance (SCP) framework applied in agribusiness products in general and fishery products, in particular, is of great significance in conceptualizing the strategy design specifically to a value chain segment in a territory in terms of economic development. This study aims to analyse the market structure and financial performance of each actor in the tuna value chain in three South Central provinces of Vietnam in order to provide an overview of the economic efficiency. Within the study, the interviews have been conducted with 315 respondents, including shipowners, middle-persons, and processors, directly related to the tuna value chain in 2018. The market concentration of each actor was quantitatively indicated in form of the Lorenz curve and Gini coefficient. In addition, actor's financial performance was calculated by costs and earnings models. The study results also showed that the market structure of middle-persons and processors tended to be monopolistic while shipowner's market structure tended to be in perfect competition. Besides, the processors received the highest return compared to other actors due to their highest value-added contribution and the most significant business scale. Finally, several policy interventions were suggested to improve the economic efficiency of the value chain.

1. Introduction

Tuna is one of the most important seafood products in Vietnam. Specifically, the export value of tuna products in 2020 was estimated to obtain approximately 649 million USD, a decrease of nearly three percent year-over-year, which can be explained by the worldwide impact of the COVID-19 pandemic. Despite the decline in 2020, tuna products still contributed the largest turnover to Vietnam's total export value of fishery products (Custom, 2020).

Like other small-scale fisheries globally, Vietnam's tuna fishery plays a significant part in food security, income, and employment through its fishing, trading, and processing activities. Furthermore, its tuna products mainly meet the export market's demands, generate foreign currency revenues and promote socio-economic growth in Vietnam's coastal areas.

On the other hand, Vietnam's tuna fishery remains several limitations, such as low product competition due to the small and fragmented production scale of fishers, poor production efficiency, and unsustainability (D-Fish, 2018b). In addition, the tuna fisher is the most disadvantaged actor in the tuna value chain as he, as a price taker, financially depends on the middle-persons or traders, and completely and openly lacks access to tuna market information. Meanwhile, the processor, who has decided the purchase price and the quantity of tuna raw materials, is the most powerful actor in the tuna value chain (Thu et al., 2020). Thus, it is admitted that some components of the economic inefficiency of Vietnam's tuna value chain seem to exist, which has not been clearly explained in previous studies. Therefore, our study aims to integrate the Structure Conduct Performance (SCP) model in the analysis of the tuna value chain

in the three South Central provinces of Vietnam to examine its economic efficiency as a whole.

The value chain integrated SCP framework is a promising way of conceptualizing more specific strategic design idea for a value chain segment in a territory in terms of the economic development, in which the economic efficiency of the value chain in the local area is at the center of development discussions (Lazzarini et al., 2001), (Figueirêdo Junior et al., 2014). According to (Bain, 1951), (Bain, 1956), the SCP model consists of three main elements: Market structure, market conduct, and market performance. Specifically, market structure denotes market concentration, product differentiation, and barriers to market entry. Meanwhile, market conduct comprises behavioral patterns followed by firms in accepting or regulating the market (Bain, 1968), and market performance is the net result of market conduct, measured by net profit, return on equity, and efficiency in the use of plant, equipment, and other resources (Narver and Savitt, 1971).

An extended SCP framework for the fishery value chain in some countries has been mentioned in the literatures, such as (Kimani et al., 2020), (Krishnan and Narayanakumar, 2011), (Mebrate and Worku, 2019), (Polymeros et al., 2010). First, (Polymeros et al., 2010) empirically examined the key factors affecting market performance in the Greek fishery industry by executing an SCP methodological framework. The results showed that market structure affects firm conduct, and also it is both market structure and firm conduct that directly or indirectly impact market performance. Furthermore, (Krishnan and Narayanakumar, 2011) investigated India's structure, conduct, and performance of the seaweed farming value chain to explore the production, institutional, marketing, social, and community relationships in small-scale seaweed farming. Their findings demonstrated that business leader's marketing, institutional arrangements, commitment, and synergistic production offers considerable savings in transaction costs. Moreover, (Mebrate and Worku, 2019) analyzed the structure, conduct, and performance of the fish market in Ethiopia and pointed that the fish market was oligopolistic, controlled by a few large wholesalers. Finally, (Kimani et al., 2020) empirically analyzed the influence of market structure, actor's conduct, and other factors on market performance in the Kenya fishery value chain. Their study results indicated that structure did not significantly affect actor's conduct, while both structure and conduct affect market performance within only on a few variables.

A value chain SCP framework applied in agribusiness products in general and fishery products, in particular, is a key element in the concept of value chain strategy since existing tools such as Strengths-Weaknesses-Opportunities-Threats (SWOT), Five-forces, and Competitiveness Diamond have not highlighted the connections between interventions and outcomes (Humphrey, 2010), (Vellema, 2010). Using the SCP value chain framework allows development practitioners to make an integrated assessment on structure, conduct, and performance from a value chain perspective, facilitating further interventions as well as stimulating value chain theorists to continue further study on the domain of value chain strategy to generate better strategic alignment to desired outcomes (Figueirêdo Junior et al., 2014).

Referring to research on the Vietnamese tuna value chain, only (Nguyen and Jolly, 2018) investigated the structure, conduct, and performance of the tuna value chain in Khanh Hoa province within a value chain governance framework. This study interviewed 46 key actors operating on the tuna value chain in 2013, in which market structure and firm's conduct were performed qualitatively, while market performance was described quantitatively. The results of this study qualitatively identified actor's operations in an imperfectly competitive market, and intermediaries received the most significant benefit compared to their investment costs. Basing on the results of (Thu et al., 2020), we identified that there seem inequalities in the market share and economic benefits distributed among actors, participating in the tuna value chain in the three South Central provinces. Therefore, this study focuses on analyzing the market structure and financial performance of key economic actors in the value chain to provide an overview of the economic efficiency of the whole tuna value chain, thereby proposing some policy interventions to improve the economic efficiency of the chain, promoting the sustainable development of Vietnam's tuna fishery. In particular, our study aims to:

- Quantitatively measure the market structure of key actors in the tuna value chain;
- Analyze financial performance and financial positions of the actors in the chain;
- Qualitatively assess whether the market structure and other actors affect actor's financial performance;
- Propose recommendations for policy interventions to improve actor's financial performance and contribute to the sustainable development of the tuna fishery.

This paper is the second study, which is the follow-up of the (Thu et al., 2020) research on the outputs of DFCPSFDV Project from 2018 to 2020. The study consists of 5 sections: the introduction, a brief review of the literatures on the extended SCP value chain and the measurement of the market concentration, the method of this study, and the results of the surveys, discussions and conclusions.

2. Literature Review

2.1. Value Chain Analysis

A value chain is a concept of business management, which was first introduced and described by (Porter, 1985). This research suggested that each firm performed its activities throughout the entire process of product design, production, sales, delivery, and after-sales service. These interconnected activities can be defined in terms of a value chain, also known as the narrow value chain approach. Subsequent studies have provided the definition of a value chain in a broad sense, which is defined as encompassing all activities involving a product, from the procurement of raw input materials to the after-sales services for the end customers (Gereffi, 2011), (Kaplinsky and Morris, 2001). The functions of each stage relate to input resources, production, and then product distribution to the next stage in the value chain (Macfadyen, 2012). Furthermore, (M4P, 2008) stated that a value chain consists of strategies, organization and cooperation, and power relationships among economic actors. Last but not least, (Kula et al., 2006) indicated that a value chain encompasses firms and their end

markets, supply and demand levels, business processes, horizontal and vertical links, supporting actors, and a set of global, national, and local government regulations and practices which provide the necessary support as well as further incentives for private sector development.

A fishery value chain includes all interconnected activities from receiving inputs, exploring fish, adding value to raw fishery materials through various marketing functions to the end customers (Adolf et al., 2015), (Nguyen and Jolly, 2018). It consists of main processes such as input provision, exploitation, procurement, processing, and distribution of fishery products to final customers (Silva, 2020), (Thu et al., 2020). Several value chains of important species, such as salmon, shrimp, tilapia, and tuna have been mentioned in the academic literature, such as (Mabe et al., 2016), (Nguyen and Jolly, 2018), (Tran et al., 2013), (Thu et al., 2020), (Ussif RashidSumaila, 2011).

The analysis of value chain is a process of identifying all marketing support activities that add value to its final product and evaluating activities in terms of financial performance, including revenues, costs, and profit (Kaplinsky and Morris, 2001), (Macfadyen, 2012), (USAID, 2006). It is also a diagnostic tool to help actors eliminate unnecessary and wasteful activities to deliver products to customers at the lowest possible cost (Kaplinsky and Morris, 2001). Furthermore, (Bolwig et al., 2010), (Macfadyen, 2012) pointed that the value chain analysis recognizes actions and supports, improving financial performance throughout the value chain by reducing costs and increasing output. Moreover, (Nguyen and Jolly, 2018) stated that the value chain analysis is necessary to understand market structure, relationships between different actors, actor's conduct, and performance, while the underlying principle of the structure-conduct-performance model is the connection between firm's performance and their conducts, which depends on market structure (Figueirêdo Junior et al., 2014). Furthermore, (Thu et al., 2020) used the value chain analysis framework to map the tuna value chain in the three South Central provinces, whereas this study integrated market structure and market performance on analyzing the tuna value chain in the same study area in order to provide the overview of the economic efficiency of the value chain.

2.2. Structure - Conduct - Performance Model

(Bain, 1951), (Bain, 1956), (Mason, 1939) formulated the Structure - Conduct- Per formance (SCP) model, which is a framework for empirical analysis of the effect of market structure on industry performance. The SCP model has three main components, namely market structure, firm conduct, and market performance. It assumes that market structure would determine a firm's conduct to determine market performance (Bain, 1956), (Roth, 2004). Furthermore, (Williams, 1994) stated that the market structure could be changed to improve a firm's conduct and market performance.

(Figueirêdo Junior et al., 2014) indicated that the SCP model is a promising way of conceptualizing strategy design, linking it to structural aspects and performance. This model was initially proposed to explain the firm's market power (Timothy, 1989).

Subsequently, it was used to perceive corporate strategies for firms (McKinsey, 2010). Furthermore, (Barney, 2001) argued that the SCP model is compatible with the resource-based perspective that enables a company to discover valuable resources in terms of industry structure. In addition, (Figueirêdo Junior et al., 2014), (Lazzarini et al., 2001) identified that extending the SCP framework to value chains provides economic development strategies for companies'networks as well as supports actors in a value chain segment in a territory. Moreover, the SCP model is proven to have impact on the efficiency of the value-adding process through assessing the levels of competitiveness, pricing behavior, and economic efficiency (Nguyen and Jolly, 2018).

2.2.1. Market Structure

(Bain, 1956) defined that market structure includes firms's market shares, and every barrier against new entrants, while (Shepherd, 1972) identified that market structure refers to the concentration of sellers or buyers, barriers to entry, and levels of product differentiation in the private sector. Furthermore, (Tung et al., 2010) argued that market structure is a classification system for the main characteristics of a market, including the number of companies in the market, the similarity of products among firms, and the ease of entering and leaving the market. Moreover, (Lipczynski et al., 2013) suggested that market structure includes seller concentration or buyer concentration, degrees of product differentiation, entry/exit barriers market, and market demand growth rate.

Admittedly, there are many different definitions of market structure, (Bain, 1968) argued that market structure includes three main aspects: Market concentration, product differentiation, and barriers to market entry. Market concentration is defined as the number of firms and the size distribution of sellers and buyers (Pomeroy and Trinidad, 1995). The degree of product differentiation, one of the entry barriers, is an essential element of market structure since it strengthens a firm's position and profitability (Pomeroy and Trinidad, 1995). Barriers to market entry are production costs that must be borne by potential entrants but not existing firms in the market, or any advantages that existing firms received in the market. Potential entry barriers are product differentiation and price elasticity, internal and legal factors, economies of scale, capital requirements, and technological factors (Pomeroy and Trinidad, 1995). Besides, (Bain, 1968) stated that the higher the market concentration is, the more barriers to entry are, and the higher the degree of product differentiation shows, the closer the market would be towards a monopoly structure.

When integrating the SCP model to the value chain, market structure represents the environment where sellers and buyers interact at different stages of value chain (Nguyen and Jolly, 2018). It includes characteristics of a market organization that strategically influence the nature of competition and pricing behavior within the market (Harriss, 1993). In addition, market structure affects the levels of profitability and pricing decisions. Some studies such as (Cotterill, 1986), (Hall, 1979), (Marion, 1979) established the relationship between market structure and profitability in the food industry, whereas others, such as, (Cotterill, 1987), (Lamn, 1981) presented the relationship between market structure and price levels. Furthermore, (Molyneux and

Forbes, 1995) argued that market structure depicts the levels of competition existing in different marketing stages and the profits that accumulate to more efficient competitive firms. Last but not least, (Ada-Okungbowa, 1998) stated that market structure could affect the nature of market competition and the process of price formation.

2.2.2. Market Conduct

Market conduct includes behavioral patterns, created by companies, in accepting or adjusting to the markets where they sell or buy products (Bain, 1968). (Moore, 1973), (Purcell, 1973) presented that market conduct refers to the actions and behaviors of firms within a given market structure, for example, pricing policies and non-price inducements practiced by businessmen to attract customers. Meanwhile, (Albert et al., 1999) stated that market conduct involves different decision-making techniques in determining price, output, sales promotion policies, and other tactics to achieve their economic goals. Additionally, (Nguyen and Jolly, 2018) pointed that market conduct implies the competitive nature of actors in the market and some significant aspects of corporate behavior, such as pricing behavior, advertising, research, innovation, development, etc., to maximize their business profits.

Regarding the relationship between market conduct and other factors of the SCP model, (Bain, 1956) argued that market structure and market conduct determine market performance. Additionally, (Bain, 1968) stated that by investigating the relationship between the market structural factors and some pricing practices (market conduct), it is possible to make some predictions on market performance.

2.2.3. Market Performance

Market performance relates to the economic outcomes regarding pricing efficiency and flexibility to comply with changing real-world situations (Bain, 1968). Furthermore, (Narver and Savitt, 1971) stated that market performance is the net result of conduct and is measured in net profits, return on equity, efficiency generated by companies or individuals. Moreover, (Hay and Morris, 1991) argued that market performance is closely related to price levels, profit margins, levels of investments, and reinvestment of profits. Measures of market performance are mentioned in the academic literature such as price, quantity, product quality, resource allocation, production efficiency (Neuberger, 1997), or net returns and marketing margin (Pomeroy and Trinidad, 1995), or production efficiency, distribution and allocation efficiency, product quality, technical progress, and profitability (Pelton et al., 2014), or the rate of return concerning marketing costs and profit margins (Nguyen and Jolly, 2018).

Referring to the relationship between market performance and other factors in the SCP model, (Bain, 1956) argued that market performance is correlated with market structural conditions and firm's conduct in terms of pricing and product policies, and profitability. Meanwhile, (Neuberger, 1997) suggested that this relationship is demonstrated through price, productivity, allocative efficiency, and growth. Additionally, (Kimani et al., 2020) empirically examined the influence of market structure in terms of the value of equipment, actor's conduct in price collusion,

product selection, access to market information, power to determine prices, and how these and other factors affect market performance in terms of profitability. The study found that market structure did not significantly affect actor's conduct, whereas it is market structure and actor's conduct which influenced market performance in some variables.

2.3. Market Concentration

As discussed in Section 2.1, market concentration is one of the three main market structure characteristics (Bain, 1968) and is considered a significant factor in the traditional SCP model (Meschi, 1997). Also, it is the function of the number of firms and their respective shares of total output in a market (Times). Furthermore, (Mohamed et al., 2013) defined a market as a concentration when there are few companies operating in the industry, or an uneven distribution of market shares existing in the private sector.

Concerning the relationship between market concentration and market competition, (Ginevicius and Cirbas, 2007),(Ginevicius and Cirbas, 2007) argued that market concentration is often associated with market competition. The higher the concentration of the market, the higher the degree of monopoly, and the lower the level of competition. On the other hand, low market concentration implies low market power held by leading companies, resulting in a competitive market (Weiss, 1971). Besides, (Pomeroy and Trinidad, 1995) stated that the more concentrated the market, the higher probability of non-competitive behavior, such as collusion in the market. Similarly, (Edwards et al., 2006) argued that market concentration is inversely proportional to competition, as market concentration encourages collusion between actors in the industry.

In terms of the relationship between the degree of market concentration and the factors in the SCP model, firstly, (Pomeroy and Trinidad, 1995) argued that the degree of market concentration plays a significant part in determining a firm's conduct in the industry, as it affects the interdependence of actor's actions. Additionally, (Hass et al., 2016), (Nguyen and Jolly, 2018) identified that market concentration is crucial in determining a company's market power in setting prices and quantity of products. Besides, (Allen, 2005) indicated that firms operating in highly concentrated industries are significantly more profitable than firms operating in less concentrated industries, regardless of efficiency. Thus, it can be said that market concentration is positively related to market performance. Conversely, market concentration will be negatively correlated with customer welfare and the number of firms in the market (Brock, 2009) , (Shepherd, 1972).

Measuring or quantifying market concentration is one of the main issues related to market concentration. There are two groups of measures, namely discrete and cumulative ones, to quantify market concentration. The discrete concentration measurement explains only for a limited number of attribute carriers and does not consider market changes and other factors. In contrast, the cumulative concentration measurement account for all values of attribute carriers and cannot adequately describe the situation in the market (Ginevicius and Cirbas, 2007).

The best known and most used discrete concentration measurement is the concentration index, the total percentage of the market shares of the largest companies in an industry (Rao, 1969). This index is an easy-to-use and a popular measurement, despite some drawbacks. Firstly, it shows only one point of the concentration curve, and thus does not explain the size distribution of firms in the market. Secondly, its accuracy largely depends on how the most significant number of firms in the market is chosen, which is difficult to be defined precisely for each type of market in the actual situation (Ginevicius and Cirbas, 2007).

For measuring cumulative market concentration, six popular measures are presented in the (Ukav, 2017) literature, including the Herfindahl index, Lorenz curve, Gini index, Horwath index, Entropy index, and Rosenbluth index. Lorenz curve and Gini index were commonly used in analyzing fisheries market concentration in many studies such as (Drury O'Neill et al., 2018), (Hass et al., 2016), (Oparinde and Oluwadare Ojo, 2014), (Wamukota et al., 2014). In our study, the Lorenz curve and the Gini index were used to measure the market concentration of the yellowfin and bigeye tuna value chain in the three South Central provinces of Vietnam.

3. Methodology

3.1. Study Sites

This study was conducted in three South Central provinces of Binh Dinh, Phu Yen, and Khanh Hoa in Vietnam (Figure 4-1), which yielded the highest oceanic tuna catches and had the largest tuna fishing vessels compared to other provinces. In 2018, Binh Dinh had the largest tuna catches in Vietnam with 52,823 tons, of which 10,050 tons of yellowfin tuna and bigeye tuna and 42,773 tons of skipjack tuna. Khanh Hoa occupied the second position with 19,103 tons, of which 3,203 tons of yellowfin tuna and bigeye tuna and 15,900 tons of skipjack tuna, followed by Phu Yen with 8,616 tons, of which 3,829 tons of yellowfin tuna and bigeye tuna and 4,787 tons of skipjack tuna.

Skipjack tuna is caught by purse seine and gillnet fisheries, taking place all year-round, while yellowfin and bigeye tunas are caught by longline/handline fisheries, mainly operating during the primary-fishing season from November to May. During this time, the tuna usually has the best quality, and the volume of tuna catches is also the largest of the year. Meanwhile, from June to October, the rest of the year is the secondary fishing season with low productivity.

Regarding the number of tuna fishing vessels, Binh Dinh had the highest number with 2,010 ships, in which 1,425 ships for longline/handline fishery, while Phu Yen came behind the second position with 657 ships, in which 502 ships were contributed to longline/handline fishery. Khanh Hoa kept the third position with 539 ships, in which 348 ships were allocated for longline/handline fishery (D-Fish, 2018b).

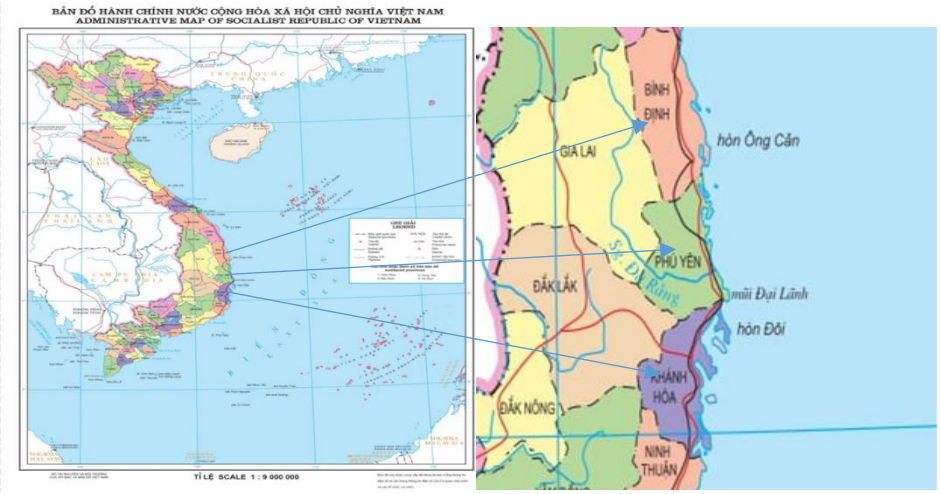


Figure 4-1: A map of three provinces of Binh Dinh, Phu Yen, Khanh Hoa showing study sites

(TheNationalOffice, 2017)

For tuna purchase and tuna process and export in the three South Central provinces, most of the tuna output is sold through purchasing actors (middle-persons and traders), then sold to processing companies. This is shown in the detailed tuna value chain description in the three South Central provinces of Vietnam in the (Thu et al., 2020) literature. In 2018, there were thirty-six tuna purchasing establishments and fifteen tuna processing companies in the study area. Table 4-1 shows the number of tuna fishing vessels, tuna purchasing establishments, and tuna processing enterprises in Vietnam's three South Central provinces in 2018.

Table 4-1: The number of tuna fishing vessels, tuna purchasing establishments, and tuna processing enterprises in three South Central provinces of Vietnam in 2018.

Study Area	Number of vessels			Purchasing agent			Processing company		
	Bigeye, Yellow-fin tunas	Skip-jack tuna	Total	Bigeye, Yellow-fin tunas	Skip-jack tuna	Total	Bigeye, Yellow-fin tunas	Skip-jack tuna	Total
Binh Dinh	1,425	585	2,010	8	9	17	1	0	1
Phu Yen	502	155	657	6	3	9	5	1	6
Khanh Hoa	348	191	539	5	5	10	8	0	8
Total	2,275	931	3,206	19	17	36	14	1	15

Source: (D-Fish, 2018a)

In terms of infrastructure and logistics services serving tuna fisheries in the research area, Binh Dinh has three fishing ports: Quy Nhon, De Gi, and Tam Quan ports. Phu

Yen has three fishing ports: Tien Chau, Phu Lac, and Dong Tac ports, while Khanh Hoa has two main fishing ports: Hon Ro and Da Bac ports. In 2018, the infrastructure at the fishing ports has been specifically invested, with the rennovated fishing ports (roof system, wastewater treatment system). However, this investment has not met the requirements for the sustainable development of tuna fisheries. For example, there remain no logistics services and specialized fishing berths for the tuna industry, and no freezers at the fishing ports are available for preserving tuna products. In addition, some fishing ports had purchasing activities that fail to meet hygiene conditions. Furthermore, shipbuilding and repairing services were fragmented and small-scale and there was a shortage of technological and material facilities. Moreover, ice plants had low capacity and poor ice quality due to outdated ice production machinery technology (D-Fish, 2018b).

3.2. Study Phases and Study Scope

3.2.1. Study Phase

This study was conducted in four phases: Interview surveys, focus group discussion, key informant interviews, and validation workshop presented in details of the (Thu et al., 2020) study. Quantitative data in this study was mainly obtained from the interview surveys from March to June 2018. The contents of the semi-structured questionnaires on the economics of the tuna fishing, purchasing, and processing activities of actors along the tuna value chain in an average month in the last year (2017) were required. Data on volume, revenues, price, variable costs, fixed costs of every actor in an average month allowed us to construct Lorenz curves, Gini coefficients, and costs and margins models for each actor along the chain. The open-ended questions in the interview surveys, focus group discussion, key informant interviews, and validation workshop helped to collect qualitative information, especially the main factors affecting the financial performance of actors as well as some possible solutions to improve the performance of actors along the chain.

3.2.2. Study Scope

Out of 435 respondents in the interview surveys of the (Thu et al., 2020) research, 315 persons were directly related to the yellowfin tuna and bigeye tuna value chain, the remaining respondents were associated with the skipjack tuna value chain. To ensure higher reliability for the analysis of the market structure and market performance of actors along the chain, the yellowfin tuna and bigeye tuna value chain was chosen as a case study. Therefore, the scope of the study was limited in studying the market structure and financial performance of actors in the yellowfin tuna and bigeye tuna value chain in three South Central provinces of Binh Dinh, Phu Yen, and Khanh Hoa at the survey time in 2018. Four different distribution channels of the yellowfin and bigeye tuna value chain which have existed in these provinces, were mentioned in the (Thu et al., 2020) literature. In this study, we mainly focused on the second distribution channel, which includes fishers, middle-persons, processors, and export markets because sixty-six percent total volume of yellowfin tuna and bigeye tuna was traded on this channel in 2018 (Thu et al., 2020).

The market structure and financial performance of actors were analyzed in this study, focusing on analyzing the market concentration of each actor by determining its Lorenz curve and Gini coefficient, and evaluating the market performance of each actor in the chain. Through the value chain analysis process, we qualitatively assessed whether the market structure and other factors can affect the financial performance of each actor in the chain.

All data on the market structure and financial performance collected and presented in this paper are monthly averages and pertained to the survey time in 2018. These recall data indicated economic transactions of actors in the tuna value chain last year (2017). Also, the data for each link in the chain for three provinces covered by the study are averages and hide the individual characteristics. Table 4-2 summarizes the number of individual questionnaires and focus group discussions completed in each of the three provinces, and the number of participants involved in the key informant interviews and validation workshop.

Table 4-2: Sample frame used during the study

Study Area	Shipowners	Middlemen	Processors	Representatives related to the tuna value chain
Binh Dinh	121 questionnaires 1 FGD with 12	Eight questionnaires	One questionnaire	• 1 D-Fish's member, 3 DoFIs's members, 1 VINATUNA's member, 1 VASEP's member, 1 VIFEP's member for the KIIs; • 20 tuna value chain players (shipowners, middle-persons, processors), 5 D-Fish's members, 5 DoFIs's members for a validation workshop
Phu Yen	77 questionnaires	Four questionnaires 1 FGD with 5	One questionnaire	
Khanh Hoa	98 questionnaires	Three questionnaires	Two questionnaires 1 FGD with 3	
Total	296 questionnaires	15 questionnaires	Four questionnaires	

3.3. Data Collection

The data collected during the study, allowed us to estimate the number of critical indicators for each actor in the tuna value chain. For shipowners, the indicators were calculated both separately for each province by taking averages of respondent's values in each province and on the entire sample frame. For middle-persons and processors, the indicators were only calculated on the total sample in the three provinces since the number of respondents in each province was tiny. An interesting point in this study, we assumed that revenues and costs made by the shipowners during a sea trip were

monthly revenues and monthly costs. Meanwhile, monthly revenues and monthly costs made by the middle-persons and processors were in an average month.

We used the average monthly revenue made by each actor to demonstrate the Lorenz curve and calculate the Gini coefficient for each actor in the chain in order to measure market concentration. The sale volume and the selling price for one kilogram of yellowfin tuna and bigeye tuna during the peak and off seasons are significantly different. As a result, the average monthly revenue of each actor was calculated by averaging the average monthly revenues during the primary and secondary harvesting seasons.

The financial indicators which were calculated for each actor, based on the (M4P, 2008) literature, include gross margin, gross margin per kilogram of yellowfin and bigeye tunas, net income, net income per kilogram of yellowfin and bigeye tunas, marketing margin, and marketing margin per kilogram of yellowfin and bigeye tunas. The calculation on these indicators was made possible with the detailed questions in the semi-structured questionnaires, which provided the data on sales volumes, price, variable and fixed costs and allowed to construct costs and earnings models for each actor.

Variable costs change according to the amount of tuna caught/traded/produced (M4P, 2008). These costs are expenses incurred during a sea voyage for tuna fishers, including fuel, ice, bait, food, necessary necessities, and the labour cost (wages paid for labors). For tuna purchasing businesses, variable costs are typically related to the costs of purchasing raw tuna, the labour cost (loading and unloading costs and indirect labour), fish hygiene, and ice costs. Meanwhile, variable costs typically include the costs of purchasing raw tuna and the labour cost (wages paid for tuna processing workers for tuna processing enterprises and indirect labour).

Fixed costs do not vary according to the amount of tuna caught/traded/produced (M4P, 2008). These costs typically include monthly taxes/fees, financial expenses (monthly principal and interest), repair and maintenance costs, depreciation expenses, and other expenses for tuna fishers. Meanwhile, fixed costs are typically associated to salaries paid to tuna purchasing staff, financial costs, monthly taxes, depreciation expenses, and other expenses for tuna purchasing businesses. For tuna processing enterprises, the fixed costs include packaging costs, repair and maintenance costs, financial costs, chemical costs, microbiological costs, electricity costs, water costs, environmental costs, selling expenses, taxes, depreciation expenses, and other expenses.

For shipowners, average operational costs incurred during an average sea trip in 2017 were assumed as average monthly operational costs. These costs were entirely recall data without any records. By contrast, monthly operational costs incurred in tuna purchasing and processing enterprises were based on accounting records.

3.4. Data Analysis

Descriptive statistics such as frequency and percentage were used to analyze the socio-economic characteristics of key actors, including shipowners, middle-persons, and processors. Lorenz curves and Gini coefficients were applied to measure the

market concentration for each actor in the chain. Also, financial performance indicators based on the (M4P, 2008) literature were calculated to analyze the economic efficiency of each actor in the chain.

3.4.1. Market Structure

In this study, market concentration is measured to get a thorough look at the market structure of each actor in the chain. An understanding of the market structure can provide an aid in formulating appropriate development strategies based on a deep grap of the actual market. Based on previous studies such as (Bila and Bulama, 2005); (Ndaghu et al., 2011); (Taru and Lawal, 2011); (Oparinde and Oluwadare Ojo, 2014) ; (Mkunda et al., 2019), the Lorenz curve and Gini coefficient were used to measure the market concentration of each actor in the chain.

3.4.1.1. Lorenz Curve

Lorenz Curve, which was developed by Lorenz in 1905, is used to give an intuitive nature of the market concentration of each actor through a graphical representation. It represents the cumulative percentage of monthly revenues in relation to the cumulative percentage of the whole population. If all individuals have the same monthly revenues, the Lorenz Curve lies in the 45-degree line, the perfect equality line, or the egalitarian line. If there is an inequality in monthly revenues, the Lorenz Curve is below the 45-degree line.

Lorenz Curve for each actor in the tuna value chain was constructed on the basis of guidelines of (FAO, 2005). Firstly, monthly revenue distribution in each actor was sorted from the smallest value to the largest value. Next, the proportion of monthly revenue owned by each individual and the ratio of each individual to the total population were defined. In the third step, the cumulative proportion of revenue and the cumulative proportion of the population were calculated. Then, the equidistributed line, representing the cumulative proportion of revenue equal to the cumulative proportion of the population, was plotted. Finally, the Lorenz Curve, which is always below the equidistribution line, was plotted to represent the cumulative proportion of revenue against the cumulative proportion of the population.

3.4.1.2. Gini Index

The Gini coefficient, developed by Gini in 1912, and it was used to determine market concentration through the Lorenz curve. It measures the ratio of the area between the Lorenz curve and the equidistribution line (which is called the concentration area) to the maximum concentration area (FAO, 2006). It is expressed by the following formula:

$$G = \frac{A}{(A+B)} (1)$$

Where: G = Gini coefficient; A= Area that lies between the line of equality and the Lorenz curve; A+B = Total area under the line of equality.

Based on the (Bila and Bulama, 2005); (FAO, 2006); (Ndaghu et al., 2011) literatures, the Gini coefficient was determined according to the following formula:

$$G = 1 - \sum X * Y \quad (2)$$

Where G = Gini coefficient; X = proportion of population; Y = cumulative proportion of monthly revenue.

