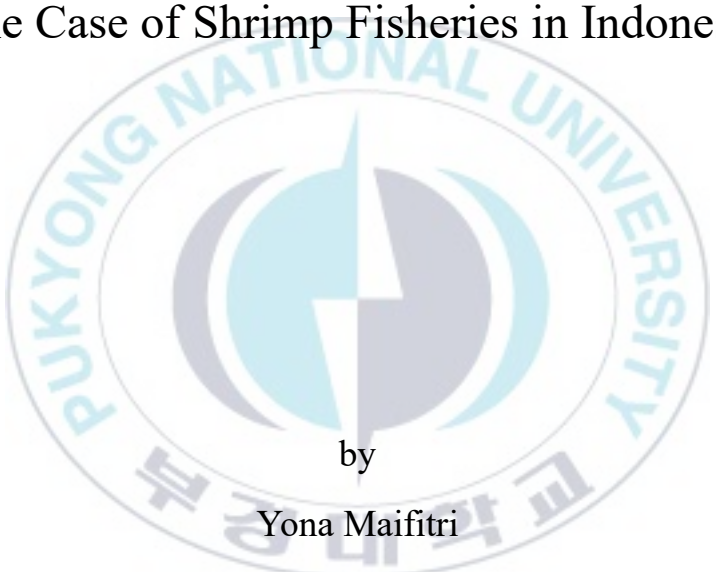
Thesis for the Degree of Master of Fisheries Science

The Role of Fisheries Management in Resolving the Overexploitation Conflict of Trade Liberalization for Sustainable Fisheries

-The Case of Shrimp Fisheries in Indonesia-



by

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Division of Fisheries Science

The Graduate School of World Fisheries University,

Pukyong National University

August, 2021

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수산업 발전을 위한 무역자유화의 과잉개발에 대응한 어업관리의 중요성에 대한 연구

-인도네시아 새우어업을 중심으로-

Advisor: Prof. Sang Go Lee

by

Yona Maifitri

A thesis submitted in partial fulfillment of the requirements

For the degree of

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Division of Fisheries Science, The Graduate School of World Fisheries University

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August 27, 2021

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List of Acronyms

AFTA:	ASEAN Free Trade Area
ASEAN:	Association of Southeast Asian Nations
CBD:	Convention on Biological Diversity
CEA:	California Environmental Associates
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EBFA:	Ecosystem-Based Fisheries Assessment
EBFM:	Ecosystem-Based Fisheries Management
FAO:	Food and Agriculture Organization
FHC:	Fish Health Certificate
GAP:	Good Aquaculture Practices
GATT:	General Agreement on Tariffs and Trade
GDP:	Gross Domestic Product
GHP:	Good Hygienic Practices
GT:	Gross Tonnage
HACCP:	Hazard Analysis Critical Control Point
IQ:	Individual Quota
MCS:	Monitoring, controlling and surveillance
MMAF:	Ministry of Maritime Affairs and Fisheries

MPA:	Marine Protected Area
MPI:	Ministry foe Primary Industries of New Zealand
MSY:	Maximum Sustainable Yield
OECD:	Organisation for Economic Co-operation and Development
SIBAS:	Information System and Online Database
RIPI PUPR:	Infrastructure Development Master Plan
SIUP:	Fisheries Business License,
SIPI:	Catch License
SIKPI:	Fish Carries Vessel License
TAC:	Total Allowable Catch
TACC:	Total Allowable Commercial Catch
TFA:	Trade Facilitation Agreement
USD:	United Stated Dollar
WPP:	*Wilayah Pengelolaan Perikanan* / Fisheries Management Area
WPP-NRI:	*Wilayah Pengelolaan Perikanan Negara Republik Indonesia* / Fisheries Management Area of Republic of Indonesia
WTO:	World Trade Organization

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Abstract

Shrimp is Indonesia major commercial commodity both in domestic and international market which contribute greatly to Indonesia GDP. Shrimp resources stock in Indonesia experienced overexploitation shown from the decrease of annual catch in most of Indonesia fisheries management areas. Indonesia has 11 management areas which are assembled based on natural resources characteristic and managerial objective. The conundrum of Indonesia as a major exporter country, and the declining of wild shrimp stock has become major issue in Indonesia fisheries management. International trade is necessary for Indonesian economic growth, particularly in the fisheries sector. This study aims to identify the role of fisheries management in resolving the overexploitation conflict of trade liberalization for sustainable fisheries by comparing two areas of fisheries management in Indonesia (East Java, WPP 712; and North Sulawesi, WPP 716). Both areas for the case study have different characteristic regarding the annual shrimp capture productivity, the participation in international trade, and regional fisheries management. Lack of the enforcement of current law and regulation, and ineffective MCS system contribute to the increase of IUU fishing practice which endangers Indonesia fisheries resources, and degrade the quality of the environment. This study recommends that Indonesia should enforce the effective fisheries management measure such as Total Allowable Catch (TAC) in order create a balanced system between fisheries trade, and resources sustainability.

Keywords: Fisheries Management, Total Allowable Catch (TAC), Trade Liberalization, East Java, North Sulawesi.

I. Introduction

Globalization is the result of increased cross-border activities, particularly in economic activities. Globalization occurs due to trade of commodities and service, the movement of international capital, and the development of technology all over the world. The most dominant force in globalization is the flow of information in all marketable activities, marketization mobility of goods, services, capital, labor, and technology (Shangquan, 2000; UN, 2017).

Indonesia was a member of the General Agreement on Tariffs and Trade (GATT) in 1950. Indonesia also participated in the Uruguay Round of multilateral trade negotiation and joined World Trade Organization (WTO) in 1995. The exposure of Indonesia to globalization created economic benefits in the form of economic growth and welfare (Verico & Pangestu, 2020). Trade liberalization has increased Indonesia terms of trade and economic growth, reducing wage inequality and the use of child labor, and increasing labor absorption (Wacker *et al*, 2014).

Fishery product is highly mobile, it can be produced and harvested in one country, landed in another country, processed in a third, and consumed in another country. This characteristic will secure the future of fishery product to stay at the top of most highly internationally traded commodities. Asian countries predicted to keep the role of the exporter while the developed countries would still be the main importer (OECD, 2018). The development of fish trade is influenced by

technological development in the fishing industries (harvesting, preserving, and processing), the distribution, and the demand side such as consumer behavior. (Valdimarsson *et al*, 2004). In countries where lack of management is concerning especially those who are still applying open access system, market liberalization and globalization would lead into resources depletion due to over exploitation. Particularly for important commercial commodities such as shrimp and tuna, the urge to fulfill the demand from the international market would cost Indonesia and exporting countries its natural resource. The absent of effective management in international trade may create negative impact in environment and fish habitat (Deere, 2000; Schmidt, 2003).

Developing country like Indonesia requires strong fisheries management to sustain and develop its international fisheries trade. As developing country Indonesia is highly dependent on fisheries trade for the economic growth. This study investigated and depicted the linkages between the fisheries management and fisheries trade in Indonesia fisheries. This case study aims to describe the role of fisheries management in resolving the overexploitation conflict of trade liberalization for sustainable fisheries by comparing two different fisheries management area in Indonesia. The data gathered for this study are derived from official annual report published by the Indonesia government. The review of previous study regarding Indonesia fisheries trade and fisheries management specifically in shrimp industry, is also presented in this study as benchmark. This

study also gives general description of Indonesia fisheries law, its implementation, and the linkages with international fisheries trade.

II. Fisheries Production Export and Management in Indonesia

2.1. Indonesia Fisheries Production

Indonesia fishery production reached approximately 23 million tons in 2019 consisted of inland catch, marine catch, aquaculture, and seaweed production (Figure 1). In 2017 the potential catch was 12.5 million tons, and TAC was 9.77 million tons for all species combined within the 11 fisheries management areas of Indonesia. Around 6.3 million Indonesia participated in inland capture, marine capture, and aquaculture. The marine fishing fleet consisted of 768 thousand vessels in 2018, and there were around 100 thousand vessels operating in inland water. Small scale fishers dominated the Indonesian fisheries sectors, and most likely struggle with poverty. There are around 630 thousand registered boats, almost 90% are < 10 GT, while boats > 30 GT were around 8,900 units, but from this number only 3,600 are officially licensed (CEA, 2018; MMAF 2020).

Indonesia shrimp production (Figure 2) come from aquaculture production, marine capture, and inland capture fisheries. The quantity of catch is increasing each year, with the major shared coming from aquaculture which contributed more than 50% of the total production. Capture fisheries catches increase slightly each year with no indication of significant increases expected in the coming years. Inland capture fisheries of the wild shrimp only made a minor contribution to the total production as the aquaculture subsector dominates production.

