

**YANGON UNIVERSITY OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME**

**A STUDY OF DEVELOPMENT OF FISHERY SECTOR
IN MYANMAR
(2008-2009 to 2017-2018)**

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MDevS - 20 (14th BATCH)**

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**A STUDY ON DEVELOPMENT OF FISHERY SECTOR IN
MYANMAR
(2008-2009 to 2017-2018)**

A thesis submitted as a partial fulfilment towards the requirement of the degree of
Master of Development Studies (MDevS)

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This is to certify that this thesis entitled "**A STUDY ON DEVELOPMENT OF FISHERIES SECTOR IN MYANMAR (2008-2009 to 2017-2018)**" submitted as a partial fulfillment towards the requirements for the degree of Master of Development Studies has been accepted by the board of examiners.

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ABSTRACT

The fishery sector is considered as one of the most important sectors which is to fulfill the protein requirement of the people of Myanmar and to provide the food security as well as to get the opportunity for the employment to a large number of fishery communities and rural dwellers. The main objective of this thesis is to study the development of fisheries, production, export and consumption situation of fisheries sector and to identify the strength and weakness of fishery sector in Myanmar. It was found that fish culture was the most important activation in fresh water. And also offshore fishery was the second largest production not only marine fishery production but also total fishery production. The destination of exporting countries was not changed significantly. The type of fishery high demand in the world market, as the sea food is more and more popular. Therefore, the development of fishery sector for foods security needs to be south better ways to maintain valuable resources. The fishery exporting enterprises also needs to care about the promotional activities to entice new customers. To take advantage of the bargaining power of buyers, the private enterprises need to attract new customers from other regions of the global.

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ABBREVIATIONS

AFTA	-	ASEAN Free Trade Agreement
AIT	-	Asian Institute of Technology
CSO	-	Central Statistical Organization
DOF	-	Department of Fisheries
EEZ	-	Exclusive Economic Zone
FAO	-	Food and Agriculture Organization
FOCs	-	Flags of Convenience
FFYP	-	Fifth Five-Year Plan
GDP	-	Gross Domestic Product
HACCP	-	Hazard Analysis Critical Control Point
IUU	-	Illegal, Unreported, and Unregulated
IDRC	-	International Development Research Centre
ICPD	-	International Conference on Population and Development
JICA	-	Japan International Cooperation Agency
JTED	-	Joint Technical Education District
LFDB	-	Livestock and Fisheries Development Bank
NCWA	-	National Women Affairs
NACA	-	Network of Aquaculture Centers in Asia-Pacific
NGO	-	Non Government Organization
MFF	-	Myanmar Fisheries Federation
PPFC	-	People's Pearl and Fisheries Cooperation
SEAFDEC	-	Southeast Asian Fisheries Development Center
SLORC	-	State Law and Order Restoration Council
SOE	-	State-owned Economic Enterprise

CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

Myanmar, a country in Southeast Asia with almost 55 million populations, is rich in natural resources. It has vast coverage of rain forests, cultivable plains, underground resources of precious minerals and numerous north-south flowing river systems with broad deltas for fresh water resources. It possesses a long coastal line that stretches to 2,832 kilometer and 8.2 million hectares of inland water bodies. Since Myanmar is endowed with rich and varied marine and inland fishery resources, fisheries sector is standing one of the most important sectors in Myanmar for local food security, foreign exchange earnings and employment opportunities.

The fisheries sector in Myanmar, comprising the freshwater fisheries, marine capture fisheries. Value chains for capture and capture fisheries differ from fish to fish and from country to country, and frequently within regions. The fishery sector is to fulfill the protein requirement of the people of Myanmar and to provide the food security. Per capita consumption of fish of Myanmar people was approximated to be 66 kilogram person per year. The fisheries sector in Myanmar provides employment to 3.2 million people (800,000 full-time and 2.4 million part-time).

Myanmar fisheries sector had been under state control till 1988, developing with a slow pace during this period. After 1988, the Department of Fisheries (DOF) under the Ministry of Livestock and Fisheries has taken important changes in fisheries sector to be in line with principles of market economy. The DOF is mainly providing the technical know-how of fish culture and supplying good quality fish seeds to fish farmers. EU has provided technical assistance to Myanmar for the production of fishery products that are in-line with EU regulations. Myanmar has been exporting only frozen wild caught fishery products to EU and DOF has been making efforts to get approval for Myanmar to also export aquaculture products to EU.

The Inspection and Certification Unit of the DOF of Myanmar makes sure that the quality and safety of fishery products are fit for human consumption by

developing and applying quality and safety management systems to ensure food safety through the implementation, validation, and verification of Hazard Analysis Critical Control Point (HACCP) system and improved inspection practices that are harmonized with international inspections systems.

Privatization of aquaculture, hatcheries, and ponds, processing plants, cold storages, trading and marketing system has been a major stimulating factor in sea food exports. This process was pushed the fishery sector to a speedy way of development. Livestock and fishery sectors contribute about \$97 billion to gross domestic product (GDP) in Myanmar's economy and it is the fifth contributor to GDP after agriculture, trade, processing and manufacturing and transport sector.

The people of Myanmar like fish and fishery products which are essential of daily meals of them, fish sauce and fish and shrimp paste are the favorite dishes of Myanmar. Therefore, there have been greatly stimulating productive capacities of the fishery communities and Myanmar's Fishery Sector have been pushed to strongest growing stage. The development of fisheries can be examined by studying and identifying the production, consumption and exports situation of the fisheries sector in Myanmar. So, the government and the private sector can prepare the impacts and needs of this sector according to this studying.

1.2 Objective of the Study

The main objective of the study is to study the production, consumption situation and export of fisheries sector in Myanmar and to identify the strength and weakness of the fisheries sector in Myanmar.

1.3 Method of Study

This study used descriptive method based on previous study. More specifically, the study reviews relevant literature and secondary data from Department of Fisheries, Myanmar Fisheries Federation, Library of Yangon University of Economic, relevant Journals and Internet website.

1.4 Scope and Limitation of the Study

This study period covers 2008-09 to 2017-18 and the fishery production is divided into freshwater fisheries and marine fisheries. The fishery export is divided

into fish, prawn and others. Not only fishery production but also fishery exports are presented by volume (in metric ton).

1.5 Organization of the study

The study is organized in five chapters. Chapter one is introduction. Chapter two describes literature review. Chapter three state overview of fisheries sector in Myanmar. Chapter four illustrates fishery production, consumption and export in Myanmar and chapter five is conclusion.

CHAPTER II

OVERVIEW OF FISHERY SECTOR

2.1 History of Fisheries Sector

In general, the term fishery refers to a place where fish and other aquatic species such as shrimps and sponges are caught. This article is about fish as food for humans. For sea life in general as food, see seafood. For fish fed to other fish, see commercial fish feed and aquarium fish feed. Fishery also means a collection of fish that inhabit a reasonably well delimited section of marine and fresh water habits.

For centuries, fisheries sector has been important for social and economic development as the people consume fish in various forms at every meal. Fish and prawn are said to have been not only a major source of animal protein but also one of the sources of foreign income in country. Intermediate Technology Publications wrote in 1992 that "Fish provides a good source of high quality protein and contains many vitamins and minerals. It may be classed as white fish, oily fish, or shellfish (Fish as food, 2015). Whitefish, such as haddock and seer, contain very little fat (usually less than 1%) whereas oily fish, such as sardines, contain between 10–25%. The latter, as a result of its high fat content, contain a range of fat-soluble vitamins and essential fatty acids, all of which are vital for the healthy functioning of the body (A.Z.Faridi,2014). Sustainable, productive fisheries and aquaculture improve food and nutrition security, increase income and improve livelihoods, promote economic growth and protect our environment and natural resources (World Fish, 2015).

Generally, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery (Fishery Wiki, 2019). According to the FAO, a fishery is typically defined in terms of the "people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, and purpose of the activities or a combination of the foregoing features"(D.Manoharan,2017). The definition often includes a combination of fish and fishers in a region, the latter fishing for similar species with similar gear types (JFAR, 2019).

A fishery may involve the capture of wild fish or raising fish through fish farming or aquaculture (Nelson, Joseph S, 2006). Directly or indirectly, the livelihood of over 500 million people in developing countries depends on fisheries and aquaculture. Overfishing, including the taking of fish beyond sustainable levels, is reducing fish stocks and employment in many world regions (Fishery Wiki, 2019).

Improving the productivity of fisheries and aquaculture is vital to reducing hunger and poverty for millions in the developing world (FAO, 2017). Sustainable, productive fisheries and aquaculture improve food and nutrition security, increase income and improve livelihoods, promote economic growth and protect our environment and natural resources. Sustainable approach to fisheries and aquaculture will help to protect our natural resources and ensure that fish stocks are available for future generations. Currently, overfishing, ineffective management practices, industrial development and agricultural pollution have reduced fish stocks. While property fisheries management could be a challenge, solid global and regional governance of these vital resources will ensure that we can produce enough fish for those living in poor regions.

Aquaculture, in particular, has tremendous potential to enhance food security and be environmentally sustainable. Small-scale cultivation is very necessary for meeting the world's growing demand for fish. As fish need a smaller environmental footprint than different animal supply food, cultivation could be a lot of environmentally property possibility for meeting the world's food wants than different animal supply foods.

The contribution of fisheries and aquaculture to development has consistently been underestimated both in national development and poverty reduction strategies and in international cooperation. FAO (2005b) identify two factors which influence the degree to which fisheries are included in development policy in a given country: the sector's contribution to foreign exchange earnings and its contribution to food security and nutrition (measured by dependence on fish protein). The more reliant a country is on fisheries for its foreign exchange earnings and food security, the argument goes, the more likely that policy makers will recognize their importance and that this will be reflected in development policy. The fisheries sector usually makes a valuable contribution to economic development of coastal areas. The relative dispersion of coastal small-scale fisheries adds to maintaining economically viable rural communities and balancing the trend towards growing coastal urbanization. In

history, fisheries have often been the basis for human settlements and coastal development in both the rural and urban environments. The infrastructure developed for fisheries (feeder road, landing sites and coastal havens, water-retaining ponds) tend to trigger further economic developments in other sectors such as tourism or agriculture.