The Gini coefficient for each actor in the chain was also determined on the basis of guidelines of (FAO, 2006). The Gini coefficient ranges from zero to one. A perfect equality in concentration (low) of actors is expected if G tends towards zero, while perfect inequality in concentration (high) of actors is expected if G tends toward one. If G =1, the market is imperfect, and G = 0, the market is perfect and competitive.

3.4.2. Market Performance

3.4.2.1. Actor's Operational and Financial Performance

Based on the (M4P, 2008) literature, financial performance indicators of each actor in the chain was calculated. These indicators were defined as follows:

- Gross margin = Revenues - Variable Costs (3)
- Gross margin per kilogram = (Gross margin)/(Volume of tuna) (4)
- Net income = Revenues-Variable Costs- fixed costs (5)
- Net income per kilogram = (Net income)/(volume of tuna) (6)
- Marketing margin = Revenues-Purchase cost (7)
- Marketing margin per kilogram = (Marketing margin)/(Volume of tuna) (8)

3.4.2.2. Relative financial position of actors in the value chain

In this step, the breakdown of costs, revenues, gross margins, net incomes, and marketing margins among the actors in the chain were taken into consideration. The comparison method, proposed in Tool 6 of the (M4P, 2008) was used to compare the financial performance indicators of actors both at per unit and at total monthly sale volumes. With these results, the conclusions about the financial position of each actor in the chain was withdrawn.

4. Results

4.1. The Yellowfin Tuna and Bigeye Tuna Value Chain

As detailed in Figure 3-8, yellowfin and bigeye tunas were caught by longline/handline fisheries in the South Central Coast of Vietnam. After catching the tunas, fishers stored them in cold basements in their tuna ships. After the duration of the sea trip, averaging from twenty to twenty-five days, tuna ships landed at the fishing port; tunas were sold to middle-persons and then sold and transported to processors by cold trucks. At processing plants, raw yellowfin tuna and bigeye tuna were stored and processed into finished tuna products such as tuna loin/CO, tuna Cube/CO, tuna Saku/CO, tuna Steak/CO. These tuna products were mainly exported to foreign markets such as the US, EU, Japan, China, and other countries, while by-products of the tuna processing process were sold to the domestic market. Although there were many different actors in the chain, due to time and money limitations, only three main actors including shipowners, middle-persons, and processors were interviewed and analyzed in the study.

4.1.1. Shipowners

296 shipowners catching yellowfin tuna and bigeye tuna in three South Central provinces in 2018 were randomly chosen for the interview. The survey results showed that all shipowners were men, who were in middle-age with an average of 46 ± 11 years old, which have accumulated enough experience and capital to manage tuna fishing operations. However, the age of these shipowners is relatively old, and there is minimal young workforce following this career because these workers tend to study and stay in the big cities in Vietnam. Most of them were married, accounting for ninety-two percent of total respondents. They were also the head of the family and were primarily responsible for the family budget. In addition, each shipowner's household was an extended family from six to seven persons. The majority of the shipowners had a low educational level, with ninety-three percent of total respondents completing primary and secondary education. Therefore, it is difficult for them to quickly access science and new technology in catching and preserving tuna raw materials. Eighty-nine percent of total respondents have eleven years to over thirty years experience of fishing, which allowed them to actively participate in tuna fishing, promptly deal with extreme weather on offshore, and transfer their experience to other fishers. Table 4-3 summarizes the socio-economic characteristics of 296 shipowners exploiting yellowfin and bigeye tuna in the three South Central provinces in 2018.

The survey results in 2018 showed that most oceanic tuna ships were made of wood, from 15 to 24 meters in length, and four fishing rods. Each tuna ship had an average of six to seven persons, including the shipowners and crew members. Most fishers used traditional methods to catch yellowfin tuna and bigeye tuna, and then preserved tuna raw materials in the cold basements made of styrofoam, which were not guaranteed for keeping cold. After docking, tunas were sold to middle-persons at the fishing ports, where fresh tunas were classified into three grades, namely first-grade tuna (average weight of 30 kilograms or more), second-grade tuna (average weight of 20 - 30 kilograms), and third-grade tuna (average weight lower than 20 kilograms). Based on this classification, the quality control staff of the processing plant will evaluate the tuna meat quality accordingly. If tunas met the weight and meat quality required by the plant, they would be purchased at the set price; otherwise, they will get a lower price. The assessment of tuna quality, which was utterly dependent on the judgment of the processors, often were often disappointing to fishers. In addition, the tuna trading business between shipowners and middle-persons is based on the credit relationship in which shipowners get loans from middle-persons before a sea voyage and sell the caught tunas to these lenders afterward, which is one of the main reasons for the weak negotiating power of shipowners in tuna transactions (Thu et al., 2020).

In general, the number of shipowners fishing for yellowfin and bigeye tunas was relatively large. The majority of shipowners owned one tuna ship, while only few shipowners owned two. Shipowners encountered numerous disadvantages, namely: (i) They had a weak price negotiation and were always price takers; (ii) They lacked information on the tuna market; (iii) They were completely dependent on the judgment of the processors on their tuna products; (iv) They were at high risk because there was no sale contract between the shipowners and middle-persons; (v) They did not have

substantial financial resources and thus depended on middle-person financing, making it a challenge to change the better tuna buyers.

4.1.2. Middle-persons

15 middle-persons, including directors of yellowfin and bigeye tuna purchasing establishments in the three South Central provinces in 2018 were interviewed. Among the respondents, eighty percent were men, and twenty percent were women. The average age of middle-persons was forty-nine years old, and they all had sufficient experience, capital, and relationships to manage their tuna purchasing companies. Similar to ship-owners, the age of the middle-persons is relatively old, which is a common feature of workers in the fishery sector as it does not attract many young workers to participate in this sector. All interviewed middle-persons were married and both husbands and wives were all involved in the management of tuna purchasing companies. Most of the husbands were the managers in charge of dealing with processors and banks, whereas their wives were responsible for managing tuna purchasing at fishing ports and working with shipowners. Most middle-persons had a medium family with six to seven persons. They had a better education level than shipowners (seventy-three percent of middle-persons had education levels from secondary school or higher). Most middle-persons had eleven years or more experience of purchasing tuna. In addition, they lived in the tuna fishing communities and understood fishers; thus, they could purchase a large amount of raw tuna at reasonable prices. According to respondents, there were three business scale types: Small, medium, and big companies. A large tuna purchasing company was a large-capital enterprise that financed from one-hundred-fifty to three hundred ships. A medium tuna purchasing company was an enterprise that financed between fifty and seventy ships, while a small tuna purchasing company financed from twenty to thirty ships. Among fifteen middle-persons interviewed, five were directors of large tuna purchasing companies and ten were directors of medium-sized enterprises. Table 4-4 presented the socio-economic characteristics of middle-persons in the study in 2018.

The survey results showed that most middle-persons had two prominent roles: Providing loans, oil, and ice for tuna ships before a sea trip and buying tunas from shipowners to sell to processors. Most tuna purchasing companies acted as purchasing agents of the processors through contracts. They undertook tuna procurement from shipowners according to the tuna volume and price requirements of processors, and received commission from the processors. These middle-persons accessed tuna market information regularly and had good long-term relationships with the processor (Thu et al., 2020).

Table 4-3: Socio-economic characteristics of shipowners in sampled three South Central Provinces of Vietnam

Variables	Categories	Binh Dinh		Phu Yen		Khanh Hoa		Average Three South Central Provinces	
		Frequency	(%)	Frequency	(%)	Frequency	(%)	Frequency	(%)
Sex	Male	121	100	77	100	98	100	296	100
	Female	0	0	0	0	0	0	0	0
Age	≤ 30	17	14	11	14	0	0	28	9
	31-40	31	26	23	30	24	24	78	26
	41-50	28	23	16	21	29	30	73	25
	51-60	40	33	22	29	28	29	90	31
	>60	5	4	7	9	17	17	29	9
Mean ± SD		44±9.63		45±11.18		49± 10.77		46.03±10.62	
Marital status	Single	4	3	3	4	3	3	10	3
	Married	112	93	69	90	90	92	271	92
	Divorced	0	0	0	0	0	0	0	0
	Widowed	5	4	5	6	5	5	15	5
Household size	≤ 5	50	41	30	39	40	41	120	41
	6-10	71	59	47	61	58	59	176	59
	> 10	0	0	0	0	0	0	0	0
Mean ± SD		6±2		7±3		6±2		6.5±2	
Position									
	Shipowner	121	100	77	100	98	100	296	100
	Captain	0	0	0	0	0	0	0	0
	Other	0	0	0	0	0	0	0	0
Educational level									
	Illiteracy	0	0	0	0	0	0	0	0
	Primary	59	49	37	48	49	50	145	49
	Secondary	49	40	36	47	44	45	129	44
	High school	13	11	4	5	5	5	22	7
	College/University	0	0	0	0	0	0	0	0
Tuna fishing experience									
	≤ 10	16	13	8	10	11	11	35	11
	11-20	93	77	53	69	61	62	207	70
	21-30	12	10	15	20	26	27	53	18
	>30	0	0	1	1	0	0	1	1
Mean ± SD		15.8± 5.6		17.22±5.93		18.58±5.92		17.07±5.91	

Source: (Primary Processed Data, 2018)

Table 4-4: Socio-economic characteristics of middlemen in sampled three South Central Provinces of Vietnam

	Categories	Three South Central provinces in Vietnam	
		Frequency	(%)
Sex	Male	12	80
	Female	3	20
Age	30-40	1	7
	40-50	9	60
	50-60	5	20
Mean ± SD		48.9±5.84	
Marital status	Single	0	0
	Married	15	100
	Divorced	0	0
	Widowed	0	0
Household size	≤ 5	3	20
	6-10	12	80
	> 10	0	0
Mean ± SD		6±2	
Position			
	Director	15	100
	Manager	0	0
	Other	0	0
Educational level			
	Illiteracy	0	0
	Primary	3	20
	Secondary	6	40
	High school	4	27
	College/University	2	13
Tuna purchasing experience			
	≤ 10	0	0
	11-20	9	60
	21-30	5	33
	>30	1	7
Mean ± SD		20±6.22	
The operational scale of tuna purchasing companies			
	Large (finance for 150-300 tuna vessels)	5	33
	Medium (finance for 50-70 tuna vessels)	10	67
	Small (finance for 15 - 30 tuna vessels)	0	0

Source: (Primary Processed Data, 2018)

4.1.3. Processors

Directors of four tuna processing and exporting companies in three South Central provinces of Vietnam in 2018, including one company in Binh Dinh, one company in Phu Yen, and two companies in Khanh Hoa, were interviewed individually. These companies are the leading tuna processing and exporting enterprises in Vietnam, with the number of employees from 300 to 600 people, production capacity from 5000 tons to 15000 tons per year. The survey results showed that there was an equal percentage of processors as men and women. Meanwhile, according to secondary data from the three surveyed provinces, there were eight male owners of tuna processing companies (sixty percent processors) and six female owners (forty percent) in the study area in 2018. The respondents were forty-nine years old on average, and they have gained sufficient education, experience, capital, and relationships to manage tuna processing and exporting activities in their companies. All respondents were married and had a medium family with five to six persons per household. They also graduated from universities, enabling them to quickly acquire advanced tuna processing knowledge. Most respondents had experience in processing and exporting tuna from eleven years to thirty years. In general, processors were the main actors creating much-added value in the tuna value chain. Due to high negotiating power, they determined the purchase price and volume, and were the most influential actors (Thu et al., 2020). Table 4-5 summarizes the socio-economic characteristics of processors interviewed in the three South Central provinces.

Table 4-5: Socio-economic characteristics of processors in sampled three South Central Provinces of Vietnam

Variables	Categories	Three South Central provinces in Vietnam	
		Frequency	(%)
Sex	Male	2	50
	Female	2	50
Age	40-50	2	50
	50-60	2	50
Mean ± SD		48.8±4.79	
Marital status	Single	0	0
	Married	4	100
	Divorced	0	0
	Widowed	0	0
Household size	≤ 5	2	50
	6-10	2	50
	> 10	0	0
Mean ± SD		5±2	
Position			
	Director	4	100
	Manager	0	0
	Other		
Educational level			
	Illiteracy	0	0
	Primary	0	0
	Secondary	0	0
	High school	0	0
	College/University	4	100
Tuna processing experience			
	≤ 10	0	0
	11-20	3	75
	21-30	1	25
	>30	0	0
Mean ± SD		17.75± 3.4	

Source: (Primary Processed Data, 2018)

4.2. Market Structure through the Tuna Value Chain

4.2.1. Shipowners

Table 4-6 shows that the Gini coefficient was calculated in 296 shipowners in three South Central provinces in 2018. The majority of shipowners (48.31%) had total monthly revenues ranging from VND 150,001,000 to VND 200,000,000. The value of the Gini coefficient computed was 0.37, which tends to approach zero. It implies

that there was an equality in the market share of shipowners in the study area. It also means that most shipowners had average monthly revenue in the same range, and their market shares are relatively equal. This result was further reinforced by the Lorenz curve, which showed relatively equality in market shares among shipowners (Figure 4-2), with 67% of the shipowners accounting for about 74% of monthly revenues. This Lorenz curve is close to the 45^0 line, implying an equilibrium in shipowner's market shares.

Table 4-6: Estimate of Gini coefficients for shipowners in sampled three South Central Provinces of Vietnam

Unit: VND 1,000

Class of shipowners according to monthly revenue	Number of shipowners	Proportion of shipowners (X)	Cumulative proportion of shipowners	Total value of monthly revenues	Proportion of total revenues	Cumulative proportion of total revenue (Y)	X*Y
0	0	0	0	0	0	0	0
0-100,000	1	0.34%	0.34%	95,444	0.18%	0.18%	0.00001
100,001-150,000	74	25.00%	25.34%	9,863,553	19.06%	19.24%	0.04811
150,001-200,000	143	48.31%	73.65%	24,634,724	47.61%	66.86%	0.32300
200,001-250,000	74	25.00%	98.65%	16,085,579	31.09%	97.95%	0.24488
250,001-300,000	4	1.35%	100.00%	1,058,090	2.05%	100.00%	0.01351
Total	296	100%		51,737,389	100.00%		0.62951

Gini index	**0.37049**
Mean value of revenue	**174,788**

Source: Computed from the field survey data, 2018

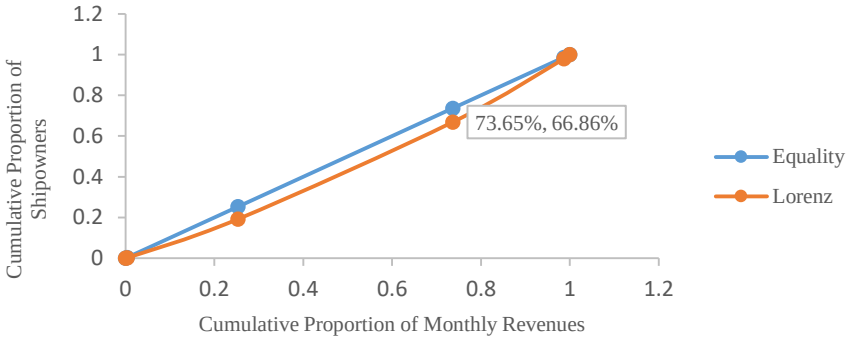


Figure 4-2: Lorenz curve of shipowners

4.2.2.Middle-persons

Table 4-7 describes the estimate of Gini coefficient for 15 middle-persons in the study area in 2018. Most middle-persons (66.67%) had total monthly revenues between VND 9,500,000 and VND 19,500,000,000. The value of the Gini coefficient was 0.51, indicating an inequality in the market share of middle-persons in the study area. It means that the tuna market for middle-persons is concentrated, but only few control the majority of the market share. The Lorenz curve (Figure 4-3) indicated a high inequality in market shares with 69% of the middle-persons accounting for about 87% of monthly revenues. This curve is far from the 45^0 line, implying a high inequality in the middle person's market shares.

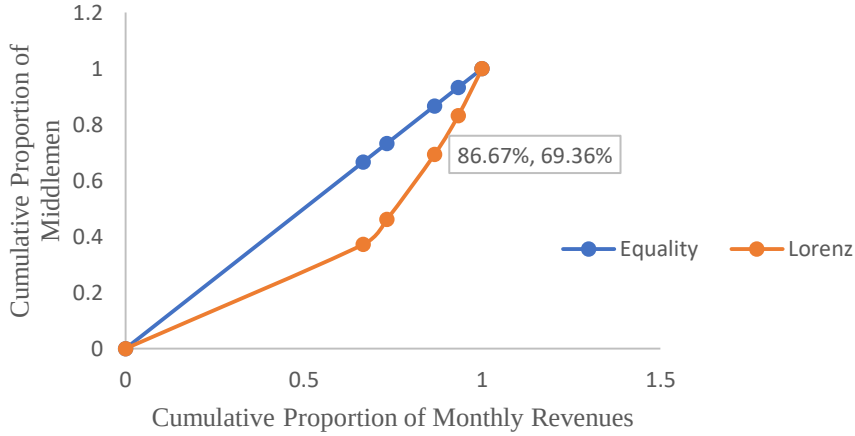


Figure 4-3: Lorenz curve of middlemen

Table 4-7: Estimate of Gini coefficients for middlemen in sampled three South Central Provinces of Vietnam

Unit : VND 1000

Class of middlemen according to monthly revenue	Number of middlemen	Proportion of middlemen (X)	Cumulative proportion of middlemen	Total value of monthly revenues	Proportion of total revenues	Cumulative proportion of total revenue (Y)	X*Y
0	0	0	0	0	0	0	0
9,500,000-19,500,000	10	66.67%	66.67%	121,874,250	37.23%	37.23%	0.24820
19,500,001-29,500,000	1	6.67%	73.34%	29,452,500	9.00%	46.23%	0.03082
29,500,001-39,500,000	2	13.33%	86.67%	75,740,000	23.13%	69.36%	0.09248
39,500,001-49,500,000	1	6.67%	93.34%	45,600,000	13.93%	83.29%	0.05553
49,500,001-59,500,000	1	6.67%	100.00%	54,720,000	16.71%	100.00%	0.06667
Total	15	100.00%		327,386,750	100.00%		0.49369

Gini index	**0.50631**
Mean value of revenue	**21,825,783**

Source: Computed from the field survey data, 2018

4.2.3. Processors

Table 4-8 shows the Gini coefficient computed data on four processors in the study area in 2018. The Gini coefficient value was 0.44, indicating that there is partial inequality in the tuna market for the processors. The Lorenz curve (Figure 4-4) indicates that 75% of the monthly revenues were accounted by 65% of the processors. It means that there is an inequality in the processor's market shares.

Table 4-8: Estimate of Gini coefficients for processors in the three South Central Provinces of Vietnam

Unit: VND 1000

Monthly revenue	Number of processors	Proportion of processors (X)	Cumulative proportion of processors	Total value of monthly revenues	Proportion of total revenues	Cumulative proportion of total revenues (Y)	X*Y
0	0	0	0	0	0	0	0
25,220,650	1	25.00%	25.00%	25,220,650	18.67%	18.67%	0.04668
28,588,320	1	25.00%	50.00%	28,588,320	21.16%	39.83%	0.09958
34,500,000	1	25.00%	75.00%	34,500,000	25.54%	65.37%	0.16342
46,793,900	1	25.00%	100.00%	46,793,900	34.64%	100.00%	0.25001
Total	4	100.00%		135,102,870	100.00%		0.55967
				Gini index			**0.44033**
				Mean value of revenue			**33,775,717**

Source: Computed from the field survey data, 2018

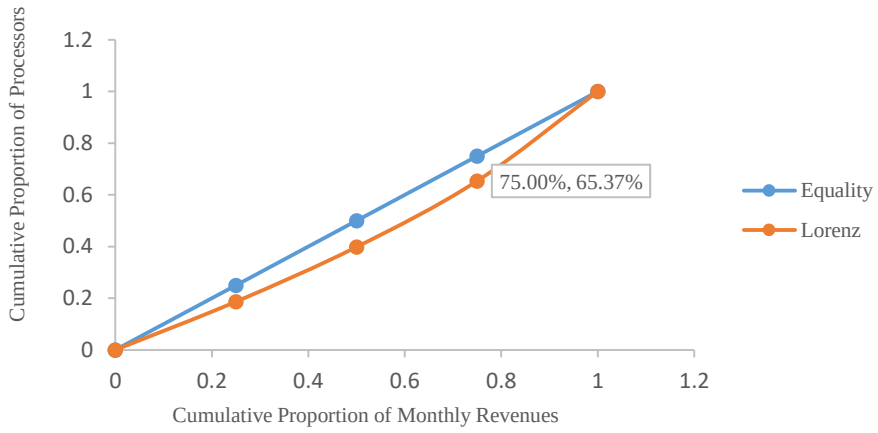


Figure 4-4: Lorenz curve of processors

4.2.4. Comparisons of Market Structure through the Tuna Value Chain

The values of the Gini coefficients and the Lorenz curves for shipowners, middle-persons, and processors were calculated and described in Tables 4-6, 4-7, and 4-8 and Figures 4-2, 4-3, and 4-4 to assess the income equality and the market share's distribution of each actor in the tuna value chain. The comparison of the Gini coefficients of three main actors in the chain indicated that middle-persons had the highest value (0.51), followed by processors (0.44), and then shipowners (0.37). Thus, the Lorenz curve of middle-persons lays furthest from the 45^0 line, followed by the Lorenz curve of processors, and finally, the Lorenz curve of shipowners lying close to 45^0 line. This result showed that the higher the Gini index is, the greater the Lorenz

curve area gets, the higher the inequalities in monthly revenue, the higher the concentration level, and the more imperfect the markets are. Therefore, the market structure of middle-persons and processors tends to be monopolistic while shipowners's market structure tend to be in perfect competition.

4.3. Market Performance through the Value Chain

4.3.1. Shipowners

Table 4-9 provides the economic characteristics of yellowfin and bigeye tuna fishing vessels and the financial performance of each shipowner in the tuna value chain.

Some interesting points drawn from this table were as follows:

- Yellowfin and bigeye tuna fishers made, on average, nine sea trips per year, with the average of twenty-five days per trip and six people per fishing vessel.

- There were significant differences in revenues, volumes, and selling price per kilogram of yellowfin and bigeye tuna made by each shipowner in an average sea trip during the peak and low-fishing seasons. The average revenue per sea trip during the main season was 1.7 times higher than that during the secondary season. Similarly, the average volume of tuna caught in a sea trip during the peak fishing season was 2,300 kilograms, while that in the low fishing season was 1,100 kilograms. Furthermore, the average selling price of 1-kilogram tuna caught in the peak season was 98,000 VND/1 kg, while that in the low season was 121,000 VND/1 kg. The reason for such differences was that the average volume of tuna caught in a sea trip in the main season was very high, many vessels would like fish for tuna, and thus a significant volume of raw tuna was landed at the fishing port at the same time. Also, most shipowners did not have cold storage to preserve fish, and they would like to sell tuna caught promptly to return their home; thus, they were willing to accept the lower prices. Meanwhile, the volume of yellowfin tuna and bigeye tuna was scarcer in the low season, and few tuna shipowners would like to go fishing during this period; therefore, processors and middle-persons set higher prices to encourage more fishers to go offshore to catch tuna.

- The average revenue of each tuna fishing vessel per sea trip was VND 174,788,000, and there was an insignificant difference in the shipowner's average revenues in each province in the study area. The average production cost of each vessel per sea trip was VND 128,763,000, including total variable costs of VND 102,090,000 and total fixed costs of VND 6,673,000. Total variable costs accounted for 80% of total production costs, in which fuels accounted for the highest percentage with 45%, followed by labor (24%), ice (15%), food, and bait (16%). Meanwhile, total fixed costs only accounted for 20% of total production costs, in which interest and bank charges contributed to the most significant proportion of the total fixed costs.

- The financial performance of each shipowner in the three South Central provinces of Vietnam was positive in terms of gross margin, net income, and marketing margin, both in total value and value per kilogram. Each shipowner earned a gross margin in a sea trip of VND 72,699,000 and a gross margin per kilogram of VND 42,000. Furthermore, they achieved net income in a sea trip and net income per kilogram with VND 46,025,000 and VND 25,000, respectively. Moreover, each shipowner's

marketing margins for the total volume and per kilogram counted for VND 174,788,000 and VND 106,000, respectively. Each shipowner attained the marketing margin in a sea trip equals total monthly revenues due to tuna purchase price of zero. The financial performance indicators of each shipowner in each province were insignificantly different. It was explained that fishers in the three South Central provinces live in close geographical areas and catch yellowfin and bigeye tunas together in the East Sea. Therefore, each tuna ship's economic characteristics, revenues, and total production costs in a sea trip were almost similar.

The results also showed that most shipowners achieved a positive profit in a sea trip, especially during the peak fishing season. However, most shipowners operated individually, and there were no horizontal and vertical linkages in the chain. Thus, each tuna ship's production costs were very high, so each shipowner's economic efficiency was not truly expected.

Table 4-9: The economic characteristics of a yellowfin and bigeye tuna fishing vessel and financial performance of per shipowner in the tuna value chain

Variables	Binh Dinh		Phu Yen		Khanh Hoa		Average	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Number of days in a sea trip	24	3	24	4	26	4	25	4
Number of sea trips in a year	9	2	9	2	8	2	9	2
Number of employees on the board	6	1	6	1	6	1	6	1
Tuna's volume in primary season (kg)	2,200	400	2,300	400	2,300	400	2,300	400
Tuna's volume in seconday season (kg)	1,000	400	1,100	400	1,100	400	1,100	400
Tuna's volume in a sea trip (kg)	1,600	300	1,800	300	1,700	300	1,700	300
Selling price in 1-kilogram tuna in primary season (1000VND/kg)	98	3	98	3	98	3	98	3
Selling price in 1-kilogram tuna in secondary season (1000 VND/kg)	121	4	121	4	121	4	121	4
Selling price of 1-kilogram tuna caught in a sea trip (1000 VND/kg)	110	3	110	3	110	3	110	3
Revenue in primary season (VND 1000)	219,017	37,048	221,226	37,467	221,274	37,489	221,226	37,467
Revenue in secondary season (VND 1000)	125,732	45,928	128,351	45,119	128,320	45,437	128,351	45,119
Revenue in a sea trip (VND 1000)	172,375	34,141	174,606	34,452	174,797	34,512	174,788	34,442
Unit price(VND 1000)	105	3	106	6	105	3	106	6
Total variable costs in a sea trip (VND 1000)	101,275	4,702	102,090	4,793	102,036	4,837	102,090	4,793
Total fixed costs in a sea trip (VND 1000)	26,522	2,679	26,673	2,784	26,679	2,781	26,673	2,784
Total operational cost (VND 1000)	128,777	9,219	128,763	5,377	128,715	5,393	128,763	5,377
Unit total cost (VND 1000)	81	16	81	17	81	16	81	17
Gross margin in a sea trip (VND 1000)	71,100	33,981	72,699	34,615	72,631	34,634	72,699	34,615
Gross margin per kilogram (VND 1000)	41	13	42	14	41	14	42	14
Net income in a sea trip (VND1000)	44,578	34,007	46,025	34,657	45,952	34,684	46,025	34,657
Net income per kilogram (VND 1000)	24	16	25	17	25	17	25	17
Marketing margin (VND 1000)	172,375	34,141	174,606	34,452	174,797	34,512	174,788	34,442
Marketing margin per kilogram (VND 1000)	105	3	106	6	105	3	106	6

Source: Computed from the field survey data, 2018

4.3.2. Middle-person

Table 4-10 provides the data results collected and analyzed for middle-persons in the tuna value chain. Middle-persons are significant economic actors in the chain since they support finance for shipowners, set purchasing prices, and grade raw tuna at the fishing ports (Thu et al., 2020).

The results showed that the average monthly volume of tuna traded per middle person was 190,267 kilograms with 260,067 kilograms in the peak fishing season and 120,467 kilograms in the low fishing season. It is also noted that the raw tuna price paid to shipowners was equal mong both middle-persons and processors, and the middle-persons only received a sales commission from the processors. The results presented that the average price of 1 kilogram of yellowfin and bigeye tunas was VND 115,000 with the figure in the peak season being slightly lower than that of low seasons, at VND 106,500 and VND 123,500, respectively. Meanwhile, as regards the selling price of 1 kilogram of the tuna in the purchasing contract agreement between the processor and the middle person, there was a difference between the purchase price of the raw tuna from shipowners and the one agreed by the middle person with the processor. The average difference of 5000 VND/ a kilogram of the tuna was the amount of money paid by the processor to the middle person, including 3000 VND/ a kilogram for ice, labor, and other costs, and 2000 VND/a kilogram for the commission for the middle-person. Therefore, the larger amount of the tuna is traded, the higher the sale commission the middle-persons receive.

Other interesting observations from the data in the table were as follows:

- The average monthly revenue of each tuna purchasing enterprise was substantial with VND 21,825,783,000, which was 125 times higher than that of each shipowner. This was not surprising since the scales of the tuna purchasing enterprises in the sample were large and medium, and they financially supported from 50 to 300 vessels. In addition, the middle-persons in the survey have great economic potential and close relationships with shipowners and processors.

- The average monthly total production cost of each tuna purchasing enterprise was VND 21,478,867,000 in which 98% (VND 21,110,600,000) was a monthly total variable cost and 2% (VND 368,267,000) was allocated to monthly total fixed cost. The structure of total variable cost included 99% for the tuna purchasing cost and one percent remaning for the loading and unloading cost and ice cost. Meanwhile, the total fixed costs were generally meager, in which the financial cost accounted for 50%, and the remaining was allocated relatively evenly, to others such as depreciation, taxes/fees, and other expenses. Most respondents said that they had to borrow money from banks to have financial capital for the tuna business. Also, because they had strong economic potential, their bank loan procedure was more straightforward than that of shipowners.

- The profitability indicators per kilogram of yellowfin and bigeye tuna achieved by each middle person were very low. For instance, monthly gross margin and monthly net income per kilogram of yellowfin and bigeye tuna attained by each middle person were 4000 VND/ a kilogram and 2000 VND/a kilogram, respectively. Similarly, each

middle person achieved a marketing margin per kilogram (or added unit costs of tuna sold) of 5000 VND/a kilogram. However, the profitability indicators for the total monthly traded tuna volume attained by each middle person were significant due to the large monthly volume of tuna traded. For example, each middle person gained a monthly gross margin of VND 715,183,000, a monthly net income of VND 346,917,000, and a monthly marketing margin of VND 896,450,000. The larger the volume of tuna was traded, the greater the returns each middle person could earn. The absolute financial performance indicators implied the financial position or wealth of each middle-person in the chain. To sum up, purchasing actors added a little value to tuna products; however, they played significant roles in supporting finances for shipowners and buying raw tuna for processors.

Table 4-10: Financial performance of per middle-person in the tuna value chain

Variables	Three South Central provinces of Vietnam	
	Mean	SD
The monthly volume of tuna traded in main-harvest season (kg)	260,067	181,642
The monthly volume of tuna traded in sub-harvest season (kg)	120,467	82,977
The monthly volume of tuna traded (kg)	190,267	132,287
The selling price of 1-kilogram tuna in main-harvest season (1000VND/1kg)	106.5	0.5
The selling price of 1-kilogram tuna in sub-harvest season (1000 VND/1 kg)	123.4	1
The selling price of 1-kilogram tuna (1000 VND/1kg)	115	0.6
Monthly revenue in main-harvest season (VND1000)	27,666,700	19,265,108
Monthly revenue in sub-harvest season (VND1000)	14,823,467	10,123,101
Monthly revenue (VND1000)	21,825,783	15,081,506
Unit price (VND1000)	115	1
Total variable cost in an average month (VND 1000)	21,110,600	14,658,683
Total fixed cost in an average month (VND 1000)	368,267	237,279
Total operational cost in an average month (VND1000)	21,478,867	14,890,836
Unit cost (VND1000)	113	0
Monthly gross margin (VND 1000)	715,183	430,708
Monthly gross margin per kilogram (VND 1000)	4	0
Monthly net income (VND 1000)	346,917	197,676
Monthly net income per kilogram (VND 1000)	2	0
Marketing margin (VND 1000)	896,450	541,081
Marketing margin per kilogram (VND 1000)	5	1

Source: Computed from the field survey data, 2018

4.3.3. Processors

Table 4-11 provides the outputs of the data collected and analyzed for processors in the tuna value chain. Processors are the most critical influencers in the tuna value chain since they have the highest negotiating power and thus can determine raw tuna's

volume and purchase price (Thu et al., 2020). The results showed that the average monthly volume of processed tuna products traded was 94,485 kilograms. Some kinds of processed yellowfin and bigeye tuna products were fillet tuna meat, whole, and frozen tuna, frozen tuna loin with and without CO, slice (steak) with and without CO, frozen cut pieces (saku, cube) with and without CO. According to interviewees in 2018, the selling price of processed tuna products ranged from USD 15 to USD 20 (about VND 345,000 - VND 460,000) and the average price of 1 kilogram of processed tuna products of all kinds was 356,000 VND/a kilogram. Therefore, the average monthly revenue of each processor was calculated of VND 33,775,718,000.