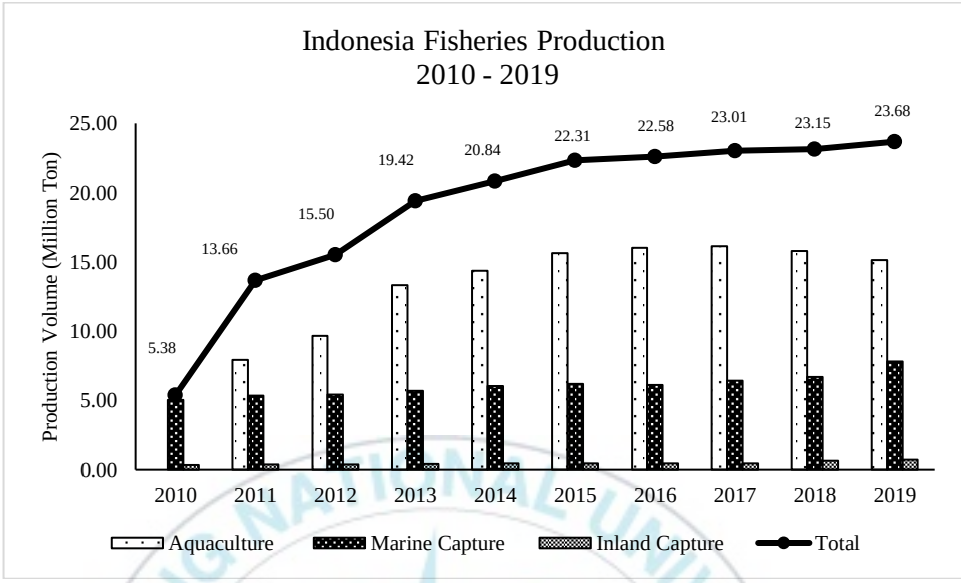

Figure 1. Indonesia Fisheries Production (2010 – 2019)
Source: MMAF, 2021

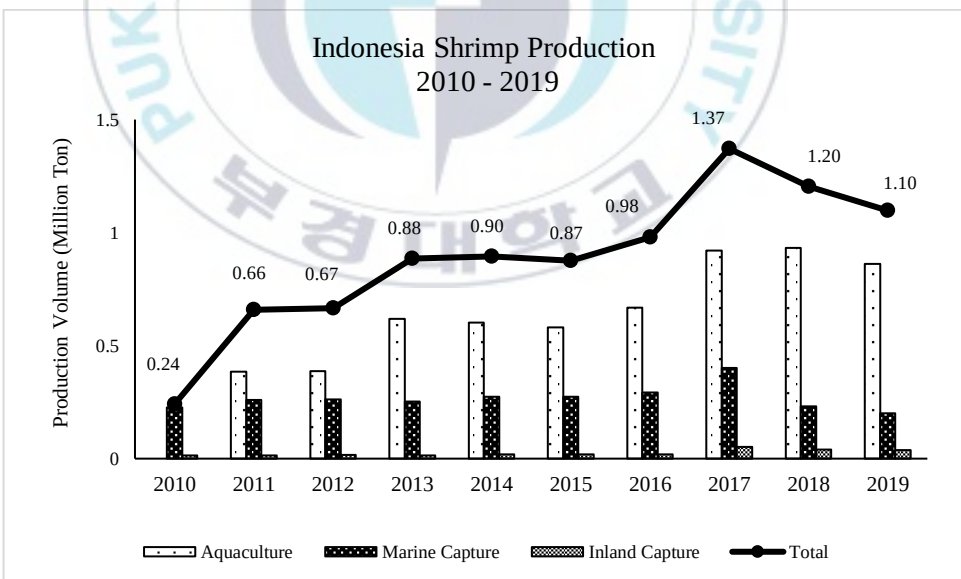

Figure 2. Indonesia Shrimp Production (2010 – 2019)
Source: MMAF, 2021

2.2. Indonesia Fisheries Export

Fisheries sector contributed around 3.7% to Indonesia GDP in 2019. Based on Indonesia Central Bureau of Statistic data, the growth of fisheries GDP in 2019 reached 5.81%, only 52.81% of the target set in the Ministry of Fisheries and Marine Affairs Strategic Plan document 2015-2019. Export of fisheries commodities are dominated by shrimp, tuna, squid, crab, and seaweed, while contribution from other commodities such as ornamental fish are still relatively low. Total fisheries export reached 1.18 million ton in 2019 (Figure 3). This trend is expected to raise as the aquaculture sector expands. Aquaculture sector contributed significantly to Indonesia fisheries production. In 2019 the largest export in terms of value was shrimp (207,705 Ton, USD 1,72 billion) whereas, the largest export based on the volume was seaweed (209,241 Ton). The value of Indonesia fisheries export has been stable without major fluctuation (Figure 4). Fisheries trade is very crucial for Indonesian economy, the development of the small-scale fisheries, improving the livelihood of the coastal communities, and for the contribution to Indonesia GDP. Therefore, the export target set to be increased each year by the authority. Based on data published by FAO, Indonesia is currently the second largest seafood producing country, after China. Indonesia is also one of the biggest shrimp exporting countries along with several other developing countries in Southeast Asia. In the shrimp sector the most commercially traded species are the giant tiger prawn (*P. monodon*) and white-leg shrimp (*L. vannamei*).

Those species are culture in Indonesia shrimp farming sector. In capture fisheries there are several species of penaeid shrimp that are targeted namely: banana prawn (*Penaeus merguiensis*), giant tiger prawn (*P. monodon, P. semisulcatus, P. esculentus*), western king prawn (*P. latisulcatus*), mud prawn (*Metapenaeus ensis, M. endeavouri*) dan coromandel shrimp (*Parapenaeopsis stylifera, Trachypenaeus asper, Solenocera subnuda*). The main market for Indonesia shrimp export is USA, Japan, and China (Fahrudin, 2003; World Bank, 2016; WTO, 2020; MMAF 2020; Statistic Indonesia, 2020).

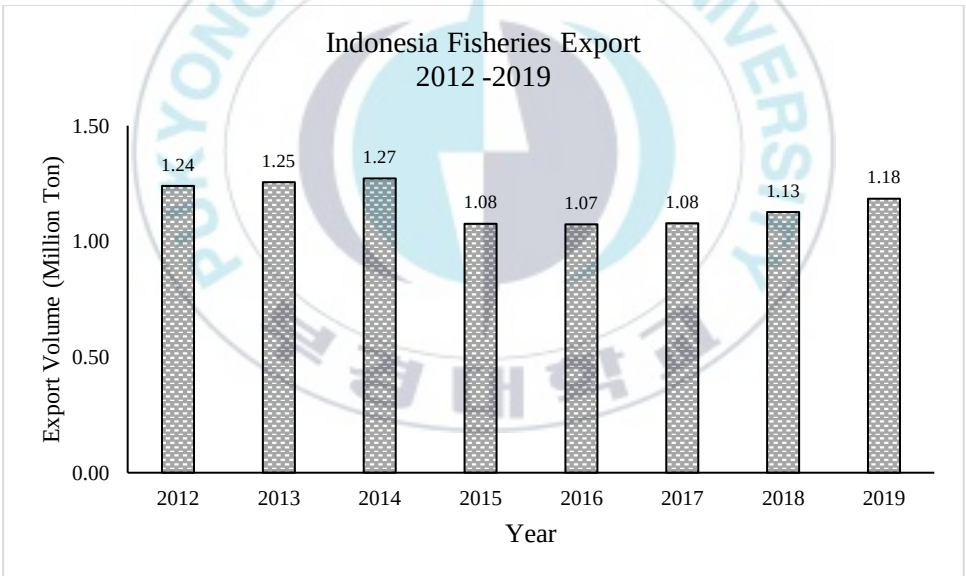

Figure 3. Indonesia Fisheries Export (2012 – 2019)
Source: MMAF, 2021

The quantity of Indonesia shrimp export from 2012-2019 is shown in Figure 5, and the value is depicted in Figure 6. The data shown are for total production including marine, inland, and aquaculture production in all Indonesia fisheries

management areas. It shows stable production which decreased slightly between 2014 and 2015 then, stayed stable before an increase was observed between 2018 and 2019. This development of production trajectory is similar to the world seafood export and import situation between 2014 and 2015 when a slight decrease was also observed (Ministry of Trade, 2018). Similar trend could be seen in global market as weaker shrimp prices during the first half of 2015 took a toll on export revenues in the major producing countries (Globe Fish, 2015)