As farming and terrestrial livestock often both generate more foreign exchange and are perceived to make a larger contribution to food security than other renewable resource sectors such as forestry and fisheries, they generally receive much more attention in national development strategies and donor priorities. When faced with resource allocation decisions, many government's priorities water use for human consumption, agriculture, hydropower, and industry over inland fisheries and aquaculture (FAO, 2017). This is largely attributable to the perceived contribution of each sector to development, but also to the prevalence of single water-use systems.

Encouraging multiple uses of water, however, can increase its productivity and allow for simultaneous development of several sectors. Use of freshwater for aquaculture and agriculture, for example, is not necessarily mutually exclusive, and integrated aquaculture-agriculture (IAA) systems have been shown to increase the productivity of agricultural activities on farms which have ponds. IAA ponds also contribute to the resilience of small farms, enabling them to maintain some degree of food production during droughts (Brummett, 2006).

2.2 The Role of Fishery Sector in Economic Development

Fisheries and aquaculture production is an important contributor to many national economies across Asia and the Pacific region. The role that fish play in both the food security and nutritional security of many rural and coastal populations has often been underestimated in the past. It is also now increasingly recognized that fisheries and aquaculture are important contributors to the national economies of some APFIC member countries, especially those in the Asian region. In value terms, fish products are also the most heavily traded natural food commodity in the world and trade issues involving fish are becoming increasingly important. A fish consumption hike driven by an increase in the consumer's preference over fish consumption is more likely to increase the fish sector's percentage of GDP.

An important contribution of the sector is the employment opportunities it generates, especially in remote and marginal areas. And not only in fishing but also in

boat-building and maintenance, mechanical workshops for engines and gear, net-marking and repair, handling, processing, packing and transport. In developing countries, it is estimated that some 39 million fishers (including those engaged in production, harvesting and landing site-based activities) are dependent for all or part of their livelihoods on fisheries. Together with their dependents, as many as 200 million people may rely on fisheries for their livelihood.

Since 1961 the annual global growth in fish consumption has been twice as high as population growth, demonstrating that the fisheries sector is crucial in meeting FAO's goal of a world without hunger and malnutrition. While annual growth of aquaculture has declined in recent years, significant double-digit growth is still recorded in some countries, particularly in Africa and Asia. The sector's contribution to economic growth and the fight against poverty is growing. Strengthened demand and higher prices increased the value of global fish exports in 2017 to USD 152 billion, 54 percent originating from developing countries (Jacqueline A, 2018).

Human societies face the enormous challenge of having to provide food and livelihoods to a population well in excess of 9 billion people by the middle of the twenty-first century, while addressing the disproportionate impacts of climate change and environmental degradation on the resource base (FAO, 2018). In recent years, liberalization policies, technological innovations, improvements in processing, packaging, and transportation, as well as changes in distribution and marketing have further accelerated this trend, while facilitating the emergence of complex supply chains in which goods often cross national boundaries several times before final consumption (Sumaila et al. 2014; Bellmann et al. 2016).

The removal of trade restrictions such as tariffs, tariff escalation, export restrictions, subsidies, and non-tariff barriers can reduce trade restrictions with benefits to employment and possibly help conserve the marine ecosystem. They can also reduce prices of finished goods and provide consumers with greater choices of a wider range of quality products. By facilitating the transfer of technology between nations, international trade can facilitate the transfer of more environmentally friendly technology at lower cost, which can help ease the pressure on marine ecosystems and fish stocks while helping to reduce poverty and hunger. Trade plays a significant role in the quantity of fish caught and how the benefits of fisheries are distributed between and within countries. If effectively harnessed, the power of trade can be used to support the implementation of the SDGs.

2.2.1 Fishery Production

The world is faced with a critical challenge of feeding the growing population that is expected to reach 9.6 billion by 2050. Global food and biological process security should be achieved through enlarged food production; improved biological process quality of food made, and reduced garbage. An increase in food production should happen in a very context wherever resources necessary for food production, like land and water, are even scarcer in a more crowded world, while the world is required to change the ways it conducts economic activities in the face of global climate change. This article is concerned with roles that fisheries and aquaculture can play in this challenging context.

The fishery sector is of vital importance to the economy and to the social well-being of the people. Fisheries is an important source of livelihood and sustenance for the people of the region, contributing towards food security, poverty alleviation, generating employment and incomes, government revenue, potential sector for Foreign Direct Investment, export earnings, development and stability of rural and coastal communities and culture, recreation and tourism. Fishery resources play a very important role in nutrition and food security within the region.

The importance of fisheries increased considerably during the 20th century, which enabled the nation to develop from a poor agricultural country to a prosperous modern society. The fisheries' significance and their dominant influence on the economy was, however, vulnerable to fluctuations in fish prices internationally and the condition of domestic fish stocks. Around the turn of 21st century, the importance of the fishing industry declined considerably, not because of direct fall in fisheries themselves, but rather as the result of a rapid growth in the service and production sectors, such as financial intermediation, software design and aluminum manufacture. Diversification in the economy increased with further development from primary production, a similar process as known to occur in other developed countries (Dr.Ögmundur K, 2011).

The fisheries sector is rarely a strategic sector for national economic development. Although it plays a prominent role in only a few countries such as Iceland, Namibia, Maldives and other small island developing states rich in fishery resources relative to their populations, it is nonetheless an important economic activity, and very often a strategic one, in many coastal regions of the world, Indeed, in many countries, fish export is a major contributor to foreign exchange earnings,

often ranking far higher than other agricultural commodities. The major trade flow—from south to north—underlines the significance of this sector for the trade balance of many developing countries. Licensing fees of foreign fishing fleets are another source of foreign exchange revenue from marine fishery resources, especially in West African and South Pacific countries.

2.2.2 Fishery Consumption

The more considerable and substantial contribution of fisheries worldwide is the supply of highly nutritious animal protein for human consumption and the employment and income generation in often-remote coastal areas. While globally some seventeen percent of the animal protein supply is derived from fisheries, in many developing countries – especially in the Asian region that is home to nearly two-thirds of the world’s population—this share is above fifty percent. Finally, the growing importance of recreational fishing is also notable, especially as its contribution to economic benefits is often difficult to assess and still insufficiently recognized. Demand for fish continues to increase in most of the world – in line with population growth as well as increases in consumption of animal protein associated with urbanization and rising incomes (UN ATLAS, 2016).

Fish and fisheries – both marine and inland – are an intrinsic part of the livelihoods of many in developing countries (Ian Payne, 2000). The important contribution to food security made by fish caught as a part-time occupation of essentially agricultural households. The interface between the resource and people’s livelihoods – especially those of the landless development – has so far been largely disregarded in the policies of governments and donors, which tend to be dominated by high seas fishing interests and other aspects of sectorial policy. Considerations of this kind suggest that a review of the orientation of fisheries policies would be opportune (Ian Payne, 2000). In many development countries, fish is an essential food for meeting minimal nutritional needs.

Urbanization has also shaped the nature and extent of fish consumption in many countries. While the global rural population is currently near its peak, since 2007 the urban population has accounted for more than half of the world’s people, and it continues to grow. It is projected that in 2050, the urban population will have increased by more than two-thirds and will make up 66 percent of the global population (UN, 2015d). Nearly 90 percent of this increase will take place in Africa and Asia. Urban inhabitants typically have more disposable income to spend on

animal proteins such as fish and eat away from home more often. In addition, the physical infrastructure and increased population density that are characteristic of urban areas allow for more efficient storage, distribution and marketing of fish and fish products.

The broad economic trends that have driven growth in global fish consumption in recent decades have been paralleled by many fundamental changes in the ways consumers choose, purchase, prepare and consume fish products. The globalization of fish and fish products, propelled by increasing emphasis on trade liberalization in many parts of the world and facilitated by advances in food transportation technologies, has lengthened supply chains to the point where a single product may be produced in one country, processed in another and consumed in yet another. This development has allowed consumers access to species of fish that are caught or farmed in regions far from their point of purchase and has introduced new products and tastes to what were previously only local or regional markets.

2.2.3 Fishery Export

The rapid development of aquaculture, for the local and export markets, and its rapid transformation in many areas into a commercial or semi-industrial activity is also contributing substantially to the development of rural areas. The fisheries sector can also be and inexpensive ‘observer’ and , potentially, ‘ guardian’ of the aquatic resources and environment of a country or a region, capable of alerting the relevant authorities in case of some major hazard such as pollution. Fishers and fish farmers often first witness major changes in ecosystems. Under this angle, and provided fisheries adopt a responsible attitude ‘across the board’, as provided in the FAO Code of Conduct for Responsible Fisheries, fisheries could significantly increase their future contribution to sustainable development.

An increasing amount of trade in fish products is between developing countries, however, rather than from developing to developed countries. Demand for fish in developing countries continues to grow, due both to population growth and increased per capita consumption. While there is increasing demand for higher value fish in developing countries, low-value fish continue to make up the bulk of fish consumed there, globally fish and food already represent sixteen.6% of all animal protein intake and this proportion has been increasing.

There are substantial geographical variations in world food provide and demand, and active international seafood trade importantly contributes to smoothing

regional imbalances. Therefore, it is essential to understand regional trends in the supply and demand and their implications on international market in discussing the role of seafood sector in achieving global food and nutritional security. An expected change in cultivation growth by region and by species anticipated importance of cultivation in providing food to satisfy growing demand.

Sustainable, productive fisheries and aquaculture improve food and nutrition security, increase income and improve livelihoods, promote economic growth and protect our environment and natural resources.

2.3 Food and Agriculture Organization

Fishery as a subsector of agriculture in most countries depends on water and alternative finite natural resources for its advancement. The sharing of natural resources makes it improper to plan fishery or aquaculture in isolation. However, the history and specific mandate of national fishery agencies should not be conducive to intersectional intervention. This should be taken as a challenge for FAO.

In the promotion of business cultivation, the subsequent measures to safeguard the business from the onslaught of alternative sectors in increasing competition for the common resources ought to be place in place.

(i) The continued promotion of the FAO Code of Conduct for Responsible Fishery through NACA and the aquaculture department of SEAFDEC should result in appropriate national policies that guide commercial aquaculture to a sustainable development path.

(ii) Research in the area of cutting-edge technology should be brought under greater collaboration between the public research agencies and the private sector. This is for the reasons of cost-sharing and effective use of the new technology. Many aspects of analysis in industrial cultivation are of interest to analysis establishments in developed countries; thus the potential collaboration. FAO might contribute to the exchange of analysis desires that will lead to collaboration among these analysis establishments, maybe through NACA.