Table 4-11: Financial performance of per processor in the tuna value chain

Variables	Three South Central provinces of Vietnam	
	Mean	SD
The monthly volume of processed tuna traded (kg)	94,485	24,383
The selling price of 1 kg of processed tuna traded (VND 1000)	356	11
Monthly revenue of processed tuna traded (VND 1000)	33,775,718	9,488,518
Unit price (VND 1000)	356	11
The monthly volume of tuna materials in main-harvest season (kg)	187,500	55,000
The monthly volume of tuna materials in sub-harvest season (kg)	133,750	28,100
The monthly volume of tuna materials (kg)	160,625	41,452
The buying price of 1 kg of tuna materials in main-harvest season (VND 1000)	106.5	0.58
The buying price of 1 kg of tuna materials in sub-harvest season (VND 1000)	123.5	1.29
The buying price of 1 kg of tuna materials (VND 1000)	115	0.58
Total variable cost in an average month (VND 1000)	19,460,288	5,128,118
Total fixed cost in an average month (VND 1000)	4,831,188	1,293,497
Total operational cost (VND 1000)	24,291,475	6,420,343
Unit total cost (VND 1000)	257	3
Monthly gross margin (VND 1000)	14,315,315	4,399,906
Monthly gross margin per kilogram (VND 1000)	150	10
Net income (VND 1000)	9,484,128	3,148,106
Net income per kilogram (VND 1000)	99	9
Marketing margin (VND 1000)	15,296,655	4,712,028
Marketing margin per kilogram (VND 1000)	161	10

Source: Computed from the field survey data, 2018

Other interesting observations which can be drawn from the data in the table were:

- The average monthly volume of tuna materials of each processor was 160,625 kilograms, of which the amount in the main fishing season was 187,500 kilograms and that of the secondary fishing season was 133,750 kilograms. The average buying price of 1 kilogram of raw tuna was VND 115,000, of which the main and secondary seasons were VND 106,500 and VND 123,500, respectively. Therefore, the monthly tuna purchasing cost of each processor was VND 18,471,875,000. According to the respondents, the volume of tuna raw materials caught by fishers in the three South Central provinces did not meet the tuna processing and the export demand during the low fishing season. Thus, to encourage fishers to catch the tuna offshore, processors regularly increased the purchasing price to VND 15,000 - VND 20,000 for 1-kilogram yellowfin and bigeye tuna. At the same time, they also imported tuna materials from other countries such as Indonesia, or the Philippines.

- The average monthly production cost of each processor was VND 24,291,475,000 in which the total variable cost was VND 19,460,288,000 (80%) and the total fixed cost was VND 4,831,188,000 (20%). The total variable cost structure consisted of the tuna purchasing cost (95%) and the direct labor cost (5%). Actual fixed cost items incurred by each processor including packaging costs, maintenance, and repair costs, financial expenses (interest and bank charges), chemicals/microorganisms, electricity costs, water costs, management costs, shipping cost, telephone/transaction cost, environmental charges, depreciation, marketing expenses, tax, and other costs.

- The financial performance indicators of each processor were high in terms of a kilogram of processed yellowfin and bigeye tuna product and for the total volume of tuna product traded. Regarding the profit index per kilogram of the tuna product traded, each processor gained a monthly gross margin, net income, and marketing margin of VND 150,000, VND 99,000, and VND 161,000, respectively. Considering the performance indicators of the total volume of tuna product traded, each processor achieved VND 14,315,430,000, VND 9,484,243,000, and VND 15,296,655,000, for gross margin, net income, and marketing margin, respectively. To sum up, the processors created the most value and also received the most profit in the tuna value chain.

4.3.4. Comparison of Market Performance across the Tuna Value Chain

Mapping the yellowfin and bigeye tuna value chain and constructing costs and earnings models for each stage in the value chain, as shown above, allows a comparison among different actors in the chain. Table 4-12 presents a comparison of revenues, costs, gross margin, net income, and marketing margin per kilogram of yellowfin and bigeye tuna. This table also shows the percentage of each actor's cost and earnings contribution compared with the entire value chain.

- These are some exciting observations in the table as follows:

+ The processors were the most significant contributor in added costs and the price of a kilogram of yellowfin and bigeye tunas in the chain. Concerning the total added cost of a kilogram of the tuna in the entire chain (approximately VND 230,000/kg), the processors contributed the most considerable cost with VND 142,000 (62%), followed by the shipowners of VND 81,000 (35%), and then the middle-persons of

VND 7,000 (4%). Regarding the price of the tuna per kilogram sold by the processor (VND 356,000), the shipowners and the middle-persons attained the low percentages of 30% and 32% of the total unit price, respectively, with a difference of only 2%. Meantime, the proportion difference between the unit price of the processors and that of the middle-persons was 68%. Due to their modern processing technology and export value chain, the processors created the most value for the tuna value chain (68% of the total unit price). Fishers occupied the second position (30%) thanks to their raw tuna exploitation, whereas middle-persons only added 2% of the total unit price due to their middle role in the tuna value chain.

+ The processors achieved the highest gross margin, net incomes, and marketing margin per kilogram of yellowfin and bigeye tuna compared to other actors in the chain. Regarding the total gross margins for a kilogram of the tuna in the entire chain (approximately VND 196,000/a kilogram), the processors attained the highest gross margins with VND 150,000/a kilogram (77%). The shipowners achieved the second-highest amount with VND 42,000/ a kilogram (21%), followed by the middle-persons with the lowest figure of VND 4,000/ a kilogram (2%). Similarly, the total net incomes per kilogram of the tuna in the entire chain were VND 126,000/ a kilogram, in which the processors achieved the highest value with VND 99,000/ a kilogram (79%), followed by the shipowners and the middle-persons with 25% and 2%, respectively. Referring total marketing margin for a kilogram of the tuna in the entire chain (VND 272,000/ a kilogram), the processors still achieved the highest value with VND 161,000/ a kilogram (59%), while the shipowners and the middle-persons occupied the second and the third positions with 39% and 2%, respectively.

In summary, for each kilogram of yellowfin and bigeye tunas, the processors created the biggest value and received the highest profits due to advanced processing technology and tuna export. The shipowners ranked second position because of their tuna exploitation capability. Meantime, the middle-persons ranked the lowest position based on their roles on purchasing and distributing tuna materials.

However, for the total volume of raw tuna materials traded, total costs, total revenues, total net incomes per actor in an average month, there were different scales of actor's tuna exploiting, purchasing, and processing activities. Table 4-13 presents the average monthly material volume, costs, revenues, net income, and margins per actor in the yellowfin tuna and bigeye tuna value chain in the three South Central Provinces of Vietnam.

The results shown in Table 4-13 are interpreted as follows:

- Compared with the shipowners, the processors and the middle-persons had overwhelming advantages in the total tuna volume traded, total costs, and total revenues. Concerning the total tuna volume in the entire chain (352,592 kilograms), the middle-persons and the processors ranked the first and second positions with 54% and 45%, respectively. In contrast, the shipowners only accounted for a tiny percentage with 1%. Regarding the total monthly costs in the entire chain (VND 45,899,119,000), the processors and the middle-persons accounted for 53% and 46%, respectively, while the shipowners only occupied 1%. With reference to the total

revenues in the entire chain (VND 55,773,876,000), the processors constituted the most significant proportion with 60 %, followed by the middle-persons with 39%, and then the shipowners with only 1%. These results showed that tuna processing and purchasing enterprises had large-scale capital and business operation, whereas the shipowners had low-scale capital and scattered production operations.

- Like the financial indicators presented above, the processors attained the highest percentage in total gross margin, net incomes, and marketing margins. Table 4-13 only showed the total net income and marketing margins of the actors in the chain. Specifically, the processors achieved the highest net incomes and marketing margins with 96 % and 93%, respectively, while the middle-persons attained 3% and 6% in turns. Finally, the shipowners gained the lowest percentages with 1% for both net incomes and marketing margins.

These results also showed that the processors gained the highest financial performance indicators in total value and a kilogram of tuna compared with other actors based on adding the most value to the tuna products and being the most significant scale finance and production in the chain. The middle persons obtained the modest financial performance indicators in a kilogram of tuna traded due to adding the least value to the tuna products. In addition, they attained the second position on performance indicators in the total volume, based on their large-scale finance and business. Although the shipowners contributed the relative value for 1 kilogram of tuna products, they achieved the lowest financial performance indicators in the total volume because of their small and scattered tuna fishing operations.

4.4. Critical factors impacting on value chain performance

Through questionnaire respondents and focus group discussions, our study qualitatively explored whether the market structure and other factors can affect the financial performance of the actors along the tuna value chain. We have chosen in this paper to focus primarily on presenting the market structure and financial performance of key actors in the chain. However, through the value chain analysis process, we summarized several significant factors determining the value chain performance as follows:

- The market structure can affect the value chain performance. The processors and middle-persons tended to be monopolistic, and their financial performances were well-performed, but the incomes were accrued to a small group of market participants. This finding denoted an inefficient and imperfectly competitive market with a monopolistic nature, which was suggested by economic and game theory.
- Economies of scale and collective marketing can improve the financial performance of the chain's actors. The processors and middle-persons, who have a large scale of finance and production, had a significant volume of traded tuna products, thus reducing the cost of doing business and increasing their returns. Meanwhile, the shipowners, who have a small scale of finance and scattered operations, failed to take advantage of the benefits of collective marketing when they purchased material inputs and sold raw tuna individually; thereby, their financial performance indicators were not good as they had expected.

- Access to market information and business loans can influence an actor's market performance. The processors and the middle-persons, who have more comprehensive access tuna market information and business loan than the shipowners, had much better financial performance indicators than the shipowners.

Table 4-12: Relative financial position of actors in the yellowfin tuna and bigeye tuna value chain

Value Chain Actor	Costs (VND 1000)			Revenues (VND 1000)		Gross margins (VND 1000)		Net Incomes (1000 VND)		Marketing Margins (1000 VND)	
	Unit total cost	Added unit cost	% VC added cost	Unit Price	Unit price as % export price	Unit gross margin	% VC gross margin	Unit net income	% VC net income	Unit margin	%VC margin
Shipowner	81	81	35	106	30	42	21	25	20	106	39
Middle-person	113	7	4	115	32	4	2	2	2	5	2
Processor	257	142	61	356	100	150	77	99	79	161	59
Total		230	100			196	100	126	100	272	100

Source: Computed from the field survey data, 2018

Table 4-13: Relative financial position of actors in the yellowfin tuna and bigeye tuna value chain

Value Chain Actor	Total tuna material's volume (kg)		Total costs (VND 1000)		Total revenues (VND 1000)		Total net incomes (VND 1000)		Marketing margins (VND 1000)	
	Volume (kg)	% VC volume	Costs (VND 1000)	% VC Cost	Revenue	% Total VC revenue	Net incomes (VND 1000)	% VC net income	Marketing Margins	%VC Marketing Margin
Shipowner	1,700	0.5	128,777	0.3	172,375	0.3	44,578	0.45	172,375	1.05
Middle-person	190,267	54.0	21,478,867	46.8	21,825,783	39.1	346,917	3.51	896,450	5.48
Processor	160,625	45.5	24,291,475	52.9	33,775,718	60.6	9,484,128	96.04	15,296,655	93.47
Total VC	352,592	100	45,899,119	100	55,773,876	100	9,875,623	100	16,365,480	100

Source: Computed from the field survey data, 2018

5. Discussions and Conclusions

5.1. Discussions

The tuna value chain mainly served the export market and included three main actors: fishers, tuna purchasing enterprises, and tuna processing companies. Representatives of these actors investigated during the field survey were shipowners, middle-persons, and processors. Most shipowners, who were middle-aged, owned a tuna fishing ship. They held a low level of education but a lot of experience in the tuna fishing. Meanwhile, most middle-persons, middle-aged ones, owned large or medium tuna purchasing businesses and financed many tuna fishing vessels. They had an average level of education and lots of experience in tuna procurement. More prominently, most processors, who were middle-aged, were directors of large tuna processing companies, and had a university education and many experiences in processing and exporting tuna.

In this study, we examined the market structure and the market performance of actors in the yellowfin and bigeye tuna value chain in the three South Central provinces of Vietnam. Using the Lorenz curve and Gini coefficient to measure the market structure of actors in the tuna value chain, the research findings showed that the market concentration indexes of these actors were different. Most shipowners had average monthly revenues at similar levels, and their market structure tended to be perfectly competitive. Meanwhile, the market structure of middle persons was concentrated, and it tended to be in monopolistic competition. Similarly, the market structure of processors was also concentrated with a few processors largely controlling their market shares. Concerning the market performance of actors in the tuna value chain, the processors attained the most returns in the total tuna volume traded and per kilogram of tuna traded, followed by the middle persons and then the shipowners. The processors and the middle-persons reaped significant benefits due to the largest and the second-largest financial scale and business operation size, respectively, while the shipowners received the least benefits because of their small financial scale and scattered production.

Our research results have some similarities with those of previous studies in Vietnam's tuna value chain, such as (Huy, 2018), (Nguyen and Jolly, 2018), (USAID, 2020) in two aspects of mapping the tuna value chain and identifying the roles of actors in the chain. All studies have determined that most yellowfin tuna and bigeye tuna went through the distribution channel of fishers - tuna purchasing enterprises - processing companies. Shipowners have little power to negotiate prices and products, whereas middle-persons have a strong financial potential, act as tuna purchasing agencies, and provide loans/credits, oil, and ice. Finally, processors have the most powerful actor since they create the most added value, have high negotiating power, and set the tuna purchase price and volume.

However, our study has revealed significant and new contributions compared with previous studies:

Firstly, this study has conducted on large, complete, and new sample data. 315 key actors were interviewed, including shipowners, middle-persons, and processors in the

three provinces of Binh Dinh, Phu Yen, and Khanh Hoa in 2018. Meanwhile, (Nguyen and Jolly, 2018) only examined 46 key actors in Khanh Hoa province in 2013, (Huy, 2018) interviewed 163 key actors in three provinces of Binh Dinh, Phu Yen, and Khanh Hoa in 2014 and 2015, and finally (USAID, 2020) studied only 23 key actors in Binh Dinh province in 2019.

Secondly, our results have some differences, compared with other studies. Although (Nguyen and Jolly, 2018) qualitatively described the structure-conduct-performance components of each key actor in the tuna value chain, our study focused on analyzing the market structure through quantitatively determining market concentration by plotting Lorenz curve and calculating Gini coefficient for each actor in the chain. In addition, the financial performance indicators of actors were quantitatively examined, and qualitative evaluation was done on whether the market structure and other factors influence the performance of actors. Furthermore, monthly averages were calculated by taking average values in the peak and the low fishing seasons to measure the financial performance indicators of actors in the chain, whereas (Huy, 2018) and (Nguyen and Jolly, 2018) used yearly averages to analyze the actor's financial performance. In our study, the use of monthly averages took into account the seasonality of the yellowfin and bigeye tunas, which reflects more precisely on the nature of the tuna fishery than previous studies.

Moreover, our research results showed the difference between the selling price of a kilogram of yellowfin tuna and bigeye tuna during the peak and the low seasons, which was not discovered by any previous studies. From this finding, the weakness in the tuna trade management at the fishing port during the peak season was identified. During this period, a large amount of tuna was imported at the same time, and because there was no cold storage system to preserve fish, and shipowners had to sell the tuna quickly to avoid post-harvest losses; thus, the price of a kilogram of the tuna sold in the peak season was lower than in low season. Therefore, the Directorate of Fisheries and the local fisheries departments need to have investment policies so that the fishing port has a cold storage system to help fishers eliminate the concern of "good season, devaluation". Finally, the financial positions of actors in the value chain were identified by comparing each actor's financial performance indicators on both per kilogram of tuna and total volume of tuna, which has not been explicitly mentioned in the previous studies.

Findings from our study have some similar results compared with the previous studies on the fisheries value chain in the World. Firstly, this study discovered the capital asymmetry, with most low-capitalized fishers at the bottom and a few middle-persons and processors with high capital at the apex. Furthermore, the results showed that the processors and middle-persons have a larger financial and production scale, significantly higher than the shipowners. Thus, their volume and revenue of traded tuna were more remarkable than those of the shipowners. These results are consistent with those of the previous studies on the fisheries value chains such as (Adeogun, 2009), (Daw, 2014), (Kulindwa and Lokina, 2013), (Wamukota et al., 2014). Furthermore, the study identified that the processors with a large scale of capital determined the purchasing price and the total volume of tuna traded, while the

shipowners with much lower capital always received the raw tuna price, which has also been mentioned in the previous studies such as (Grydehoj and Nurdin, 2015), (Sebastian et al., 2014). Finally, the variable costs incurred by actors in the chain accounted for a more significant proportion than the fixed costs, one of characteristics of identifying the producer-driven value chains (Jimenez et al., 2020), (Kulindwa and Lokina, 2013), (Kimani et al., 2020).

Several challenges and weaknesses are drawn from the yellowfin and bigeye tuna value chain in three South Central provinces of Vietnam. Firstly, shipowners still have not cooperated and linked together to buy input materials such as gasoline, oil, ice, food at reduced price, based on the volume purchased in large quantities. Each shipowner buys input materials individually at retail prices, so production costs are often very high, reducing their profit in a sea trip. Furthermore, the tuna fishing activities of the shipowners are limited and scattered which makes them unable to generate large volumes in order to sign direct contracts to processors. Moreover, shipowners have meager financial resources and depend on middle-persons, so they are forced to sell tuna caught to these middle-persons. In addition, the tuna classification and quality assessment at the fishing port depend entirely on the assessment of middle-persons and processors, which is often detrimental to the fishers. Secondly, shipowners do not have complete access to information about the tuna market and are only price recipients in tuna transactions; thus, they do not have much incentive to improve tuna fishing and preserving techniques, bringing higher economic efficiency in a sea trip. Furthermore, shipowners are usually under the impact of "good season, devaluation" during the peak fishing seasons. Finally, the processors have not shown their leadership roles in the chain. They still depend on the middle-persons to collect tuna materials, without having any specific solutions to increase the sustainable development of the tuna value chain in the study areas.

Due to the remaining challenges and weaknesses in the chain presented above, some solutions are proposed to improve the economic efficiency of the tuna value chain. Firstly, it is essential to build a tuna auction center under the strict management of the Fisheries Departments in the investigated provinces to determine the standards of tuna materials, tuna grades, and tuna purchase price. Secondly, the Vietnamese government needs to support building cold storage systems at the fishing port, helping fishers eliminate the "good season, devaluation"situation during the peak fishing season. Finally, the Directorate of Fisheries and Fisheries department in the local area should open short-term training programs to help fishers approach scientific methods in fishing and preserving raw materials to add value to the tuna, increasing their economic efficiency in a sea trip.

5.2. Conclusions

This paper analyzes key actor's market structure and performance in the yellowfin and bigeye tuna value chain in the three South Central provinces of Vietnam in 2018. The Lorenz curve and Gini coefficient were used to quantitatively determine the market concentration of each actor in the tuna value chain. Furthermore, financial performance indicators were calculated to determine the financial position of each

actor in the value chain. Through the analysis of the tuna value chain, qualitative assessment was done on whether the market structure and other factors can affect the financial performance of each actor. Finally, some possible solutions were recommended to improve the economic efficiency of the tuna value chain, promoting the sustainable development of Vietnam's tuna fishery.

5

CHAPTER 5. GENDER ANALYSIS OF THE TUNA VALUE CHAIN'S PURCHASING STAGE IN THE SOUTH CENTRAL PROVINCES OF VIETNAM-CASE STUDY OF BINH DINH PROVINCE

Nguyen Dang Hoang Thu [1,2], Rachel Sundar Raj [2], Cao Le Quyen[3], Le Thi Minh Hang[4], Nang Thu Tran Thi [5]

& Philippe Lebailly[2]

[1] Faculty of Project Management, The University of Danang - University of Science and Technology, Da Nang, Vietnam

[2] Economy and Rural Development Department, Faculty of Gembloux Agro-Bio Tech, Liege University, Gembloux, Belgium

[3] Vietnam Institute of Fisheries Economics and Planning, Ha Noi, Vietnam

[4] Faculty of Business Administration Management, The University of Danang - University of Economics, Da Nang, Vietnam

[5] Faculty of Fishery, Vietnam National University of Agriculture, Ha Noi, Vietnam

Correspondence: Nguyen Dang Hoang Thu, Faculty of Project Management, The University of Danang - University of Science and Technology, Da Nang, Vietnam. Tel: 84-905-620-897. E-mail: ndhthu@dut.udn.vn

• Paper accepted for December 22, 2020

• Paper to be submitted to the Asian Social Science

(The gender analysis of the tuna value chain, presented in chapter 5, is chosen as a case of the social tuna value chain analysis. This chapter aims to analyze gender differences between male and female purchasers along the tuna value chain in Binh Dinh province in terms of the roles, tasks, opportunities, as well as constraints of men and women in terms of productive, reproductive, and community management roles. It helps to make some recommendations for gender-sensitive policies to improve gender equality and women's empowerment in the tuna fishing communities).

Women play an essential role in the world's fisheries (Bennett, 2005), but traditionally, fisheries are associated with men (Fro¨cklin et al., 2013). In developing countries, women are involved in the small-scale fisheries sector as gatherers, fishers, traders, processors, and marketers of fishery products (FAO, 2011), (FAO, 2015a). However, many of these roles have been overlooked, under-recognized, and virtually invisible in the management policies of small-scale fisheries (Harper et al., 2017). In addition, there are many issues of gender inequality in the fisheries sector, such as women's limited access to resources (Thorpe et al., 2014) and women's decision-making restrictions (Calhoun et al., 2016), as well as discrimination against based on identity (Weeratunge et al., 2013). These gender inequalities negatively affected women's livelihoods and their families, as women are also involved in reproductive work (Weeratunge et al., 2010).

Women's social roles and gender aspects are often ignored in fisheries research and policies (Bennett, 2005), (Harper et al., 2013), which can lead to the failure of policy interventions, and as a result of failing to achieve the goal of creating sustainable livelihoods at the community level (Bennett, 2005). In addition, (FAO, 2015b) clarified discrimination against women in small-scale fisheries and argued that gender mainstreaming should be an integral part of small-scale fisheries policies. More importantly, goal 5 of the United Nations 2030 Agenda for Sustainable Development focuses on "Gender equality and women's empowerment"(UN, 2015). Therefore, it can be said that it is important to include gender aspects in research and policies in the fisheries sector due to the provision of the needed data on gender perspectives and the elimination of gender inequality in the fisheries policies (EIGE, 2015).

Gender analysis can be defined as the study of disparities between men and women in roles, conditions, needs, and power, in order to provide a background for explaining gender inequalities in policies, programs, and projects. It is conducted at many levels (household, community, country) in different roles of men and women at different stages of life. Mainstreaming gender is described as the change in the view of an organization when it begins to mainstream gender into all aspects of its procedures and priorities so that women and men benefit from gender equality (Biswas, 2017).

Gender mainstreaming in fisheries value chain analysis is essential to meet business efficiency, social equity, and food security and poverty reduction goals (Agri-ProFocus, 2012). In terms of business efficiency, women represent about 50% of total employment in the primary and secondary fisheries sector (FAO, 2020a). However, the lack of gender analysis data and the omission of women's social roles in fisheries policies leads to the failure of upgrading strategies, which do not respond well to the female workforce in the sector. At the social equity level, gender analysis in the

fisheries value chain facilitates women's economic empowerment and access to markets and services (Agri-ProFocus, 2012), which helps to achieve the sustainable development goal (SDG 5) of the United Nations (UN, 2015). Finally, women make a positive contribution to poverty reduction and food security goals, since their productivity would be 20% to 30% higher than men if they were given the same access to resources (FAO, 2013), and they tend to allocate a higher share of their income to family welfare (Barclay et al., 2017).

There are some studies which focused on gender analysis of fishery value chains in countries worldwide, such as (Lwenya and Abila, 2000), (Browne, 2002), (Society, 2012), (Hillenbrand et al., 2014) and (USAID, 2018). The general points of these studies are integrating gender into the fisheries value chain analysis and introducing the policy interventions that improve gender equality and women's empowerment. A few studies did not use any specific gender analysis framework (Lwenya and Abila, 2000), (Browne, 2002). Meanwhile, (Hillenbrand et al., 2014) used the social relation approach, and (USAID, 2018) used Harvard, Moser approaches, and the six USAID gender dimensions as frameworks for the gender analysis. There have been no integrated gender analyses across the fishery value chains in Vietnam, excluding two studies on gender integration in the shrimp value chain (Veliu et al., 2009), (Oxfam, 2016).

Given time and budget constraints, we performed a gender analysis on the tuna purchasing stage in Binh Dinh province as a case study of gender analysis on the tuna value chain in the three provinces of South Central Vietnam. USAID's six gender dimensions, including access to assets, beliefs (including knowledge and perceptions), practices and participation, time and space, legal rights and status, and power and decision-making, are used to analyze gender differences in the roles, tasks, opportunities, and constraints between men and women as purchasing agents along the tuna value chain. The Harvard analytical framework and the Moser gender analysis framework are selected to determine gender differences in the activity profiles of purchasing agents, which generate strategic and practical gender needs. The research questions in this chapter used the questions suggested by (USAID, 2012) to apply to gender analysis in the tuna purchasing stage, presented in Table 5-1 of this thesis. Answering these questions helps us recommend policy interventions to improve gender equality and women's empowerment in the tuna fishing community in Vietnam.

Abstract

This study aims to identify the gender disparities between men and women as purchasing actors in the tuna value chain in South Central provinces, thereby suggesting gender-sensitive policies towards gender equity, women's empowerment, and sustainable tuna fisheries management. The study was conducted with the aid of a set of structured questionnaires executed through personal interview surveys. Tam Quan and Quy Nhon fishing ports in Binh Dinh province were chosen as study sites for conducting gender analysis at the tuna value chain's purchasing stage in the South Central provinces of Vietnam. Forty respondents were directly interviewed at their home or at the fishing ports in Binh Dinh province in May 2020, of which are ten middlemen and nine middlewomen purchasing yellowfin and bigeye tunas at Tam Quan fishing port; and twelve middlewomen and nine female traders purchasing skipjack tuna at Quy Nhon fishing port. This study used gender analysis tools such as the Harvard and Moser approaches, and the USAID's six gender dimensions to identify gender differences between men and women in the tuna purchasing stage in productive, reproductive, and community managing roles. Some policy recommendations for improving gender equity, women's empowerment, and sustainable tuna fisheries management were proposed, including (i) describe the importance of women's reproductive role in gender-responsive strategies; (ii) establish tuna trading management board at the fishing port to collect information on the needs, issues, and interests of purchasing actors; (iii) organize training courses on tuna business and management skills at the fishing ports during the low season for the full participation of middle-actors, especially women; (iv) provide access to savings, credit, and microfinance for female traders to create opportunities for expanding their business; (v) improve facilities at the fishing ports to increase the overall well-being of the fish trading communities; (vi) introduce alternative job opportunities for laborers in the tuna purchasing stage during the low season; (vii) support laborers trading yellowfin and bigeye tuna in seeking other ways to make a living due to the depletion of these tuna resources.

1. Introduction

Women play a significant role in world fisheries (Bennett, 2005), but traditionally, fisheries have taken for granted to men (Williams, 2008), (Fro¨cklin et al., 2013). Actually, in developing countries, women living in coastal areas, with various roles, participate in the small-scale fisheries sector as gleaners, fishers, traders, processors, and marketers of fisheries products (Weeratunge and Snyder, 2009), (FAO, 2011), (FAO, 2015a). Although women participate in fishing, processing, and selling, many of these roles have been overlooked, under-acknowledged, and almost invisible in fisheries management and policy development (Chapman, 1987), (Harper et al., 2017). Also, there exists gender inequality in the fisheries sector (Koralagama et al., 2017). In particular, women are restricted on resource access (Hauzer et al., 2013), (Thorpe et al., 2014) and on decision making (Choo et al., 2008), (Medard, 2012), (Calhoun et al., 2016), and even suffer from discrimination based on identity (Weeratunge et al., 2013), (Vervaele, 2014). Moreover, (Weeratunge et al., 2010)

asserted that this gender inequality affects women's livelihood and their entire households since women are also related to reproductive work.

Although women have an important role in the fisheries sector, their social roles have often remained invisible to researchers and policy makers (Bennett, 2005). Besides, gender aspects are often ignored in fisheries policy and research (Diamond et al., 2003), (Harper et al., 2013). Lack of understanding about the role of women in the fisheries sector as well as attention to the gender dimension of fisheries management can lead to failure of policy interventions, hence achieving the target of creating sustainable livelihoods at the community level is impossible (Bennett, 2005). Furthermore, (Bennett, 2005) argued that policy interventions that address gender roles in the development process help strengthen institutional capacity in coastal artisanal communities, which would have the greatest overall impact. Also, the European Institute for Gender Equality (EIGE, 2015) exhibited that doing a gender analysis in the fisheries sector provides the necessary data and information in integrating a gender perspective into policies, programs, and projects. This supports the development of interventions in order to eradicate gender inequalities and meet women's and men's different needs in fishing communities (EIGE, 2015). Thus, it can be said that it is meaningful to include gender aspects in research and policy in the fisheries sector. However, there has been few research on gender analysis in Vietnam's fishing community so far, except for the two studies on gender analysis in the shrimp value chain, including (Veliu et al., 2009) and (Oxfam, 2016).

To fill the research gap, we conducted a gender analysis at the tuna value chain's purchasing stage of in Binh Dinh province, one of three South Central Provinces of Vietnam. The objectives of this study were not only to identify the different roles of men and women as purchasing actors but also to acknowledge their needs and challenges in the tuna value chain in the South Central Provinces of Vietnam, thereby suggesting gender-sensitive policies to aim at a fairer and more sustainable management in the tuna fisheries community. In particular, our study aims to:

- Provide empirical evidence for gender analysis in the tuna fisheries community by analyzing gender disparities between men and women in the tuna purchasing stage and identifying the specific roles of women as middle-persons and traders in the tuna value chain;
- Suggest recommendations for gender-sensitive policies, research, and actions to improve gender equity and women empowerment in the tuna fisheries community and promote sustainable tuna fisheries management in the region.

This paper is organized as follows. Section 2 provides a short review of related work on gender analysis of tuna value chains as a background for this research. Section 3 describes the method of this study, and the results are given in Section 4. Finally, discussions and conclusions are presented in Section 5.

2. Related Work on Gender Analysis in Tuna Value Chains

On the gender analysis of tuna value chains, most researchers studied about women's roles in tuna fisheries and gender differentials between men and women

along the chain. Some case studies in this research direction are briefly summarized as below.

Firstly, (Tuara, 2006) established what is known on the involvement of women in the tuna fishery in the Pacific Islands and the impacts of tuna fisheries on women. As a review, this study looked at national, regional, and international articles, documents, field reports, and books written on women in development, gender in development, women in fisheries, and the assessment, management, and development of Pacific Islands tuna fisheries. In addition, it showed that most women were found in processing for small-scale and commercial fisheries and marketing for the domestic market, while men were found in capturing and commercial marketing areas. The study also identified some positive and negative effects of fisheries on women and suggested some actions to improve gender equity.

Secondly, (Kruijssen et al., 2013) put a gender lens on value chain analysis to understand why men and women fulfill certain roles at every level in marine resource value chains, especially the tuna value chain in the Solomon Islands. A gender analysis of marine resource value chains was done to help identify key entry points for equitable improvement of the livelihoods of those participating in the chains. Using the gender division labor and livelihood approaches, this study showed the differences in men's and women's gender-specific roles in marine resource value chains and other livelihood activities in two communities in the Solomon Islands. These disparities lead to unfair outcomes and opportunities for men and women, affecting their livelihood security and well-being. Some key recommendations were suggested, including: (i) In order to assess and intervene in marine resource-based livelihoods, it is necessary to identify the gender disparities and to explain the main reasons for these differences; (ii) To improve the equity of gender and decision-making, it is essential to build capacity and knowledge of women for contributing to decision-making processes; (iii) Several potential entry points for upgrading marine resource value chains were proposed such as exploration of different models of coordination and collective effort among fishers and gleaners, especially for women, and provision of training and awareness on processing options to improve fish preservation.