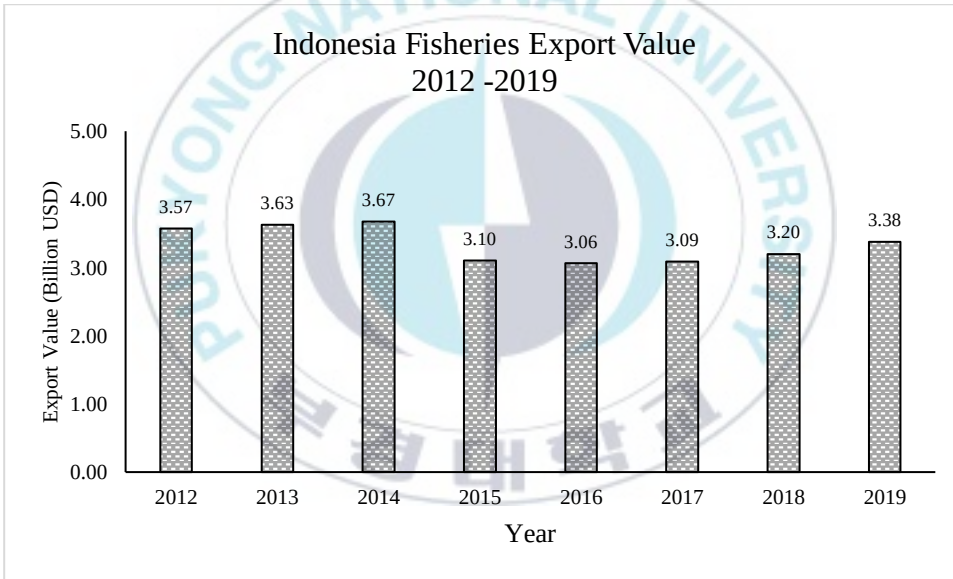

Figure 4. Indonesia Fisheries Export Value (2012 – 2019**)**
Source: MMAF, 2021

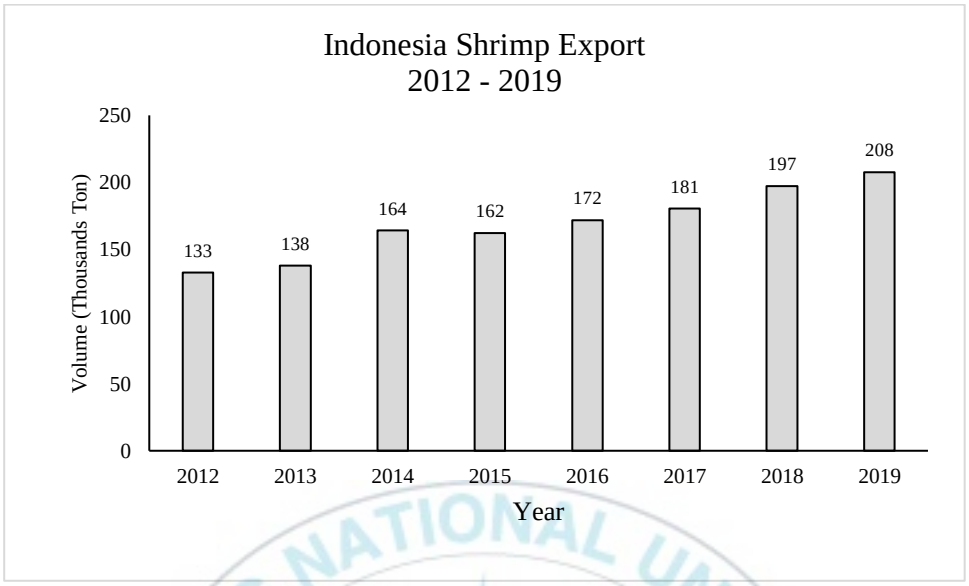

Figure 5. Indonesia Shrimp Export (2012 – 2019)
Source: MMAF, 2021

Figure 6. Indonesia Shrimp Export Value (2012-2019)
Source: MMAF, 2021

2.3. Indonesia Fisheries Management and Policy

Fisheries management areas were established in Indonesia to accommodate the need for fishing operations, fish breeding, conservation, research, and fishery development. The fisheries management areas are termed WPP-RI, which are divided based on natural resources characteristic and managerial objective. Below are the 11 Fisheries Management Areas in Indonesia (Figure 7)

1. WPP-RI 571 Malacca Strait and Andaman Sea
2. WPP-RI 572 Indian Ocean of Western Sumatera and Sunda Strait
3. WPP-RI 573 Indian Ocean of Southern Java, Southern Nusa Tenggara, Sawu Sea, and Western of Timor Sea
4. WPP-RI 711 Karimata Strait, Natuna Sea and South China Sea
5. WPP-RI 712 Java Sea
6. WPP-RI 713 Makassar Sea, Bone Bay, Flores Sea and Bali Sea
7. WPP-RI 714 Tolo Bay and Banda Sea
8. WPP-RI 715 Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea and Berau Bay
9. WPP-RI 716 Sulawesi Sea and Northern sea of Halmahera Island
10. WPP-RI 717 Cendrawasih Bay and Pacific Ocean
11. WPP-RI 718 Aru Bay, Arafuru Sea, and Eastern Timor Sea

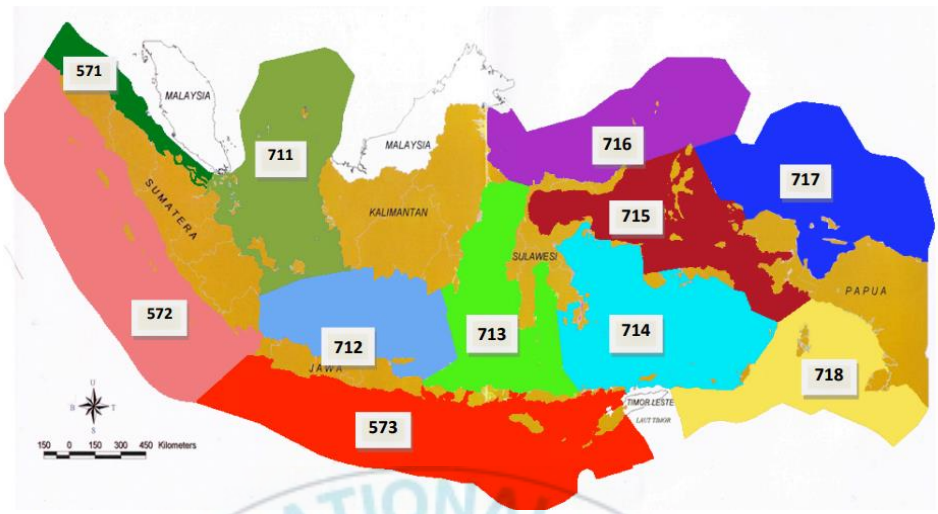

Figure 7. Indonesia Fisheries Management Areas
Source: MMAF, 2012

Below are national laws regarding fisheries management in Indonesia:

1. Law No. 5 year 1983 regarding Indonesia's Exclusive Economic Zone
2. Law No. 17 year 1985 regarding Ratification of the United Nations Convention on the Law of The Sea/United Nations Convention on the Law of the Sea 1982
3. Law No. 31 year 2004 on fisheries. This law regulated the exploitation of fisheries based on fairness, equity, and sustainability in its utilization by prioritizing the expansion of job opportunities and improving the standard of living for the fishers, fish breeders, and/or parties related to fishing activities.
4. Law No. 45 year 2009 to modify law No. 31 year 2004. The amendment made to improve the previous law, since the management, surveillance, and

law enforcement systems from the law No. 31 of 2004 failed to provide a sustainable and equitable livelihood for the fishers. Law No. 45 of 2009 expected to be able to anticipate technological developments and legal needs in the context of managing and exploiting potential fish resource. This law also regulated the Fisheries Business License (SIUP), Catch License (SIPI), Fish Carries Vessel License (SIKPI), Illegal, Unreported, and Unregulated Fishing, resources sustainability, and Maximum Sustainable Yield (MSY) in all fisheries management areas (Sapari, 2019)

5. Law No. 32 year 2014 regarding maritime. Management of marine resources is conducted through a legal framework to provide legal certainty and benefits for all people within the context of politics, economy, socio-culture, and security. This law also regulated the maritime surveillance, conflict reduction between actor in maritime sector, and sustain the environment.
6. Law No. 7 Year 2016 concerning the protection and empowerment of fisherman, aquaculture farmer, and salt miner. Protection and empowerment in this law include insurance, credit, and loan.
7. Government Regulation No. 60 Year 2007 regarding fishery stock conservation. This government regulation aimed to endorse conservation and management measure to maintain and sustain fishery stock. One of

main objective of this regulation is reach 20 million Ha of Marine Protected Area (MPA) in Indonesia territory.

8. Ministerial Decree No. 47 Year 2016 concerning total allowable catch (TAC), resources potential, and exploitation rate for several species in Indonesia fisheries management areas.
9. MMAF Decree No. KEP.58/Men/2001 regarding the implementation procedure of Community Monitoring Systems in the Management and Utilization of Marine and Fisheries Resources.
10. MMAF Regulation No. PER.05/MEN/2007 on fishing vessel monitoring system.
11. MMAF Regulation No. PER.07/MEN/2010 on operation legal letter of fisheries vessel.
12. MMAF Regulation No. PER.18/MEN/2010 on fishing logbook.
13. MMAF Regulation No. PER.02/MEN/2011 as amended No. PER.05/MEN/2012 regarding fishing zone, fishing gears instalment, auxiliary fishing gears in fisheries management area.
14. MMAF Regulation No. PER.14/MEN/2011 on fishing business as amended by minister of marine affairs and fisheries regulation No. PER.49/ MEN/2011. This law regulated license for vessel, fishing vessel > 30 GT are required to have Fisheries Business License (SIUP), and Catch License (SIPI), and Fish Carries Vessel License (SIKPI). The purpose of licence

scheme implementation is to manage fisheries resources in all Indonesia Fisheries Management Area.