(iii) The vast experience FAO has acquired through its various programmes in different parts of the world should be put to use wherever possible. The application of participatory research, community-based natural resource management and people participatory programmes requires appropriate politico-social milieus. The IDRC-

assisted programme in Vietnam could be carefully studied, and its lessons drawn for replication somewhere else, in China or in Thailand for instance (FAO, 2004).

FAO ought to still play its vital role in cultivation development at the world and regional levels; but, its cultivation development policies ought to be divided. Commercial cultivation is best supported by the UN agency sectoral approach through its Department of Fisheries, whereas the FAO Rural Development arm would be more appropriate for the promotion of low-input aquaculture as a means of poverty alleviation (Mimako.K, 2015).

Supply and demand relationships for crops, livestock, and fish commodities are linked to each other within a relatively simple representation of world trade, where all countries export to and import from one, integrated world market for each commodity. The model reaches equilibrium in every market by determination for the one world worth that balances net exports and imports for all countries so the market effectively clears globally. At the country level, the supply and demand of each commodity adjust according to price movements; the adjustment is regulated by commodity-specific price elasticity of supply and demand. At the country level, there can be either a net surplus or deficit, which is to be reconciled on the global market through international trade (Taylor and Francis, 2015).

Promoting tight add fisheries and cultivation is a very important strategy that may result in simpler and accountable fisheries management and cultivation, while also improving livelihoods and food security. Improved operating conditions in fishing and cultivation will moreover enhance responses to promote demands and improve business through export and market access. The UN agency Blue Growth Initiative acknowledges the importance of guaranteeing that existing and future jobs during this sector are tight jobs, which will secure sustainable marine and freshwater resource management whereas additionally tributary to world economic and social development. FAO works with governments, civil society, non-public sector and alternative global organization agencies to reinforce the provision of jobs, as well as various employments, and to enhance labour conditions on the total fish value chain – from catch to market (Seilert, 2001).

2.3.1 Sustainable fisheries and aquaculture policies for the future

Fisheries and aquaculture provide food for hundreds of millions of people around the world every day, and employ over 10% of the world's population, many of them women. However, marine and aquatic ecosystems are under stress – from

climate change, fishing pressure, and pollution from various human activities, which lead to ocean acidification and declining biodiversity.

Recent estimates suggest that about one-third of global marine fish stocks are biologically overfished, up from about 10% in the mid-1970s. And the rapid progress of aquaculture production (the farming of aquatic organisms) now represents more than wild catches globally, raises concerns about pollution, disease, invasive species and coastal ecosystem degradation in various parts of the world (OECD,2018).

It is estimated that global fisheries could generate an additional USD 80 billion in value annually if they were optimally managed. Over a quarter of this foregone value is believed to be caused by illegal, unreported and unregulated (IUU) fishing, which reduces the resources available to legal fishers, undermines governments' capacity to manage fish stocks sustainably, and reduces public revenue.

Fisheries and aquaculture play an important role in addressing global poverty and food insecurity. About 60 million people worldwide are employed in the primary sectors of fisheries and aquaculture. 85 percent of those 60 million work in Asia and an additional 10 percent in Africa. In rural areas, fisheries have a very important socioeconomic and cultural dimension as a source of livelihoods and a way of life. Women have a big stake in fisheries and aquaculture, particularly in fish processing and marketing, where they constitute 90 per cent of the labour force. At least 15 percent of all people directly engaged in the fisheries primary sector are women (FAO, 2018).

Fisheries are increasingly important in many countries facing the challenge of young people migrating from rural to urban areas as well as leaving their homes to find employment opportunities in other countries.

The Voluntary Guidelines are an international instrument that provides consensus principles and guidance on addressing small-scale fisheries, and provides special acknowledgement for the role of women in fishing communities. In the early 1970s, there have been significant changes from year to year in fish stocks and the major landing in off-shore waters, because of the sudden collapse. Many stocks in the North Atlantic also collapsed dramatically in the late 1970s. However, certain stocks have undergone rapid expansion, notably sardines off both Japan and China. And a result of environmental changes, the considerable fluctuation in fish stocks can take place.

2.4 SWOT analysis

SWOT, is an acronym from its principal components: Strengths, Weaknesses, Opportunities, and Threats (Glaister & Falshaw, 1999). An SWOT analysis is a simple and flexible tool, consisting of gathering opinions from a knowledgeable body of people familiar with a particular business or industry to help evaluate internal strengths and weaknesses, as well as external opportunities and threats (Helms and Nixon, 2010). Strength refers to inherent abilities to complete and grow strong. Weaknesses are the inherent deficiencies that cripple one's growth and survival. In itself, SWOT is not an analysis but, as a tool, it can aid in effectively performing a broad analysis (Duarte, et al., 2006). In strategic planning categorizing issues into strengths, weaknesses, opportunities, and threats is one of the most respected and prevalent tools (Glaister and Falshaw, 1999).

In theory, SWOT matrix presents a mechanism for facilitating the linkage among company strengths and weaknesses (internal factors), and threats and opportunities (external factors) in the marketplace. It also provides a framework for identifying and formulating strategies by matching key internal and external factors. The SWOT technique is as a general tool designed to be used in the preliminary stages of decision-making and as a precursor to strategic planning in various kinds of applications (Johnson et al., 1989; Bartol et al., 1991). An examination of both internal and external factors of the sector may assist in shaping the future of fishery sector.

A SWOT analysis examines four elements:

- **Strengths:** Internal attributes and resources that support a successful outcome.
- **Weaknesses:** Internal attributes and resources that work against a successful outcome.
- **Opportunities:** External factors that the entity can capitalize on or use to its advantage.
- **Threats:** External factors that could jeopardize the entity's success.

Recent uses of SWOT analyses in business journals were reviewed by (Helms and Nixon, 2010), who identified its broad utility as a planning tool and for recommending strategic actions by businesses, industries, non-profit organizations, and countries. However, SWOT has been criticized because it does not provide

implementation strategies, or adequate context for strategy optimization, and thus there is a need to link SWOT analysis to other follow-up strategic tools and methodologies (Helms and Nixon, 2010). Nevertheless, despite some criticism, there seems to be general agreement that SWOTs are useful in early stages of long-term strategic planning (Helms and Nixon, 2010).

Applications of SWOT to marine and freshwater fisheries have appeared in recent years in peer-reviewed journals (Çelik et al., 2012; Panigrahi and Mohanty, 2012; Stead, 2005) and government reports (e.g.,GS Gislason & Associates Ltd. 2004;Loefflad et al., 2014). Applications of SWOT analyses to aquaculture systems are more prevalent (Ahmed and Luong-Van, 2009;Bolton et al., 2009; Cowx et al., 2010; Garza-Gil et al., 2009; Rimmeret al., 2013). It is an effective way of gathering and classifying information, illustrating particular matters, and generating strategic planning ideas for a business (Chan, 2011). SWOT analysis approach in this study was used to formulate the strategy of fishery development.

2.5 Reviews on Previous Study

After the Second World War, the fleets of the Northern Hemisphere were ready to take on the world to re-establish food production (Garcia and Grainger, 1996; Pauly et al., 2002). Accompanied with the rapid expansion and progress in fisheries technology, fishing industries were discovering new fishing grounds and expanding their fishing both horizontally and vertically.

Thereafter, stress in several large-scale fisheries start to appear and some fisheries, such as that of the Peruvian anchovy in 1971-1972 collapsed with global repercussions (Hannesson, 1995; Pauly et al., 2002). At that time, natural causes (El Niño event) were claimed to be the reason for the Peruvian anchovy collapse, however, as claimed by Pauly et al. (2002) overfishing was found to be a significant factor. Regardless of latter major collapses and stocking signals, the fishing pressure and high levels of effort continued (Potts, 2003). Pauly et al. (2002) stated that literature supports the claim that, historically, fisheries have tended to be non-sustainable, although not unexpectedly there is a debate about the cause for this and the exceptions. Based on an examination of historical catch and abundance data, together with experimental studies and surveys, Longhurst (2007) suggests that all sea fisheries could collapse by the middle of this century unless action is taken to prevent this from happening.

Worm et al. (2006) predicted that all fisheries will have collapsed by 2048. This prediction was criticized by Branch (2008). However, literature gives many examples and different scenarios of the collapse of fisheries concluding that overall, the main cause is a failure by fisheries management to sustain fisheries resources. Therefore, as stated by Pauly et al. (2002) fisheries have rarely been sustainable. Rather, fishing has induced serial depletions, long masked by improved technology, geographic expansion and exploitation of previously spurned species lower in the food web. On the other hand, assuming good signs, a success in one fishery sector may be seen as a failure in another due to the conflict in objectives (Hilborn, 2007).

All the above mentioned crises of geographical spread of the fishing fleets, development in fishing technologies and stress signals in stocks, lead to maritime jurisdiction (EEZ) and evoked the idea of global fisheries management. Thereafter, different international initiatives, instruments and management approaches were initiated to unify the protection of the world marine resources especially, the shared one.

Mg De Park, (2006) studied that current development of fishery sector and to find out issues and challenges faced by fishery sector. This study found that the management must be fitted to the prevailing fisheries status of the country. The approach to fisheries management must also be changed from the conventional system to a more appropriate management system. Sustainability of fisheries is urgently required and must be based on an appropriate policy. Although fisheries sector has been improving both in quantity and export revenue, technology, extension support, capital access and security that remain unanswered on the potential for small-scale poverty focused marine culture. The will be necessary to promote infrastructure support, particularly the development of fisheries facilities and regional ports.

Aung Tun Win, (2008) studied that production, policies, institution and contributions of fisheries sector. The study found that in order to achieve the high rate of production in long run, DOF has conducted conservation and rehabilitation of fishery resources, promotion of fisheries researches and management surveys, collection and compilation of fishery statistics and information, extension services, supervision of fishery sectors, and sustainability of fishery resources. DOF also provided financial assistance and loans through Livestock and Fisheries Development Bank. For the human resources development in fishery sector, DOF has conducted researches and trainings for aquaculture and fishing technology, quality control and

assurance on fishery products, and fishery resource management. to upgrade the quality of fish and fishery products for export and local production, all the processing factories should practice the HACCP system. The fisheries resource management measures are needed to monitor, both on the fish stock and on the local communities whose livelihood and/or food security depends on the resources.