Thirdly, (Barclay et al., 2015) examines women's involvement in two supply chains in the fisheries sector of the Solomon Islands – tuna fisheries and coastal fisheries. It used the fish chain as a conceptual framework to analyze gender aspects of the fisheries supply chain. Some gender issues were found in the tuna fisheries and coastal fisheries value chains. The study also suggested some recommendations for improving the information and data on gender analysis to better address women's inclusion in fisheries, thereby enhancing this sector's social benefits and outcomes in the Solomon Islands.

Fourthly, (Wessels, 2017) provided an analysis of the roles of women playing in pole-and-line and handline tuna supply chains in Maldives. The fish chain was also used as a means to investigate gender aspects of the fisheries supply chain. Besides, this study proposed some factors influencing the roles of women in the community, such as improving the quality of life and providing access to education and

employment for women, and the impact of access to technology, social network, and mass media on increasing the status of women and opportunities offered to women in Maldives.

Furthermore, (O'Neill et al., 2018) emphasized the significant roles of middlewomen in the Ghanaian tuna industry. Their key roles to the global seafood industry at the local scale were exhibited by financing industrial tuna fleets that supplies tuna for major international export companies. Their participation facilitates the operation of large seafood corporations.

Lastly, (USAID, 2018) used the USAID's gender dimensions framework with its six domains, including access to assets; knowledge, beliefs and perceptions; practices and participation; time and space; legal rights and status; power and decision making to capture the gender differentials along the tuna value chain and across different types of fishing. The project included both small-scale tuna (municipal fisheries) and large-scale tuna (hand line and purse seine fisheries) in Philippine and Indonesia.

Gender analysis of the tuna value chain has been conducted in tuna-fishing countries such as Philippine, Indonesia, Solomon Islands, Pacific Islands, Maldives, and Ghana. Meanwhile, there has been no research on gender analysis of the Vietnamese tuna value chain, although Vietnam is one of the countries with developed tuna fisheries in Southeast Asia. Therefore, conducting a gender analysis on the tuna value chain's purchasing stage in Southern Central Provinces of Vietnam fills the research gaps. We only carried out the gender analysis on the tuna purchasing stage due to our limited budget and time constraints. Furthermore, purchasing actors play a key role in the tuna supply chain in Vietnam in the context of small-scale fisheries since they act as local purchasing agents for the processing plants and provide loans and input for fishers. Thus, they have a certain influence on fishers's changing practice (e.g., for e-logbook and traceability systems) and help processors develop and operate a better traceability system if incentives were provided (e.g., premium prices and a more stable price for traceability products) (USAID, 2020). Also, men and women are involved in tuna procurement, whereas only men are involved in tuna exploitation. Therefore, this study aims to identify the different roles of men and women as purchasing actors of the tuna value chain as well as acknowledge their needs and challenges in the tuna fisheries communities in the South Central Provinces of Vietnam, thereby proposing gender-sensitive policies toward more equitable and sustainable tuna fisheries management in these communities.

Referring to gender analysis methods used in the fisheries sector, firstly, (Overa, 1993), (Walker, 2001), (Walker, 2002), (Silva, 2011) use gender division of labor approach to identify the role of women in the fisheries sector. Also, (Weeratunge et al., 2012) use a conceptual framework that combines with the social relations approach (Kabeer, 1995), (Kabeer, 1996), (Kabeer, 1999) and social well-being approach (Mcgregor and Camfield, 2009) to analyze gender roles, relations, assets, capabilities, and decision-making within individuals, households, and communities, as well as in the wider institutional context of the market and state in the aquatic agricultural systems of five countries including Cambodia, Zambia, Bangladesh, Philippines, and the Solomon Islands. Furthermore, (Hillenbrand et al., 2014) uses the

Social Relations approach to assess the impact of a gender lens on women's empowerment and better understand gender relations in Cambodia. Finally, (USAID, 2018) used a gender-responsive value chain analysis which is combined between USAID's six gender dimensions and Harvard and Moser approaches to identify gender differences in activity profiles and three roles of men and women in production, reproduction, and community on tuna value chains in the Philippines and Indonesia. Our study also employs six gender dimensions of USAID and Harvard and Moser gender analysis tools to analyze gender disparities between men and women in the tuna purchasing stage and identify women's specific roles as middle-persons and traders in the tuna value chain in Vietnam.

3. Methodology

This section presents the study area, study design, and analytical method. Firstly, the purchasing sites involved in the study are described in details. Then, the study design consists of secondary data collection, key informant interviews, and personal interview surveys, which provide qualitative and quantitative data for gender analysis. Lastly, an analytical method based on the Harvard, Moser, and USAID's six gender dimensions is given.

3.1 Study Area

This study was undertaken in Binh Dinh province in May 2020. Binh Dinh has the largest tuna production in Vietnam, and is one of the three provinces chosen for carrying out the research of (Thu et al., 2020). During this period, personal interview surveys were conducted with middle-persons and traders purchasing tuna at Tam Quan and Quy Nhon fishing ports. Purchasing actors consist of middle-persons and traders, who play a significant role in Binh Dinh province's tuna supply chain. Traders buy tunas directly from fishing vessels, then sell most of them to middle-persons or processors and the remainder to domestic markets. Meanwhile, middle-persons buy tuna directly from fishers or traders and act as local purchasing agents for processors. Also, these middle-actors provide finance and inputs for fishers such as gasoline, oil, ice; thus having a certain influence on fishers (Thu et al., 2020) and (USAID, 2020). Middle-persons often have capital and business scales more considerable than those of traders, hence, the former provide finance and input for more vessels than the latter.

Binh Dinh is a province in the South Central Coast of Vietnam with a total natural area of 6,025 squared kilometers and a population of about 1.6 million people. It has a coastline of over 134 kilometers. Binh Dinh has offshore fisheries, among which the tuna fishing is the most developed in Vietnam and mostly concentrated in Hoai Nhon district and Quy Nhon city. It currently has three large fishing ports, including Quy Nhon, De Gi, and Tam Quan ports (BinhDinh, 2018). Figure 5-1 describes the map of Binh Dinh province.

Our research focused on Tam Quan and Quy Nhon ports as specific sites to conduct gender analysis of the tuna value chain's purchasing stage. Quy Nhon port is located in Hai Cang ward, Quy Nhon city, Binh Dinh province. It is considered the largest wholesale market for skipjack tuna, where most middle-persons and traders are women. This fishing port's peak operating time is from 0 am to 8 am, and the activities

of purchasing skipjack tuna take place here all year-round. Meanwhile, Tam Quan port lies in Hoai Nhon district, Binh Dinh province, where many yellowfin and bigeye tuna fishing vessels land. It is recognized as the largest marketplace for purchasing yellowfin tuna and bigeye tuna in the province, where both men and women work as middle-persons or traders. Its peak operating time is from 7 am to 5 pm, and the trading activities only take place here between the 7th and the 23rd of every month in the lunar calendar.

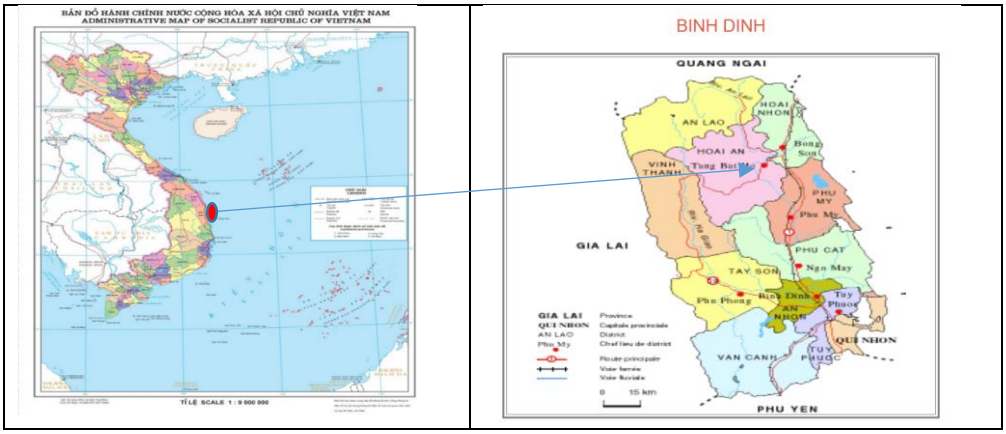


Figure 5-1: Map of Binh Dinh Province of Vietnam

Source: (BinhDinh, 2018)

Binh Dinh has two tuna value chains, which are (i) skipjack tuna value chain, and (ii) yellowfin and bigeye tuna value chain. For the former, tunas are caught by purse seine and gillnet fisheries. Once fishing vessels have landed at Quy Nhon port, shipowners report the output of caught tuna to the managers at the port. Skipjack tunas are then unloaded and sold to middle-actors, which include middle-persons and traders. After that, only a small number of fresher and finer tunas are sold at the port with a higher price for domestic markets, whereas a large proportion of the tunas are sold to processing enterprises to produce canned tuna serving for export markets. The processors determine purchasing prices, and purchasing actors receive commissions based on the buying volume. For the latter, tunas are caught by longline/hand-line fisheries, then landed at Tam Quan port. Similar to the former, middle-actors mostly act as local purchasing agents for processing enterprises and receive commissions. Most of caught yellowfin and bigeye tunas are transported to processors in order to process them into frozen tuna fillets catering for export markets. Only a tiny proportion of the tunas is processed into tuna fillets dedicated to hotels and restaurants in domestic markets (Thu et al., 2020).

3.2. Research Design

Gender analysis at the tuna purchasing stage is based on the qualitative data provided by secondary data collection, key informant interviews (KII), site visits, and the quantitative data taken from personal interviews.

3.2.1. Secondary Data Collection

The secondary data was collected from various sources, including the Provincial Department of Fisheries in Binh Dinh, Management Boards of Quy Nhon and Tam Quan fishing ports, and studies such as (Thu et al., 2020) and (USAID, 2020). This data provides the inputs to a desk review on the tuna value chain in Binh Dinh and insights on purchasing actor's tuna business. The literature on gender analysis in the fisheries sector in other countries was reviewed during the research process to finalize the research instruments and tools.

3.2.2. Key Informant Interviews

Key Informant Interviews were conducted with four persons including two employees of Binh Dinh's Department of Fisheries and two directors of the management board of Quy Nhon and Tam Quan ports. These interviews aim to provide better understanding about the overall enabling environment for gender equality in fishing communities in the local area, especially the different roles that men and women play in the tuna purchase, participation, decision-making, marketing, and management in the tuna fisheries community. During the interview process, the fishing port's directors also provided us with the contacts of middle-actors, who purchase tunas, for facilitating face-to-face interviews.

3.2.3. Personal Interview Surveys

Personal interview surveys were conducted with nineteen middle-persons (including ten middlemen and nine middlewomen) who do purchase of yellowfin and bigeye tuna at Tam Quan port, and twelve middle-persons and nine traders (all are women) who mainly buy skipjack tuna at Quy Nhon port. All interviewees are either the directors of tuna purchasing companies or the owners who manage their tuna purchasing activities at the ports. Out of the ten middlemen interviewed at Tam Quan port, only two directly manage the tuna purchase at the port. The remaining middlemen are the owners of tuna purchasing enterprises, who are responsible for managing transactions with processors as well as gas stations and ice storage, while their wives, even though are not legal owners, take charge in managing the tuna purchase at the port.

A set of structured questionnaires were developed to facilitate data collection relating to middle-persons and traders in Binh Dinh. The Harvard, Moser, and USAID's six gender analysis domains were used to build the questionnaires. The information content to collect in the designed questionnaires includes general information of the interviewees, their tuna businesses, and USAID's six gender analysis domains related to these interviewees, which include: practice and participation; knowledge, beliefs, and perceptions; legal rights and status; power and decision making; time and space (Sundar Raj, 2020).

The survey instruments were designed to capture the productive, reproductive, and community roles of men and women as middle-persons and traders at the tuna purchasing stage in Binh Dinh. Multiple-choice answers were developed for each question, with an added option of ''Others, please specify'' to capture answers that are often unpredictable in the questionnaire development process. Besides, some open-ended questions were designed to understand the respondent's opinions on

related issues. We translated the structured questionnaires into the local language, and upon completion of the interview, the questions and answers back-translated to English to ensure that nothing was lost in the process of translation. The average interview lasted from thirty to forty minutes and took place at the fishing port or the respondents's home. All interviews were recorded for further analysis.

3.3. Analytical Method

Gender analysis at the tuna purchasing stage in Binh Dinh aims to identify gender differences in the roles, tasks, opportunities, and constraints of men and women as middle-persons or traders in productive, reproductive, and community managing roles.

Gender analysis tools such as Harvard, Moser, and USAID's six gender dimensions were employed as frameworks for this research. The Harvard Analytical framework (March et al., 1999) also known as the Gender Roles Framework, was used to analyze men's and women's productive and reproductive roles. Also, the Moser framework (Moser, 1993) was applied to assess community roles, which are classified into community managing activities and community politics. Using gender analysis tools such as the Harvard and Moser approaches is necessary to identify gender differentials in activity profiles and generates strategic and practical gender needs, a significant step in developing interventions that integrate and mainstream gender concerns. Additionally, this analysis was also based on USAID's six gender dimensions (USAID, 2012) to assess gender differentials in access to assets, knowledge and perceptions, practices and participation, time and space, legal rights and status, and power and decision-making. Table 5-1 presents USAID's six gender dimensions and their associated gender issues.

3.4. Data Analysis

After interviewing forty interviewees at Quy Nhon and Tam Quan ports, we created the questionnaires on Google Forms due to its facilitation for data analysis. The paper answers were manually encoded in the online survey, and then a data file in Microsoft Excel was automatically generated by Google Form. Data were analyzed in this file, and then the descriptive statistics and comparison between men and women were performed with R software. There are only forty people in the sample, and the data are non-parametric (the Shapiro tests proved that also), thus, the Wilcoxon rank-sum test was conducted instead of t-text, and the function wilcox_test were used to compare the difference between men and women. As more categories were compared, Kruskal-Wallis tests (Kruskal.test) were used, followed by Dunn tests (dunn_test). In this study, a five percent level of significance was used. The occurrence of relevant words among responses was observed and counted for open-ended questions. Finally, field notes, experiences from site visits, ocular inspection, and finding from secondary data enriched for doing gender analysis at the tuna purchasing stage (Sundar Raj, 2020).

Table 5-1: The six domains and their associated key issues

Domain	Key Issues
Access to assets	Who has access to which particular assets? What constraints do they face?
Knowledge, beliefs, perceptions	Who knows what? What beliefs and perceptions shape gender identities and norm?
Practices and participation	Who does what? What are the gender roles and responsibilities that dictate the activities in which men and women participate? How do men and women engage in development activities?
Time and space	How do men and women spend their time, as well as where and when?
Legal rights and status	How are women and men regarded and treated by customary and formal legal codes?
Power and decision-making	Who has control over the power to make decisions about one's body, household, community municipality and state? Are such decisions made freely?

Source: (USAID, 2012)

4. Results

4.1. Characteristics of Purchasing Actors and General Work Situation

The field survey results showed that the skipjack tuna trade at Quy Nhon port was traditionally associated with women (one hundred percent of total middle-persons and traders were women). In comparison, the purchase of yellowfin and bigeye tuna at Tam Quan port was taken by both men and women, which occupied fifty-three percent and forty-seven percent, respectively. At Qui Nhon port, the respondent's mean age was forty-eight years old for middlewomen, and forty-four years old for female traders. Meanwhile, the respondent's average age was forty-eight years old for middlemen, and for fifty years old for middlewomen at Tam Quan port. All interviewees were married, except for one single female trader. The average household size was six, and wives tend to be younger than husbands.

The educational level among interviewed female traders was generally quite low since their highest one was only up to the middle school. Meantime, middle-persons had a higher education level among which four persons attained the university level. The middlemen's education level was higher than that of middlewomen. For example, there were six middlemen and only one middlewoman completing high school.

In terms of tuna purchasing experience, women had a longer average time in business than men, but the difference is non-significant (Wilcoxon, $p = 0.5283$). The average business time was 12 ±10.6 years for women and 9.95 ± 10.4. years for men. However, men tend to have a promotion in work faster than women with 3.5 ± 1.84 years and 4.28 ± 3.65 years, respectively, but the difference is not significant (Wilcoxon, $p = 0.6887$). Regarding reasons for career choice, tradition and relation have been mentioned many times and equally for both men and women. Most middle-persons and traders said that their family has been in the tuna business for years, so they have good relationships with processors and fishers. Also, the stability and good

income were factors for purchasing actors to pursue their job for a long time.

In the tuna business, most women were involved in the purchase of skipjack tuna, whereas both men and women were related to the yellowfin and bigeye tuna trade. There were no male respondents in the skipjack business since this business requires a lot of time, meticulousness, and diligence which are dominant characteristics among female partners. Skipjack tuna is a much smaller size than yellowfin and bigeye tuna, so it takes more time and effort to classify according to size and quality. A large amount of skipjack tuna is sold to processors for export, whereas the remaining part, beautiful tunas, are sold to wholesalers at the fishing port from 0 am to 8 am, a hard time for purchasing actors. Meanwhile, yellowfin tuna and bigeye tuna are mainly sold to processing companies from 7 am to 5 pm, a more pleasant time than the skipjack tuna trade.

Regarding the quantity of yellowfin and bigeye tuna traded in an average month, the middlewomen dealt with larger quantities than middlemen, however, the difference is not significant (Dunn, $p = 0.691$). Regardless of the species of tuna and the profession, women dealt with significantly larger quantities than men (Wilcoxon, $p = 0.045$) with average means of 336,500 ± 347,471 (kg/month) and 165,500 ± 136,615 (kg/month), respectively. Table 5-2 presents price of kilogram of tuna, and the monthly quantity of tuna traded in Binh Dinh province according to gender and tuna species.

In terms of monthly average profit, middlewomen had significantly higher profits than that of female traders in the skipjack tuna trade (Dunn, $p=0.0328$), whereas middlewomen had a slightly higher profit than middlemen in the yellowfin and bigeye tuna purchase, yet the difference is negligible (Dunn, $p =0.485$). The daily capital was used more or less constant for men and women. For example, the money generated was always reinvested in ‘‘a special pot’’ only used for tuna trade. The money left after subtracting loading and unloading costs, ice and transportation costs, and after reinvesting in the pot, was considered as income.

Table 5-2: Price of Kilogram of Tuna, Monthly Quantity of Tuna Traded according to Gender and Tuna Species

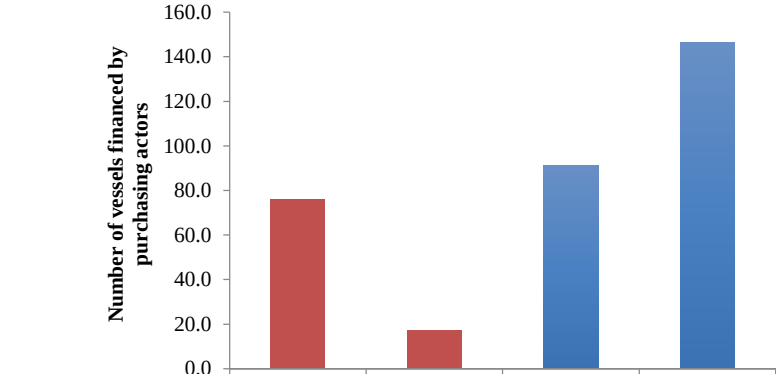
Tuna Species		Yellowfin & Bigeye Tuna	Skipjack Tuna	
Price of a kilogram of fresh tuna in May, 2020 (Vietnamese dong)				
		Middle-person	Middle-person	Trader
Men		83,700 ± 823		
Women		83,222 ± 1,563	34,583 ± 669	34,222 ± 441
Quantity of tuna traded per month (kg/month)				
		Middle-person	Middle-person	Trader
Low month	Men	126,000 ± 103,409		
	Women	241,111 ± 163,435	564,167 ± 444,843	85,556 ± 30,766
Peak month	Men	205,000 ± 169,984		
	Women	314,444 ± 215,355	757,500 ± 595,622	171,111 ± 61,531
Average month	Men	165,500 ± 103,409		
	Women	167,778 ± 112,891	379,167 ± 297,305	128,333 ± 46,149

Source: (Sundar Raj, 2020)

4.2. Six Domains of Gender Analysis

4.2.1. Access to Assets

In addition to tuna purchase, middle-persons and traders are also responsible for financial sponsorship and provide oil or ice for shipowners catching tuna. The results showed that each middle-actor provided finance for at least ten tuna fishing vessels, and the average amount invested for a vessel was from three hundred to three hundred and fifty million Vietnamese dong. In terms of yellowfin and bigeye tuna's chain, middlewomen financed more vessels than middlemen, however, the difference is not significant (Wilcoxon, p = 1). Meanwhile, the number of tuna vessels financed by female traders was less than five times that financed by middlewomen (Dunn, p = 0.0151). Figure 5-2 shows the average number of tuna vessels financed by purchasing actors according to gender and profession.



Means of the numbers of vessels	75.8	17.1	91.1	146.3

Figure 5-2: Number of tuna vessels financed by purchasing actors according to profession and gender

Source: (Sundar Raj, 2020)

Note : MP/S: Middle Person purchasing skipjack tuna; T/S: Trader purchasing skipjack tuna; M/YB: Men (Middlemen) purchasing yellowfin tuna and bigeye tuna; W/YB: Women (Middlewomen) purchasing yellowfin tuna and bigeye tuna.

Most purchasing actors who provide inputs for fishers catching tuna were the owners of ice factories and petrol stations. Regarding the yellowfin and bigeye tuna trade, the percentage of middlemen owning one petrol station was significantly higher than that of middlewomen with eighty-eight percent and forty percent, respectively. In the skipjack tuna trade, the percentage of middlewomen owning a petrol station was very high, with sixty-four percent, whereas that of female traders was quite low with only twenty percent. All middlewomen in the sample responded that although they owned ice factories and petrol stations, their husbands had a decisive voice on the matters on the use, maintenance, and operations of ice factories and petrol stations. Most purchasing agents also had some necessary and additional items related to the

tuna trading activities such as cell phones, motorbikes, freezers, refrigerators, calculators, knives, scissors, tables, baskets, and bags.

The purchasing actors are financially independent or borrow money from formal financing institutions to raise capital in the tuna business operations and their working capital requirements. The survey showed that middlewomen and middlemen tend to borrow money from banks, whereas female traders rely on self-financing. The respondents explained that middle-persons need more working capital to operate their tuna business operations, such as a large amount of money to finance many vessels, buy tuna from fishers, and invest in ice factories and petrol stations. Furthermore, middle-persons are often very rich and have more collateral than traders, hence, they borrow money from the bank more easily than traders. Meanwhile, female traders often have a small business scale and do not have much collateral, so they relied heavily on self-financing. The results also indicated that middlewomen tend to borrow from banks more than middlemen. This can be explained by the fact that middlewomen often owned larger tuna purchasing companies than middlemen. All respondents contended that their purchasers, such as processing companies, restaurasnt owners, etc., did not provide them with any sources of financing, and they did not have access to financing assistance/support from the government. Figure 5-3 depicts number of respondents using sources of financement of the business according to gender, profession, and species of tuna.

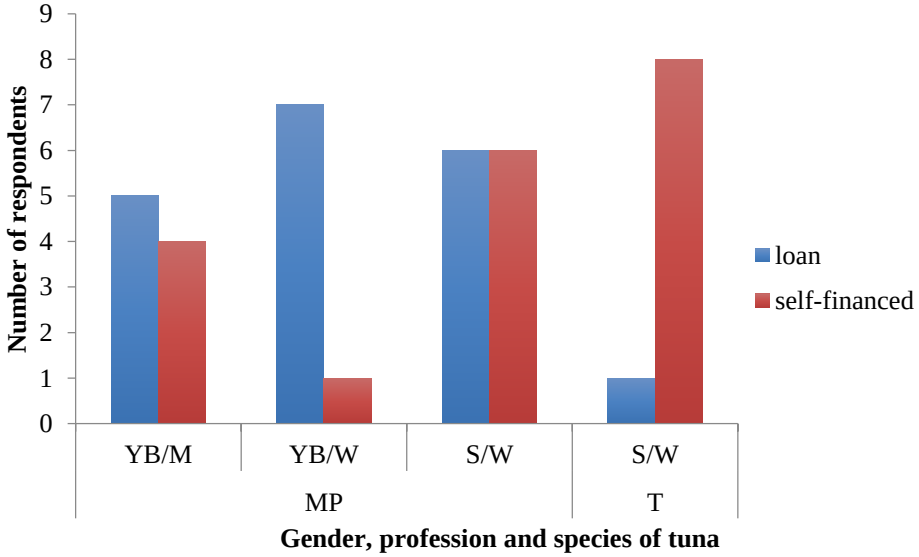


Figure 5-3: Number of respondents use sources of financement of the business according to gender, profession, and species of tuna

Source: (Sundar Raj, 2020)

Note: MP: Middle Person, T: Trader, YB/M: Men purchasing yellowfin and bigeye tuna, YB/W: Women purchasing yellowfin and bigeye tuna, S/W: Women purchasing skipjack tuna.

Both men and women generally purchased tuna at the same place at the fishing port every day, which was due to familiarity in terms of not only the place of business but

also other suppliers (fishers) and customers (processing companies, restaurant owners, wholesalers, etc.). Men only involved in purchasing yellowfin and bigeye tuna, so their main customers were processors, exporters, and restaurant owners. Meanwhile, women participated in purchasing all tuna species, so their customers were more diverse, including processors, exporters, restaurant owners, wholesalers, retailers, etc. Besides, middlemen's customers were mainly men, while both men and women were customers of middlewomen and female traders. Men typically focused on corporate clients, while women have both institutional and retail clients. Both men and women let their customers buy debts. Their customers, processing companies, paid for the goods about two weeks after receiving fresh tuna, whereas wholesalers or retailers paid for the goods and kept the original debt. Figure 5-4 presents number of respondents doing business with each type and gender of buyers.

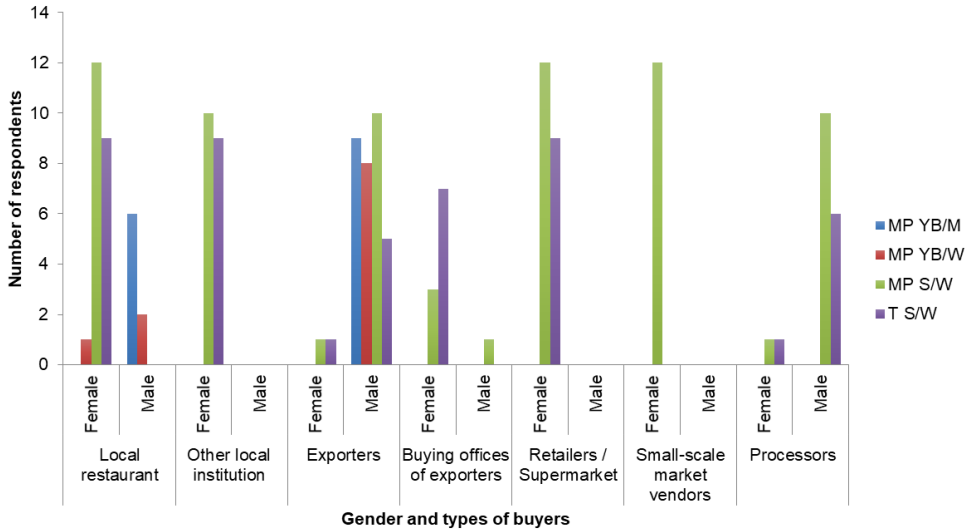


Figure 5-4 : Number of respondents do business with each type and gender of buyers

Source: (Sundar Raj, 2020)

Note: MP YB/M: Middlemen purchasing yellowfin and bigeye tuna, MP YB/W: Middlewomen purchasing yellowfin and bigeye tuna, MP S/W: Middlewomen purchasing skipjack tuna, T S/W: Female traders purchasing skipjack tuna.

4.2.2. Practices and Participation

The survey showed that men's and women's main activities in the tuna purchasing stage are based on their physical characteristics. Male laborers typically performed the more physically demanding work such as loading and unloading products, operating the equipment, cleaning and maintaining the facility, taking care of the storage, and transporting tuna to buyers. Also, they carried out other activities, such as quality control and participation in meetings. Meanwhile, female laborers often performed meticulous and careful activities, such as the record of sales and financial transactions, the payment of the bills and salaries, the receiving payments, the

processing registration, and legal documents and labeling. They also undertook activities such as weighing, sorting, classifying, packing the products, removing guts and gills, and cooking.

The participation rate of male and female laborers was different according to types of tuna trade. For the skipjack tuna trade, the number of female workers was higher than that of male workers because skipjack tunas have small size and weight so women can participate in tasks such as loading and unloading products, transporting tuna to buyers like men's. Moreover, female laborers were more favored due to their meticulous and hard work, suitable for the purchase of skipjack tuna from 0 am to 8 am. Meanwhile, the proportion of male workers was higher than the one of female workers in the purchase of yellowfin and bigeye tuna because of the men's better physical health to meet the demand for heavy jobs. Yellowfin and bigeye tunas have large size and heavy weight that requires laborers to have good health for loading, unloading, and transporting tuna from vessels to trucks, so men are preferred. Figure 5-5a and Figure 5-5b depicts business-related administrative tasks and business-related maintenance tasks done by men and women according to the species of tuna traded, respectively.

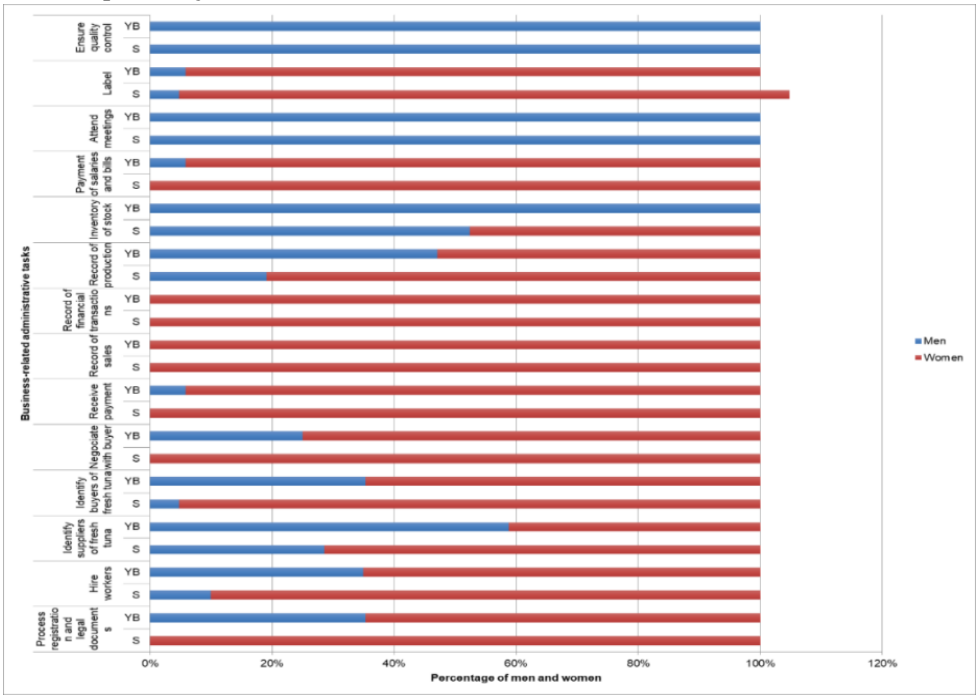


Figure 5-5a: Business-related administrative tasks done by men and women according to the species of tuna traded

Source: (Sundar Raj, 2020)

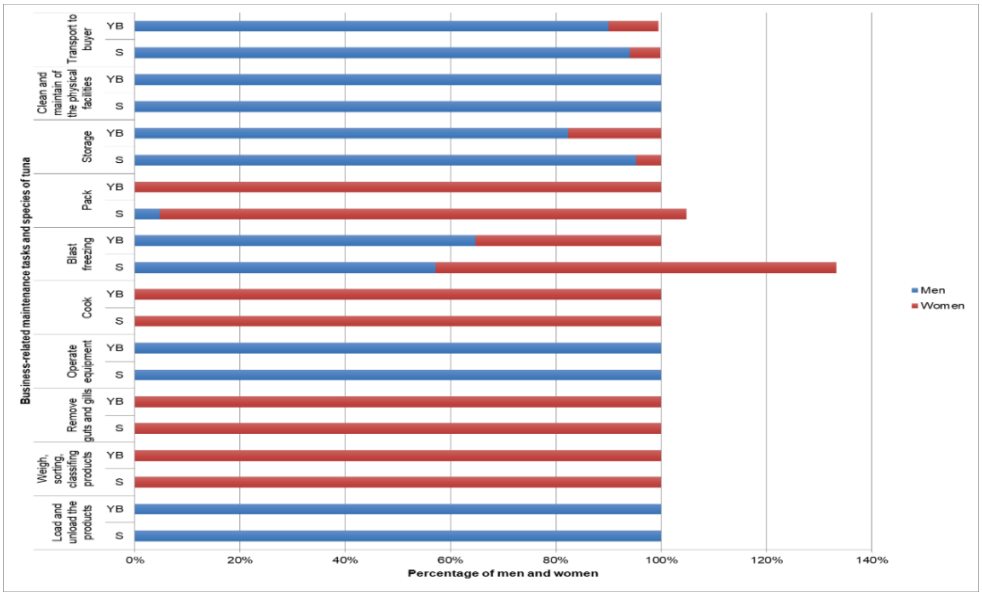


Figure 5-5b: Business-related maintenance tasks done by men and women according to the species of tuna traded

Source: (Sundar Raj, 2020)

Note: S = skipjack tuna, YB = yellowfin tuna and bigeye tuna

The majority of respondents admitted that their awareness and participation in fishery-related projects/activities were still limited. Most female traders answered that they had never participated in any community activities or association meetings or any coastal management programs. Meanwhile, most middlemen answered that they participated in the meetings related to tuna fisheries, community activities, or coastal management programs as they were invited. On the contrary, most middlewomen responded that they rarely attended any community meetings or fishery related projects/activities, but it was their husbands who did these tasks on their behalf. The majority of middlewomen and female traders focused on their tuna business and immediately returned to their home after finishing the work to take care of their family. Middlewomen in purchasing yellowfin and bigeye tunas sometimes participated in social activities in their communities. Meanwhile, middlewomen and female traders trading skipjack tuna rarely participated in those activities due to their tuna business with this harsh period from 0 am to 8 am. They saved all the time after work for compensatory sleeping and taking care of their family. Both middle-persons and female traders likewise admitted that their participation in skills training programs was quite rare.