15. MMAF Regulation No.PER.12/MEN/2012 on High Seas Fishing Business. This law regulated the term and conditions acquire license (Fisheries Business License, Catch License, and Fish Carries Vessel License).
16. MMAF Regulation Number PER.13/MEN/2012 on Catch Certificate. This law regulated the written document to state the fishery product are not involved in IUU fishing affair. The objective of Catch Certificate is to accelerate trading activity, support action against IUU fishing, guarantee the traceability of fishery product, and follow sustainability measure.

As reported by OECD in 2017 a road map is being developed in Indonesia to establish quota scheme, open and close season, fisheries zoning law and introduce multi-stakeholder institutions to manage the 11 fisheries management areas. The use of right of privilege in fisheries, and access control are being considered as one of the fisheries management measure in Indonesia. New laws are being developed for the use of right of privileges in fisheries, and important step towards regulating access to resource.

Historically Indonesia has been practicing Input control since 1970, by granting license to vessel more than 30 GT by the central government, provincial government to vessel 20-30 GT, and the regency government for smaller vessel.

Regarding the licensing scheme in Indonesia fisheries, small scale fishers are not obligated to get license to go fishing. Based on Indonesian fisheries law No. 7 year 2016, small scale fishers defined as fisheries who work in fisheries without a vessel, or with vessel of maximum 10 GT.

Indonesia also used technical measure as one of the instruments to manage its fisheries. Technical measure applied for minimum mesh size for trawl and purse seines, maximum mesh size for gillnets, and minimum distance for FADs. In shrimp capture the technical measure set to minimum mesh size for trawl to 1 inch. Since 2015, Indonesia government completely banned fishing gear such as trawl in consideration of environmental destruction the two gears would cause (Ministerial Regulation No. 2 year 2015). This new regulation is getting mixed response from fishers who protested the regulation due to the frustration for not being able to reach their production target. Trawl is known as the most productive fishing gear, but its destructive impact toward the fish habitat, and the significant inevitable by catch (especially in the shrimp trawl) render this particular gear an uncontrollably massive killing weapon. Regardless the fact that the regulations on the usage of the trawl and seine nets had come into force, most of the fishers still illegally operate trawl and seine net in Indonesia fisheries management areas. The MMAF enforced the regulation in priority areas such as North Java Sea since the pressure of trawl fishing was alarming, and due to the stocks in those areas were over-exploited (FAO, 2014; CEA, 2018).

To manage and improve Indonesia fisheries sector, The Ministry of Marine Affairs and Fisheries (MMAF) introduced the Marine and Fisheries Development Policy 2020-2024. The purpose of this policy is to improve communication with fishers, to optimize aquaculture sector role to meet the market demand, to strengthen surveillance to manage the marine coastal and small island, and to improve human resources in fisheries (WTO, 2020)

III. Linkage Between Fisheries Management and Trade

International trade is the major force in fisheries sector as well as one of the major sources of foreign change earning for the developing countries. Developing countries depend on globalization and trade liberalization for the improvement of its economic growth, and to accelerate the country's development. Most major exporting countries in fisheries sector are developing countries, and importing countries are mostly developed countries. Export orientation always linked with the increase of production and in term of fisheries it would lead to increase in the effort to harvest the fisheries product. The exploitation of fisheries resource to meet the market demand will lead to over-exploitation if not properly managed. As trade liberalization is delivering monetary advantage toward the big fisheries industry, in the case for small scale fishers the same advantage did not apply (Kurien, 1998; Deere, 2000).

Trade liberalization and globalization have been praised for international economic growth, sustainable development, increase market competition, raise the choice for consumers, increase monetary advantage, and increase international relationship among trading countries. As well as offering opportunities, globalization is also credited with the increase of IUU fishing activities. This side effects of globalization could be a threat to small scale fisheries and coastal community in developing countries. As response to the globalized fisheries

product, international guideline and standard are being established to manage the whole chain of fisheries. There is an increasing proof raised by scientist that globalization is a tremendous contributor to climate change, environmental degradation, and pollution. The association and severity of environmental destruction, and trade liberalization lays in the fisheries management in each country (Deere, 2000; FAO, 2007; Afzal 2007; Samini & Jenatabadi, 2014; Ilic & Hafner, 2015; UN 2017; OECD, 2020; Verico & Pangestu, 2020)

Fishery is a global commons resources which demands regional and international co-operation to ensure that fish stocks are exploited in a sustainable and responsible way. The trade between import and export countries has been discussed and negotiated in several conferences and mandated in some regulations. WTO as the biggest organization who regulates the international trade has already created guideline for the trade transparency to avoid fraud and unfairness in economic term. The current international trade regulation did not take environmental protection into consideration. The sustainability of natural resources in exporter countries remains outside the international trade priority (Ahmed, 2005; OECD, 2020).

Consumers are becoming more aware about responsible fisheries and there are concerns about the issue of conservation in fisheries such as IUU fishing and fish safety. This new wave of awareness impacting the supply side is demanding more responsibility to ensure toxic material free products such as from heavy

metals and whether the product is harvested responsibly and sustainably. Market demand also impact on the way the Hazard Analysis Critical Control Point (HACCP) legislation increased their strictness in certify the fisheries product. Development and implementation of Good Aquaculture Practices (GAP), Good Hygienic Practices (GHP) and Hazard Analysis Critical Control Point (HACCP) are required in the whole food chain. In market theory it is a strong argument that consumer behavior is the main reason for a producer to change the way they produce. In this case the role of consumer is extremely important to drive the fisheries producer to harvest, process, and distribute fisheries product in sustainable and responsible term. The International Standards Organization ISO14000 series which is a party to auditing for the certification of compliance regarding manufacture, trade, and environmental protection guidelines (Valdimarsson *et al*, 2004; Lem & Emerson, 2008; FAO, 2007; Ritcher *et al*, 2017).

3.1.Indonesia Fisheries Management and Trade

Indonesia is a member of:

- World Trade Organization (WTO).
- Association of Southeast Asian Nations (ASEAN)
- ASEAN Free Trade Area (AFTA).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),
- Convention on Biological Diversity (CBD)
- Biosafety Protocol.

As the member of WTO Indonesia remains committed to the multilateral trading system. Indonesia improved its WTO commitments by ratifying the Trade Facilitation Agreement (TFA) in 2017. Fisheries sector has huge impact toward the food security, livelihood, and economic development in Indonesia. Therefore, government program regarding grants, loans, and subsidies are targeting fisheries sector. Economic theory demonstrates the market-distorting effect of subsidies, which gives uneven disadvantage in the world market. Based on the above-mentioned theory, the members of the World Trade Organization (WTO) aspire to solve this matter within the framework of international trade rules to tackle fisheries subsidies. The main purpose is to conduct free and fair trade between member countries to reach prosperity and livelihood improvement. Indonesia submitted several notifications to the WTO, one of those are about subsidies and countervailing measures. Recent Ministerial Conference of the World Trade Organization was unable to reach an agreement on draft text related to fisheries subsidies, and instead agreed to "continue to engage constructively in the fisheries subsidies negotiations,". (Valdimarsson, 2007; Bahety, & Mukiibi, 2017; CEA, 2019; WTO, 2020).

The process of international fish trade in Indonesia is managed by the national government agencies. There are several licenses required and granted by different ministry in Indonesia to ensure that the export system is running properly. These include the Catch License (SIPI) issue by MMAF, Vessel License (SIKPI)

issued by Ministry of Transport, and the Foreign Labor License to the exporters issued by Ministry of Labor. Based on the shrimp supply chain, some of the production is for local market and the rest are retained by traders for processing and export. The role of the trader is very essential in shrimp supply chain especially for international trade.

The objective of Indonesia fish trade policy is ensuring that fisheries resources stock is adequate for national utilization, accommodating the supply for fish processing industries, guaranteeing excellent quality for human consumption, avoiding disease spread, and sustaining the natural resources stock. Export and import of animal, fish, and plant is mandated under law No. 16 year 1992. Ministry of Agriculture Decree No. 265 year 1986 and No. 245 year 1990 regulated the import and export requirement of live fish such as import permit, and Fish Health Certificate (FHC) from its origin country. Fisheries law No. 31 Year 2004 also regulate the export and import requirement for fisheries product.

Presidential Regulation No. 71 year 2015 established policy to ensure the availability and maintenance of the price stability of goods distribution in the market to deal with shortage and price fluctuation. Government regulation No. 9 year 2018, is the follow up of Law 3 No. Year 2014. This regulation aims to ensure protection and empowerment of fishermen, aquaculture farmer, and salt farmers. Ministry of trade regulation No. 66 year 2018 regulated procedural export-import policy in Indonesia. Law No. 7 Year 2014 is concern with trade principles,

compliance, and restriction. Law No. 45 year 2009 issue by MMAF regulates the environment and resources protection as well as law No. 32 year 2009 issued by Ministry of Environment and Forestry to establish an environmentally sustainable development. To achieve its goal this law introduced environmental planning policy.