Tun Naing,(2014) studied to examine production and consumption industry in Yangon Region which found that rapid progress of fisheries sector plays the dominants role in the production of food, improvement of income and generation of employment. Marine fisheries sharply develop in accordance with the privatization and initiation of marine culture may be a good generator for future production. For sustainable development for long run and for conservation of fishery resources, the government has already drawn up a long-term plan to product fishery resource. In doing so, people's participation is the most important element.

CHAPTER III

OVERVIEW OF FISHERIES IN MYANMAR

3.1 Overview of Myanmar Fishery Sector

Myanmar is geographically located in Southeast Asia between latitudes 9° 32' N and 28° 31' N and longitudes 92° 10' E and 101° 11' E with a total area of 677,000 km². It stretches 936 km from east to west and 2,051 km from North to South. The country's fishing waters including Exclusive Economic Zone (EEZ) is about 486,000 km² and the continental shelf area is 228,781 km². The length of its continental coastline is 2,832 km divided into three coastal regions, the Rakhine Coastal region, the Ayeyarwaddy and Gulf of Mottama (Mataban) region (the Delta Zone), and Tanintharyi region. Myanmar has extensive inland water bodies of 8.1 million ha which include natural lakes, reservoirs, river systems, and ponds. Its river system consists of the 2,000 km Ayeyarwaddy (Irrawaddy), Sittaung and Thanlwin (Salween) rivers, and 2,600 km of distributaries and smaller rivers combined (Fishery Country Profile, 2016).

The fisheries were conducted in seasonal flood plains and permanent inland water bodies, called as (Inn). The fishing rights in such fishing grounds were leased by fixed rental fees. The development of marine fisheries was far left behind due to the underdevelopment of consumer market, difficulties in transportation and less interest of the government. Aquaculture in Myanmar began in 1953 with the farming of imported species. The main reason was being that aquaculture had not received an appropriate level of interest or attention from local fish farmers and fish consumers.

There were a few family based traditional processing industries in the coastal areas until the beginning of the 1960s. However to meet consumers demand, the processed fisheries product was imported. Of which, 80% was dried fish. After the establishment of the socialist government in 1962, the efforts to establish commercial marine fisheries began. The People's Pearl and Fisheries Board was established to promote of marine fisheries. In the early 1970s the People's Pearl and Fisheries Board

was restructured and transformed as People's Pearl and Fisheries Cooperation (PPFC). On the 1st December 1988 and March 1989, the "open-door policy" was introduced. The changes in economic system gave strong impacts to the economy as well as the fisheries sector. From that time onward, the market oriented economic system has been adopted in Myanmar and also new foreign direct investment law was launched (Aye Marlar Thwin, 2013).

In 1992, more permits were granted and joint venture with the state and foreign companies carried out production and marketing of marine products were approved. Government of Myanmar has set new fisheries development policies; promulgated new fisheries laws, rules and regulations and set new institutions to manage effectively the fisheries sector of Myanmar. In the early 1994/95, Myanmar Fishery Enterprise was established and all the fishery activities were delegated to the private sector. The process of privatization has pushed the fishery sector to develop with a momentum. The infrastructures, such as fishing vessels, ice plants, cold storages were sold or leased to private enterprises. Department of Fisheries took only supervisory measures of model fish farms, shrimp farm and hatcheries. The state granted permission to import offshore fishing vessels and fishery exports improved quickly.

Myanmar Livestock and Fisheries Development Bank were established in 1996 in order to provide financial supports. The culturing system was modified and aquaculture grew significantly. Today fishery products not only secure the country's consumption but also for exports. There is very formal credit available to fish farmers. Large farms are able to access credit for buying feed from large fish traders at moderated interest rates of 3% per month. Smaller farmers are unable to access fish trader credit, and often borrow from informal leaders at 4-6% per month.

The fisheries sector of Myanmar is divided into marine and freshwater fisheries sub-sectors. While marine fisheries sub-sector includes inshore and offshore, the freshwater fisheries sub-sector includes aquaculture, as well as leasable and open fisheries sub-sector.

3.2 Regulatory Framework of Fisheries Sector in Myanmar

The participation of fishery organizations is important for capacity building. In Myanmar, the national and international fishery organizations are networking among center and peoples to exchange information, to support policy guidelines and to provide extension services. All the fisheries require licensing from the Department of Fisheries (DOF) which plays a proactive role in the promotion of the sector for food security, poverty alleviation and income generation.

Directorate of Livestock and Fisheries is directly responsible to the Minister of Livestock and Fisheries. The Directorate formulates the plans and coordinates, supervises, monitors and evaluates the performance of the livestock and fisheries sector of the Union of Myanmar. The Directorate also gives guidance on formulation of projects and conducts foreign relations (DOF:Fishery Statistics,2016).

3.2.1 Fisheries Institution

The Department of Fisheries under the Ministry of Livestock and Fisheries is the main government institution. The Department undertakes all round fisheries development and extend management to commercial fisheries activities including exports. The head office dedicates fisheries administrations to the provincial offices in States and Divisions. The level of administration is down to the Township level fisheries offices. To materialize its responsibilities the Department of Fisheries is implementing the following issues. –

- i. Conservation and rehabilitation of fisheries resources
- ii. Promotion of fisheries research and survey
- iii. and compilation of fisheries statistics and information
- iv. Fisheries extension services
- v. Supervision of fisheries sectors
- vi. Sustainability of fisheries resources.

All of its tasks are then shared among the relevant management line. The administrative structure of the Department has following four directorates

- i. Fisheries Supervision and Revenue
- ii. Aquaculture
- iii. Fisheries Inspection and Quality Control and
- iv. Administration and Finance.

Some roles are cross-cutting whilst others relate to fisheries or aquaculture administration; they can be summarized as follows:

- i. The issuing of licenses for fisheries gear/vessels/sites and aquaculture sites/ventures.
- ii. Evaluation of sites for aquaculture or fisheries.
- iii. The production of fingerlings for sale to aquaculture and leasable fisheries (revenue generation) and stocking of Open Water Fisheries (reservoirs, rivers and other water bodies including community ponds)
- iv. As an advisory body to the Minister of Livestock and Fisheries and the Divisional and State Government on fisheries and aquaculture matters.
- v. As a regulatory body for the correct and proper conduct of fisheries and aquaculture (i.e. inspection of fishing gears/sites).
- vi. As an inspection body for the fish trade (i.e. inspection of legal size of export products, quality assurance and certification, etc.).
- vii. Administration of the system for the auctioning of Leasable Freshwater Fisheries (the auction price of the lease is collected by DoF). This is a key income generating activity from the inland fisheries sector.
- viii. Stocking of Open Water Fisheries. This is performed in a number of ways ranging from the release of millions of 7-day old fish fry (typically Rohu) to the release of larger (0.5-1") fingerlings. (e.g. one hatchery may release up to 50 million fry to natural waters).
- ix. Administration of water bodies for aquaculture including so-called virgin land, degraded agricultural lands, perennially flooded areas, small dams, village ponds, borrow pits near roads and houses, spill water from irrigation, feasible cage culture sites in rivers, rice fish, environment friendly mangrove culture, salt pens (in rainy), barge and raft culture in brackish and marine areas.
- x. The collection and communication of aquaculture knowledge (under the Deputy Director for Aquaculture Extension).
- xi. Training/extension.

Under the management of Yangon Division Department of Fisheries, the section for research and development has organized with The “Institute of Fisheries Technology” and “Marine Fisheries Research”. The regular training

courses on aquaculture, aquatic animal disease control, fisheries inspection and quality control, and fisheries inspections are conducted year round.

The marine fisheries research has been focused on resources management. The recent activities are dealing with conservation of shark, Ayeyarwaddy dolphin and sea turtles. The collaboration with Association of Southeast Asian Fisheries Development Centers (SEAFDEC) on Marine Fisheries Resources Survey is undergoing in the early of 2007.

In Myanmar, the Central Statistical Organization (CSO) is the only authority to undertake national level statistical data collection, processing and compiling. In the case of fisheries statistics, Department of Fisheries is responsible in data collection, processing and dissemination. All of these activities in the department are undertaken by the “fisheries planning and statistic section”. (FAO, 2016)

3.2.2 Myanmar Fisheries Federation (MFF)

As part of ASEAN Fisheries Federation, Myanmar Fisheries Federation (MFF) was established. Currently it is one and only NGO that deals with fisheries industries and supporting aquaculture development. It provides recommendation to the Department of Fisheries for the grant of license on newly establishment aquaculture and also to Livestock and Fisheries Bank to disburse loans for aquaculture extension. Currently the main body of the Federation is composed of relevant associations such as fisheries exporters, fish farmers, shrimp farmers, crab exporters, eel exporters, ornamental fish growers as well as aquatic animal feed producers etc..

Two important drivers have recently given rise to the creation of a Myanmar Fisheries Federation (MFF). One was the pressure on Myanmar during the period of its accession to ASEAN to increase the representation of civil society in local and national administration. Another is the Yangon Government policy focus on developing a market economy through encouraging private enterprise. In 1998, the Myanmar Fisheries Federation was created from the Myanmar Fishery Association. The organization has national and local coverage; most of the larger (fish) farmers are members of the local MFF branch. A Central Executive Committee (with office holders each having a 3 year tenure) plays a co-ordinating role. The current office holders are drawn more from academia and the private sector. Each local MFF chair is selected by a steering committee every 3 years. A 3-day annual meeting is held in

Yangon bringing together 10 local MFF branches whose membership includes Fishery operators, fish farmers and related industries and people. The MFF has a variety of roles in supporting its members:

- i. In particular MFF is able to support applications made by its members to DOF to undertake fisheries and aquaculture activities.
- ii. MFF can also support applications to the Livestock and Fisheries Bank for loan applications.
- iii. There is some indication that MFF enjoys considerable political favour with the higher levels of government and can negotiate directly for its member's applications.
- iv. Local MFF branches raise issues of collective importance to their members (e.g. from Shan State MFF which currently has 30 members from the south of the state) such as accessing initial investment, raw materials for feeds, negotiating with local authorities to change use of land.
- v. MFF helps with negotiation of selling and harvesting, working collectively.
- vi. The national MFF remit includes "transferring technologies to farmers" and "communicating and cooperating with trans-boundary organizations", although mechanisms for undertaking this do not exist other than through the organization of, and participation in meetings.