The participation rate of middle-persons and traders in fishing-related organizations was also minimal. A small percentage of males and females were members of the Vietnam Tuna Association, which included thirty-eight percent middlewomen trading skipjack tuna, and twenty-two percent and thirty percent for middlewomen and middlemen trading yellowfin and bigeye tuna, respectively. However, none of them

occupied leadership positions (i.e., president, vice-president, secretary of Vietnam Tuna Association), and all-female traders did not participate in this organization.

4.2.3. Knowledge, Beliefs, and Perceptions

• Knowledge

This study did not reveal significant gender disparities about critical knowledge gaps about tuna and fisheries regulations, however, the comprehensive awareness of these respondents on fisheries policies and laws was quite low. More than half of men (sixty-seven percent) and women (fifty-nine percent) incorrectly answered questions related to current tuna fisheries policies and laws. This evidence found that a critical knowledge gap needs to be explained for the purchasing actors. Provincial managers need to increase the dissemination of the right information on tuna and fisheries regulations to chain actors, especially purchasing agents, due to their impacts on changing fisher's practices and helping processing enterprises operate a better traceability system (USAID, 2020).

• Skills and abilities

The results showed that women are easier, more skillful and efficient in trading transactions, and pay their debts more often than men. Seventy-eight percent middlemen and one hundred percent middlewomen and female traders believed that ''women are more skillful in trading than men''. Also, fifty-five percent middlemen and ninety-two percent middlewomen and female traders stated that ''women find it easier to deal with trading business than men''. In addition, sixty-eight percent middlemen and one hundred percent middlewomen and female traders claimed that ''women are more efficient in trading than men''. Finally, seventy-eight percent middlemen and one hundred percent middlewomen and female traders believed that ''women pay their debts more often than men''. The two reasons for women to have more advantage in the small-scale trade are that first, this activity is not suitable for men since small-scale trading need to be subservient to all other actors (Kusakabe et al., 2006) and second, women's natural ability is to avoid conflicts, thus they tend to have better negotiation skills (Weeratunge et al., 2010). Figure 5-6 depicts the percentage of opinions of men and women on gender-related statements about the tuna trade.

• Enjoyment of the job

The majority of respondents identified themselves as tuna middle-persons and traders with a high degree of job satisfaction. The results presented that there is an insignificant gender difference in the reasons for the tuna trade job's enjoyment. In the purchase of yellowfin and bigeye tuna, both middlemen and middlewomen love their own job due to several reasons, including (i) a good income and a stable and happy life (fifty percent of total respondents); (ii) money to invest in their children's education (thirty percent); (iii) awareness of the importance and the recognition of everyone on their roles in the tuna community in which they feel their freedom, pride, self-development, and better social life as a tuna middle actors (twenty percent). Likewise, most middlewomen purchasing skipjack tuna stated that they love their own job due to the three reasons mentioned above. However, female traders purchasing skipjack tuna love the job because it brings them a good income, a happy and stable

life, and their children's chances of schooling. No female traders mentioned that they feel self-developed and proud of their roles in the tuna community. Figure 5-7 depicts the number of purchasing agents providing the reasons why they enjoy their work by gender and tuna species.

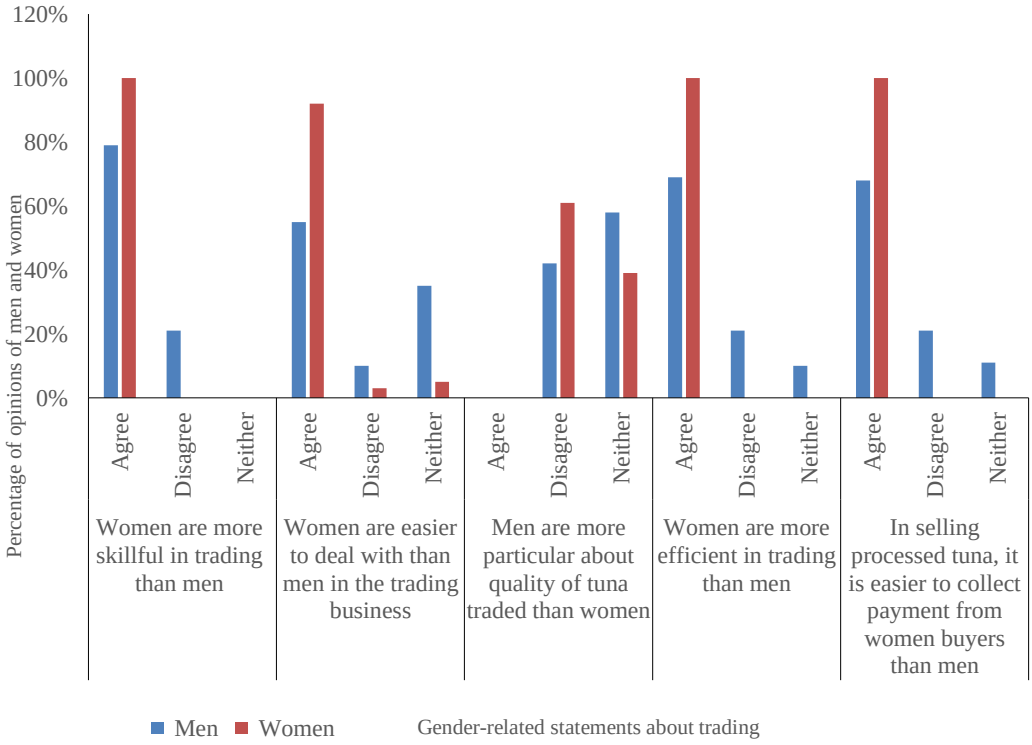


Figure 5-6: The percentage of opinions of men and women on gender-related statements about the tuna trade

Source: (Sundar Raj, 2020)

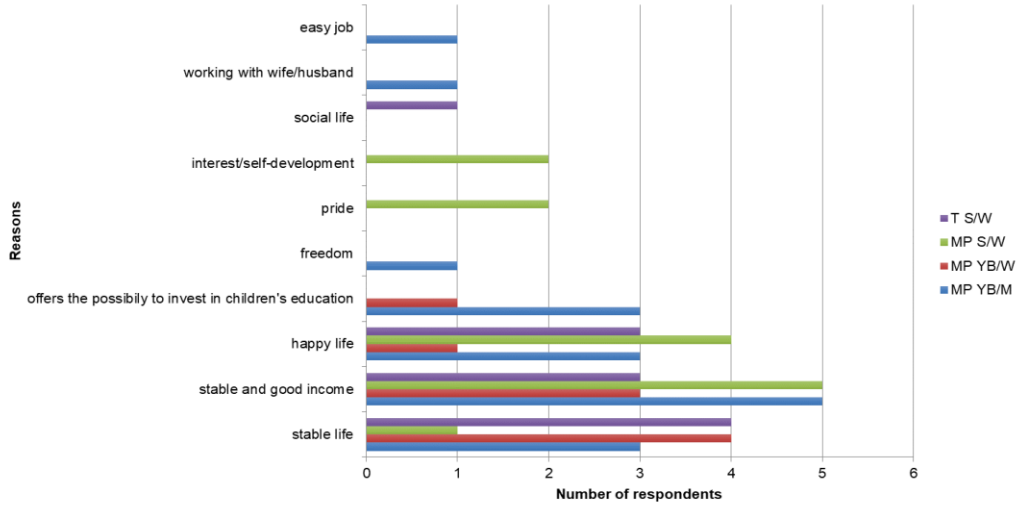


Figure 5-7: Number of purchasing agents providing the reasons why they enjoy their work by gender and tuna species

Source: (Sundar Raj, 2020)

Note: T S/W: Female traders purchasing skipjack tuna, MP S/W: Middlewomen purchasing skipjack tuna, MP YB/M: Middlemen purchasing yellowfin and bigeye tuna, MP YB/W: Middlewomen purchasing yellowfin and bigeye tuna.

- Hopes and fears

The results showed that most respondents would like to pursue and develop their business for a long time. Middlemen and middlewomen want to have stability and growth in their business to pass it on to their children while no female traders mentioned this capacity. Middle-persons raised fears in purchasing yellowfin tuna and bigeye tuna since their income decreased due to COVID 19 and the resource depletion of yellowfin tuna and bigeye tuna. Figure 5-8 presents respondent's hopes and fears according to their gender, profession, and tuna species.

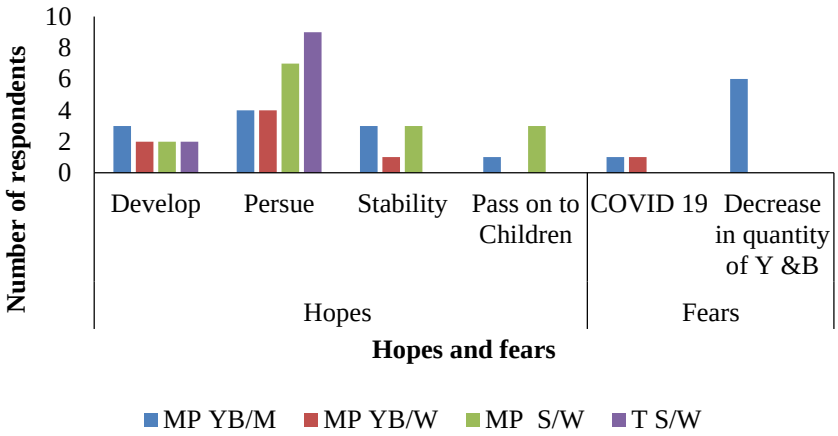


Figure 5-8: Respondents' hopes and fears according to their gender, profession and tuna species

Source: (Sundar Raj, 2020)

Note: MP S/W: Middle Person purchasing skipjack tuna (middlewomen); T S/W: Trader purchasing skipjack tuna (female trader); MP YB/M: Men (Middlemen) purchasing yellowfin tuna and bigeye tuna; MP YB/W: Women (Middlewomen) purchasing yellowfin tuna and bigeye tuna.

4.2.4. Legal Rights and Status

The results showed that middle-persons and traders easily access to laborers/workers. Specifically, the formers can find the latters within a day whenever trading operations happen. They hired workers by seasons and paid wages according to the traded volume of tuna. A small percentage of employees, such as accountants, purchasing officers, workers at ice facilities, and petrol stations, had long-term contracts. The majority of laborers working on the tuna purchasing stage did not receive accident, life, and health insurances. Also, they were not paid any form of allowances for overtime work. For the skipjack tuna trade, wages were paid equally between men and women due to their similar duties. However, male received higher wages than female in trading yellowfin tuna and bigeye tuna because of the heavier work that men were responsible for. For workers who were pregnant or had small children, they were treated like other workers without priority regimes.

4.2.5. Power and Decision Making

• Business-related

All forty respondents, including thirty women and ten men, were either owners or managers of their tuna businesses. Thirty women, including middlewomen and female traders, were the owners, and claimed that they were the main decision-makers for their businesses. They were responsible for deciding where to buy fresh tunas, whom to sell, where to get financing, and other issues concerning the tuna business, such as giving financial supports for fishers, trading volumes and schedule, and hiring workers. However, most middlewomen were involved in the tuna business with their

husbands, who often managed ice facilities and petrol stations. These middlewomen reported that they sometimes consulted their spouses in significant business decisions due to the men's understanding and position as the heads of households. Out of the ten middlemen, eight only managed general businesses, such as working with processors, managing finance, etc., whereas their wives handled tuna procurement, laborers, and other work at the fishing port on behalf of their husbands. For each couple, the husband and the wife consulted with each other to make common decisions on business issues. The remaining two middlemen were business owners and managed all tuna business activities, while their wives were housewives and incompletely understand their husband's businesses. These husbands were not obliged to consult their spouses on matters related to their businesses but found no harm informing the wives about the business status. The husbands were also responsible for transferring the business earnings to their wives, who were in charge of managing the household budget.

• Household-related

Regarding household decision issues, both male and female interviewees agreed that the mother decided on food purchase and preparation, budgeting household income while the father gave decisions on leisure activities, health activities, family rules, and community activities. Both father and mother discussed and made joint decisions on their children's education. Respondents answered that their families follow the patrilineal regime in which the father is the head of the family. In particular, both husband and wife have their opinions related to family issues, but the final decisions are made by men. Women are responsible for taking care of children, managing housework and family budget. They are money-keepers and pay for small household items, while their husbands decide on big expenses.

• Community management

The survey showed that sixty-three percent men and fifty-four percent women sometimes participated in community activities. Most respondents had never participated in training programs, public hearings, and coastal resources management programs. Many middlewomen admitted that they did not have free time to join these activities since they have to save their time for doing tuna business and taking care of their family. Meanwhile, middlemen answered that they would not like to spend much time attending those activities because they found them not useful for their tuna business. Thus, none of the respondents were either a Vietnam Tuna Association president, or a committee member, or a marine resource manager at local levels.

4.2.6. Time and Space

• Working time

For the yellowfin and bigeye tuna trade, the peak period for purchasing tuna or the main harvest season of tuna occurs from November to May, while the rest of the year is the low period. Fishers use the handline/longline method combining with light to catch tuna, so they go off-shore when moon set and return to the fishing port when moon rise. Thus, the purchase of yellowfin and bigeye tuna only takes place from the seventh to the twenty-third of every month according to the lunar calendar. During the peak period, middlemen had higher average number of working hours than

middlewomen, at 16.5 ± 0.7 hours/per day and 14.8 ± 1.8 hours/per day, respectively, but the difference is insignificant (Dunn, p = 1). During the low period, the average number of working hours of middlemen were significantly lower than that of middlewomen at 4.8 ± 3.16 hours/per day and 6.0 ± 2.14 hours/per day, respectively (Dunn, p = 0.03). A large amount of yellowfin and bigeye tuna is mainly sold to processing companies, so the daily working time of middle-persons is from 7am to 5 pm.

The skipjack tuna trade takes place all year round, and its peak period lasts from December to May. Fishers use purse seine and gillnet methods to catch tuna, and the tuna fishing vessels landed at the fishing port every day. During the peak period, the middlewomen and female traders had an average number of working hours of about sixteen hours per day at the fishing port, while that during the low period was eight hours per day. Compared to the trade of yellowfin and bigeye tuna, the skipjack tuna trade requires a longer working time and a harder schedule due to its regular working time from 0 am to 8 am every day.

• Spare time

Regarding spare time, the activities of men and women were completely different. Ninety-six percent women, who were married, reported that they did not have spare time. They had to take care of their children and family after finishing their work at the fishing ports. Only one woman, who was single, had free-time after work. Meanwhile, eighty-nine percent middlemen said that they spent spare time for activities such as drinking beer or having coffee with their friends and talking to partners to expand their relationships. Only eleven percent men answered that they did housework with their wives and educate their children after work. We emphasize here that the middlewomen and female traders trading skipjack tuna have to work from midnights to early mornings, so they often sleep and take care of their families during daytime. Thus, most of them do not have spare time for their leisure activities.

In addition, Vietnamese culture expects women to be mainly responsible for childcare and housework, while middlewomen and female traders do not allow this cultural expectation to limit the time and labor that they commit to their business. They would like to do well in both of the productive and the reproductive roles. Most women presented at the fishing ports just in time for the tuna purchase and immediately returned home after finishing their work for doing their duties as a daughter-in-law, a wife, and a mom. A large amount of time that women spend on their productive and reproductive activities had negative impacts on other areas of their lives, for example, they had less time for leisure, sleep and rest.

The overwhelming majority of middlewomen and female traders were not interested in any fisheries activities in their community. All female traders have never participated in any of these activities, while a few middlewomen were aware of them and sometimes participated in. The productive and reproductive responsibilities had already taken up spare time of those women, making them not have enough time to participate in community programs actively.

• Distance

The middle-persons and traders were local people and had close relationships with tuna fishers. Most respondents reported that their house is very close to the fishing port. The average distance between their house and the fishing port by gender is 4.72 ± 2.07 kilometers for women and 5.67 ± 2.0 kilometers for men, which is not significant (Wilcoxon, $p = 0.151$). The majority of the middle-actors went to the fishing ports by motorbike; only one middleman and one middlewoman traveled by car to get to the port. Most female partners said that doing tuna business closed to their home helps them fulfill both productive and reproductive roles, while male partners answered that trading tuna in the fishing port was very convenient for their business due to the availability of good relationships with fishers and processors.

5. Discussions and Conclusion

5.1. Discussions

This study provides valid evidences for gender analysis in the tuna fisheries community by identifying the gender differences between men and women as purchasing actors on the tuna value chain in Binh Dinh province. The gender disparities between men and women were shown in productive, reproductive, and community roles based on USAID's six gender dimensions to assess gender differentials in access to resources; beliefs, knowledge and perception; practices and participation; time and space; legal rights and status; and power and decision-making. Issues on gender equity, women's empowerment, and sustainable tuna management will be presented in Sections 5.1.1 and 5.1.2. Several recommendations will be proposed in Section 5.1.3 to improve these issues.

5.1.1. Issues on Gender Equality and Empowerment

- Responsibilities in tuna business management and household chores limit women's exposure to the community life. The majority of middlewomen and female traders do not have enough free time to involve in fisheries organizations and related activities in their communities. Failure to participate in these activities results in women's deficiency in organizational skills and positive relationships with other actors in the tuna value chain.
- Due to being kept busy with their productive and reproductive activities, most women seem to be unable to spend time on their leisure and sleep/rest. Particularly, in addition to upbringing children and doing household chore, middlewomen and traders are also required to manage the tuna business at the fishing ports while the average working time is equal to or even higher than men's. Therefore, women's lack of free time reduces their opportunities to establish good relationships to have broader and more profitable markets.
- Women's reproductive role, which is unpaid, makes it difficult for middlewomen and female traders to accumulate capital and experience in the startup stage. In particular, women did not receive any incentives/benefits during pregnancy and child rearing, so they depended entirely on their husbands during this period.
- The low educational attainment of middlewomen and female traders can badly/ negatively result in the efficiency of their tuna business. Also, owing to less chance

for training programs on business skills and tuna fisheries management, many women lack necessary management skills for their business.

• Most middlewomen and female traders play less important role in decision-making even though they are business owners. Particularly, in order to make any significant decisions on work issues, they have to consult with their spouses who are considered the family head.

• Women are constrained to traditional norms and values in society to participate in the decision-making process actively. Some stereotypes in terms of productive, reproductive and social roles are listed below:

• Gender disparity in work management and administration. In all tuna businesses, women are in charge of managing tuna procurement and managing other tasks at the fishing ports. As regards men, middlemen are responsible for managing ice factories and petrol stations and doing bank transactions.

• Gender disparity in the allocation of activities in the purchasing phase. Most of the male laborers are involved in physically demanding jobs while female laborers' major responsibilities deal with administrative tasks.

• Gender disparity in family life. Middle-women and female traders are mainly responsible for upbringing children and doing housework, whereas men only get involved if they feel their willingness.

• Gender disparity in decision-making in family. Due to patrilineal culture in which man is the head of the family, the final decisions are made by the husband even though women are involved in discussion on family related issues.

• Gender disparity in professional community management activities. Women had a less critical voice than men in these community activities. In particular, most middlewomen and female traders take secondary role in tuna fisheries or community organizations while men often have the final say in community activities and fisheries-related organizations/projects.

Despite being constrained to traditional norms and values, middlewomen and female traders take the dominant role in the tuna business in terms of productivity and financial investment for tuna vessels. Therefore, the tuna trade has brought women a certain degree of empowerment in which middlewomen and female traders could asserted their positions in the tuna business.

5.1.2. Issues on Sustainable Fisheries Management

• The knowledge gap of the purchasing actors on tuna and fishery regulations is quite low. This, as a result, has triggered their misunderstanding in laws, regulations, and current tuna fisheries policies.

• The limited participation of purchasing actors, especially middlewomen and female traders, in fisheries-related activities/projects in the community mitigates the decisive voice of women in fisheries organizations and community projects.

• The purchasing actors suffer low income and unsustainable livelihoods due to resource depletion of yellowfin and bigeye tuna. Consequently, purchasing agents have to look for other ways to make their living, for example, purchasing other seafood or investing in other businesses such as hotel services, restaurants, etc.

5.1.3. Recommendations

The study has identified significant issues such as gender equality, women's empowerment, sustainable tuna fisheries management issues, the following intervention policies are recommended.

Regarding gender equality and women's empowerment, first of all, gender-responsive strategies should place the emphasis on women's important role in housework, unpaid work. Secondly, it is necessary to establish tuna trading management board at the fishing ports to easily gather information of needs, problems, and interests of middle-persons and traders. All of these activities should be supported by the local authority and operate as a platform for men and women to discuss common or different tuna trade issues as well as share knowledge and information at the fishing ports to prevent wasting participants'time, especially women.

As regards women's roles in tuna business community and production, local authorities need to have policies on economic, social, and educational supports for tuna middle-persons and traders in general, and for women in particular. Specifically, women, especially female traders, should be provided access to savings, credit, micro-finance services, so that they can have opportunities for expanding their business. In addition, alternative job opportunities must be offered in low seasons, especially for female workers. Besides, training courses on tuna business and management skills should be conducted/ organized at the fishing port during the low periods so that all purchasing actors, especially women, can fully participate in them. Finally, fishing port facilities for the community's well-being in general and women's benefits of using the facilities in particular must be improved.

In terms of sustainable tuna fisheries management, local managers should increase the dissemination of information on tuna fisheries and fisheries policies during the low periods. The aim is to increase the purchasing actors' awareness, to ensure the sustainability of tuna business activities, and to improve sustainable tuna fisheries management with the ultimate goal of enhancing the competitiveness of the tuna value chain. Besides, local managers should have policies to support purchasing actors, especially for laborers in the yellowfin and bigeye tuna trade, to look for alternative ways of earning money to compensate for the resource depletion.

5.2. Conclusion

This paper presents gender analysis at the tuna value chain's purchasing stage in Binh Dinh province in 2020. We used gender analysis tools such as Harvard, Moser, and USAID's six gender dimensions to identify the gender disparities between men and women as middle-persons and traders in productive, reproductive, and community roles. This study helps to identify significant issues such as gender equality, women's empowerment, sustainable tuna fisheries management issues, and suggests intervention policies.

6

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

This thesis is part of the outcome of DFCPSFDV Project implemented from 2018 to 2020. It starts with three research questions which highly concentrate on economic and gender issues across the tuna value chain in three South Central provinces of Vietnam. This dissertation aims to propose fisheries policies, in order to improve the socio-economic life of fishers and women in the chain for developing sustainable tuna fisheries in particular and Vietnamese fisheries in general. We used a value chain analysis framework and combined secondary information and primary data of 435 respondents (mainly fishers, middle-persons, traders, and processors) and 40 purchasing actors (both men and women) involved in the tuna value chain in three provinces of Binh Dinh, Phu Yen, and Khanh Hoa. After analyzing economic and gender issues in the tuna value chain, we have discovered meaningful findings to answer the aforementioned research questions. These findings lead us to the following conclusions:

- A map of the Vietnamese tuna value chain is made, the roles and positions of the fishers and several factors negatively affecting fishers' income are identified.

➢ The map of the Vietnamese tuna value chain is established with core processes, key actors and activities, material flows, knowledge and flows of information, the volume of tuna materials, number of actors and jobs, values at different levels, and relationships between key actors on the tuna value chain.

There are five core processes in the Vietnamese tuna value chain: input provision, tuna exploitation, tuna purchase, tuna process, distribution, and market. Key actors involved in the tuna value chain in the local area include fishers, traders/middle-persons, processors/exporters, wholesalers/retailers, and supporting actors. Mapping tuna material flows gives a clear picture from preparing the inputs before each voyage to transporting tuna products to wholesalers/retailers. It helps us assess value-adding, wasteful, and necessary but not value-adding activities. Regarding knowledge flows, all actors are concerned with the quality of tuna raw materials but to different degrees. For example, fishers and traders/middle-persons are money-oriented concerns, so they place tuna quality at a lower priority than tuna volume. In contrast, processors are concerned with the quality and quantity of raw tuna to comply with Vietnamese and export market standards. For information flows, the processing enterprises determine the price, demand on species, quantity, and quality of raw tuna. Meanwhile, fishers are price takers and do not receive public and comprehensive market information. There are 3,206 shipowners, 130 middlemen/traders, and 14 processors in the tuna value chain. Processors add the highest values to the chain, followed by fishers then, traders/middlemen. Regarding the relationship and linkage between actors, fishers have credit relationships with traders/middle-persons and have little trust and weak linkages with other actors.

➢ The roles and position of fishers and several factors affecting fisher's income are identified.

The results have shown that fishers play significant roles on the chain as they exploit and provide raw tuna for the entire chain. Nevertheless, they have a little position and

a minor influence in the chain. Fishers rely heavily on middle-persons and traders for credit loans. They get loans from traders/middle-persons before each voyage and sell caught tuna to these same lenders afterward, which is one of the primary causes of fishers'low bargaining power in tuna transactions. Fishers are price takers and do not have access to obvious market information. Several adverse factors which directly affect the income of fishers are listed below. The first factor is that the quality of caught tuna decreased, significantly affecting the fisher's income due to outdated fishing vessels and traditional fishing methods, long sea trip duration, and unguaranteed logistics services. In addition, the education level of fishers is deficient. Fishers still stand alone on the chain and do not cooperate together to take advantage of buying input material in bulk at lower prices and the benefits of significant financial and operational scales when cooperating.

- An overview of the economic efficiency of the Vietnamese tuna value chain is provided, market structures of key actors are quantitatively determined, and some factors affecting the chain's performance, especially fisher's performance are identified.

➢ The economic efficiency of the Vietnamese tuna value chain is shown by examining the financial performance of three key economic actors on the chain, including shipowners, middle-persons, and processors.

The processing enterprises achieve the highest net incomes per kilogram of tuna and the total volume of tuna traded. The total net income per kilogram of yellowfin and bigeye tuna in the entire chain was VND 126,000 a kilogram, among which the processors reached the highest percentage with 79 percent, and the shipowners and the middle- persons came next with 21 percent and 2 percent, respectively. For the total volume of yellowfin and bigeye tuna traded in a month, the processors achieved the highest net incomes, with 96 percent of the net incomes of the entire chain. The middle persons attained the second rank with three percent, followed by shipowners with one percent. Considering the total volume of tuna traded, the shipowners obtained tiny and the lowest profit, compared to middle-persons and processors, even though they are the exploiters and suppliers of raw tuna for the chain.

➢ The Gini coefficient and Lorenz curve are used to measure the market concentration of the actors on the chain; the results have shown that the market structure of these actors is different.

The shipowner's market structure tends to be perfectly competitive, with the value of the Gini coefficient calculated as 0.37 and the Lorenz curve close to the 45-degree line. In contrast, the market structure of the processors and the middle persons tend to be in monopolistic competition. Their Gini coefficients are 0.44 and 0.51, respectively, and the Lorenz curves of these actors lie far from the 45-degree line. Thus, the market structures of processors and middle-persons tend to be monopolistic, and the incomes are accrued to a small group of market participants. This result denotes an inefficient and imperfect raw tuna trading market in three South Central provinces as monopolistic competition exists in the market.

➢ Some factors affecting the chain's performance, especially fisher's performance are identified.

Market structure is one of several significant factors that can affect the economic performance of the tuna value chain's actors. The monopoly market structure has a negative impact on the chain's economic efficiency. Besides, economies of scale and collective marketing can enhance the financial performance of the actors. The processors and the middle persons with considerable financial and operating scales have traded a significant volume of tuna products, thereby reducing business costs and increasing profits. Meanwhile, shipowners with small and dispersed production scales failed to benefits of collecting marketing, so their financial performance indicators have not been as expected. Besides, access to market information and business loans can affect the financial performance of the actors. The processors and the middle persons have more access to tuna market information and business loans than the shipowners, so they significantly have better financial performance indicators.

- The social roles of women as purchasing actors, gender inequalities, and women's empowerment are affirmed.

➢ Middlewomen and female traders still dominate the tuna business on the production and finance scale, even though traditional norms and values confine them.

Regardless of the tuna species and fisheries, women traded significantly larger quantities of tuna than men (Wilcoxon, $p = 0.045$), with an average of 336,500 ± 347,471 (kg/month) and 165,500 ± 136,615 (kg/month), respectively. In addition, middle women and female traders are more accessible, skillful, and efficient in trading transactions and pay their debts more frequently than men.

➢ Some gender inequalities and women's empowerment are identified.

The gender analysis shows that women as purchasing actors still bear many disadvantages compared to middlemen. Women do not have enough time to spend on their leisure, sleep/rest, involvement in fisheries organizations and community activities, participation in training programs on business skills, and establishing good business relationships with other partners in consequence of being busy with their productive and reproductive activities. Also, women's reproductive role is unpaid, and they do not receive any incentives/benefits during pregnancy and child-rearing; thus, they are entirely dependent on their husbands during this period. Besides, middle women and female traders play a secondary role in tuna fisheries or community organizations, consult their husbands in significant business decisions, and are not the final decision makers in the family.

Based on the conclusions mentioned above, we recommend two following policy packages to provide more support for fishers and women who endured the vulnerabilities/disadvantages in the tuna value chain. The aim is to improve their socio-economic life in the tuna fisheries community. Details are presented at the end of this thesis.

2. Recommendations

2.1. Support policies for fishers

To reduce the vulnerability of fishers and improve their socio-economic life, increased support from the government, NGOs, and private sector for fishers is a prerequisite. Supporting policies should target four key areas: technical training, infrastructure needs, financing, and research and development (Bjorndal et al., 2014).

2.1.1. Policies to support technical training

➢The government should strongly support funding for training and technical guidance for fishers on advanced tuna fishing and preservation technology.

One of the causes leading to the decline in the quality of raw tuna and directly affecting the income of fishers is the use of outdated tuna fishing and preservation technology. Some traditional methods used by fishers to catch tuna harmed the raw tuna's quality, such as letting caught tuna struggle hard before pulling it on board, using rudimentary tools to beat the tuna's head to death, and not performing its gill hook and organ removal. Thus, only one percent of the volume of tuna caught is in good quality to be exported the whole tuna to the Japanese market with a high unit price, whereas ninety-nine percent of tuna volume with a lower quality level is exported to other markets with significantly lower selling prices. Therefore, the Directorate of Fisheries and the Sub-department of Fisheries in three South Central provinces should open training programs to guide fishers on effective tuna fishing and preservation technology. For example, the Directorate of Fisheries should support sending technical staff and typical fishers abroad to learn advanced tuna fishing and preservation technology at fisheries centers in some countries with developed tuna fisheries, such as Japan, SEAFDEC, or hiring foreign experts to teach effective tuna fishing and preserving methods for fishers (Quyen, 2018).

2.1.2. Policies to support the development of infrastructure systems at fishing ports

➢ The government should upgrade or invest in building new fishing port systems or fishing wharves specialized for docking and trading in tuna.