In a well-managed export market, there could be beneficial interaction between the international trade and resources sustainability. Consumers' behavior plays a big role in demanding sustainable harvested and well-processed fishery product. Indonesia can only achieve the optimum advantage of fish trade liberalization if robust fisheries management measure is established and implemented. There are several countries with excellent fisheries management which have enabled them to rebuild and sustain their fisheries stock.

3.2. Other Countries Fisheries Management

3.2.1. New Zealand.

New Zealand is applying Quota Management System (QMS) to manage its fisheries. Annual Total Allowable Catch (TAC) is designed to set the catch limit for every species. TAC divided into several group based on the fisheries categories: recreational, customary fishing, and commercial fishing (TACC). Quota Management System (QMS) has proven to sustain New Zealand fisheries stock (MPI, 2020). New Zealand has been able to rebuild their depleted stock and sustain

the wild catch of Cod. Red Cod is New Zealand's major export commodities and is exploited in a sustainable manner.

3.2.2. Norway

Norway is applying input, technical measure, and output control for the fisheries management. Input control measure such as license and permits regulate the vessels in Norway fisheries areas for each type of fisheries. Technical measure also applied in Norway fisheries in term of mesh size regulation, fishing gear type, and discard ban. TAC established annually for several species. Individual Vessel Quota is applied for specific species such as herring, and capelin. In some fisheries Norway implanted periodic quotas, trip quotas, and quotas of days at sea as output control measure in some fisheries (OECD, 2005). Norway fisheries management is considered to be one of the successful attempts to manage fisheries in a sustainable way.

3.2.3. USA

USA fisheries management is mandated under Magnuson-Stevens Fishery Conservation and Management Act of 1996. ITQ was first introduced to USA in 1960 for several species (ocean quahog/surf calm, wreckfish fisheries, Pacific halibut, and sablefish). USA is also applying TAC for its fisheries management. Annually the total allowable catch is set each year. Fisheries authority will have annual limit for the number of fish allowed for harvesting, number of fishers,

requirements on where, when, and how fish can be caught. These limits are to ensure that fishes are being caught after the fish reaches the maturity. It is important to note that to catch the fish too early would endanger the fish productivity. This practice in long term would contribute to stock depletion from recruitment and growth overfishing. This regulation would mitigate this kind of issue to happen, and ensure the protection of fish population and ecosystem (Fish Watch, 2021)

IV. Shrimp Fisheries Export and Fisheries Management

Shrimp is the biggest contributor to Indonesian foreign earning compared to other fishery product (Oktaviani & Widodo, 2005). This case study reviewed the shrimp international trade in two different fisheries management area in Indonesia. East Java and North Sulawesi representing two different Fisheries Management Area (WPP). Figure 8 is the map of Indonesia, East Java marked with number 15, and North Sulawesi marked with number 24. Comparing these two areas in this case study will give deeper understanding of aspects of fisheries management which influences the resources stock in each area and the impact of international trade towards the shrimp capture production.

Figure 8. Map of Indonesia Provinces
Source: Indonesia Tourism, 2021

4.1. Fisheries Sector Profile

The coastline of East Java is approximately 3,498 km long measured from the highest tide. The ecosystem along the coastal zone varies from mangrove, seagrass bed, coral reefs, and white sandy beaches. The fishing settlement are located in the north and east coast, meanwhile, the south coast area is generally a steep beach and only certain part could be developed for fishing or tourism (MMAF, 2013).

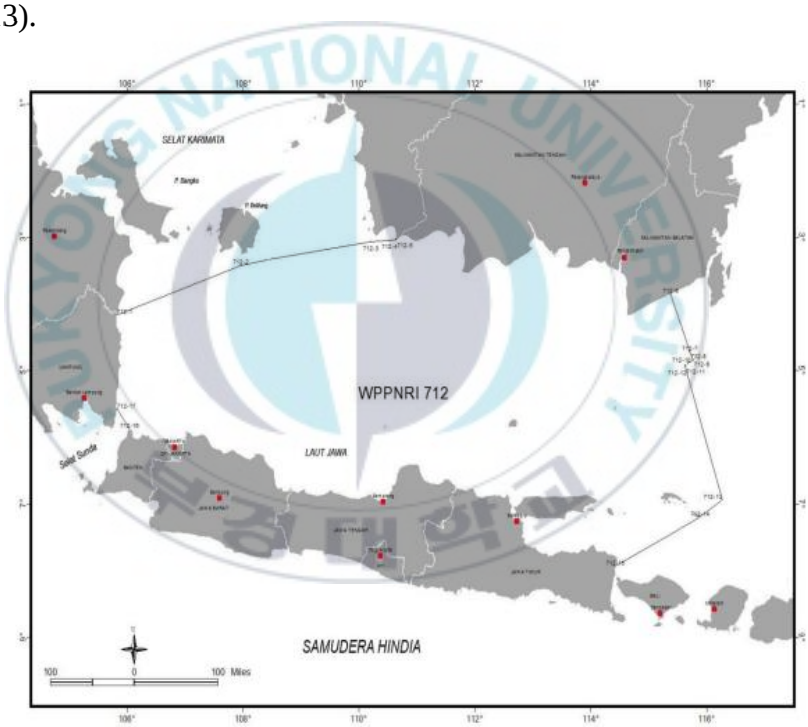

Figure 9. Fisheries Management Area 712 (East Java)
Source: MMAF, 2014

North Sulawesi is an archipelago province consisting of 287 islands with 59 inhabited islands and 228 uninhabited islands. The total area is 15,376.99 km^2, with sea area (EEZ) of 190,000 km^2. Territorial waters area is 161,540 km^2 with a

length of coast 2,395.99 km, and forest area of 701,885 ha (SIBAS RIPI PUPR, 2017). Bitung is one of the regions in North Sulawesi Province which has the largest port in the province. Most of the fisheries trade around north Sulawesi go in and out from Bitung port. North Sulawesi with the profile as an archipelago province has major fisheries commodities such as tuna and shrimp. The exploitation status for tuna and shrimp and other major resources in WPP 716 generally are fully exploited, except squid and reef fish were over exploited.

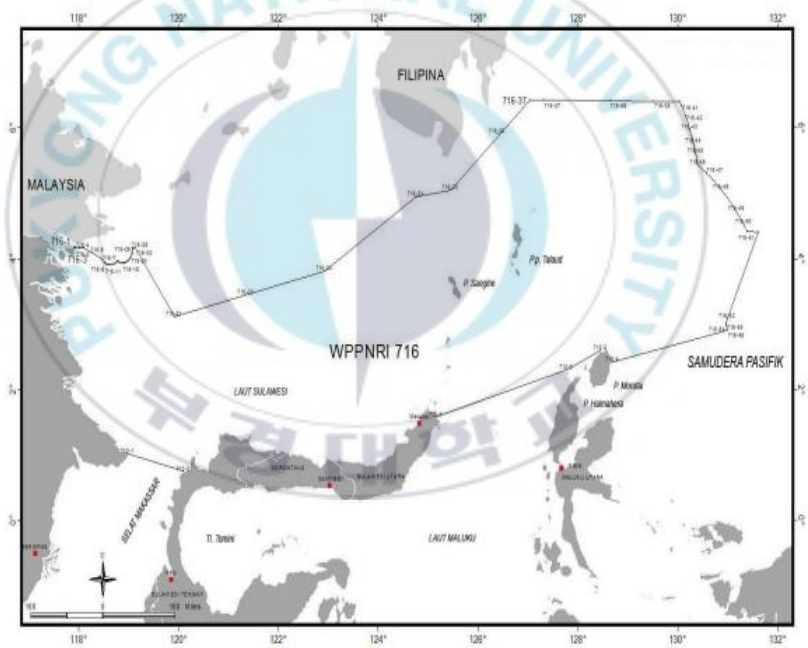

Figure 10. Fisheries Management Area 716 (North Sulawesi)
Source : MMAF, 2014

4.2. Shrimp Production

Capture fisheries production in marine waters in East Java Province generally consists of pelagic fish, demersal fish, and non-fish group; Crustacea and Mollusca (MMAF, 2013). The shrimp capture fisheries grew steadily from 2010, reaching its peak in 2017 of 32,875 tons, and the volume decreased to 5,613 tons in 2019. The production size was relatively low compared to aquaculture production. Despite the huge gap between shrimp capture and aquaculture, the trends were similar showing stable or increasing from 2010 and peaking by 2017, before decreasing trend set in. Shrimp aquaculture highest production was in 2017 with 156,139 tons and decreased by around 30% to 104,616 tons in 2019.