In many locations the membership is comprised mainly of wealthy business people who are lessees of leasable fisheries or who own substantial aquaculture operations. There are a number of members with smaller holdings and this is more evident in an area such as Shan State. The MFF could represent an important vehicle for co-ordination and communication amongst aquaculture producers and fisheries actors both inside and outside of Myanmar (Fishery Statistics,2017).

3.2.3 Fishery Laws and Regulations

During British administration, there was a Fisheries Law of 1905 and during the post war period, parliament democracy government approved 1954 Fisheries Law which derived from 1905 Law. Under administration of State Law and Order Restoration Council, the 1954 Fisheries Law was repealed and substitute with the following laws and relating to fisheries.

- i. Law relating to the Fishing Rights of Foreign Vessels (1989)
- ii. Aquaculture Fisheries Law (1989)
- iii. Myanmar Marine Fisheries Law (1990) and
- iv. Freshwater Fisheries Law (1991)
- v. Law amending the law relating to the fishing rights of foreign fishing vessels (1993)
- vi. Law amending the Myanmar Marine Fisheries Law (1993)

As describing in provisions of these laws, the main objects are to-

1. prevent fisheries from extinction
2. safeguard and prevent the destruction of fisheries water and environment
3. obtain duties and fees payable to the State and
4. extend fisheries management activities in accordance with the law.

The fishing right laws grant concession to conduct fishing within Myanmar marine territorial to joint ventures and foreign fishing companies. However, extending of trawl fishing beyond the permitted fishing ground is violation of the law. The considerable conflicts between fishing rights trawlers and traditional fishers were happened. Thus, the 1989 law of fishing right was amended comprehensively in order to enforce marine fisheries management. In 1993 “Law amending the law relating to the fishing rights of foreign fishing vessels” and “Law amending the Myanmar marine fisheries law” were enacted. The amending law mainly concern with punishment and fine for violation of law.

According to the provision of these laws, Department of Fisheries is the main institutional body to limit fishing grounds, fishing methods and catch volume for the fishing rights operations (DOF: Fishery Statistics,2016).

3.2.4 Policy Implications

There is loads of shut up up demand for farmed fish in Asian nation. The fish farming worth chain is very dynamic in some respects, however lags behind different countries within the region in several others. This unevenness reflects the consequences of Myanmar’s long isolation and up to date, partial, economic transition. The sector has huge potential to grow and develop more by turning into additional competitive, spatially distributed and smallholder-inclusive. To achieve this growth there needs to be:

- a. Fewer restrictions on land use (patchy “informal” relaxation and regulations has led to uneven development, high transaction costs and a risky investment climate).
- b. Better access to formal credit for fish farmers and other enterprises in the fish value chain (improving access to formal credit will also reduce the costs of informal borrowing, even for those who do not make use of it directly)
- c. Increased private investment and competition in the feed sector (to bring down costs to the farmer and improve quality).
- d. Greater development of ‘hard’ infrastructure (roads, electricity and water control to increase efficiencies all along the supply chain).
- e. Public investments in seed production technologies for promising species (building upon past successes in this area to encourage technological and product diversification for farmers).
- f. More development of ‘soft’ infrastructure(human capital, extension and veterinary services , to support more responsive public and private service provision for farmers in areas such as disease control) (Ben B,2015).

3.2.5 Fishery Development Plans

As the fisheries sector is one of the main veins in day-to-day supply of food, the government has laid down the fishery plan for high production to cope along with the increased demand for consumption. The Department of Fisheries implements these plans with the following objectives:

- a. To develop and increase the aquaculture technology and production,
- b. To increase fish production for self-sufficiency and export the surplus,
- c. To develop quality assurance, standard, safety and health of aquatic product,
- d. To promote fishery research and to preserve fishery resources and environments, and
- e. To upgrade the socio-economic status of fishing communities.

The government’s long term strategy is centered upon the sustainable exploitation of aquatic resources. The State the has given priority to providing adequate support for the future of fishing industry, and special attention being given to less costly freshwater fish which contributes to food security for the local

population. The Ministry of Livestock and Fisheries has laid down a 30-year long term plan for the of fishery sector, covering the period of 2001-2031. This plan was divided into six phases and each phase covered five year. The long term plan aims at the following policy targets:

- i. To upgrade the of rural areas by promoting fish farming,
- ii. To boost the multi-sector of the fishing industry without affecting the ecosystem,
- iii. To promote the participation of all stakeholders in the sustainable development of the fishing industry;
- iv. To achieve the common target of the fisheries sector of the ASEAN member countries at the end of the fourth five-year plan in 2020-2021, and
- v. To achieve equal status of the fishing industry with the developed nation at the end of the planning period 2031.

Total fishery production has been targeted to reach 41,510 thousand metric tons in 2031. Total output value of base year, 2000-2001 was 37,310.99 million Kyats and it was aimed to reach 144,782.81 million Kyats in final year (2030-2031). Inland fishery production has been aimed to increase 4% yearly and marine production, 2.6%. Target of fishery export value in 2030-2031 is US\$ 2.4 billion. The plan intends to have 180,000 acres (728.43 square kilometers) of shrimp farms at the end of 2031.

The State also planned to establish net making plants, engine manufacturing plants, and food processing plants. Long term lease system and culture based capture fisheries will be promoted. More intensive laws, administration and enforcements will also be practiced. The Department of Fisheries also formulated “Natural Resource Management Policies” by setting up strategy to increase fish production by stocking fish and prawn seeds into dams, reservoirs and natural water bodies. In this way, there is significant increase in fish production by such culture based capture system in Myanmar(Aung Tun Win, 2008).

3.3 Types of Fisheries Sector in Myanmar

3.3.1 Freshwater Fisheries (aquaculture and inland fisheries)

Myanmar has impressive freshwater capture fisheries. The inland waters are made up mainly of the interlocking/ mingling of riverine and estuarine systems of the Ayeyarwaddy (Irrawaddy, 2 150 km long), Chindwin (844 km; a tributary of the main

Ayeyarwaddy) and Sittaung (563 km) rivers, plus the large Thalwin River (2 400 km) to the east. The first three have adjacent deltas and are arguably part of a larger joint system. Together these systems extend from the eastern part of the Bay of Bengal to the Gulf of Moattama and along the eastern edge of the Andaman Sea. The Ayeyarwaddy River alone has a mean discharge of 13 500 m³/second from its catchment of 424 000 km² (Welcomme, 1985), notably, practically all within Myanmar (Fishery Country Profile, 2016).

With a total population of about 54 million, Myanmar potentially has an inland fishery greatly exceeding that of any single national part of the Mekong River basin, and quite feasibly rivals that of the lower Mekong Basin in its entirety. There are also great similarities in the fisheries of the Ayeyarwaddy and Mekong and Myanmar presents a fascinating opportunity to compare statistics and experiences between these regions, with potential for extension to elsewhere such as South America.

For management (licensing/regulation) purposes Myanmar divides its inland capture fisheries into two main categories:

1. "Inn" leasable fisheries. These are almost exclusively key fishing grounds on floodplains which are primarily fished through the erection of barrage fences around the lease area with fish collected in various collection pens or traps. The peak season involves capturing fishes migrating off the floodplain at the beginning of river draw-down. Lease holders enjoy exclusive rights to fish the lease area including preventing access by others and a certain degree of environmental management and control. This is referred to locally as the "Inn" fishery. For present purposes it is the same as the floodplain (and Great Lake) barrage fishing components of the "Lot" system in Cambodia. There are currently 3 722 leasable fisheries in Myanmar of which 3 490 are still exploitable. Of these, 1 738 (52.3 percent) are located in Ayeyarwaddy Division (the lower floodplains and delta of the river). Leases have been auctioned every year but DoF is extending the lease period to up to 9 years to promote improved long-term management. There is no government owned leases. A register of leases is kept and details of lease arrangements are held on Land Revenue Forms.
2. Open fisheries. These are fisheries in all other areas including all types of fishing operation. The right to fish in these areas is licensed out by DoF. All fishing gears require a license. For most this is a set fee. Some of the larger gears, particularly "bagnets" set in rivers (comparable to those used in the lower Mekong), are allocated

by a tender system ("tender fisheries"). Fees are variable between regions according to production and capacity. License fees for smaller-gears are low. Although the policy is for complete coverage of licenses for all gears (a monumental task in such a fishery) it was intimated that licenses tend to be neglected for smaller gears and the system concentrates on those people perceived as fishing for "profit".

Unlike the capture fisheries, development of aquaculture needs applied technique and essential inputs. In the context of developing country, the intensification of aquaculture generally is limited by inadequate feed inputs, weakness in water management and less capacity to access disease control and scarcity of qualified operators. However, in the case of Myanmar, the environment is almost free from pollution. Therefore the most possible challenge in further development will be the constant supply of quality feed and the intensity of disease controlling capacity.

The Department of Fisheries has made a resources management strategy that conduct stock enhancement in the natural water body including man-made reservoirs. Thus the quality of fish species may establish in this water and may assist the food security and improvement of livelihood of people in the rural areas (Fishery Country Profile, 2016).

3.3.2 Marine Fisheries (Inshore and Offshore Fisheries)

The marine territory extends about 486,000 square kilometers with exclusive economic zone (EEZ) and provides considerable large fisheries resources. There are approximately 770 finfish species identified in Myanmar. Among the whole fisheries sector in Myanmar, marine fishery is most important. The FAO assisted technical cooperation project on "Reformulation and Strengthening of Fisheries Statistic System" in 1997. The main objectives of the project were to train enumerators and statisticians to be core operators in fisheries statistics. In the beginning, marine fisheries was composed of onshore fisheries, inshore fisheries and offshore fisheries. After the promulgation of the 1990 Marine Fisheries Law, onshore and inshore fishery was combined into inshore (coastal) fisheries.

In inshore fisheries, fishing boats can operate in waters 10 nautical miles from the shoreline. Inshore fishing boats are not more than 30 feet long, powered by less than 25 HP engine, and use driftnet, gillnet, and long line. On the other hand, offshore fishing vessels operate beyond the inshore fishing zone to the EEZ, are more than 30 feet long powered by more than 25 HP engine and use trawl net, purse seine, and long line (Khin Maung Soe,2008).