Currently, the system of fishing ports and wharves in Vietnam's three South Central provinces is commonly used for various fish species. The infrastructure in fishing ports and wharves has been upgraded and built; however, most of the wharves in fishing ports have no roofs, reducing the quality of raw tuna when transporting tuna from vessels to the fishing ports, especially in the hot season. Furthermore, most fishing ports do not have a cold storage system to preserve tuna, so fishers have to sell raw tuna quickly to avoid post-harvest losses, especially in the peak season. Therefore, the government should invest in or upgrade a system of fishing ports specialized for docking and trading in tuna. This system will include fishing wharves with roofs, a preliminary processing area, a storage system, and a wastewater treatment system to ensure tuna quality, food hygiene, and safety and reduce post-harvest losses (Quyen, 2018). In particular, the government should invest a cold storage system in the fishing

ports, helping fishers eliminate the worry of ‘‘good season, low price’’ during the peak fishing season.

➢The government should build a tuna auction center/ tuna auction market.

Shipowners often have meager financial resources and borrow finance from middle-persons and traders before a sea trip, so they have to sell their caught tuna to these purchasing actors. In addition, the classification and assessment of tuna quality at the fishing port rely entirely on the judgment of the purchasing agents and the processing enterprises. Furthermore, the purchasing actors often buy in bulk, manipulating raw tuna’s size, price, and quality at the fishing port. Besides, fishers are price recipients and do not have access to open and transparent tuna market information. Moreover, monopolistic competition exists in the raw tuna trading market in three South Central provinces, resulting in income inequality and power inequality for fishers on the chain. In addition, (Jacinto and Pomeroy, 2011) asserted that the auction system is a potential mechanism to offer higher prices to fishers and avoid exploitation; thus, the government should establish a tuna auction center or tuna auction market in each province under the close supervision of the local fisheries department. These auction centers/markets will determine the exact quantity, quality, size, and price of raw tuna and set standards for raw tuna, price ranges, and delivery time. These are the primary conditions for fishers to have the right to discuss the selling price of tuna raw materials with purchasing actors and processing enterprises according to market signals in which high-quality tuna materials will come with a high unit price and vice versa (Quyen, 2018). At the same time, these auction centers/markets will help the tuna trading market in the study area operate more efficiently, avoiding monopolistic competion.

➢ Private enterprises should invest in service vessels to purchase raw tuna offshore and upgrade logistics services at the local fishing ports.

The average time of a long sea voyage, from 20 to 25 days, negatively affects the quality of tuna raw upon arrival at the fishing ports. Therefore, private companies should invest in service vessels to buy tuna directly offshore, helping fishers reduce the long tuna preservation time on ships. Besides, some logistics services for fishing and trading tuna at local fishing ports are still backward and weak, such as shipbuilding and ice supply services which indirectly affect the quality of raw tuna. Thus, private enterprises need to upgrade their tuna fishing logistics facilities to improve fishing efficiency and reduce post-harvest losses.

2.1.3. Financial support policies for fishers

➢The government should establish tuna fishing cooperatives.

The shipowners operate individually, and each person buys input materials at retail prices. Consequently, the production cost of a sea voyage is high, which reduces the net returns of fishers per sea trip. Currently, the shipowners have not cooperated in taking advantage of buying input materials in large quantities as well as having significant financial and productional scales. In addition, some academic literature suggests that the establishment of cooperative models helps small-scale fishers increase their bargaining power, share resources (Bjorndal et al., 2014), and improve

their financial returns (Jacinto and Pomeroy, 2011). Therefore, we recommend that the government should initiate tuna fishing cooperatives. The basic idea of the formation of tuna fishing cooperatives is to organize the association of shipowners exploiting raw tuna with each other from the purchase of input materials, to the exploitation, preservation, transportation, and consumption of raw tuna. These cooperatives will promote the linkages between exploiting and processing through association contracts and mobilize capital contributions from cooperative members or borrow capital from credit institutions to expand their operations. Besides, the tuna fishing cooperatives will invest in the fishery logistics services at the local fishing ports, such as shipbuilding, ice services, fishing gear, and oil, serving cooperative members (Quyen, 2018).

To encourage and persuade shipowners to join tuna fishing cooperatives, fisheries managers should establish pilot models of tuna fishing cooperatives in the three South Central provinces of Vietnam according to the following primary contents: (i) Establishing pilot tuna fishing cooperative groups from shipowners voluntarily participating in this group; (ii) Building a linkage chain between a pilot tuna fishing cooperative group and processing companies in order to ensure a good connection between fishers and processors, for examples, processing enterprises commit to purchase raw tuna from this cooperative group at reasonable prices and reward shipowners for good performances and the provision of high-quality raw tuna; (iii) Organizing dialogues between groups of fishers and tuna processors in the linkage model to help strengthen linkages and exchange of information on the market, requirements, and product standards in order to build a sustainable cooperation mechanism; (iv) Organizing training courses and discussing on issues of developing cooperation capacity among team members, such as the pilot implementation of cooperation in the process of purchasing input materials and consumption of raw tuna or the sharing of experiences on fishing and preserving tuna effectively. Successfully organizing such pilot models of local tuna fisheries cooperatives will help tuna fishers to realize many practical benefits when participating in cooperative groups rather than standing alone. Fisheries managers will then spread the success of these models and encourage other fishers to join cooperative groups. These pilot models of local tuna fishing cooperatives are the future precursors for the local tuna fishing cooperatives (Quyen, 2018).

➢ The government should have savings, credit loans, and microfinance programs, creating conditions for fishers to access capital quickly.

The credit-based relationship between fishers and purchasing actors can either be gainful or exploitative. On the one hand, middle persons/ traders provide timely financial support before each sea voyage. In return, fishers are price takers and have to sell raw tuna to these purchasing actors. Therefore, the government should increase financial support for small-scale fishers to solve cash flow issues by researching and implementing savings, credit loans, and microfinance programs, creating conditions for fishers to access these capital sources promptly.

➢The local government should guide fishers in applying more consistent price valuation methods and recording cost and net returns over time.

The profit-sharing arrangement between shipowners and their crews is unfair. Fishing laborers do not know clearly about the caught volume and the total revenue and profit of each sea-trip and are not pleased with the total amount paid by shipowners. Thus, the local government should open a short-term training program for fishers in applying more consistent valuation methods and recording costs and net profits, and suggest an explicit agreement between shipowners and workers on board before each sea voyage.

2.1.4. Policies to support research and development

➢ The government should have programs to apply advanced tuna exploitation and preservation technologies.

The results showed that fishers still use traditional methods to catch and preserve tuna, one of the reasons for the decrease in the quality of raw tuna, directly affecting their income. Therefore, the directorate of fisheries and the local fisheries sub-departments should organize pilot samples on applying advanced technology in fishing and preserving tuna, such as Japanese tuna fishing and preserving technology.

➢ The government should study an appropriate linking model for the tuna value chain in three South Central provinces.

The results showed that the tuna value chain actors have a weak relationship, especially fishers, who lack trust and linkage with other actors on the chain. At the same time, processing enterprises have not shown their leadership role in the chain. They still depend on middle persons or traders to buy raw tuna materials without any specific solution to improve the sustainable development of tuna fisheries in the three South Central provinces. Meanwhile, processors are the most influential actors on the tuna value chain, potentially being a key agent for connecting the other actors on the chain; however, they are currently doing limited in this direction. Therefore, the Directorate of Fisheries and the local fisheries sub-departments should study a suitable linkage model managed by the processor and apply this model to the tuna value chain in three South Central Provinces.

2.2. Policies to support women

2.2.1. Policies that help improve gender equality and women empowerment

➢ Gender-responsive strategies should emphasize the vital role of women in taking care of their family, which are unpaid work.

Responsibilities in the tuna business management and household chores make it impossible for female purchasing actors to sleep or rest fully and positively participate in fisheries organization and related activities in their communities. Women are primarily responsible for raising their children and doing housework, yet the reproductive role is not recognized. Therefore, we recommend that gender-responsive strategies in sustainable tuna fisheries development policies need to highlight the significant role of women in upbringing children and doing housework.

➢ The local fisheries sub-departments should establish a tuna business management board and organize training courses on tuna business and management skills at the fishing port.

Female purchasing actors do not have time to attend training programs in the tuna business and management skills and expand positive relationships with other actors in the tuna value chain. Thus, we recommend that the local fisheries sub-departments should set up a tuna business management board at the fishing port to collect information easily on the needs and problems of purchasing actors and help them share their knowledge and interests in the information of tuna products at the port, to avoid wasting the time of participants, especially women. Besides, local authorities should organize short-term training courses on the tuna business and management skills at fishing ports during the low season so that male and female purchasing agents can fully participate.

➢ The local government should have savings, credit, and microfinance programs helping women traders access these services promptly to expand and develop their business.

Compared with middlewomen, female traders have much lower capital and collateral. Thus, they are not financially sufficient to expand and develop their tuna business. Therefore, we recommend that the local authorities should open savings, credit, and microfinance services for female tuna traders to have opportunities to develop their tuna business. However, there are several potential problems of indebtedness when subsidized and directed credit programs granted to the poor (including small-scale fishermen and female traders) such as poor loan recoveries, inefficiencies, and high transaction costs, among others. Therefore, it is necessary to establish microfinance services in the local area for the poor including small-scale female traders (Tietze and Villareal, 2003). To establish successful microfinance programs for the poor, lenders and borrowers must adhere to the following principles (Ledgerwood, 1999), including (i) lenders provide services tailored to the preferences of the poor, such as small and short-term loans, suitable for the income and the payment model of the poor; (ii) lenders need to effectively manage operations to decrease unit costs such as standardizing the lending process, selecting staff from the local community; (iii) lenders need to create encouragements for customers to repay loans, for example, preferential pricing in exchange for quick repayment; (v) lenders need to charge full-cost interest rates and fees. In addition, establishing microfinance programs for small-scale female traders should ensure the timeliness and the linkage between these programs and oceanic tuna fisheries' production and procurement characteristics (Tietze and Villareal, 2003).

➢ The local authorities should introduce alternative jobs for male and female workers involved in the tuna purchasing process during the low season, especially female workers.

During the low season, the amount of raw tuna landed in the fishing ports is much less than in the primary season, so the workload for workers participating in the tuna purchasing process is much lower. Thus, we recommend that the local government

should have a policy of introducing alternative jobs for tuna purchasing workers during the sub-harvested season.

➢ The local government should improve facilities in the fishing ports.

As mentioned in the policies to support fishers, fishing port facilities must be improved for the benefit of the community and the interests of women when using these facilities in particular.

➢ The local fisheries sub-departments should raise awareness of purchasing actors, especially women, on current laws and regulations and tuna exploitation, trade, and process policies.

The understanding of purchasing actors on current laws and regulations related to tuna fisheries is relatively low. Therefore, local managers should increase the dissemination of information on tuna fisheries and current fisheries policies during the low season to allow purchasing actors to participate fully.

2.3. Proposing some solutions for the sustainable management of tuna fisheries

Vietnam is trying to improve the specific tuna fisheries management system. The Vietnamese government has issued Decision 339/QD-TTG 2021- Approving the strategy for developing Vietnam's fisheries by 2030 with a vision towards 2045 (Minister, 2021). In addition, the Directorate of Fisheries coordinated with the Marine Fisheries Research Institute to implement the two projects related to the survey of aquatic resources and planning and constructing a system of marine protected areas for sustainable development; however, these projects have not yet been completed. The results of these projects will serve for the management, granting quotas of mining licenses, formulating industry development strategies, and planning for exploitation and protection of resources (RIMF, 2020). This thesis will suggest some solutions helping to protect fisheries resources in general, and tuna resources in particular, in the long-term, as follows:

➢ **The implementation of quotas according to the number of vessels engaged in tuna exploitation:** According to the WCPFC, the current fishing efforts of Vietnamese tuna vessels are still below the maximum sustainable yield (WCPFC, 2020)However, fisheries managers should implement quotas for oceanic tuna fishing fleets to protect tuna stocks and sustainably manage the tuna fishery long-term (RIMF, 2019).

➢ **Building a data collection system:** Data on resources (stocks, biological behavior, migration) and catch statistics are still limited. Therefore, fisheries managers should establish and operate a commercial fishery statistics system to collect information on tuna catches and fishing intensity through activities such as "Capture Log Book" and "exploiting monitoring". These activities will be necessary for adjusting fishing activities towards sustainability (RIMF, 2019).

➢ **Implementation of monitoring tuna fishing activities:** To sustainably manage oceanic tuna fisheries, fisheries managers should monitor tuna fishing activities. These activities help to manage tuna fishing vessels, such as the vessel's operating

area, compliance with regulations on fishing gear, and the object of exploitation. Monitoring the tuna fishing activities is carried out by staff from the Resource Protection Department or an appropriate specialized unit in the local area (RIMF, 2019).

REFERENCES

Abdel-Fattah, Sayed, Malcolm, Gamal and Naggarb (2015). *Value chain analysis of the aquaculture feed sector in Egypt.* Aquaculture, 437: 92-101.

Ada-Okungbowa, C. I. (1998). *The market structure, conduct, and performance for Jam in Ondo State, Nigeria.* Agrosearch, 4(1&2): 12-20.

Adeogun, O. A., etal (2009). *Economic Viability of Small-scale Marine Capture Fisheries in the Bonny Area, Rivers State, Nigeria.* Marine Resource Economics, 24(2): 195-203.

Adolf, S., S. R. Bush and S. Vellema (2015). *Reinserting state agency in global value chains: The case of MSC certified skipjack tuna.* Fisheries Research, 182.

Agri-ProFocus (2012), *Gender in value chains: Practical toolkit to integrate a gender perspective in agricultural value chain development*: *Cgiar Gender Platform*.

Albert, J., M. Jeanne and A. Gerald (1999). *Structure, Conduct, And Performance Changes In The U.S. Agricultural Commodity Trucking Industry.* Journal of Food Distribution Research, Food Distribution Research Society, 30(1): 1-14.

Allen, A. a. S., S (2005). Performance of the Agricultural Commodity Trucking Sector in the United States. The Southwestern Economics Association Annual Meeting, March 23-26. New Orleans, LA.

Allison and Ellis (2001). *The livelihoods approach and management of small-scale fisheries.* Marince Policy, 25(5): 377-388.

Anderson, J., C. Anderson, J. Chu, J. Meredith, F. Asche and G. Sylvia (2015). *The Fishery Performance Indicators: A Management Tool for Triple Bottom Line Outcomes.* PLoS ONE, 10(5).

Assembly, U. G. (2012). Fisheries and the right to food. Note by the Secretary-General. Fish is food -the FAO's fish price index.

Bailey, M., S. R. Bush, P. Oosterveer and L. Larastiti (2016). *Fishers, Fair Trade, and finding middle ground.* Fisheries Research, 182.

Bain, J. (1951). *The Relation of profit Rate to Industry Concentration, American Manufacturing, 1936-1940.* Quarterly Journal of Economics, 65(3): 293-324.

Bain, J. (1956), *Barriers to New Competition*: Harvard University Press, Cambridge, MA.

Bain, J. (1968), *Industrial Organization*. New York: John Wiley and Sons Inc.

Barclay, K., A. M. Payne, S. Mauli and O. Krushelnytska (2015). *Toward Gender-Quitable Fisheries Management in Solomon Islands*. D. C. W. B. G. Washington.

Barclay, K., M. Voyer, N. A. Mazur and A. M. Payne (2017). *The importance of qualitative social research for effective fisheries management.* Fisheries Research.

Barney, J. B. (2001). *Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view.* Journal of Management.

Béné, C. (2006). Small-scale Fisheries: Assessing Their Contribution to Rural Livelihoods in Developing Countries. FAO. Rome.

Bennett, E. (2005). *Gender, Fisheries and Development.* Marine Policy, 29(5): 451-459.

Berkes, F., R. Mahon, P. McConney, R. Pollnac and R. Pomeroy (2001). *Managing smalls cale fisheries. Alternative directions and methods.* International Development Research Centre.

Bila, Y. and Y. Bulama (2005). *Structure of Maiduguri Cattle Market, Borno State Nigeria* Global Journal of Agricultural Science, 4(2): 159-164.

BinhDinh. (2018). "*Binh Dinh-Potential and Investment Opportunities*." https://binhdinh.gov.vn/en/doanh-nghiep/investment-promotion-policy/investment-policy-of-the-province.

Biswas (2017), *Towards gender-equitable small-scale fisheries governance and development*: Food and Agriculture Organization of the United Nations FAO.

Bjørndal, T., A. Child, Lem, Audun.M. and M. Dey (2015). *Value Chain Dynamics and the Small-Scale Sector: A Summary of Findings and Policy Recommendations for Fisheries and Aquaculture Trade. Aquaculture Economics & Management*, 19:1: 148-173.

Bjorndal, T., A. Child and A. e. Lem (2014). Value Chain Dynamics and the Small-Scale Sector. Policy Recommendations for Small-Scale Fisheries and Aquaculture Trade. FAO Fisheries and Aquaculture Technical Paper. FAO. Rome**:** 112.

Bolwig, S., P. Stefano, T. Andries, R. Lone and H. Niels (2010). *Integrating Poverty and Environmental Concerns into Value-Chain Analysis: A Conceptual Framework.* Development Policy Review 28(2): 173-194.

Brock, J., Obst, N. (2009). *Market Concentration, Economic Welfare, and Antitrust Policy.* Journal of Industry, Competition and Trade 9: 65-75.

Browne, P. B. (2002). *Women do fish: a case study on gender and the fishing industry in Sierra Leone.* Global Symposium on Women in Fisheries.

Calhoun, S., F. Conway and S. Russell (2016). *Acknowledging the Voice of Women: Implications for Fisheries. Management and Policy.* Marine Policy, 74: 292-299.

Cao, L. Q., T. H. Nguyen, Q. T. Trinh, P. T. Phan and T. D. Cao (2018). *Value Chain Analysis for Skipjack Tuna Captured in the South Central Region of Vietnam. Vietnam Journal Agricutural Science*, 16(9): 791-798.

Chapman, M. (1987). *Women fishing in Oceania. Human Ecology*, 15(3): 267-288.

Choo, P. S., B. S. Nowak, K. Kusakabe and M. J. Williams (2008). *Guest Editorial: Gender and Fisheries. Development*, 51(2): 176-179.

Chuenpagdee, R., L. Liguori, M. L. D. Palomares and D. Pauly (2006). *Bottom-up, global estimates of small-scale marine fisheries catches.* Fisheries Centre Research Reports, 14(8).

Cochrane, K. (2020). *Reconciling sustainability, economic efficiency and equity in marine fisheries: Has there been progress in the last 20 years?* Fish and Fisheries, 1-26.

Coronado, Salas, Gonzáleza and Chuenpagdeec (2020). *Who's who in the value chain for the Mexican octopus fishery: Mapping the production chain.* Marine Policy, 118.

Cotterill, R. (1986). *Market Power in the Retail Food Industry: Evidence from Vermont.* The Review of Economics and Statistics, 68(3): 379-386.

Cotterill, R. (1987). *Agricultural Cooperatives: A Unified Theory of Pricing, Finance, and Investment.* Cooperative Theory: New Approaches.

Crona, B., M. Nyström, C. Folke and N. Jiddawi (2010). *Middlemen, a critical social-ecological link in coastal communities of Kenya and Zanzibar.* Marince Policy, 34(4): 761-771.

Custom (2019). Internal Report of the General Department of Vietnam Customs.

Custom (2020). Internal Report of the General Department of Vietnam Customs.

Custom, V. (2018). Internal Report of the General Department of Vietnam Customs.

D-Fish (2018a). Internal Report of the Directorate of Vietnamese fisheries.

D-Fish (2018b). Internal Report of the Directorate of Vietnamese fisheries.

Daw, T. M. (2014). *Women Fish Traders on the Kenyan Coast: Livelihoods, Bargaining Power, and Participation in Management.* Coastal Management, 42, 531-554.

Diamond, N. K., L. Squillante and L. Z. Hale (2003). *Cross Currents Navigating Gender and Population Linkages for Integrated Coastal Management. Marine Policy*, 27(4): 325-331.

Drury O'Neill, E., B. , A. J. G. Crona, R. Ferrer, Pomero and J. N. S (2018). *Who benefits from seafood trade? A comparison of social and market structures in small-scale fisheries.* Ecology and Society 23(3).

Duijin, A. P. V., R. Beukers and W. V. D. Piji (2012). The Vietnamese seafood sector - A Value Chain Analysis, *Centre for the Promotion of Imports from Developing Countries* (CBI).

Edwards, P. (1999). *Aquaculture and poverty: past, present and future prospects of impact.* Discussion paper prepared for the 5th Fisheries Development Donor Consultation.

Edwards, S., A. Allen and S. Shaik (2006). Market Structure Conduct Performance Hypothesis Revisited using Stochastic Frontier Efficiency Analysis. American Agricultural Economics Association. USA.

EIGE. (2015). "Gender Analysis." from https://eige.europa.eu/gender-mainstreaming/methods-tools/gender-analysis.

FAO (1995). Code of Conduct for Responsible Fisheries. Rome.

FAO (2004). Report of the Expert Consultation on the Role of Small-scale Fisheries in Poverty Alleviation and Food Security. No. 749. F. F. Report. Rome.

FAO. (2005)."Charting Income Inequality. The Lorenz Curve. EASYPol Series 000." from http://www.fao.org/policy-support/tools-and-publications/resources-details/fr/c/445784/.

FAO. (2006). "Inequality Analysis: The Gini Index. EASYPol Series 040." from http://www.fao.org/policy-support/tools-and-publications/resources-details/es/c/446282/.

FAO (2010). The State of World Fisheries and Aquaculture.

FAO (2011). *Gender Inequality, Risk and Vulnerability in the Rural Economy: Re-focusing the Public Works Agenda to Take Account of Economic and Social Risks, by Rebecca Holmes and Nicola Jones.*

FAO (2012). The State of World Fisheries and Aquaculture 2012. Rome.

FAO (2013). Fao policy on gender equality - attaining food security goals in agriculture and rural development.

FAO (2014). Developing Sustainable Food Value Chains. Guiding Principles.

FAO (2015a). *A Review of Women's Access to Fish in Small-Scale Fisheries.* Fisheries and Aquaculture Circular.

FAO (2015b). Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication.

FAO (2020). In brief - The state of World fisheries and aquaculture- Sustainability in action.

FAO (2020a). The State of World Fisheries and Aquaculture 2020. Sustainability in action. FAO. Rome, Italy.

Ferrol-Schulte, D., S. Ferse and M. Glaser (2014). *Patron–client relationships, livelihoods and natural resource management in tropical coastal communities.* Ocean & Coastal Management, 100: 63-73.

Figueirêdo Junior, H. S., M. P. M. Meuwissen and A. G. J. M. Oude Lansink (2014). *Integrating structure, conduct and performance into value chain analysis.* Journal on Chain and Network Science, 14(1): 21-30.

Fro¨cklin, S., M. D. L. T. Castro, L. Lindstro¨m and N. S. Jiddawi (2013). *Fish Traders as Key Actors in Fisheries: Gender and Adaptive Management. AMBIO*, 42: 951-962.

Gereffi (2011). *Global Value Chain Analysis: A primer.* Duke Center on Globalization, Governance & Competitiveness.

Ginevicius, R. and S. Cirbas (2007). *Determining market concentration.* Journal of Business Economics and Management.

Grydehoj, A. and N. Nurdin (2015). *Politics of technology in the informal governance of destructive fishing in Spermonde, Indonesia.* GeoJournal, 81(2): 291-292.

Hall, L. e. a. (1979). *Beef Wholesale-Retail Marketing Margins and Concentration.* Economica, 46: 295-300.

Harper, S., C. Grubb, M. Stiles and R. Sumaila (2017). *Contributions by Women to Fisheries Economies: Insights from Five Maritime Countries. Coastal Management*, 45(2): 91-106.

Harper, S., D. Zeller, M. Hauzer, D. Pauly and U. R. Sumaila (2013). *Women and Fisheries: Contribution to Food Security and Local Economies. Marine Policy*, 39: 56-63.

Harriss, B. (1993), *There is method in my madness or is it vice versa? Measuring agricultural performance in agricultural and food marketing in developing countries* Redwood Books, Trowbridge, Wilshire.

Hart and Stringer (2016). *Upgrading and exploitation in the fishing industry: Contributions of value chain analysis.* Marine Policy, 63: 166-171.

Hass, A., D. Edwards and U. Sumaila (2016). *Corporate concentration and processor control: Insights from the salmon and herring fisheries in British Columbia.* Marine Policy, 68: 83-90.

Hauzer, M., P. Dearden and G. Murray (2013). *The Fisherwomen of Ngazidja Island, Comoros: Fisheries Livelihoods, Impacts, and Implications for Management. Fisheries Research*, 140: 28-35.

Hay, D. and D. Morris (1991), *Industrial Economics and Organization: Theory and Evidence*: Oxford University Press.

Hillenbrand, E., S. Lakzadeh and A. Talukder (2014). *Using the Social Relations Approach to Capture Complexity in Women's Empowerment: Using Gender Analysis in the Fish on Farms Project in Cambodia. Gender and Development*, 22(2).

Holt, Weisman, Johnson and Käll (2016). *A Social Wellbeing in Fisheries Tool (SWIFT) to Help Improve Fisheries Performance.* Sustainability, 8(8): 667.

Humphrey, J. S., H. (2010). *Governance and upgrading: linking industrial cluster and global value chain research.*

Huy, L. (2018), *The study on tuna value chain in South Central Provinces, Vietnam.*

Jacinto, E. R. and R. S. Pomeroy (2011), *Developing markets for small-scale fisheries: utilizing the value chain approach, in: R.S. Pomeroy*. UK and Cambridge. MA, USA Oxfordshire.

Jespersen, Kelling, Ponte and Kruijssen (2014). *What shapes food value chains? Lessons from aquaculture in Asia.* Food Policy, 49: 228-240.

Jimenez, E. A., M. T. Amaral, P. L. D. Souza, M. d. N. F. Costa, A. S. Lira and F. L. Fedou (2020a). *Value chain dynamics and the socioeconomic drivers of small-scale fisheries on the amazon coast: A case study in the state of Amapa, Brazil.* Marine Policy.

Jimenez, E. A., A. M.T and P. L. D. Souza (2020b). *Value chain dynamics and the socioeconomic drivers of small-scale fisheries on the amazon coast: A case study in the state of Amapá, Brazi.* Marine Policy, 115.

Johnson, D. S. (2006). *Category, narrative and value in the governance of small-scale fisheries.* Marine Policy, 30(30): 747-756.

Jueseah, Knutsson, Kristoferssona and Tómassonc (2020). *Seasonal flows of economic benefits in small-scale fisheries in Liberia: A value chain analysis.* Marine Policy, 119.

Kabeer, N. (1995). *Reversed Realities: Gender Hierarchies in Development Thought. Contemporary Sociology*, 24(5).

Kabeer, N. (1996). *Agency, Well-being & Inequality: Reflections on the Gender Dimensions of Poverty IDS.* Bulletin, 27(1): 11-21.

Kabeer, N. (1999). *Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment. Development and Change*, 30(3): 435-464.

Kaplinsky, R. (1999). *Globalisation and Unequalization: What Can Be Learned from Value Chain Analysis.* Journal of Development Studies 2(37): 117-146.

Kaplinsky, R. and M. Morris (2001). *A Handbook for Value Chain Research.*

Kimani, P., A. Wamukota, J. Maynyala and C. Mlewa (2020). *Factors influencing financial performance in marine small-scale fisheries value chain in Kenya.* Marine Policy, 122.

Koralagama, D. K., J. Gupta and N. Pouw (2017). *Inclusive Development from a Gender Perspective in Small Scale Fisheries. Current Opinion in Environmental Sustainability*, 24: 1-6.

Krishnan, M. and R. Narayanakumar (2011). *Structure, Conduct and Performance of Value Chain in Seaweed farming in India.* Agricultural Economics Research Review, 23: 505-514.

Kronen, Vunisea, Magrona and McArdle (2010). *Socio-economic drivers and indicators for artisanal coastal fisheries in Pacific island countries and territories and their use for fisheries management strategies.* Marine Policy, 34(6): 1135-1143.

Kruijssen, F., J. Albert, M. Morgan, D. Boso, F. Siota, S. Sibiti and A. J. Schwarz (2013). Livelihoods, Markets, and Gender Roles in Solomon Islands: Case Studies from Western and Isabel Provinces, *CGIAR Research Program on Aquatic Agricultural Systems. Penang Malaysia*.

Kula, O., J. , Downing and M. Field (2006). *Value chain programmes to integrate competitiveness, economic growth and poverty reduction* Small Enterprise Development 17(2): 23-35.

Kulindwa, K. and R. Lokina (2013). *Winners and Losers in the Finfish Trade on Mafia Island: A Value Chain Analysis.* Western Indian Ocean Journal Marince Science, 12: 151-168.

Kusakabe, K., P. Sereyvath, U. Suntornratana and N. Sriputinibondh (2006). *Women in Fish Border Trade: The Case of Fish Trade between Cambodia and Thailand.*

Lamn, R. (1981). *Prices and Concentration in the Food Retailing Industry*. The Journal of Industrial Economics, 30: 67-78.

Law, V. (2018). Tiêu chuẩn Việt Nam TCVN12153:2018.

Lazzarini, S., F. Chaddad and Cook (2001). *Integrating Supply Chain and Network Analyses: The Study of Netchains.*

Lipczynski, J., J. Wilson and J. Goddard (2013), *Industrial Organization, Competition, Strategy, Policy*: Prentice Hall, London, second edition.

Lwenya, C. A. and R. Abila (2000). *The Gender Role in Fish Processing and Trading Practices in Lake Victoria (Kenya).* Lake Victoria Fisheries Organization.

M4P. (2008). "Making Value Chains Work Better for the Poor: A Toolbook for Practioners of Value Chain Analysis ", from http://www.fao.org/3/at357e/at357e.pdf.

Mabe, S., N. P. Parenreng, P. D. Karningsih and P. Engelseth (2016). *Mitigating Risk in the Tuna Supply through Traceability System Development.* International Food and Agribusiness Management Review, 19(1).

Macfadyen, G. e. a. (2012). *Value-chain analysis — An assessment methodology to estimate Egyptian aquaculture sector performance.* Aquaculture, 362-363: 18-27.

March, C., I. Smyth and M. Mukhopadhyay (1999). *A Guide to Gender Analysis Frameworks.* Oxfam GB.

Marion, B. E. A. (1979). *The Price and Profit Performance of Leading Food Chains.* American Journal of Agricultural Economics, 61: 420-433.

Martin, K. (2005). *Mapping Economic Diversity in the First World: The Case of Fisheries* Environment and Planning A: Economy and Space.

Martínez-Espinosa, M. (1997). *Expert Consultation on Small-Scale Rural Aquaculture 1997*. FAO Fisheries Report No. 548. FAO. Rome.

Mason, E. (1939). *Price and Production Policies of Large-Scale Enterprise.* American Economic Review, 29(1): 61-74.

Mcgregor, J. A. and W. Camfield (2009). *Needs, Wants and Goals: Wellbeing, Quality of Life and Public Policy. Applied Research in Quality of Life*, 4(2): 135-154.

McKinsey (2010). *Valuation: Measuring and Managing the Value of Companies.*

Mebrate, Y. and A. Worku (2019). *Structure, Conduct and Performance of Fish Market in Central Ethiopia.* Management Studies and Economic Systems, 4(4): 295-303.

Medard, M. (2012). *Relations between People, Relations about Things: Gendered Investment and the Case of the Lake Victoria Fishery, Tanzania. Signs Journal of Women in Culture and Society*, 37(3): 555-566.

Meschi, M. (1997). *Analytical Perspectives on Mergers and Acquisitions: A Survey.* CIBS Research Papers in International Business, 5(97).

Mkunda, J., J. Lassen, B. Chachage, L. J.M., Kusiluka and L. Pasape (2019). *Analysis of marketing efficiency of processed sardine products of Lake Victoria: Case of Tanzania.* African Journal of Science, Technology, Innovation and Development Policy Review.

Mohamed, Z., M. Shamsudin, A. Latif and A. Mu'azu (2013). *Measuring competition along the supply chain of the Malaysian poultry industry.* International Conference on Social Science Research.

Molyneux, P. and W. Forbes (1995). *Market structure and performance in European banking.* Applied Economics, 27(2).

Moore, R. (1973). *Concentration, Technology, and Market Power in Banking, Is Distance Dead?* Federal Reserve Bank of Dallas Financial Industry Studies: 1-10.

Moser, C. O. (1993), *Gender Planning and Development: Theory, Practice, and Training*.