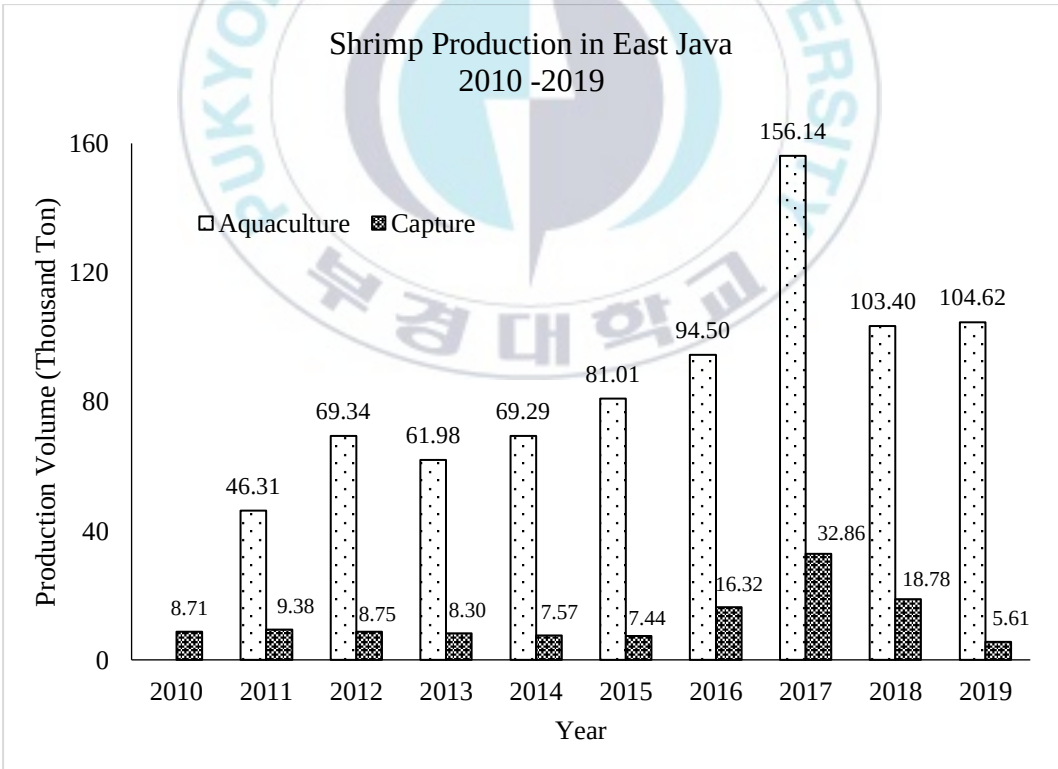

Figure 11. East Java Shrimp Production Volume (2010 – 2019)
Source: MMAF, 2021.

Fisheries in North Sulawesi is not as developed as fisheries in East Java. The production for capture and aquaculture in term of volume is much less than production volume in East Java. The shrimp production in North Sulawesi is presented in Figure 12.

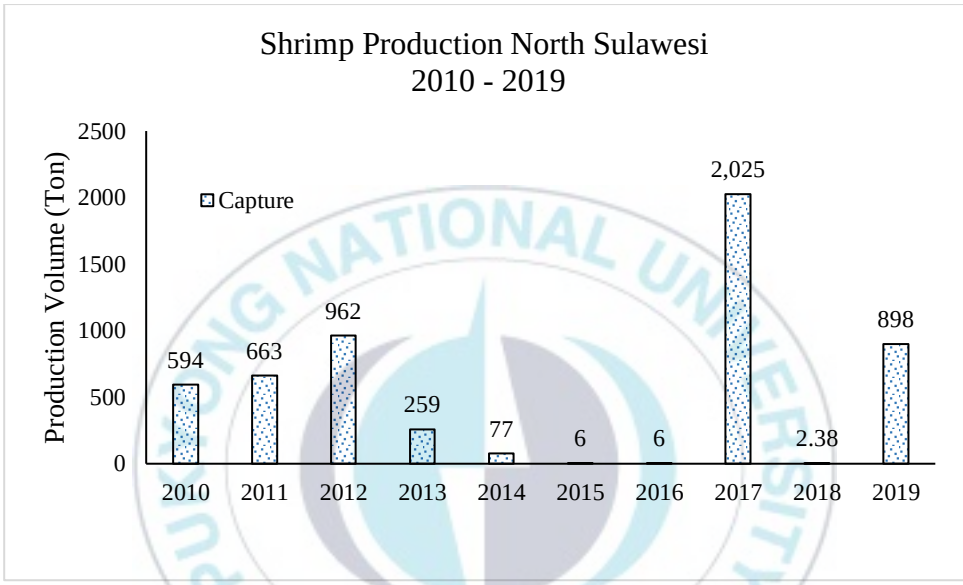

Figure 12. Shrimp Production in North Sulawesi (2010-2019)
Source: MMAF, 2021.

Shrimp capture fisheries dominated the production volume in North Sulawesi from 2010 – 2013, as during that period aquaculture was not yet developed in North Sulawesi. By 2019 the capture shrimp production in north Sulawesi reached 898 ton while the aquaculture was about 432 ton.

4.3. Shrimp Export

East Java Shrimp Export is one of the biggest and productive area in Indonesia, along with DKI Jakarta, Lampung Province and South Sulawesi. The

high number of exports from Tanjung Perak Port in East Java is also supported by the shrimp production from another province. The amount of shrimp exported from East Java grew from 2015 to 2019. The form of shrimp commodities exported range from frozen shrimp, fresh shrimp, and processed shrimp. Frozen product accounted for the largest volume of the East Java shrimp export. Despite the high percentage of frozen shrimp exported, the trend was decreasing each year, caused by the rise of other shrimp product such as preserved shrimp in airtight bag which the export quantity increasing in the last two years (Statistic of East Java, 2020).

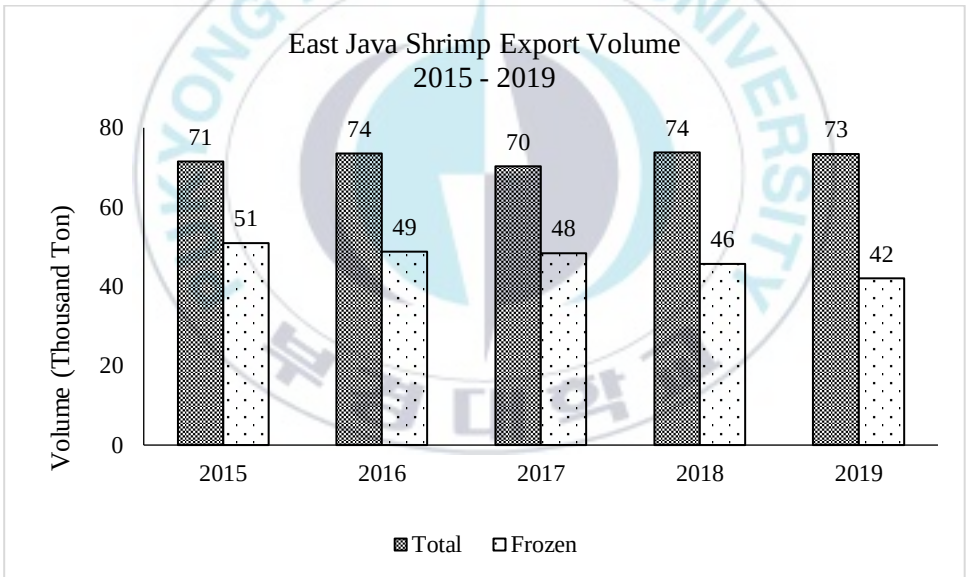

Figure 13. East Java Shrimp Export Volume (2015 – 2019)
Source: Statistic of East Java, 2020

The value of shrimp exported fluctuated each year, in 2019 with total of exported quantity almost the same with the volume of 2018, but the value in USD was slightly reduced from 708 million USD to 655 million USD (Figure 14), in

2019 most of the export from Asian countries were experience decline due to the weak demand from market in USA, EU, and Japan. (Globe Fish, 2019).

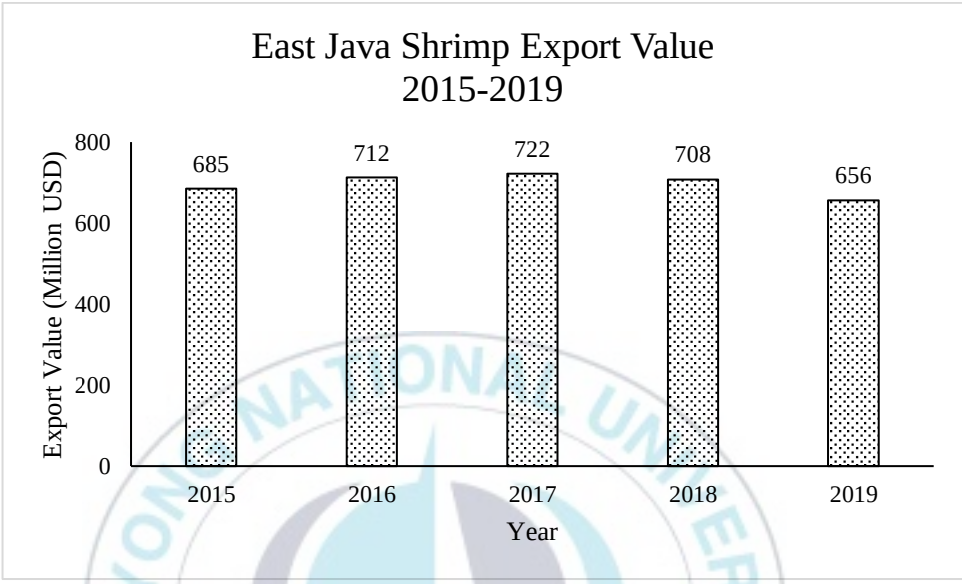

Figure 14. East Java Shrimp Export Value (2015-2019)
Source: Export Statistic of East Java, 2020

Shrimp export from North Sulawesi did not occur continuously as in the case of East Java which is one of the biggest exporter provinces with stability in production and export quantity. Most of the shrimp for exports is not distributed from its province port because the shrimp needs further processing in other areas before being shipped to main container port in Indonesia. Most export products pass through the two main ports which are Tanjung Priok (DKI Jakarta) and Tanjung Perak (East Java) (World Bank, 2016). In north Sulawesi the most productive regency is Minahasa, and the City of Bitung in term of capture fisheries. Shrimp export from North Sulawesi only happened in 2014, when the province

exported around 16,344 kg of shrimp to United State of America through Tanjung Priok Port.