The Department of Marine Administration is responsible for the registration of fishing boats and fish carrier vessels carrying the flag of Myanmar, while the Department of Fisheries (DOF) carry out the granting, suspending, and withdrawing of fishing licenses from fishing boats or carrier vessels. Also, the DOF is authorized to implement, control, and enforce laws, regulations, and conservation and management measures which must be complied with by the fishing vessels. The fishing efforts have been controlled by the licensing system. Any fishing activities without licenses are illegal. Several provisions have endorsed with fishing licenses, such as, limits in fishing ground, fishing periods, and fishing gear and methods. However, the fishing vessels are not properly monitored. The fisheries licensing system is not functioning well to meet its main purposes to control the fishing efforts and landing. The large scale trawling with high-powered boats are subjected to destruct coastal fishing grounds in shallow waters as they are cruising into inshore fishing territory. Also there are conflicts between the trawlers and small scale fishers in use of fishing grounds.

3.3.3 Aquaculture Fisheries

Myanmar is endowed with fishery resources and quite easy to harvest from the fresh water or brackish or marine. Thus, the development of aquaculture was much left behind when compared to some of Asia countries. The first fish culture was made in 1954 but biotechnology was not well established among the local farmers. In 1968, induced breeding of indigenous major carps was successfully conducted. 2004-2005, the total shrimp ponds area was about 63000 HA in the coastal region.

At present fresh water aquaculture is well established in terms of seed production and grow-out culture of more than 20 species. Currently, 26 fresh water fisheries stations under Department of Fisheries, establishes in all strategic areas, are conducting seed production and research works in order to enhance aquaculture industry(Aye Marlar Thwin,2013).

The production of fish fingerlings and stocking into aquaculture ponds is the typical form of aquaculture and is currently practiced for a range of species. This is also the form of aquaculture that is promoted by the DoF along with some cage aquaculture. Typically the aquaculture operations that were observed by the mission were over 1.2 ha and were not of a type that could be widely adopted by Myanmar farmers in general, due to the scale and the requirement for capital investment. The strict control by the agriculture department regarding the conversion of rice lands into

other uses (especially aquaculture) is one of the strongest restraints to more widespread development of aquaculture in freshwater areas. Paddy lands flat and typically inundated by flooding or rainfall for rice cultivation. Paddy land also has few alternative uses for agriculture because of the tendency to be covered in water for parts of the year. Aquaculture is one of the few activities that are profitable enough to repay the cost of conversion of paddy (through raising earth walls and excavation into ponds). In areas where the profitability of rice farming is quite marginal, fish pond aquaculture can be an attractive alternative.

3.3.4 Freshwater Prawn Culture

The most common and prioritized species is giant freshwater prawn, and Myanmar has gained much interest in freshwater prawn aquaculture. Hatchery technology was attempted in 1980s and little success was obtained due to lack of technology on hatchery grow-out operation. Myanmar has very rich fishery resources of commercially important freshwater prawn species. The farmers usually practice polyculture of prawn and fish where prawn is minor crop species. This is also to minimize the operational cost. It is difficult to know the exact area of prawn monoculture farms. The technology of hatchery operation becomes well established in both government and private sector.

3.3.5 Shrimp Culture and Shrimp Hatcheries

Grow-out culture of marines shrimp, *Penaeus monodon* has been initiated since early 1980 practicing traditional trap and hold system particularly in western coastal area. Natural post-larvae of *Penaeus monodon* were trapped into the pond during the high tide period through sluice gates. There were no inputs in terms of pond preparation, eradication of predators, water fertilization, feeding, etc. however, 70 to 123 kilograms of large size of shrimp per hectare of culture area were harvested. As the ponds were usually as large as 50 to 100 hectares, the shrimp production could make more than enough money for the shrimp farmers. Having no law concerned with aquaculture, those shrimp ponds existed as illegal ponds up to 1990. Only in 2000, the state level committee that the Shrimp Aquaculture Development Committee formulated and implemented three years project plan of shrimp aquaculture development in Myanmar (Thame, M. & Aye, T.T., 2005).

In the year 2002, a pilot demonstration on Mangrove Friendly Shrimp Culture was conducted as a measure of verification of semi-intensive shrimp culture technique through collaboration of Myanmar DoF and SEAFDEC-AQD.

Demonstration pond with 1.4 ha and 0.72 totaling 2.12 ha could produce 11.1 metric ton of shrimp with average size of 50 pcs / kg. At the same time, private shrimp farms nearby the demonstration pond suffered failure due to severe occurrence of white spot disease. The private farmers were invited and disseminated the comprehensive technology. Similar demonstration was repeated in 2005 and also gained the success. A few private shrimp farms applied the MFA technology with success but later due to market and shrimp price constraints shrimp farming has been done only by a few farmers (DOF, 2017).

As of 2017-2018 Myanmar have three types of shrimp farming: Semi-intensive shrimp ponds 24536.29 hectares, Extensive plus shrimp ponds 61059.63 hectares and Extensive or traditional shrimp ponds 169818.54 hectares totaling 235474.46 hectares. The total production of fresh water prawn and marine shrimp in 2017-2018 were 35694.20 MT. Recently, the Department of Fisheries encouraged to development of fish and shrimp culture in every states and regions for self-sufficient of local consumption and increasing for export market (DOF, 2017).

3.4 Production Inputs in Fishery Sector (Inshore and Offshore)

The financial assistance loans by LFDB, and most investment goes to the development of fishery facilities, in terms of building new fishing vessels, fishing gears, cold storages and processing plants and for their maintenances.

The main production facilities in Fishery Sector are as follow:

- (a) Fishing vessels
- (b) Fishing Gears
- (c) Ice plants, cold storages and processing plants

3.4.1 Fishing Vessels

In general, there are two kinds of fishing vessels; small fishing boat and offshore-fishing vessels. And the small fishing boats can categorize into two; powered boat and non-powered boat. Offshore vessels can also categorize into two; national and foreign owned. Before the practice of the market oriented economy, the offshore fisheries were totally controlled by the state. Since 1994-95, there are mainly two types of fisheries in Myanmar, onshore fisheries into inshore and offshore fisheries. Different kinds of fishing vessels are used due to the distant from the shore.

The Department of Fisheries examines the conditions of fishing vessels by doing the research of other country in Myanmar and participating in research. The

result of studies conducted last year by scientists on a Norwegian research vessel will be released within the next couple of months, the Department of Fisheries has announced. It was found that the research vessel RV Dr Fridtjof Nansen was in Myanmar from August to September 2018. The ship – named after a famous Norwegian explorer, diplomat, humanitarian and Nobel Peace Prize laureate – conducted a month-long study of fish resources and the marine ecosystem off Rakhine, Tanintharyi and Ayeyarwady. Because the waters off other countries were included in this year’s survey programme, more time was needed to compile the results, which will be released in July or August. The regional report will be released first and the results for individual countries will follow later (Myat Moe Aung, 2019).

Myanmar, Sri Lanka and Thailand were involved in the latest round of studies, which involved surveys of fish stocks, measurements of microplastic particles in the water, and microplastic contamination in fish. The research findings showed a decline in fish in the waters around the country (Aye Marlar Thwin, 2013).

Deep-sea fish stocks decreased by 90 percent, while coastal fish stocks decreased 75pc, according to the research. The 2015 study estimated that deep-sea fish stocks increased by 77pc and coastal fish increased by 40pc (Myat Moe Aung, 2019). The volume of microplastics in the sea is believed to be rising, and this could endanger fish, turtles, dolphins and other marine animals that ingest the debris. The following table represents different kinds of vessels in fishery sectors.

Table (3.1) Fishing Vessels

Year	Inshore Fishing Boat		Share in Inshore Fishing Boat	Offshore Vessels		Share in Offshore Fishing Vessels	Total
	Powered Boat	Boat		National	Foreign		
2008-2009	14025	14645	93.13%	1758	356	7%	30784
2009-2010	13788	17054	92.59%	2077	391	7%	33310
2010-2011	13823	15548	91.89%	2196	396	8%	31963
2011-2012	12288	15463	90.65%	2598	264	9%	30613
2012-2013	12157	12757	89.65%	2724	150	10%	27788
2013-2014	12490	13732	90.07%	2736	153	10%	29111
2014-2015	12240	13391	89.86%	2840	52	10%	28523
2015-2016	13831	12583	89.67%	3030	11	10%	29455
2016-2017	16012	10704	89.25%	3168	48	11%	29932
2017-2018	15084	6802	87.3 %	3172	5	13%	25077

Source: Fishery Statistics, 2018.

According to the table (3.1), the number of inshore fishing boats, power boat and non-power boats are greater than offshore vessels. The participation of inshore fishing boat is 93.13% and offshore vessels 7% in total number of vessels, in 2008-2009. In 2017-18, participation of inshore fishing boats is 87.3% and offshore vessels is 13% in total number of vessels, because inshore fishing boats is decreased due to the research. In this study, the number of inshore fishing boats more than offshore fisheries than offshore fisheries in Myanmar. The number of offshore vessels is limited in accordance with the amount of maximum sustainable yield and the national vessels are given to priority to operate.

3.4.2 Fishing Gears

There are six types of fishing gears in Myanmar. They are trawl, purse seine, drift net, long line, stick-held falling net and trap. The table (3.5) shows types of fishing gears from 2008-09 to 2017-18.

Table (3.2) Types of Fishing Gears

Year	Trawl	Purse Seine	Drift Net	Long Line	Stick-held Falling Net	Trap	Number
							Total
2008-2009	803	159	672	2	21	101	1758
2009-2010	914	165	856	3	35	104	2077
2010-2011	1004	170	885	7	29	101	2196
2011-2012	1100	273	807	23	302	93	2598
2012-2013	1125	278	836	38	356	91	2724
2013-2014	1144	287	788	31	347	139	2736
2014-2015	1167	283	900	27	327	136	2840
2015-2016	1240	284	994	43	351	127	3030
2016-2017	1343	322	956	31	395	121	3168
2017-2018	1397	329	923	23	387	113	3172

Source: Fishery Statistics, 2018.

According to the table (3.2), total fishing gears are 1758 in 2008-09 and increased 3172 in 2017-18. The growth rate of fishing gear is near 80% during the

study period 2008-09 to 2017-18. The most useful fishing gears are trawl and drift net. And then, trawl nets are main gear for demersal fish species. The drift nets are mainly target higher valued commercial pelagic species. It is widely used in Ayeyarwaddy division.