Narver, J. and R. Savitt (1971), *The Marketing Economy: An Analytical Approach*: New York : Holt, Rinehart and Winston.

Ndaghu, A. A., V. B. Taru and J. A. Isah (2011). *Structure and Conduct of vegetable Marketing in Kwadom Yamaltu-Deba Local Government area of Gombe State.* Global Journal of Agricultural Sciences, 10(1): 71-75.

Neuberger, D. (1997). *Structure, Conduct and Performance in Banking Markets.* Thuenen-Series of Applied Economic Theory 12, University of Rostock, Institute of Economics.

Nguyen, K. and C. Jolly (2018). *Balancing interests of actors in the ocean tuna value chain of Khanh Hoa province, Vietnam.* Marine Policy, 98: 11-22.

Nurdin, N. and A. Grydehoj (2015). *Informal governance through patron–client relationships and destructive fishing in Spermonde Archipelago, Indonesia.* Journal of Marine and Island Cultures, 40(2).

O'Neill, E. D., N. K. Asare and D. W. Aheto (2018). *Socioeconomic Dynamics of the Ghanaian Tuna Industry: A Value-Chain Approach to Understanding Aspects of Global Fisheries. African Journal of Marine Science* 40(3): 303-313.

Oparinde, L. and S. Oluwadare Ojo (2014). *Structural Performance of Artisanal Fish Marketing in Ondo State, Nigeria* American Journal of Rural Development, 2(1): 1-7.

Overa, R. (1993). *Wives and Traders: Women's Careers in Ghanian Canoe Fisheries.* MAST, 6(1/2): 110-135.

Oxfam (2016). *Identifying Gender Inequalities and Possibilities for Change in Shrimp Value Chains in Montreal Indonesia and Vietnam.*

Pelton, L., D. Strutton and J. Lumpkin (2014), *Marketing Channels - A Relationship Management Approach* Edinburgh Business School, Heriot- Watt University.

Pérez-Ramírez. M., B. Phillips, D. Lluch-Belda and S. E. Lluch-Cota (2012). *Perspectives for implementing fisheries certification in developing countries.* Marine Policy, 36(1): 297-302.

Polymeros, K., C. Karelakis and E. Kaimakoudi (2010). *A path analysis approach in investigating the performance of the Greek fisheries market.* Acta Agriculturae Scandinavica 7(2-4): 128-138.

Pomeroy, R., J. Parks, K. Courtney and N. Mattich (2016). *Improving marine fisheries management in Southeast Asia: Results of a regional fisheries stakeholder analysis.* Marine Policy, 65: 20-29.

Pomeroy, R. S. and A. C. Trinidad (1995), *Industrial organization and market analysis: Fish marketing*.

Ponte, S. (2008). *Greener Than Thou: The Political Economy of Fish Ecolabeling and Its Local Manifestations in South Africa.* World Development, 36(1): 159-175.

Porter (1985), *The Competitive Advantage: Creating and Sustaining Superior Performance*: NY: Free Press.

Purcell, D. (1973). *An Approach to Research on Vertical Integration: The Beef System in Oklahoma.* American Journal of Agriculture, 55(1).

Purcell, S., B. Crona, W. Lalavanua and H. Eriksson (2017). *Distribution of economic returns in small-scale fisheries for international markets: A value-chain analysis.* Marince Policy, 86: 9-16.

Quyen, C. (2018). Studying solutions to improve the efficiency of tuna value chain in the Central region, Report of the Vietnam institute of fisheries economics and planning.

Rosales, R. M., R. Pomeroy, I. J. Calabio, M. Batong, K. Cedo, N. Escara and M. A. Sobrevega (2017). *Value chain analysis and small-scale fisheries management.* Marine Policy, 83: 11-21.

Roth, A. (2004). *The Ecology of a Dual Television Market: Competition and Diversity in the Netherland.* 6th World Media Economics Conference, Montreal, Canada.

SEAFDEC (2017). SEAFDEC Annual Report 2017.

Sebastian, C. A. F., G. Marion and S. M. Kathllen (2014). *To cope or to sustain? Eroding long-term sustainability in an Indonesian coral reef fishery.* Regional Environmental Change.

Shepherd, W. (1972). *The Elements of Market Structure.* Review of Economics and Statistics, 54: 25-37.

Shrestha, M. K. and J. Pant, eds. (2012). *Small-scale Aquaculture for Rural Livelihoods: Proceedings of the National Symposium on Small-scale Aquaculture for Increasing Resilience of Rural Livelihoods in Nepal.* Rampur, Chitwan, Nepal, Institute of Agriculture and Animal Science, Tribhuvan University, and Penang, Malaysia, WorldFish Center.

Silva, A. (2020). *Value chain of fish and fishery products: origin, functions and application in developed and developing country markets.* Food and Agriculture Organization of the United Nations.

Silva, D. D. A. M. D. (2011). *Faces of women in global fishery value chains-Female involvement, impact and importance in the fisheries of developed and developing countries.*

Society, W. C. (2012). *A Gender Perspective on Securing Livelihoods and Nutrition in Fish-dependent Coastal Communities.* Evaluations and Research.

Sundar Raj, R. (2020), *Gender Analysis in the Purchasing Node in the Tuna Value Chain in the Central Provinces of Vietnam*, Master's thesis, Gembloux Agro-Bio Tech (GxABT). University of Liege, Gembloux, Belgium.

Taru, V. B. and H. Lawal (2011). *Concentration in the North Eastern Nigeria's yam market: a Gini coefficien analysis.* Journal of Tropical Agriculture, Food, Environment and Extension, 10(2): 49-57.

The National Office (2017). *Announcement on the Administrative Map of the Socialist Republic of Vietnam.*https://ipvietnam.gov.vn/web/english/introduction//asset_publisher/lkBHulAdnfEF/content/announcement-on-the-administrative-map-of-the-socialist-republic-of-vietnam.

Thi Minh Hop, H. (2012), *Integration of farmers in the shrimp subsector in the Mekong river delta, Vietnam*, Doctoral thesis, Liege University.

Thorpe, A., N. Pouw, A. Baio, R. Sandi, E. Ndomahina and T. Lebbie (2014). *"Fishing Na Everybody Business": Women's Work and Gender Relations in Sierra Leone's Fisheries. Feminist Economics*, 20(3): 53-77.

Thu, N., C. Quyen, L. Hang, Nang Thu Tran Thi and P. Lebailly (2020). *Social Value Chain Analysis: The Case of Tuna Value Chain in Three South Central Provinces of Vietnam.* Asian Social Science, 16(8): 43.

Times, T. E. "Definition of Market Concentration" from https://economictimes.indiatimes.com/definition/market-concentration.

Timothy, F. B. (1989), Chapter 17 Empirical studies of industries with market power. Handbook of Industrial Organization. 2**:** 1011-1057.

Tran, N., C. Bailey, N. Wilson and M. Phillips (2013). *Governance of Global Value Chains in Response to Food Safety and Certification Standards: The Case of Shrimp from Vietnam.* World Development, 45.

Tuara, P. N. (2006). *Gender Issues in the Pacific Islands Tuna Industry*. Secretariat of the Pacific Community Noumea, New Caledonia.

Tung, G., C. Lin and C. Wang (2010). *The market structure, conduct and performance paradigm re- applied to the international tourist hotel industry.* African Journal of Business Management, 4(6): 1116-1119.

Ukav,I. (2017). *Market Structures and Concentration Measuring Techiques.* Asian Journal of Agricultural Extension, Economics and Sociology, 19(4).

UN (1992). "United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992."

UN (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. U. Nations.

UN (2017). The first-ever Ocean Conference. U. Nations.

UN, DESA. United Nations, Population Division (2019). World Population Prospects: The 2019 Revision. In: United Nations.

USAID (2006). "Guidelines for Value Chain Analysis." from https://www.spring-nutrition.org/publications/tool-summaries/guidelines-value-chain-analysis.

USAID (2012). *Toward Gender Equality in Europe and Eurasia: A Toolkit for Analysis.* USA.

USAID (2018). Gender Considerations in Tuna Fisheries. *15th Infofish World Tuna Conference*: *Tuna 2018*. Bangkok, Thailand.

USAID (2020). Analysis of the tuna value chain in Binh Dinh province, Vietnam.

Ussif RashidSumaila, L. (2011). *Managing Bluefin Tuna in the Mediterranean Sea.* Marine Policy, 36: 502-511.

Veliu, A., N. Gessese, C. Ragasa and C. Okali (2009). *Gender Analysis of Aquaculture Value Chain in Northeast Vietnam and Nigeria. World Bank.*

Vellema, H. (2010), *Governance, inclusion and embedding: Raising the issues* (Chapter), Value Chains, Social Inclusion and Economic Development, 1st Edition, Routledge, 19.

Vervaele, K. (2014). *Flemish Fishermen's Wives: Their Lives and Roles in Fisheries. Social Issues in Sustainable Fisheries Management*: 201-203.

Vietnam (2017). "Fisheries Law 2017", https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Luat-Thuy-san-338490.aspx.

Vu, D. H. (2018). National tuna management plan in Vietnam for 2019-2021. WCPFC.

Walker, B. L. E. (2001). *Sisterhood and Seine-Nets: Engendering Development and Conservation in Ghana's Marine Fishery. The Professional Geographer*, 53(2).

Walker, B. L. E. (2002). *Engendering Ghana's Seascape: Fanti Fishtraders and Marine Property in Colonial History.* . Society and Natural Resources, 15(5): 389-407.

Wamukota, A., T. D. Brewer and B. Crona (2014). *Market integration and its relation to income distribution and inequality among fishers and traders: The case of two small-scale Kenyan reef fisheries.* Marine Policy, 48: 93-101.

Wanga, Somogy and Charlebois (2019). *Mapping the value chain of imported shellfish in China.* Marine Policy, 99: 69-75.

Watson, Nichols, Lam and Sumaila (2017). *Global seafood trade flows and developing economies: Insights from linking trade and production.* Marine Policy, 82: 41-49.

WCED (1987). Brundtland Report, the World Commission on Environment and Development.

Weeratunge, N., C. Béné, R. Siriwardane, A. Charles, D. Johnson, E. Allison, H., , P. Nayak, K., and M. C. Badjeck (2013). *Small-Scale Fisheries through the Wellbeing Lens. Fish and Fisheries*, 15(2).

Weeratunge, N., T. M. Chiuta, A. Choudhury, A. Ferrer, S. M. C. Hüsken, Y. Kura, and P. Kantor (2012). *Transforming Aquatic Agricultural Systems Towards Gender Equality: A Five Country Review. . Aquatic Agricultural System* AAS-2012-21.

Weeratunge, N. and K. Snyder (2009). Gleaner, Fisher, Trader, Processor-Understanding Gendered Employment in the Fisheries and Aquaculture Sector. *FAO-IFAD-ILO Workshop on Gaps, trends and current research in gender dimensions of agricultural and rural employment: differentiated pathways out of poverty*.

Weeratunge, N., K. Snyder, A., and C. P. Sze (2010). *Gleaner, Fisher, Trader, Processor: Understanding Gendered Employment in Fisheries and Aquaculture Fish and Fisheries.* Fish and Fisheries, 11(4).

Weiss, L. (1971). *Quantitative studies of industrial organization.* University of Wisconsin.

Wessels, P. (2017). *The Roles of Women in Maldivian One-by-One Tuna Supply Chains: A Scoping Study*, Dalhousie University, International Pole & Line Foundation.

Williams, D. M., Molyneux, P., Thornton, J. (1994). *Market structure and performance in Spanish banking.* Journal of Banking and Finance, 18: 433-443.

Williams, M. J. (2008). *Why look at Fisheries through a Gender Lens?* . Development, 51(2): 180-185.

Wilson, J. R. and J. Boncoeur (2008). *Microeconomic efficiencies and macroeconomic inefficiencies: on sustainable fisheries policies in very poor countries. Oxford Development Studies*, 36(4): 339-460.

WorldBank, FAO and W. Center (2010). *The hidden harvests – the global contribution of capture fisheries*. C. edition.

WorldFishCenter (2011). Aquaculture, fisheries, poverty and food security. Penang, Malaysia.

APPENDICES A

APPENDIX 1: QUESTIONNAIRES FOR FISHERS

Name of Enumerator:

Date of interview:

Name of Community:

Dear Correspondent,

We are members of a Ministry of Science and Technology-funded national research project on the fisheries value chain entitled "Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam". Since tuna fishery is one of the significant fisheries in Vietnam, we choose tuna fisheries as a typical study representing Vietnam fisheries. The overall aim is to analyze the economic issue in the tuna value chain to propose policies toward improving the socio-economic life of fishers in the chain. The research objective is to provide a basic overview and the economic efficiency of the tuna value chain and examine which critical factors can affect its economic efficiency.

This research includes the following specific objectives:

- Map the Vietnamese tuna value chain to describe the main actors, material/product flows, volume, number of actors and employees, knowledge and information, relationships, linkages and trust, and the value at different levels of the tuna value chain;

- Investigate the economic efficiency of the tuna value chain by analyzing the financial performance of each of the main economic actors along the tuna value chain, including transaction volume, costs, revenues, returns, and profitability across the different actors along the value chain;

- Examine which critical factors can affect the financial performance of each actor, especially the financial performance of fishers.

The obtained data will only be used for research purposes and to help develop policy recommendations to develop sustainable tuna fisheries in Vietnam. We hope you will feel comfortable providing us with accurate data and information; your information will be treated with the utmost confidentiality. Please feel free to ask any questions or raise any issues you might have. Thank you for your participation. Please fill in the formation and tick your choice on the appropriate boxes.

I. General Information

1. Address: ……Ward:....., District:....., Province:.....

2. Interviewee's name:.....; Phone number:.....

3. Age:.....;. Sex: ☐ Man ☐ Woman

4. Your position: (Shipowner =1; Captain=2; Other =3)

5. Educational level : (Illiteracy =1; Primary=2; Secondary= 3; High school =4)

6. What is your marital status?

☐ Single ☐ Married ☐ Divorced ☐ Widowed

7. What is your household size?

☐ <= 5 ☐ 6-10 ☐ >10

II. Production Information

1. What is your main occupation?

☐ Handline ☐ Longline ☐ Purse seine ☐ Gillnet

2. The main exploited species

☐ Yellowfin tuna and bigeye tuna ☐ Skipjack tuna ☐ Others

3. How many years do you become a fisher?:….(years). How many years do you exploit tuna?:……(years).

4. What is your occupation qualification?

☐ Well-trained ☐ Short-term training ☐ Experience ☐ Others

5. How many average employees are there in your vessel? :……(persons); How many family members in your vessel?:…..(persons); How many numbers of hired employees are there in your vessel?..... (persons).

In which: The number of employees trained:……(persons).

6. Fishing season: Main season: From …to…. Extra season: From …….to……

7. Forms of production:

☐ Single ☐ Teams ☐ Cooperative ☐ Syndication

8. How many vessels do you have?

8.1. What materials are used to make vessels? :

☐ Wood ☐ Steel ☐ Composite ☐ Others

8.2. Wattage of main machine: ….(cv). 8.3. Weight:…..(tons)

9. Have you been trained in fishing and storage techniques?

☐ Yes, how many times did they participate?:…..(Times) ☐ Never

10. Do you participate in any professional organizations?

☐ Tuna Association ☐ Fishery syndication ☐ Cooperative ☐ Others

If not participating, Why?.....

11. In the future, do you intend to change careers? ☐ Yes ☐ No

If yes, what type of occupation do you want? (Specify your occupation)?.....

To change careers, what things do you need?.....

12. What difficulties do you encounter in fishing activities ?

…..……

……..……

……..

13. What technologies do you use for exploiting tuna?

☐ Traditional technology

☐ Korean technology

☐ Japanese technology

☐ Others

14. What equipment do you use to catch fish?

☐ Manual fishing lines and hooks ☐ Automatic tractor ☐ Others

15. Fishing methods

☐ There is a control of tuna as it struggles bait fishing

☐ There is no control of tuna as it struggles bait fishing

16. Method of putting tuna on board

☐ By hand

☐ There is a padding

☐ By crane

☐ There are no padding

☐ Others

17. Fish handling techniques

17.1. Dead fish

☐ Use a pestle or wood

☐ Using a stick/skewer to spine to die

☐ Others

17.2. Cut the fish blood

☐ Use a special knife to discharge fish blood

☐ Use a special knife to discharge fish blood, stab the fish's aorta, pierce the bone, open the marrow to paralyze the fish completely

☐ Poke the marrow, clear the marrow to paralyze the fish, discharge fish blood completely

☐ Others

17.3. Fish preservation

☐ Whole fish salts, without gutting, internal organs

☐ Cut off the caudal fin of the fish, cut the gills on the sides, remove the abdominal organs to remove all the fish’s internal organs

☐ Others

17.4. Soak, cool down

☐ Reduce heat slowly (after removing organs, fish are put into the tunnel to cool down from 16-20 degrees Celsius, then put in the tunnel at 3-5 degrees Celsius, pull the fish up, freeze ice in the abdomen, and then bring down storage cellar)

☐ Sudden hypothermia (after removing organs, fish is put into the tunnel to cool down from 3-5 degrees Celsius, pull the fish up, freeze ice in the abdomen, and then take them to the storage cellar)

☐ Others

17.5. Materials of tuna’s storage tunnel

☐ Composite foam (styrofoam)

☐Tarpaulin, loose foam sheets lined on the floor

☐ Inflatable foam (Polyurethane)

18. Preserve fish in the storage cellar

☐ Using PE bags ☐Using cloth bags ☐ Not including fish

19. Loss Rates of products: %

20. Preserved time for tuna on board

☐ 10 days ☐15 days ☐ 20 days ☐ 25 days ☐ Others

21. Do you know the standards for preserving products to ensure quality safety?

☐ HACCP ☐ ISO ☐ Japanese standards ☐ Others

22. Cleaning workshop equipment, fish cellar, and tools

Contents	Frequency of hygiene *times/day*	Hygiene time (*1. After finishing a production shift) 2. Before starting a new production shift 3. Other times)*	Cleaning methods	Chemicals used for cleaning

23. In your opinion, which stage of tuna fishing needs to be improved?

24. Do you know the law against illegal fishing (IUU)? ☐ Yes ☐No

Do you enforce anti-illegal fishing (IUU) regulations? ☐ Yes ☐No

25. Do you know the rules for Dolphin Safe? ☐ Yes ☐No

26. Do you enforce Dolphin Safe's rules? ☐ Yes ☐No

27. In your opinion, which stage of tuna fishing needs to be improved?

28. Which channels did tuna materials flow along the tuna value chain?

☐ Fishers – processors - export market

☐ Fisher - traders/middle persons – processors - export market

☐ Fishers – retailers – domestic market

☐ Fishers – traders/middle-persons – processors- wholesalers/retailers – domestic market

☐ Other channels

29. How much did you sell 1 kilogram of raw yellowfin tuna, bigeye tuna, or skipjack tuna?

III. Knowledge and information flows

1. Do you have experienced in managing, operating, exploiting, and preserving tuna catch?

☐ Yes ☐No

2. Do you have master's certificates in managing, operating, exploiting, and preserving tuna catch?

☐ Yes ☐No

3. Where did you learn about managing, operating, exploiting, and preserving tuna catch?

☐ From generation to generation

☐ From shipowners, captains, and other labours on the board
☐ Through formal education (yourself or family members)
☐ Others

4. Do you know the law against illegal fishing (IUU)?
☐ Yes ☐No

5. Do you enforce anti-illegal fishing (IUU) regulations?
☐ Yes ☐No

6. Do you know the rules for Dolphin Safe? ☐ Yes ☐No

7. Do you enforce Dolphin Safe's rules ? ☐ Yes ☐No

8. What are the standards and grades existing in the market (both formal and informal?)
☐ Vietnam standards of raw tuna
☐ Japane standards of raw tuna
☐ Korea standards of raw tuna
☐ No standards of raw tuna

9. What are the current levels of understanding, skills, and knowledge about quality standards and grades along the tuna value chain?
☐ Low
☐ High
☐ Based on experiences from generation to generation
☐ There are no current levels of understanding, skills, and knowledge about quality standards and grades of raw tuna

10. Is there a unified definition of quality along the tuna value chain ?
☐ Yes ☐No

11. Who determined orientation and investment in knowledge and technology in the tuna value chain?
☐ Fishers
☐ Traders/middle-persons
☐ Processors
☐ Not any actors to determine orientation and investment in knowledge and technology

12. What are the quality criteria for raw tuna along the tuna value chain, in your view?
☐ Sensory criteria
☐ Limitation of heavy metal, microorganism, histamine
☐ Knowledge of the origin of raw tuna
☐ All above criteria

13. Which contents of information did you use to exchange between actors along the tuna value chain?
☐ Price of raw tuna
☐ Quantity of raw tuna

☐ Species of raw tuna
☐ Market information on tuna products
☐ Others

14. Which methods of information did you use to exchange between actors along the tuna value chain?

☐ Telephone
☐ Radios
☐ Face-to-face
☐ Others

15. How often did you exchange on tuna market information, prices, quantities, quality, and size of raw tuna/tuna products with other actors in the chain?

☐ No exchange
☐ Little exchange
☐ Occasionally
☐ Regularly
☐ Very regularly

16. Which your levels of trust in information sharing from other actors along the tuna value chain?

☐ Completely untrustworthy
☐ Trustless
☐ Less confident
☐ Quite confident
☐ Confident
☐ Very Confident

☐ Completely untrustworthy ☐ Trustless ☐ Less confident ☐ Quite confident ☐ Confident ☐ Very confident

IV. The economics of tuna fishing activities in an average sea trip in the last year

1. The average initial fixed investment cost for a ship

Ordered number	Objects	Purchasing time	Quantity	Unit price (million VND)	Total amount (million VND)	Depreciation period
1	**Ship**					
	Shell shipping					
	Marine machine					
	Generator					
2	**Fishing gears**					
	Dipnet					

Ordered number	Objects	Purchasing time	Quantity	Unit price (million VND)	Total amount (million VND)	Depreciation period
	Fishing hook					
3	**Fishing equipment**					
	A fishing receiver, fishing nets					
	Fish finder					
	Led lighting					
4	**Marine Equipment**					
	Navigation system					
	Rada					
	Communications machine, radios					
	Life-saving equipment					
	Fire fighting equipment					
	Medicine cabinet					
5	**Storage Equipment**					
	Soaking and cooling unit					
	Cellar and basement insulation					
	Cellar storage					
	Others					

2. Where did the investment capital for a tuna fishing ship come from?

☐ Owner's equity ☐ Loans ☐ Owner's equity and loans

3. If it is a loan source, whom did you borrow money from?

☐ Banks ☐ Traders, middle-persons ☐Processors ☐ Others

4. Where did your tuna fishing ship land?

☐ Binh Dinh ☐ Phu Yen ☐ Khanh Hoa ☐ Others

5. Fishing capacity by tuna fishing ship

5.1. The average number of days in a sea trip:….. (days). Of which, the actual number of fishing days ….. (days).

5.2. The average number of sea trips in a year:……..(sea trips). The main harvest season is from……to…….in year. The sub-harvesting season is from…… to……of the year.

5.3. Total average volume of tuna caught in a sea trip: ……..(tons). The total tuna volume caught in a sea trip in the main harvest season:…….(tons). The total tuna volume caught in a sea trip in the sub-harvesting season:……(tons).

5.4. The selling price for 1 kilogram of tuna in the main harvest season is…….(VND). The selling price for 1 kilogram of tuna in the sub-harvesting season:…….(VND).

5.5. The average revenue in a sea trip in the main harvest season is:…….(million VND). The average revenue in a sea trip in the sub-harvesting season:…….(million VND).

6. The average production cost in a sea trip:

Ordered number	Production cost in a sea trip	Total amount (Million VND)	Note
1.	Fuel		
2.	Ice		
3.	Salt		
4.	The bait		
5.	Food and necessities		
6.	Materials, fishing gear, fishing net, hook		
7.	Interest payment		
8.	Depreciation		
9.	Payment of labor		
10.	Other costs		

7. Total profit in a sea trip in the main harvest season is……(million VND). Total profit in a sea trip in the sub-harvesting season:…….. (million VND).

8. Total repair costs for fixed assets in the year is:…….(VND)

V. Market structure of fresh tuna

1. The number of fishers on each tuna fishing ship is:…….(persons)

2. The number of tuna fishing ships that you owned is:…….(units)

3. Your gross revenue in an average sea trip is:…….(million VND)

4. The form of selling tuna when the tuna fishing ships landed is:

Ordered number	Where fresh tuna is sold	Ordered number	Who buy fresh tuna
1.	Selling fresh tuna directly to consumers at sea.	1.	Processors

2.	Selling fresh tuna at fishing ports, the fishing wharf in the local area.	2.	Middle-persons, traders
3.	Selling fresh tuna at fishing ports in the province.	3.	Tuna service ships
4.	Selling fresh tuna at fishing ports in the other provinces.	4.	Citizens
5.	Other (specify)	5.	Others (specify)

5. Which customers bought your fresh tuna frequently?

☐ Processors

☐ Middle-persons and traders

☐ Tuna service ships

☐ Local citizens

☐ Others

6. For frequent customers, what is the business relationship between you and your customers? (You can choose from many options)

☐ Receive financial support from frequent customers.

☐ Borrow fishing equipment, ships from frequent customers.

☐ Get loans from frequent customers before each sea-trip and sell caught tunas to these lenders for credit loans.

☐ Others (specify)

7. How to start the business relationship between you and your frequent customers?

☐ Get loans from frequent customers before each sea-trip and sell caught tunas to these lenders for credit loans

☐ Receive financial support from frequent customers.

☐ Purchase and sale agreement.

☐ Others (specify)

8. Can you stop selling fresh tuna for regular customers?

☐ Yes ☐ No.

Briefly explain why yes or why no?……...

9. Are you a member of any fishery organization?

☐ Yes ☐ No

If yes, briefly explain your participation……..

10. How is fresh tuna price determined at the fishing port?

☐ Open bidding

☐ Negotiated

☐ Controlled by some Value Chain actors

☐ Others (specify)

11. Who is the most influential actor in the tuna value chain?

☐ Middle-persons, traders

☐ Processors

☐ Tuna Association
☐ Others (specify)

VI. Relationship between fishers and other actors in the tuna value chain

1. What is the relationship between the shipowners and input providers?
☐ Persistent network relations
☐ Spot market relationship
☐ Horizontal integration
☐ Others (specify)

2. What is the relationship between the shipowners and middle-persons or traders?
☐ Persistent network relations
☐ Spot market relationship
☐ Horizontal integration
☐ Others (specify)

3. The business relationship between the shipowners and middle-persons or traders is…….
☐ a regular, long-term exchange relationship without a sale contract
☐ a regular, long-term exchange relationship with a sale contract
☐ Credit/marketing linkage
☐ Others (specify)

4. Which typical linkage did you use to exchange between other actors along the tuna value chain?
☐ informal ☐ verbal arrangement ☐ formal written contract ☐ others (specify)

5. How long did you have the linkages between other actors that existed along the tuna value chain?
☐ Below three years
☐ From 3 years to 5 years
☐ From 5 years to 10 years
☐ Above 10 years (specify)

6. How much did you trust other actors along the tuna value chain?
☐ Distrust ☐ No trust ☐ A little trust ☐ Some trust ☐ Full trust

7. What is the relationship between you and other shipowners catching fresh tuna?
☐ According to fleet
☐ Frequently supplement and support each other
☐ Go head-to-head
☐ There is no relationship
☐ Others (specify)

8. How is the profit-sharing ratio between shipowner and employees on tuna fishing ship?
☐ Proportion 5/5 ☐ Proportion 6/4 ☐ Others

9. What is the difference between the profit-sharing ratio between the captain and the employees on a tuna fishing ship?

☐ Proportion 1.2/1 ☐ Proportion 1/1 ☐ Others

10. Do you receive any continuous or frequent assistance/help from other shipowners?

☐ Yes ☐ No

If yes, please give those bits of the help……..……

11. Do you receive any continuous or frequent assistance/help from traders/middle-persons/processors?

☐ Yes ☐ No

If yes, please give those bits of the help:…… …

12. Who will you ask for help when you faced issues related to tuna fishing activities?

☐ Employees

☐ Other shipowners

☐ Tuna association

☐ Traders, middle-persons

☐ Others (specify)

13. Do you provide any continuous or frequent assistance/help for other shipowners or traders/middle-persons/processors?

☐ Yes ☐ No

If yes, please give those bits of help……...…….

VII. In your opinion, which potential factors can affect the financial performance of actors along the tuna value chain? Which are the policy interventions that help to increase the chain's economic efficiency, especially for fishers' economic efficiency?

……
……
……
……
……
……
……
……

This is the end of the questionnaire. Thank you for your time and wish you a very nice day.

Date ..... Month ..... Year

Investigator **Information provider**

APPENDIX 2: QUESTIONNAIRES FOR MIDDLE-PERSONS

Name of Enumerator:
Date of interview:
Name of Community:
Dear Correspondent,

We are members of a Ministry of Science and Technology-funded national research project on the fisheries value chain entitled "Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam". Since tuna fishery is one of the significant fisheries in Vietnam, we choose tuna fisheries as a typical study representing Vietnam fisheries. The overall aim is to analyze the economic issue in the tuna value chain to propose policies toward improving the socio-economic life of fishers in the chain. The research objective is to provide a basic overview and the economic efficiency of the tuna value chain and examine which critical factors can affect its economic efficiency.

This research includes the following specific objectives:

- Map the Vietnamese tuna value chain to describe the main actors, material/product flows, volume, number of actors and employees, knowledge and information, relationships, linkages and trust, and the value at different levels of the tuna value chain;

- Investigate the economic efficiency of the tuna value chain by analyzing the financial performance of each of the main economic actors along the tuna value chain, including transaction volume, costs, revenues, returns, and profitability across the different actors along the value chain;

- Examine which critical factors can affect the financial performance of each actor, especially the financial performance of fishers.

The obtained data will only be used for research purposes and to help develop policy recommendations to develop sustainable tuna fisheries in Vietnam. We hope you will feel comfortable providing us with accurate data and information; your information will be treated with the utmost confidentiality. Please feel free to ask any questions or raise any issues you might have. Thank you for your participation. Please fill in the formation and tick your choice on the appropriate boxes.

I. General Information

1.Address:……Ward:....., District:....., Province:.....
2. Interviewee's name:.....; Phone number:.....
3. Age:.....; Sex: ☐ Man ☐ Woman
4. Educational level :
☐ Illiteracy ☐ Primary ☐ Secondary ☐ High school ☐ University/college
5. Your position: ☐ Trader ☐ Middle-person

II. Tuna business information

1. How many years do you become a trader/a middle person?: ……..(years)

2. Which tuna's species do you buy for your business?

☐ Yellowfin tuna and bigeye tuna ☐ Skipjack tuna ☐ Other tunas

3. Do you transport your fresh tuna to sell it ? ☐ Yes ☐ No

4. How do you transport your fresh tuna?

☐ On-foot ☐ Bicycle ☐ Local Bus ☐ Van ☐ Motorbike ☐ Other

5. How many employees do you have?.....(employees)

6. How do you paid salary for employees?

☐ Paid (full-time)

☐ Paid (part-time)

☐ Paid (family, full)

☐ Paid (family, part-time)

☐ Not paid (family)

☐ Others

7. How many tons of fresh tuna did you buy from fishers in an average year ?…….(tons)

8. How many tons of fresh tuna did you sell/trade to processors in an average month? ……..(tons)

9. Do you give money for fishers going to sea? ☐ Yes ☐ No

10. If yes, how much money did you lend to fishers going to sea?.....million VND/year. Interest rates: …..%/year. Loan period:…..years

11. As a fisher borrows money from you, do they have to sell tuna to you?

☐ Yes ☐ No

12. How many tuna fishing ships do you finance?.....(units)

13. How do you increase cash when you need working capital for your business activities?

☐ Self-funding

☐ Borrowing from relatives/family/friends

☐ From buyers

☐ From others

☐ Others (Please specify)

14. What is your assessment on the quality of raw tuna?.....

III. Questions related to tuna material flows in the tuna trading process along the tuna value chain

1.Which specific activities do you usually do along the tuna value chain?