4.4. Shrimp Fisheries Management and Resources Stock

4.4.1. Shrimp Fisheries Management

Recent studies have been discussed the impact of fisheries trade towards the increasing effort to harvest more fish in Indonesia with the objective to widen their international market reach. Ever since the introduction of trawl in Indonesia in 1950, the production of shrimp has increased dramatically. The exploitation of shrimp resources in all over Indonesia fisheries management area has become a major concern as in almost all Indonesia fisheries management areas, the shrimp resources status is over-exploited. Indonesia government acted by introducing law No. 39 year 1980 to ban the utilization of trawl in fisheries management areas. Lack of enforcement of this law is the main reason the growth of the IUU fishing in shrimp fisheries.

Indonesian government issued law No. 10/PERMEN-KP/2015 to replace law No. 56/PERMEN-KP/2014 regarding the moratorium on licences for ex-foreign fishing vessels including Fisheries Business Permit (SIUP), Fishing License (SIPI), and Fishing Vessel License (SIKPI). The main purpose of those regulations is to sustain Indonesian fisheries resources, and prevent, deter, and eliminate IUU fishing in Indonesia fisheries management areas. MMAF has also

adopted Ministerial Regulation No. 2/PERMEN-KP/2015 which prohibited the use of trawls and seine nets in all Indonesia fisheries management area.

As one of the main issues of fisheries policy in Indonesia, the enforcement of the regulation remains weak, and the actual implementation of the regulation is still questionable. As the East Java resources stock is getting worse the MMAF intensified the enforcement of the prohibition of trawl and seine net in this area, while in North Sulawesi there is still lack of enforcement. There is no study regarding shrimp resources stock in North Sulawesi and East Java regarding the prohibition of the trawl and seine net. The enforcement of ministerial Regulation No. 2 year 2015 has given promising result in some others fisheries management area in Indonesia, for example the recent study in Fisheries Management Area No. 718 mentioned that the shrimp resources stock status in Arafura Sea shown a better improvement in stock recruitment after the banned of trawl and seine nets gear (Wijopriono *et al*, 2019).

4.4.2. Shrimp Resources Stock Status

Based on Decree of the Minister of Fisheries and Maritime Affairs of the Republic of Indonesia No. 50/KEPMEN-KP/2017, below are the shrimp resources stock status:

Table 1. Shrimp Stock Status in Indonesia Fisheries Management

Fisheries Management Area		Shrimp		Remarks
1. Malacca Strait and Andaman Sea	WPP-RI 571	Potential (Ton)	59,455	Over-exploited

		Allowable Catch (Ton)	47,564	
		Exploitation Rate (E)	1,59	
2. Indian Ocean of Western Sumatera and Sunda Strait	WPP-RI 572	Potential (Ton)	8,023	Over-exploited
		Allowable Catch (Ton)	6,418	
		Exploitation Rate (E)	1,53	
3. Indian Ocean of Southern Java, Southern Nusa Tenggara, Sawu Sea, and Western of Timor Sea	WPP-RI 573	Potential (Ton)	7,340	Over-exploited
		Allowable Catch (Ton)	5,872	
		Exploitation Rate (E)	1,70	
4. Karimata Strait, Natuna Sea and South China Sea	WPP-RI 711	Potential (Ton)	62,342	Fully Exploited
		Allowable Catch (Ton)	49,873	
		Exploitation Rate (E)	0,53	
5. Java Sea	WPP-RI 712	Potential (Ton)	57,965	Over-exploited
		Allowable Catch (Ton)	46,372	
		Exploitation Rate (E)	1,11	
6. Makassar Sea, Bone Bay, Flores Sea and Bali Sea	WPP-RI 713	Potential (Ton)	30,404	Fully Exploited
		Allowable Catch (Ton)	24,324	
		Exploitation Rate (E)	0,52	
7. Tolo Bay and Banda Sea	WPP-RI 714	Potential (Ton)	3,180	Moderate
		Allowable Catch (Ton)	2,544	

		Exploitation Rate (E)	0,39	
8. Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea and Berau Bay	WPP-RI 715	Potential (Ton)	6,436	Fully Exploited
		Allowable Catch (Ton)	5,149	
		Exploitation Rate (E)	0,78	
9. Sulawesi Sea and Northern Sea of Halmahera Island	WPP-RI 716	Potential (Ton)	7,945	Fully Exploited
		Allowable Catch (Ton)	6,356	
		Exploitation Rate (E)	0,50	
10. Cendrawasih Bay and Pacific Ocean	WPP-RI 717	Potential (Ton)	9,150	Moderate
		Allowable Catch (Ton)	7,320	
		Exploitation Rate (E)	0,46	
11. Aru Bay, Arafuru Sea, and Eastern Timor Sea	WPP-RI 718	Potential (Ton)	62,842	Fully Exploited
		Allowable Catch (Ton)	50,274	
		Exploitation Rate (E)	0,86	

Note: $E < 0.5$ = moderate; $0.5 \leq E < 1$ = fully exploited; $E \geq 1$ = over- exploited.

Source: Decree of the Minister of Fisheries and Maritime Affairs of the Republic of Indonesia No. 50/KEPMEN-KP/2017

The resource status in WPP 712 which included East Java area was over exploited with 1.11 exploitation rate whereas the shrimp stock in WPP 716 (North Sulawesi) area was fully exploited. Fully exploited status suggest that the effort should be maintained within the same level with close monitoring, it does not

necessarily mean the effort should be reduced. Based on exploitation rate in WPP 712, the effort should be reduced.

The global shrimp price has been fluctuating (Figure 15) from 2012 to 2020, with the highest price for shrimp was in 2017 at 9.05 USD/Kg. In Indonesia in general shrimp export volume was on an increasing trajectory because production is also supported by aquaculture sector.

Figure 15. Global Shrimp Price (2012 – 2020)
Source: IMF, 2021.

V. Discussion

The difference between exploitation level in case study area; East Java and North Sulawesi is due to the number of fishing efforts in exploiting the resources. The resources status of wild shrimp in East Java is over exploited, and it shown from the volume of wild shrimp catch which decreased each year. if a robust fisheries management measure is not being enforced regarding this matter, within few years West Java area in WPP 712 would deplete the wild shrimp stock completely due to over exploitation and management failure. On the other hand, in North Sulawesi (WPP 716), the wild stock of shrimp is not over exploited yet. Based on the perspective of Indonesia government, this status is being seen as opportunity to increase the production, as the stock has not reached its highest potential of exploitation yet.

In general fisheries management in Indonesia are applying the same system, there is no specific measurement in each fisheries management area which make it different from each other. Except the regulation regarding the prohibition of trawl, in 2015 Indonesia government mandated to ban trawl from all Indonesia fisheries management. This regulation did not go as planned as the fishers kept on operating trawl for capture fisheries. In this case once again lack of enforcement remained Indonesia's biggest challenge regarding law and regulation. The regulation was strictly enforced in 2017 especially in North Java Sea to reduce the environment

destruction and to save the natural resources stock in North Java seas (WPP 713 and 712) where fisheries stock status is overexploitation. In the Arafuru Sea, several studies have been conducted with the promising result that the banned of trawl improve the resources stock. Beside banning the fishing gear such as trawl and seine net, Indonesian government also audit, and revoke fishing licenses in several area in Indonesia fisheries management.

It is important to note that license only applied for vessel > 30 GT while for shrimp capture fisheries where majority of the fishers used smaller boat did not require fishing license. Fishers are inclined to modify their vessel to be smaller to avoid licensing and created modification in trawl to avoid the trawl usage regulation. Those action are some the major obstacle for Indonesian government to tackle illegal unregulated and unreported fishing.

Even though aquaculture sector supported the expansion of production volume of shrimp for export and local market, it still could not protect or stall the further exploitation of the depleted wild shrimp resources in WPP 712. Aquaculture also has its share of the environmental problem from the destruction of mangrove forest and fish habitat which is also a concern regarding unsustainable aquaculture in Indonesia. The unregulated expansion of shrimp farming is also a serious issue regarding the unsustainable aquaculture practice in Indonesia. While some argue that aquaculture is the future of fisheries, lack of understanding about the impact of aquaculture to the environment make the expansion and its development is

uncontrollable. The issue of deforestation and pollution are the major threat which are directly affecting Indonesia marine biodiversity, and public health.