3.4.3 Aquaculture Area and Ponds

In Myanmar, aquaculture areas have been increased from 30282 acres in 1990-1991 to 174293 acres in 2000-2001 and then to 443695 acres in 2010- 2011 and 491345 acres in 2017-2018. Aquaculture production has also increased steady annually from 6397 MT in 1990-1991 to 128225 MT in 2000- 2001 and 1048690 MT in 2016-2017. The production from aquaculture subsector increased to 1130350 MT in 2017-2018, which was an increase about 7.78 % compared to 2016-2017 production.

Table (3.3) Total Area of Aquaculture Ponds (2008/09 to 2017/18)

(Unit-Acre)

Year	Area		Total
	<i>Fish Pond</i>	<i>Shrimp Pond</i>	
2008/2009	215930	224655	440585
2009/2010	217835	224867	442702
2010/2011	218746	224949	443695
2011/2012	220171	228297	448468
2012/2013	221395	228297	449692
2013/2014	222028	228296	450324
2014/2015	232515	236638	469153
2015/2016	239671	238311	478002
2016/2017	245807	241718	487525
2017/2018	247007	244338	491345

Source: Fishery Statistics, 2018.

The table (3.3) shows the total area of aquaculture ponds, in terms of fish ponds and shrimp ponds separately. In 2008/09, the fish pond area was 215930 acres but it has doubled in 2017/18 to 247007 acres. The shrimp pond area 224655 was in 2008/09 and doubled in 2017/18 to 244338 acres. At the same time in order to increase fish production as subsistence income. Department also initiated the paddy cum fish

farming in appropriate regions through demonstration, 16302 acres of paddy field in States in divisions were stocked with fish seed in 2017/18.

In 2017/18 Department's station hatcheries produced 796.25 million fish seed. The department fisheries have made a resource management strategy that is to conduct stock enhancement in the natural water body inducing men-made reservoirs. Thus the quality fish species may establish in these waters and may assist in the food security and improvement of livelihood of people in the rural areas.

3.4.4 Ice Plants, Cold Storages and Processing Plants

Process means transforming input to output, the term processing refers to the process associated with fisheries products between the time raw material is received and the time the final product is delivered to the cold storage. The plants produce various fish and fishery products. Since privatization took place in fishery sector, the number of cold storage and processing plants are increasing yearly. On the production side, there is not only basic processing but other accessories processing: cold storages and Ice plants are also required to accomplish the production process.

Table (3.4) Ice Plants, Cold Storages and Processing Plants in Regions and States of Myanmar (2017-2018)

Regional and State	Number of Ice Plants	Processing Plants And Cold Storages
Yangon	106	79
Tanintharyi	48	20
Rakhine	39	13
Ayeyarwaddy	70	8
Mon	29	6
Mandalay	7	-
Shan	2	1
TOTAL	301	121

Source: Fishery Statistics, 2018.

In table (3.4), at present there are 301 ice plants operating in fisheries sector. 106 in Yangon, 48 in Tanintharyi, 39 in Rakhine, 70 in Ayeyarwaddy, 29 in Mon State, 7 in Mandalay and 2 in Shan State. Yangon and Ayeyar Waddy division has large number of Ice plants for fisheries processing plants.

As of 2018, There were 79 cold storages in Yangon Division, 20 in Tanintharyi Division, 13 in Rakhine State, 8 in Ayeyarwaddy Division, 6 in Mon State, 1 in Shan State and all together a total number of 121 cold storages in Myanmar to monitor and control for the procedure of processing establishments as the requirements of international standard for food safety and quality assurance. Yangon and Tanintharyi division have large number of processing plants and cold storages for fisheries products.

Two-thirds of catch goes to modern processing, iced and canned, while others are preserved by traditional method. Traditional fish processing farms are practicing salting, sun drying, smoking and fermentation. There are also 10 fish meal plants in Yangon Division, Tanintharyi Division, Rakhine State and Ayeyarwaddy Division.

There were 4 canned food factories in Rakhine State and further factories can be extended in Yangon Division, Rakhine State and Tanintharyi Division. The required kinds of fish for can factories are caught in four months in a year. Although Myanmar has a thriving market for fishery products, the industry is still constrained by weak facilities. The potentials in aquaculture, processing plants, ice factories, feeds and medicines, net plants, fishing boat, dockyard, machineries and equipment, value added products, packing materials and containers still left as an investment fields for interested entrepreneurs.

3.4.5 Seed segment- basic technology

Fish fingerling production started in government hatcheries. Hatchery technology spread to the private sector through informal partnerships between government staff and early fish farmers. The number of hatcheries in Myanmar is small and the technology used is quite basic compared to neighboring countries. Many large vertically integrated farms produce seed in their own hatcheries and nurseries, with limited spillovers to other business. Nurseries (which buy small juvenile fish from hatcheries and raise them for several months, before selling them onto fish farms), have boomed in several locations. These are an important entry point into aquaculture for small landowners because they require relatively low levels of investment.

3.4.6 Fisheries Product Utilization and Processing

Generally fisheries products are given priority for local utilization and only the surplus is exported. However lack of data for domestic utilization leads to wide variation in per capita consumption. Most of pelagic fishes are dried at landing for the

purposes of animal feed. Also fishmeal plants consuming large volume are not negligible. In this regard FAO has estimated about 10% of the landing from Myanmar fisheries is used as non-food.

Generally, the fisheries products are exported in the processed form. In processing the weight losses ranges 40-60% depending on the type of products. Then, the total export volume of about 270,000 MT can be assumed as it is derives from the processing of 450,000 to 675,000 MT of raw material. In this regard, statistics for non-food utilization and weight loss at fisheries processing is important for the proper estimation of per capita consumption. Normally Myanmar people prefer to eat fresh fish but there are several traditional types of processed and preserved fisheries product.

Generally the basic ways of processing are drying, boiling, smoking, salting, fish paste and sauce producing, fermenting and putrefying. Among these dry fish, fish paste and sauce is the mainstay in daily food. From the small scale inshore fishing there are huge volume of small pelagic fishes and small shrimps that are too small for export. All of these are traditionally sun dried for local market. Depending on the status of drying process the products are used as food or for animal feeding. In this way the livelihoods of coastal community are being sustained.

The recent export of dry fish such as anchovies has been stimulating to increase efforts in fishing. The fishing efforts are extended even in the off season and also the fish are lured by light attraction. As a result, the sub-standard sizes and un-matured fishes are included in the landing, which can lead to deterioration of the resources. Through extending fishing efforts, several high value species disappeared, such as Spanish mackerel, Pomfret, conger eel, ribbon fish, snappers, breams, lobsters and top shells. In this regard the sustainability of the resources and livelihoods of the users has rising to call fisheries management and upgrading of fisheries processing methods in the coastal areas.

3.4.7 Value Chain in Fisheries

Below is an inform graphic that represents the different steps that constitute a value chain, taking the example of fish farming (aquaculture), from fish eggs in farms to the consumers' plates. A value chain is a key concept to understand agri-food system economics and development. It considers all the stakeholders that intervene and interact in food production and consumption. It shows the links between different activities and economic sectors (Elisabeth M, 2018).

Recent studies show that aquaculture is fast developing in SE Asia and challenges previous assumptions, for example that aquaculture is mainly for export. They show that farmed fish is mainly consumed locally, can be a main source of protein for the poor and contribute to food security.

Value chains are concerned with what the market will pay for a product or service offered for sale. Moreover, market considerations differ from country to country, region to region and having close connection with food habits and consumption pattern of the people. The main objectives of value chain management are to maximize gross revenue and sustain it over time.

The main wholesale fish markets located in Yangon are Sanpya Fish Market, Pazuntaung, Naungdone Fish Market, and Annawa Fish Market and there are also fish markets in other states and divisions. The Inspection and Certification Unit of the DOF of Myanmar makes sure that the quality and safety of fishery products are fit for human consumption by developing and applying quality and safety management systems to ensure food safety through the implementation, validation, and verification of Hazard Analysis Critical Control Point (HACCP) system and improved inspection practices that are harmonized with international inspection systems.

Moreover, fisher or shipper controlled value chains are cost driven while retailer controlled value chain are revenue driven. Key concerns of the producers are availability of fish in year round basis, minimize the seasonal gaps and shortages and cater for service oriented customers with fresh produce. Retailer controlled value chains are more concern on value addition, differentiation, change the face of the product and focus more on private brands and labels. Especially, which facilitates the retail giants to cater for their brand loyal consumers and establish image in both local and international market.

3.5 Importance of Fisheries Sector on Economy

The fisheries sector has been identified as most important for economic, social and environmental sustainability. Fisheries and aquaculture make a significant contribution to Myanmar's economy. The fisheries sector contributes roughly 2 percent of Myanmar's gross domestic product (GDP), 50 percent of animal protein consumption, 6 percent of employment—rising to as high as 34 percent in some coastal areas—and up to 56 percent of state/regional government revenue. The over-exploitation of Myanmar's fish stocks has contributed to a

decline in its marine and freshwater fish resources. The sector is now underperforming both commercially and as a source of livelihoods for small-scale fishing communities. In response, the government is committed to improving monitoring, control and surveillance and exploring the opportunities for boosting aquaculture and fisheries production.

It is difficult to accurately measure the overall contribution of fisheries. National gross domestic product (GDP) statistics combine the fisheries sector with livestock.

Table (3.5) Contribution (share) of Livestock and Fishery in GDP

(Millions of Kyat)

Year	Livestock and Fishery (at current prices)	Gross Domestic Product	Share in GDP
2008-09	2421891.6	29233288.0	8.3%
2009-10	2826546.0	33894039.1	8.3%
2010-11	3392103.2	39776764.9	8.5%
2012-13	4141221.1	51259260.0	8.1%
2013-14	4631983.8	58011626.0	8%
2014-15	5243293.9	65261890.2	8%
2015-16	5906519.1	72714021.2	8.1%
2016-17	6506746.8	79760096.5	8.2%
2017-18	7058571.9	90450949.1	8%

Source: Calculated based on Statistical Year Book 2018,CSO

According to the table (3.5), share of livestock and fishery sector is unstable but doesn't decrease very much. It is slightly from 8.3% in 2008-09 to 8% in 2017-18. But total amount of livestock and fishery productions have substantially increased. The substantial amount of net output of livestock and fishery value increased from 2421891.6 Kyat Million in 2008-09 to 7058571.9 Kyat Million in 2017-18.