☐ Unloading and purchasing raw tuna from fishers

☐ Selling raw tuna to processors

☐ Giving money for fishers going to sea

☐ Other

2. What activities in the tuna trading process can add value to the tuna value chain?

☐ Tuna transport process

☐ Tuna preservation process

☐ Tuna grading process

☐ Others

3. What activities in the tuna trading process are necessary but do not add value to the tuna value chain?

☐ Tuna transport process

☐ Tuna preservation process

☐ Tuna grading process

☐ Others

4. What activities in tuna trading process are not necessary and do not add value to the tuna value chain?

☐ Through intermediaries ☐ Others

5. Which factors affect the quality of tuna during the tuna trading process?

☐ Uncovered wharf

☐ Tuna transport process from vessels to trucks by done manually

☐ Not have cold-storages from 0 degrees to five degrees

☐ Low quality of ice-service

☐ Others

6. In your opinion, which stage of tuna purchasing needs to be improved?

7. Which channels did tuna materials flow along the tuna value chain?

☐ Fishers – processors - export market

☐ Fisher - traders/middle persons – processors - export market

☐ Fishers – retailers – domestic market

☐ Fishers – traders/middle-persons – processors- wholesalers/retailers – domestic market

☐ Other channels

8. How much did you sell 1 kilogram of raw yellowfin tuna, bigeye tuna, or skipjack tuna to processors?

IV. Knowledge and information flows

1. Do you have experienced in purchasing tuna?

☐ Yes ☐No

2. Do you have master's certificates in purchasing tuna?

☐ Yes ☐No

3. Where did you learn experiences in purchasing tuna ?

☐ From generation to generation

☐ From other colleagues in the local area

☐ Through formal education (yourself or family members)

☐ Others

4. Do you understand various types of tuna, evaluate, and classify the quality and size of tuna at landing?

☐ Yes ☐No

5. What are the standards and grades existing in the market (both formal and informal?)

☐ Vietnam standards of raw tuna

☐ Japane standards of raw tuna

☐ Korea standards of raw tuna

☐ No standards of raw tuna

6. What are the current levels of understanding, skills, and knowledge about quality standards and grades along the tuna value chain?

☐ Low

☐ High

☐ Based on experiences from generation to generation

☐ There are no current levels of understanding, skills, and knowledge about quality standards and grades of raw tuna

7. Is there a unified definition of quality along the tuna value chain ?

☐ Yes ☐ No

8. Who determined orientation and investment in knowledge and technology in the tuna value chain?

☐ Fishers

☐ Traders/middle-persons

☐ Processors

☐ Not any actors to determine orientation and investment in knowledge and technology

9. What are the quality criteria for raw tuna along the tuna value chain, in your view?

☐ Sensory criteria

☐ Limitation of heavy metal, microorganism, histamine

☐ Knowledge of the origin of raw tuna

☐ All above criteria

10. Which contents of information did you use to exchange between actors along the tuna value chain?

☐ Price of raw tuna

☐ Quantity of raw tuna

☐ Species of raw tuna

☐ Market information on tuna products

☐ Others

11. Which methods of information did you use to exchange between actors along the tuna value chain?

☐ Telephone

☐ Radios
☐ Face-to-face
☐ Others

12. How often did you exchange on tuna market information, prices, quantities, quality, and size of raw tuna/tuna products with other actors in the chain?

☐ No exchange
☐ Little exchange
☐ Occasionally
☐ Regularly
☐ Very regularly

13. Which your levels of trust in information sharing from other actors along the tuna value chain?

☐ Completely untrustworthy
☐ Trustless
☐ Less confident
☐ Quite confident
☐ Confident
☐ Very Confident

V. The economics of fresh tuna purchasing activities in an average month in the last year

1. Average monthly revenue, investment costs and return of purchasing company (million VND)

Ordered number	Items	Bigeye tuna, yellowfin tuna		Skipjack tuna	
		Peak month	Low month	Peak month	Low month
I.	Total monthly revenue				
II.	Total monthly cost - Buying raw tuna - Loading and unloading cost from vessels to trucks - Transportation costs - Phone - Ice - Interest payment - Depreciation - Taxes and fees - Others				
III.	Monthly return				

VI. Market structure of fresh tuna

1. What are key things that you needed to become a middle-persons/ a trader?

2. What do you do to the fish/seafood before you sell it?

3. Would you like to engage in any other activity or job related to fishing or fish trade/processing activities?

VII. Relationship between middle-persons and other actors in the tuna value chain

1. What types of relationships between middle-persons/ traders and shipowners/ fishers?

☐ Persistent network relations without a sale contract (Regular, long-term exchange relationship without a sale contract)

☐ Spot market relations (Negotiations on price, volume, and other requirements) with the duration and scope of that specific transactions

☐ Persistent network relations with a sale contract (Regular, long-term exchange relationship with a sale contract)

☐ Others

2. What types of relationship between traders/middle-persons and processors?

☐ Persistent network relations without a sale contract (Regular, long-term exchange relationship without a sale contract)

☐ Spot market relations (Negotiations on Price, volume, and other requirements) with the duration and scope of that specific transactions

☐ Persistent network relations with a sale contract (Regular, long-term exchange relationship with a sale contract)

☐ Others

3. Which typical nature of linkage did you use to exchange between actors along the tuna value chain?

☐ Informal

☐ Verbal arrangement

☐ Formal written contract

☐ Others

4. How long did you have the linkages between actors (for example, with traders/middle-persons) existed along the tuna value chain?

☐ Below three years

☐ From 3 years to 5 years

☐ From 5 years to 10 years

☐ Above ten years

5. How much did you trust other actors (for example, with traders/middle-persons) along the tuna value chain?

☐ Distrust

☐ No trust

☐ A little trust

☐ Some trust

☐ Full trust

6. Do you receive any continuous or frequent assistance/help from other middle-persons/traders?

☐ Yes ☐ No

If yes, please give those bits of the help…….

7. Do you receive any continuous or frequent assistance/help from processors?

☐ Yes ☐ No

If yes, please give those bits of the help…….

8. Who will you ask for help when you faced issues related to tuna purchasing activities?

☐ Employees

☐ Processors

☐ Tuna association

☐ Traders, middle-persons ☐ Others (specify)

9. Do you receive any continuous or frequent assistance/help from processors?

☐ Yes ☐ No

If yes, please give those bits of help…….

VIII. In your opinion, which potential factors can affect the financial performance of actors along the tuna value chain? Which are the policy interventions that help to increase the chain's economic efficiency, especially for fishers'economic efficiency?

……
……
……
……
……
……
……
……

This is the end of the questionnaire. Thank you for your time and wish you a very nice day.

Date ..... Month ..... Year

Investigator **Information provider**

APPENDIX 3: QUESTIONNAIRES FOR PROCESSORS

Name of Enumerator:

Date of interview:

Name of Community:

Dear Correspondent,

We are members of a Ministry of Science and Technology-funded national research project on the fisheries value chain entitled "Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam". Since tuna fishery is one of the significant fisheries in Vietnam, we choose tuna fisheries as a typical study representing Vietnam fisheries. The overall aim is to analyze the economic issue in the tuna value chain to propose policies toward improving the socio-economic life of fishers in the chain. The research objective is to provide a basic overview and the economic efficiency of the tuna value chain and examine which critical factors can affect its economic efficiency.

This research includes the following specific objectives:

- Map the Vietnamese tuna value chain to describe the main actors, material/product flows, volume, number of actors and employees, knowledge and information, relationships, linkages and trust, and the value at different levels of the tuna value chain;

- Investigate the economic efficiency of the tuna value chain by analyzing the financial performance of each of the main economic actors along the tuna value chain, including transaction volume, costs, revenues, returns, and profitability across the different actors along the value chain;

- Examine which critical factors can affect the financial performance of each actor, especially the financial performance of fishers.

The obtained data will only be used for research purposes and to help develop policy recommendations to develop sustainable tuna fisheries in Vietnam. We hope you will feel comfortable providing us with accurate data and information; your information will be treated with the utmost confidentiality. Please feel free to ask any questions or raise any issues you might have. Thank you for your participation. Please fill in the formation and tick your choice on the appropriate boxes.

I. General information

1. Address: ……Ward:....., District:....., Province:.....
2. Interviewee's name:.....; Phone number:.....
3. Age:.....; Sex: ☐ Man ☐ Woman
4. Educational level :

☐ Illiteracy ☐ Primary ☐ Secondary ☐ High school ☐ University/college

5. Your position: ☐ Director ☐ Manager
6. When did your company establish?
7. What is your company's business field?
8. When does your company start to do business on processing and exporting tuna?

9. How many companies processing and exporting tuna are there in the three South Central provinces?

10. Which organization does your company participate?

☐ Vietnam Tuna Association (VINATUNA)

☐ Vietnam Association of Seafood Exporters and Producers (VASEP)

☐ Other associations,

specify:…….....

11. How much is your company's production and processing scale?

12. What are the main challenges/ obstacles of your company in the tuna industry?

☐ Shortage of raw materials (the quantity of raw materials of tuna)

☐ Fluctuations of the price of tuna products in foreign markets

☐ Increasing requirements of international standards/certifications

☐ Increasing the level of market competition

☐ Others

13. In your opinion, which stage of tuna processing needs to be improved?

14. Which channels did tuna materials flow along the tuna value chain?

☐ Fishers – processors - export market

☐ Fisher - traders/middle persons – processors - export market

☐ Fishers – retailers – domestic market

☐ Fishers – traders/middle-persons – processors- wholesalers/retailers – domestic market

☐ Other channels

15. How much did you sell 1 kilogram of yellowfin tuna, bigeye tuna, or skipjack tuna products to exporters/wholesalers/retailers?

II. Questions related to the material flows of tuna, according to processor's views

1. Which machines and equipment do your company have to freeze tuna products?

☐ Contact freezer (Macfadyen)

☐ Individual Quick Freezer (IQF)

☐ Win cool freezer

☐ Deep freezing storage (-60 degrees Celsius)

☐ Others

2. Which machines and equipment do your company have to ensure conditions on processing technology, product storages, food safety and hygiene?

☐ Cutting equipment

☐ Vacuum packaging machine

☐ Conveyor equipment

☐ Forklift

☐ Cold storages

☐ Cool storages

☐ Others

3. Which quality management programs have your company applied?

☐	ISO 26000	☐	HACCP	☐	USDC	☐	Dolphin Safe
☐	ISO 14001	☐	SSOP	☐	IUU	☐	SA 8000
☐	ISO 9001	☐	GMP	☐	HALAL	☐	BRC
☐	ISO17025	☐	Others (specify…)				

4. Do you participate in cleaner production programs, energy saving programs, wastewater treatment programs?

☐ Yes

☐ No

5. Could you please give the names of tuna products being produced at your company?

☐ Whole tuna removed its organ are frozen, cutting off the heads and removing its organ to freeze

☐ Fillet (loin) with skin, removing skeletal or skin to freeze which includes with or without CO

☐ Sliced tuna with steaks skin on or sliced tuna with steaks skin less with or without CO;

☐ Frozen sliced tuna (saku; cube) which includes frozen sliced tuna with or without CO;

☐ Frozen steamed tuna;

☐ Canned tuna;

☐ Others;

6. Which standards have your company used to evaluate the quality of tuna materials/products?

☐ Vietnam standards

☐ Japan standards

☐ EU standards

☐ Others

7. According to your views, which activities in tuna processing can add value to the tuna value chain?

☐ Tuna processing ☐ Tuna packaging process

☐ Tuna's quality control process ☐ Shipping process

☐ Storage of finished products process ☐Raw material preparation process

☐ Others

8. According to your views, which activities in tuna processing are necessary but do not add value to the tuna value chain?

☐ Tuna processing ☐ Tuna packaging process

☐ Tuna's quality control process ☐ Shipping process

☐ Storage of finished products process ☐Raw material preparation process

☐ Others

9. According to your views, which activities in tuna processing are not necessary and do not add value to the tuna value chain?

☐ Tuna processing ☐ Tuna packaging process
☐ Tuna's quality control process ☐ Shipping process
☐ Storage of finished products process ☐Raw material preparation process
☐ Others

III. Questions related to knowledge and flows of information along the tuna value chain according to processor's views

1. Do you have experienced in processing tuna?

☐ Yes ☐No

2. Do you have master's certificates in processing tuna?

☐ Yes ☐No

3. Where did you learn experiences in processing tuna ?

☐ From generation to generation
☐ From other colleagues in the local area
☐ Through formal education (yourself or family members)
☐ Learn from a university
☐ Others

4. Do you understand various types of tuna, and quality of raw tuna?

☐ Yes ☐No

5. What are the standards and grades existing in the market (both formal and informal?)

☐ Vietnam standards of raw tuna
☐ Japanese standards of raw tuna
☐ Korea standards of raw tuna
☐ No standards of raw tuna

6. What are the current levels of understanding, skills, and knowledge about quality standards and grades along the tuna value chain?

☐ Low
☐ High
☐ Based on experiences from generation to generation
☐ There are no current levels of understanding, skills, and knowledge about quality standards and grades of raw tuna

7. Is there a unified definition of quality along the tuna value chain ?

☐ Yes ☐No

8. Who determined orientation and investment in knowledge and technology in the tuna value chain?

☐ Fishers
☐ Traders/middle-persons

☐ Processors

☐ Not any actors to determine orientation and investment in knowledge and technology

9. What are the quality criteria for raw tuna along the tuna value chain, in your view?

☐ Sensory criteria

☐ Limitation of heavy metal, microorganism, histamine

☐ Knowledge of the origin of raw tuna

☐ All above criteria

10. Which contents of information did you use to exchange between actors along the tuna value chain?

☐ Price of raw tuna

☐ Quantity of raw tuna

☐ Species of raw tuna

☐ Market information on tuna products

☐ Others

11. Which methods of information did you use to exchange between actors along the tuna value chain?

☐ Telephone

☐ Radios

☐ Face-to-face

☐ Others

12. How often did you exchange on tuna market information, prices, quantities, quality, and size of raw tuna/tuna products with other actors in the chain?

☐ No exchange

☐ Little exchange

☐ Occasionally

☐ Regularly

☐ Very regularly

13. Which your levels of trust in information sharing from other actors along the tuna value chain?

☐ Completely untrustworthy

☐ Trustless

☐ Less confident

☐ Quite confident

☐ Confident

☐ Very Confident

IV. The economics of tuna processing activities in an average month in the last year

In order to assess the product flow and value in the tuna value chain, could you please share some information on your company's business activities in the last year (2017):

A. Raw tuna purchase

1. Total raw materials purchased on an average month in the last year (2017):……(tons), in which the proportion (%) of the sources are as follows:

Ordered number	Items	Middle-persons/traders		Fishers		Import	
		Peak month	Low month	Peak month	Low month	Peak month	Low month
1.	Bigeye tuna, yellowfin tuna						
2.	Skipjack tuna						

2. The average purchasing price for 1 kilogram raw tuna (VNĐ/1 kg)

Ordered number	Items	Middle-persons/traders		Fishers		Import	
		Peak month	Low month	Peak month	Low month	Peak month	Low month
1.	Bigeye tuna, yellowfin tuna						
2.	Skipjack tuna						

3. Purchasing method of raw tuna

3.1. Transaction method:

☐ Through contract

☐ Verbal agreement

☐ Other methods (specify)

3.2. Delivery method:

☐ At the fishing port

☐ At the tuna processing company

☐ At the tuna purchasing company

☐ Other methods (specify)

3.3. Payment methods:

☐ Before receiving goods

☐ On receiving goods

☐ After receiving goods

☐ Other methods (specify)

B. Processed tuna products produced and consumed

1. Estimated production and consumption of tuna products for an average month in the last year (2017)

Ordered number	Products	Domestic market		Foreign market	
		Peak month	Low month	Peak month	Low month
I.	Yellowfin tuna, bigeye tuna				
1.	Whole tuna				

2.	Tuna loin CO				
3.	Tuna loin				
4.	Tuna steak CO				
5.	Tuna steak				
6.	Tuna saku CO				
7.	Tuna saku				
8.	Tuna cube CO				
9.	Tuna cube				
II.	Skipjack tuna				
1.	Whole tuna				
2.	Canned tuna				

2. Estimated production cost in an average month in the last year (2017)

Ordered number	Items	Yellowfin tuna and bigeye tuna		Skipjack tuna	
		Peak month	Low month	Peak month	Low month
1.	Raw material expenses				
2.	Packaging products				
3.	Chemicals/microorganisms				
4.	Maintenance and repair costs				
5.	Electricity				
6.	Water				
7.	Telephone/transaction				
8.	Salary of employees				
9.	Management costs				
10.	Shipping costs				
11.	Interest				
12.	Environmental charges				
13.	Depreciation				
14.	Marketing expenses				
15.	Other costs				
	Total cost				

3. The company produces tuna products according to:

☐ The order

☐ Estimate market demand

☐ Others (specify)

4. A company's ability to meet the market:

☐ Very low

☐ Low

☐ Medium

☐ High

☐ Very high

5. Demand forecast of forcast production

☐ Develop

☐ Remain

☐ Decrease

V. Market structure of fresh tuna

1. The number of employees in your company is:……..(persons)

2. The gross monthly revenue of your company is:…….(million VND)

3. How is fresh tuna price determined at the fishing port?

☐ Open bidding

☐ Negotiated

☐ Controlled by some Value Chain actors

☐ Others (specify)

4. Who is the most influential actor in the tuna value chain?

☐ Middle-persons, traders ☐ Processors ☐ Tuna Association ☐ Others (specify)

V. Questions related to relationships and linkages between actors along the tuna value chain, according to processor's views

1. What types of the relationships between processors and middle-persons/traders?

☐ Persistent network relations without a sale contract (regular, long-term exchange relationship without a sale contract)

☐ Spot market relations (negotiations on price, volume, and other requirements) with the duration and scope of that specific transactions

☐ Persistent network relations with a sale contract (regular, long-term exchange relationship with a sale contract)

☐ Others

2. Which typical nature of linkage did you use to exchange between actors along the tuna value chain?

☐ Informal

☐ Verbal arrangement

☐ Formal written contract

☐ Others

4. How long did you have the linkages between actors (for example, with traders/middle-persons) existed along the tuna value chain?

☐ Below three years

☐ From 3 years to 5 years

☐ From 5 years to 10 years

☐ Above ten years

5. How much did you trust other actors (for example, with traders/middle-persons) along the tuna value chain?

☐ Distrust

☐ No trust

☐ A little trust
☐ Some trust
☐ Full trust

6. Do you provide any continuous or frequent assistance/help for shipowners or traders/middle-persons?

☐ Yes ☐ No.

If yes, please give those bits of help……

7. Do you receive any continuous or frequent assistance/help from traders/middle-persons or fishers?

☐ Yes ☐ No

If yes, please give those bits of the help:……

8. Who will you ask for help when you faced issues related to tuna processing and exporting activities?

☐ Other processors
☐ VASEP
☐ Vietnam Tuna Association
☐ Traders, middle-persons
☐ Others (specify)

VI. In your opinion, which potential factors can affect the financial performance of actors along the tuna value chain? Which are the policy interventions that help to increase the chain's economic efficiency, especially for fishers'economic efficiency?

……
……
……
……
……
……
……

This is the end of the questionnaire. Thank you for your time and wish you a very nice day.

Date ..... Month ..... Year

Investigator **Information provider**

APPENDICES B

APPENDIX 1: QUESTIONNAIRES FOR TRADERS & MIDDLE-PERSONS

Name of Enumerator:

Date of interview:

Name of Community:

Dear Correspondent,

We are members of a Ministry of Science and Technology-funded national research project on the fisheries value chain entitled "Developing Feasible and Comprehensive Policies for Sustainable Fisheries Development in Vietnam". Since tuna fishery is one of the significant fisheries in Vietnam, we choose tuna fisheries as a typical study representing Vietnam fisheries. The overall aim is to analyze the social issue in the tuna value chain by examining the gender disparities between men and women as purchasing actors in productive, reproductive, and community management roles to suggest policy recommendations for improving gender equality and women's empowerment and promoting sustainable tuna fisheries management in the region.

This research includes the following specific objectives:

- To analyse gender disparities between men and women in the chain;

- To identify the roles of women and the gender inequality issues in the chain. The obtained data will only be used for research purposes and to help develop policy recommendations to develop sustainable tuna fisheries in Vietnam. We hope you will feel comfortable providing us with accurate data and information; your information will be treated with the utmost confidentiality. Please feel free to ask any questions or raise any issues you might have. Thank you for your participation. Please fill in the formation and tick your choice on the appropriate boxes.

I. Screening Questions

A) Is your enterprise/company involved in buying and selling (trading) tuna either in the local market or export markets ? (For middle-persons only)

☐ Yes

☐ No

Yes : proceed to question B

No : end interview and replace respondant

B) How would you rate your level of knowledge about the trading operations of your enterprise/company?

☐ Excellent (A)

☐ Very good (B)

☐ Good (C)

☐ Fair (D)

☐ Poor (E)

A, B, C, D: proceed with interview

E: end the interview and replace respondant

II. General informations

About the respondant

- Name:
- Age:

☐ 15-25
☐ 26-35
☐ 36-45
☐ 46-55
☐ 56-65
☐ 66+

- Gender :

☐ Female
☐ Male
☐ Other

- For how many years have you been living in this village/city ?
- How long have you been working as a trader/middle-person?
- Your highest educational attainment:

☐ No formal schooling
☐ Elementary school
☐ Secondary school
☐ Highschool
☐ University / College

- Civil status :

☐ Single
☐ Maried
☐ Separated
☐ Widow/Widower
☐ Live-in
☐ Other

About family and household

1. How many persons live in your household ?
2. How old were you when you had your first child ?
3. How many children do you have ?

☐ 0
☐ 1
☐ 2
☐ 3
☐ 4

About the respondant's partner

- Age:

☐ 15-25
☐ 26-35
☐ 36-45
☐ 46-55
☐ 56-65
☐ 66+

- Gender :

☐ Female
☐ Male
☐ Other

- For how many years has she/he been living in this village/city ?
- Highest educational attainment:

☐ No formal schooling
☐ Elementary school
☐ Secondary school
☐ Highschool
☐ University / College

- Is he/she a respondant of this study ?

☐ Yes
☐ No
☐ I don't know

About business

5. Who among members of your family work with you in fish trading ?

Household members	Number	Age	Sex	Paid	Type of work
1. Respondant					
2. Son					
3. Daughter					
4. Father					
5. Mother					
6. Niece					
7. Nephew					

8. Grandfather					
9. Grandmother					
10. Daughter-in-law					
11. Son-in-law					
12. Brother					
13. Sister					

6. Rank your main household's sources of income (1 = most important; 2 = secondary source; only 2 answers)

☐ Fishing
☐ Fish processing
☐ Secondary school
☐ Fish trading/selling
☐ Farming
☐ Profession (you are employed by a company and get a salary)
☐ Remittence (you are given money by a relative that works somewhere)
☐ Other (Specify)
☐ None

7. How much money do you buy fish for per day ?
8. How much money per day approx. do you get from fish trade?
9.How much of that money do you take as income?

☐ 0-25%
☐ 26-50%
☐ 51-75%
☐ If more than 75%

10. How much of that money do you reinvest ?

☐ 0-25%
☐ 26-50%
☐ 51-75%
☐ If more than 75%

11. Indicate by A how much approximatevely you earn per month from fish trading/selling; and by B the total household income per month from all sources

☐<100,000,000 VND
☐ 100,000,001-200,000,000 VND

☐ 200,000,001 VND-300,000,000 VND
☐ 300,000,001 VND-400,000,000 VND
☐ 400,000,001 VND-500,000,000 VND
☐ 500,000,001 VND-600,000,000 VND
☐ 600,000,001 VND-700,000,000 VND
☐ 700,000,001 VND-800,000,000 VND
☐ 800,000,001 VND-900,000,000 VND
☐ 900,000,001 VND-1,000,000,000 VND
☐ > 1,000,000,000 VND

12. Are you part of some groups in your community, and which are you a member of ?

13. Type of trading facility you are employed in ?
☐ Wholesaler
☐ Retailer
☐ Wholesaler-retailer
☐ Broker/agent
☐ Buying office of exporter

14. Area of coverage:
☐ Village
☐ Province
☐ Region
☐ Nationwide
☐ global/international

15.Type of operation:
☐ trading only
☐ trading and minor processing
☐ trading and major processing

16. Which species of tuna do you sell and in what proportions ?
☐ % Yellowfin
☐ % Skipjack
☐ % Bigeye

17. How are the species chosen for the sale ? How to assess the demand ?

18. What is your position in the trading enterprise/company ?
☐ Owner
☐ Management team
☐ Worker

19. How old were you when you started (to work for) the company ?
☐ Yes
☐ No

20. How do you cope with a bad market (fewer buyers, decreasing fish, and high price) ?

21. Do you have the possibility to go to another market if this one is bad ?

☐ Yes

☐ No

Access to assets

22. How does the company raise cash when needed for working capital of trading operations ?

☐ Self-financing

☐ Borrowed from relatives/ family/ friends

☐ Buyer

☐ Other

☐ I don't know

23. When the company borrows money to support the trading operation, who does the borrowing, and is borrower male or female ?

Position of responsible person	Gender
Owner	
Executives	
Spouse of owner	
Finance/ budget officer	
Marketer	
Other :	

24. How many employees/workers does the company have ? (indicate a number in the cells)

	Regular		Seasonal		N/A
	Supervisory	Worker	Supervisory	Worker	
Men (>15 y.o)					
Boys (< 15 y.o)					
Women (>15 y.o)					
Girls (< 15 y.o)					

25. Who is your primary buyer ?

	Gender	Buyers provide financing
Local restaurants		
other local institutional buyers		

exporters		
buying offices of exporters		
retailers/supermarkets		
small-scale market vendors		
processors		
households		
other :		

26. Would you like to have other custommers ?

☐ Yes

☐ No

27. How do you know whom to sell fish to ?

28. What percentage of the buyers you deal with are women ?

29. Do you allow your buyers to get your processed products on credit ?

☐ Yes

☐ No

30. Are there differences in the purchase behaviour between men and woman buyers?

☐ Yes

☐ No

31. Who is your primary supplier of fresh and processed tuna ? Please indicate if they are male or female. Do they allow you to get the fresh tuna on credit ? (Choose only one)

Type of supplier	Gender	Fresh (F) or processed (P) tuna	Buyers provide financing
small-scale municipal fishers			
small-scale commercial			
medium-scale commercial			
large scale commercial fishing operators			
other traders of fresh tuna			

other :			

32. What percentage of your fresh-tuna suppliers are men/women ?

☐ % Men

☐ % Women

Practices & Participation

33. In your trading operation, who usually perform the following ?

Process registration and legal document					
Hiring of workers					
Identify suppliers of fresh tuna					
Identify suppliers of processed tuna					
Identify buyers of fresh tuna					
Identify buyers of processed tuna					
Load and unload products					
Weigh, sort and classify products					
Remove the guts and gills					
Operate equipment					
Ensure quality control					
Cook					
Blast freezing					
Pack					
Label					
Storage					
Clean and maintain of the physical facilities					
Negociate with the buyer					
Transport to the buyer					
Receive payment					
Record of sales					
Record of financial transactions					
Record production					
Inventory of stocks					

34. What kind of fishery-related activities do you do but that are not trading ?

Knowledge, beliefs & Perceptions

35. Based on your experience, please say to what extent you agree/disagree with the following state- ments related to fish trading

Statement	Agree	Neither disagree nor agree	Disagree
Women are more skillfull in trading than men			
Women are easier to deal with than men in the trading business			
Men are more particular about quality of tuna traded than women			
Women are more efficient in trading than men			
In selling processed tuna, it is easier to collect paument from women buyers than men			

36. Do you like going to themarket ?

☐ Yes

☐ No

37. Do you think that men / women enjoy going to the market ? (If the respondent is a man ask about women and vice versa) ? Why

☐ Yes

☐ No

38. Are you satisfied/proud of being a fish trader? Why (not) ? And is fish trading high status in the society

39. What effects has fish trade had on your life (e.g. income, increased decision making power in the household) and on the community?

40. Do you like your job ?

☐ Yes

☐ No

41. Do you think you have a good income ? What could help you increase it ?

42. What are your dreams and hopes for the future?

Legal rights & Status

43. How many % of the male and female workers in th trading facility plant are contractual / regular ?

	Peak season		Off season	
	M e n	Women	M e n	Women
Regular				
Contractual				

44. If a women happen to be pregnant, what happens for her ? Until when does she keep working ? Is there any pregnancy/paternity leave ?

45. For the same kind of work, how does your pay compare to your male/female counterpart ? (Inter- viewer reads the sentences out loud and asks the respondent to choose one sentence that best repre- sents his/her belief)

	Answer (only one possible)
Men are paid more than women	
Men and women are paid the same	
Men are paid less than women	

Power and decision making

46. Who makes the decisions within your household about the following ? (*Read the proposition out loud and check the cell of the person who has the final word, if the respondent insists on a joint decision, check both cells)*

Area of decision making	Father	Mother	Daughter	Son	Other male household member	Other female household member
Education						
Food						
Budgeting						
Leisure activities						
Health						
Discipline						
Community involvement						

47. Who makes the decisions with regard to trading operations ? (*same directives as*

previous question)

Area of decision	Owner	Spouse of owner	Male manager/ supervisor	Female manager/ supervisor	Male staff	Female staff
supplier of tuna						
supplier of non-fish raw mate- rials						
financing the processing ope-rations						
buyer of proceed tuna						
production schedule						
production volume						
hiring of workers						
pricing of products						
training						

48. Who makes the decisions with regard to trading operations ? (same directives as previous question)

Area of decision	Owner	Spouse of owner	Male mana-ger/super vi- sor	Female ma-nager/sup er- visor	Male staff	Female staff
supplier of tuna						
supplier of non-fish raw mate-rials						
financing the processing ope-						

rations						
buyer of proceed tuna						
production schedule						
production volume						
hiring of workers						
pricing of products						
training						

49. Are there any fisheries related-projects/activities in your community ?

☐ Yes

☐ No

50. To what extent are you involved in these fisheries related-project/activities ?

	Never	Sometimes	Often	Always	N/A
Community activities					
Meetings					
Training					
Public hearing					
socials					
researches					
committee membership					
association membership					
costal resources management					
other :					

Time and space

51. How many hours per day do you work in your trading operation during peak period ? hours

52. How many hours per day do you work in your trading operation during non-

peak period ? hours

53. What are your main occupation on your spare time ? What do you usually do after you are done working? 54. Why do you go to that market and not another one ? What made you choose it ?

55. Would you spend more time on fish trade if you had less household work?

☐ Yes

☐ No

56. How often do you go to the market to trade ?

57. How do you go to the market ?

58. How long do you stay at the market ?

59. How far is the market from your home ? (km, time)

60. Compared to the time of your parents and grandparents, what has changed about the following to- pics ? And why those changes ? (If the respondent is a woman ask to comare with her mother and grand- mother, and vice versa)

Source: (Sundar Raj, 2020)

Note: The contents of this survey was compiled by Miss Rachel SUNDAR RAJ under the guidance of PhD student Nguyen Dang Hoang Thu.

APPENDIX 2: REGISTRATION OF RESULTS OF PERFORMANCE OF SCIENCE AND TECHNOLOGY TASKS USING THE STATE BUDGET

MINISTRY OF SCIENCE AND TECHNOLOGY
NATIONAL AGENCY FOR SCIENCE AND TECHNOLOGY INFORMATION

SOCIALIST REPUBLIC OF VIETNAM
Independence - Liberty - Happiness

CERTIFICATE

Registration of results of performance of science and technology tasks using the state budget

Registration number: 2020-02-1340/KQNC

Task name: Research and develop policies on fishermen, fisheries and fishing grounds for sustainable and responsible fisheries development in Vietnam
(Task number: KC.09.24/16-20. Under: Scientific and technological research program in service of sea and island management and marine economic development)

Task level: National
Organization in charge of the task: Institute of Fisheries Economics and Planning
Task director: **Dr. LE QUYEN CAO**
Participants: Master Quy Duong Nguyen; Dr. Giang Hai Phung;, Master Cong Huong Ho; Master Dang Liem Phan; Master Thi Hong Ngan Vu; Master Phuong Thao Nguyen; **Master Dang Hoang Thu Nguyen**; Master Phuong Linh Do; Master Thi Thuy Lai; Master Truong Giang Le; Dr. Xuan Trinh Nguyen; Dr. Phi Toan Nguyen; Master Quang Tu Trinh; Master Viet Long Dao; Master Van Cuong Hoang; Master Thanh Bach Nguyen

The Acceptance Council, which officially assessed the results of scientific and technological tasks was established under Decision No. 2985/QD-BKHCN dated November 3, 2020 of the Minister of Science and Technology, meeting on 17th November 2020 in Hanoi registered the results of performing science and technology tasks./.

Hanoi, December 31, 2020
ON BEHALF OF THE DIRECTOR
DEPUTY DIRECTOR

Vu Anh Tuan

Record kept at:
National Agency for Science and Technology Information
Address: 24 - 26 Ly Thuong Kiet St., Hanoi
Saved record number: **18240**