Related to fisheries management Indonesia government is dealing with fisheries stock management and sustainability in two separate regulations. With regards to fisheries production, Indonesia is still increasing the goal of production quantity to increase the export quota. By having huge amount of export will fasten Indonesia economic growth. The same goes for aquaculture sector, the potential area to be developed for aquaculture is very large, hence authorities are encouraging aquaculture farmers to expand their business and increase the number of productions to reach the maximum potential of Indonesian aquaculture production. To increase the livelihood, reduce un-employment rate, and poverty alleviation are main objective for the government to encourage the fishers and farmers to increase the effort to increase shrimp production. It might help in short run, but in long term this kind of overexploitation or inordinate expansion of aquaculture could boomerang and result into environmental disaster and Indonesia could gravely undermine the productivity of its fisheries and aquaculture resources. To balance between the economic growth to improve livelihood, and conservation of resources sustainability, Indonesia needs a reliable fisheries management plan.

Like other developing countries, Indonesia utterly needs trade liberalisation for the development of its fisheries sector and economic sector in general, but on the other hands without an effective fisheries management, it will endanger

Indonesian natural resources. The analysis of the case study in two different management area in Indonesia suggested that the increasing exposure fisheries to international trade in an area will be impacting the shrimp resources directly if there is no management measure taken to balance the exploitation and conservation. The case in East Java province which experience decline of shrimp catch each year is an evidence that the resources stock may have buckled under the demand of international supply.

This study suggested that effective fisheries management should be the main priority for Indonesia to keep up with the export system. International trade remains one of the essential sources for Indonesia to gain international currency and improve fisheries community livelihood. As a major shrimp exporter country, the export target set by the authorities is increasing annually. In 2019 one of export value targets set by MMAF was raised 6.17 billion USD. The pressure to increase production to gain more benefit may inevitably get out of control. It is important to note that the monetary advantage of international trade mostly enjoyed by the middlemen and processing company and not necessarily the producers. The increase of profit from value addition most likely would not be part of small-scale fishers' income. It remains difficult to link the international trade and coastal community livelihood improvement because the supply chain of wild shrimp capture in Indonesia seems to exclude small scale fishers in the fair share of the monetary profit.

Based on the analysis in the two-case study area, Indonesia authorities needs to increase the enforcement of management measure. A management measure consisted of at least input control, output control and technical measures. Input could be managed by licencing scheme to regulate the effort being put into the system. Output control is the most effective measure proven, but it seems very difficult for Indonesia to adopt because it requires user right, while in most Indonesia fisheries management area the system is an open access. Gear limitation, and gear restriction are part of technical measure. Indonesia already applied several management measures such as the prohibition of fishing gear like trawl and seine nets, the fishing license scheme, and total allowable catch for some species. All those management measures in Indonesia are considered not effective to sustain the resources or to stop IUU fishing. The result could be seen from declining annual production of Indonesia major fisheries commodity as a symptom of overexploitation. Taking example from another country such as New Zealand, Norway, and USA. All those countries mentioned above are applying Total Allowable Catch (TAC) to set annual limit for several species in the fishing area. Each country has different others measure regarding fisheries management, and they are considered successful in sustaining their fisheries stock. Some are successful on rebuilding their depleted stock. These measures are credited for excellent fisheries management. Trade liberalization is usually blamed for the depletion of stock. But with strong fisheries management, the economic viability

and biological sustainability objective could be reconciled and achieved at the same time.

As mentioned in Chapter II, for small scale fisheries, Indonesia adopted an open access system. Fishers with boat <10 GT can enter the system without license or the obligation to report their catch to the authority. Indonesia adopted the TAC measure for several major stocks such as tuna, shrimp, reef fish, and squid wherein limits has been set but the challenge come from lack of the enforcement. Lack of controlling, monitoring and surveillance in Indonesia fisheries management remain the problem that authority needs to tackle to sustain Indonesia fisheries management.

Several number of recommendations could be proposed to balance the trade and natural resources sustainability and improve Indonesia fisheries management.

1. Total Allowable Catch (TAC)

Applying strong and effective Total Allowable Catch (TAC) measure would increase the chance of Indonesian government to prevent the depletion of shrimp stock in Indonesia fisheries management area. Especially in those areas where the stock is already over exploited. There are several requirements which need to be addressed to implement an effective TAC measure.

1) The description of the TAC should be based on resources biomass.

2) The distribution of the TAC should be depended on historical catch

3) Strong and correct reporting system should be followed in the application of TAC.

2. Monitoring, controlling and surveillance (MCS)

For TAC system to work properly it should be buttressed by a robust monitoring, controlling and surveillance (MCS) system to ensure the fishers and each actor in capture fisheries comply with the rule. The application of MCS system is also to avoid cheating on the reporting of the landing volume. Having a reliable landing data is the essential requirement in the TAC system. The annual review of correct reporting data will give Indonesia reliable data to be reviewed in deciding the number of annual TAC.

3. Increase fisher's participation through co-governance

An adequate fisheries management like TAC would maintain Indonesia wild shrimp resources at sustainable levels by including fishers in decision making. Fishers' knowledge regarding fishing area is better than the government. By considering the local knowledge in establishing a set of management measure would give the authorities wider and deeper information regarding specific area.

4. Ecosystem-based fisheries management (EBFM)

Ecosystem-based fisheries management objective is to balance between ecological and human aspect to reach sustainable fisheries, considering that human is part of the ecosystem. The emphasize of EBFM approach is on the science-based measurement to integrate all the ecological parameters. By considering the full

spectrum of sustainability of fisheries would help Indonesia fisheries manager to comprehend that fish stock is in an integrated multispecies system. Several mechanisms to assess EBFM has been developed such as EBFA (Ecosystem-Based Fisheries Assessment) with objective is to maintain stock sustainability and economic benefit. Adopting EBFA approach will be an essential instrument to develop an integrated effective fisheries management in Indonesia.

The limitation in this study is the fact that are inadequate data on the number of fishers and the specific fishing gear use and involve in shrimp capture industry in both study areas. This is aligned with the fact that in shrimp capture fisheries most fishers are small scale and artisanal fishers. Based on Indonesia regulation, small scale fishers with boat less than 10 GT do not need license to go fishing. Therefore, this flexibility of open access-ness makes the activity of small-scale fishers invisible and unaccounted for in term of regulations and reporting.

VI. Conclusion

This brief case study has provided a description of failure in management regimes under the pressure of international trade demands is one of the the reasons behind resources stock depletion. The international trade influenced the government decision to expand the shrimp production because shrimp export is one of the vital sources of foreign currency for Indonesia. A strong and effective fisheries management can be a tool pilot the fisheries sector in exporter countries like Indonesia in a more sustainable pathway. As sustainability would be beneficial for both Indonesia shrimp fishery and international trade. The increase in awareness in import country's customers circles regarding the sustainability of the seafood product would help to engage producers like Indonesia to ensure that fisheries comply with the international standard. Ignoring the sustainable guideline in shrimp capture fisheries would deplete the shrimp stock and degrade the environment. Consequently, Indonesia would lose wild shrimp stock completely as the case developing in East Java province.

While the hypothesis was suggested that the high pressure to export shrimp for the international trade would be the main factor caused the decline in shrimp stock, this study suggested that the quality of the fisheries management remain the most determinant component regarding the stock sustainability. However international trade is still one of the major incentives motivating unsustainable

natural resources exploitation to satisfy international trade demands in fisheries with weak management regimes. This case study raises the problem of Indonesia fisheries management with the lack of adequate enforcement of the current law and rules regarding capture fisheries. This brings us to the importance of effective fisheries management measure such as Total Allowable Catch (TAC).

This study suggested that the role of fisheries management in resolving the overexploitation conflict of trade liberalization for sustainable fisheries is extremely essential. This study recommends Indonesia should enforce the effective fisheries management measure such as Total Allowable Catch (TAC); monitoring, controlling, and surveillance (MCS) system; Co-governance, and ecosystem-based fisheries management (EBFM) to construct a balanced system between fisheries trade and resources sustainability.

Acknowledgement

I would like to express my sincere gratitude to United Nations Food and Agriculture Organization (FAO), and the Government of the Republic of Korea for for letting me be part of this incredible Second Pilot Programme of the World Fisheries University. Thank you for providing me with the best education.

I would like to thank my advisor Dr. Sang-Go Lee for the unwavering support and encouragement during my study. I would like to extend my sincere thanks to all my respected professors; Dr. Andrew C.M. Baio, Dr. Christopher Brown, and Dr. Chang-Ik Zhang. Special thanks to the administrative staff of the World Fisheries University for taking such an excellent care of us during this challenging time.

To my friends for the constant love and support which make my life in Busan full of joy and laughter, thank you.

Most importantly, I am deeply grateful for my family's endless love.

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