CHAPTER IV
FISHERY PRODUCTION, CONSUMPTION AND EXPORT
IN MYANMAR

4.1. Total Fish Production (Freshwater and Marine Fisheries)

During the Fiscal Year 2017-2018, the country's total production of fish was 5.9 million MT, comprising the production of marine fish at 3.2 million MT (54% of total fish production) and production of freshwater fish at 2.7 million MT (46% of total fish production). This is shown in the following table.

Table (4.1) Total Fishery Production (2008-09 to 2017-18)

(Thousand metric Ton)

Year	Freshwater Fisheries	Percentage in Total Production	Marine Fisheries	Percentage in Total Production	Total Production
2008-09	1647.68	47%	1867.51	52%	3542.19
2009-10	1861.19	47%	2060.69	52%	3921.97
2010-11	1978.38	47%	2160.76	52%	4139.14
2011-12	2145.51	48%	2332.84	52%	4478.35
2012-13	2228.33	47%	2479.40	53%	4707.73
2013-14	2340.93	46%	2697.38	53%	5038.31
2014-15	2458.32	46%	2849.06	53%	5307.38
2015-16	2590.42	46%	2991.35	53%	5581.77
2016-17	2634.30	46%	3030.95	53%	5665.25
2017-18	2720.41	46%	3146.47	53%	5866.88

Sources: Fisheries Statistics (2017-2018)

According to the table (4.1), the growth of total production of fisheries is 3542.19 (thousand metric ton) in 2008-09 and to increase 5866.88 (thousand metric

ton) in 2017-18. The participation of freshwater in total production is 47% in 2008-09 and 46% in 2017-18. The participation of marine fisheries in total production is 52% in 2008-09 and 53% in 2017-18. The total production of fisheries increases because of the Government's four relevant fisheries law. They are Law relating to the fishing rights of foreign fishing vessels in 1989, Aquaculture Law in 1989, Myanmar Marine Fisheries Law in 1990 and Freshwater Fisheries Law in 1991. They encourage the development of fishery sector and also make actively participation of local and foreign fisheries enterprises in Myanmar.

Freshwater aquaculture contributes to the economy of Myanmar in a number of ways. The production of freshwater aquaculture is shown in table (4.2).

Table (4.2) Production of Freshwater Fisheries (2008-2009 to 2017-2018)

(Thousand metric Ton)

Year	Aquaculture Fisheries	Share in Freshwater Fisheries	Leasable Fisheries	Share in Freshwater Fisheries	Open Fisheries	Share in Freshwater Fisheries	Total Freshwater Fisheries
2008-09	775.25	46.29%	209.72	12.52%	689.71	41.19%	1674.68
2009-10	858.76	46.14%	237.46	12.76%	764.97	41.10%	1861.19
2010-11	816.82	41.29%	248.44	12.56%	913.12	46.15%	1978.38
2011-12	897.43	41.90%	282.13	13.17%	962.08	44.92%	2141.65
2012-13	927.71	41.63%	289.48	12.99%	1011.15	45.38%	2228.34
2013-14	962.38	41.11%	303.89	12.98%	1074.66	46.12%	2340.93
2014-15	997.83	40.59%	314.80	12.81%	1145.70	46.60%	2458.32
2015-16	1012.60	39.10%	338.08	13.05%	1239.74	47.86%	2590.42
2016-17	1046.80	38.48%	338.68	12.86%	1248.88	47.41%	2634.30
2017-18	1128.31	41.46%	340.41	12.51%	1251.69	46.01%	2720.41

Source: Fisheries Statistics (2017-2018)

According to the table (4.2), the growth of freshwater fisheries production is from 1674.68 (thousand metric tons) in 2008-09 to 2720.41 (thousand metric tons) in 2017-18. During the study period, 2008-09 to 2017-18, the participation of aquaculture fisheries in total freshwater fisheries production is 46.29% in 2008-2009 and 41.46 in 2017-2018. the participation of leasable fisheries in total freshwater fisheries production is 12.52% and 12.51% in 2017-18. Then the participation of open fisheries in total freshwater fisheries production is 41.19% in 2008-09 and 46.01% in

2017-18. The participation rate of aquaculture fisheries is greater than leasable fisheries. The amount of aquaculture fisheries production is increasing because the total population increases to nearly 54 million which need more than protein and have high health knowledge not to eat the prohibited protein. So, the area of aquaculture ponds are expanded from 440585 acres in 2008-09 to 491345 acres in 2017-18 to meet the needs that substitute to the other prohibited meat. Also the production of aquaculture ponds is 775.25 (thousand metric tons) in 2008-09 and to increase 1128.31 (thousand metric tons) in 2017-18 due to Government's Aquaculture Law in 1989 and Freshwater Fisheries Law in 1991.

Marine fisheries was composed of onshore fisheries, inshore fisheries and offshore fisheries. The production of marine fisheries is shown in table (4.3).

Table (4.3) Production of Marine Fisheries (2008-2009 to 2017-2018)

(Thousand metric Ton)

Year	Inshore fisheries	Share in Marine Fisheries	Offshore Fisheries	Share in Marine Fisheries	Marine Fisheries
2008-09	690.98	37%	1176.53	63%	1867.51
2009-10	672.49	37%	1298.20	63%	2060.78
2010-11	800.50	37%	1360.26	63%	2160.76
2011-12	861.60	37%	1467.04	63%	2328.64
2012-13	917.38	37%	1562.02	63%	2479.40
2013-14	998.03	37%	1699.35	63%	2697.38
2014-15	1054.15	37%	1794.91	63%	2849.06
2015-16	1106.80	37%	1884.55	63%	2991.35
2016-17	1121.45	37%	1909.50	63%	3030.95
2017-18	1164.19	37%	1982.27	63%	3146.47

Source: Fisheries Statistics (2017-2018)

According to the table (4.3) the growth of Marine fisheries production is 1867.51 thousand metric tons in 2008-09 to 3146.47 thousand metric in 2017-18. The participation of inshore fisheries in total marine fisheries is 37% in 2008-2009 and 2017-20018. The participation of offshore fisheries in total marine fisheries is 63% in

2008-2009 and 63% 2017-2018. The participation rate of offshore fisheries is greater than inshore fisheries because inshore fishery vessels include mostly non-powered boats. -Although powered boats were used in inshore fishing, fish catching and fish size were steadily declining. Moreover, modern imported fishing net has been used in inshore fishery recent years.

The production of Marine fisheries is increasing according to Myanmar Marine Fishery Law in 1990, Law amending the Myanmar Marine Fisheries Law and Law amending the law relating to the fishing rights of foreign fishing vessels in 1993. Moreover Government allowed to sell and lease infrastructure of Fishery sector (such as fishing vessels, ice-plants, processing plants, fish meal plants and canning plants etc.) to the private owners of fisheries enterprises.

4.1.1 Fish Supply in Yangon

While fish has traditionally been supplied by large commercial farms for export purposes, domestic consumption has risen over the last decade and is now an important part of the Myanmar diet. Small-scale fish farms contribute more to the economy than larger number of workers per acre of land. Now, most of the fish at Yangon' San Pya fish market is distributed and sold to markets in and around Yangon, leaving less than a third for the export market. The market has about 200 shops and 400 to 500 sellers, and about 4000 to 5000 tonnes of fish are sold every week. The amount of fish supply in Yangon is indicated in Table (4.4).

Table (4.4) Fish Supply in Yangon by Years

(Thousand Metric Ton)

Year	Production		Total
	Freshwater fish	Marine fish	
2008-09	78.83	103.69	182.52
2009-10	91.39	132.47	223.26
2010-11	93.07	138.44	231.51
2011-12	97.67	152.94	250.61
2012-13	94.68	167.01	261.69
2013-14	135.04	166.42	301.46
2014-15	142.45	152.95	295.40
2015-16	127.56	159.46	287.02
2016-17	124.65	170.58	295.23
2017-18	114.45	153.44	267.89

Source: Fisheries Statistics: 2018

As presented in the above table, the supply of fish in Yangon was increased from 182.52 metric tons in 2008-09 to 267.89 metric tons in 2017-18. 43% of total

fish supply (114450 metric tons) to the people living in Yangon was freshwater fish and 57% (153440 metric tons) was marine fish in 2017-18.

4.2 Per Capita Consumption in Myanmar

The people of Myanmar like fish and fishery products which are essential of daily meals of them, fish sauce and fish and shrimp paste are the favorite dishes of Myanmar. Fish constitutes a major source for animal protein in the diet of Myanmar people. According to the statistics of 2017/18, Myanmar has a population (53.41) million and the per capita consumption of fish was (66) kg in the fiscal year 2017-18.

Fisheries sector is standing as an important source of food and nutrition in Myanmar. In daily diet of Myanmar people, fishery products constituted in different forms and are widely eaten in main dishes, side dishes, snacks and relishes. Myanmar people are especially fond of fresh fish, fish paste, fish sauce and they are unique Myanmar dishes. A second main dish of fermented fish and shrimp, dried fish and shrimp, salted fish, and fish paste are common for all. Fishery products are available within Myanmar sufficiently and easily at reasonable prices.

Table (4.5) Per Capita Fish Consumption in Myanmar (2008-2009 to 2017-2018)

Year	Production (Thousand Metric Tons)	Per Capita Fish Consumption(kg)
2008-2009	3542.19	45
2009-2010	3921.97	46
2010-2011	4139.14	48
2011-2012	4478.35	52
2012-2013	4707.73	56
2013-2014	5038.31	59
2014-2015	5307.38	61
2015-2016	5581.77	61
2016-2017	5665.25	61
2017-2018	5866.88	66

Source: Fishery Statistics (2018)

According to the table (4.5), local consumption is derived from the difference between total production of fish and total export of fish and per capita consumption is from total consumption is divided by total population in Myanmar. During the study

period from 2008-09 to 2017-18, total consumption is 3217479.46 metric ton to 5298652.67 metric ton and per capita consumption is from 45 kg to 66 kg. Total consumption and per capita consumption increase due to the increasing population to fulfill the needs of these population by expanding inland and marine water fisheries in Myanmar and the public have health knowledge.

Generally Myanmar people prefer to eat fresh fish but there are several traditional types of processed and preserved fisheries products. The basic ways of processing are drying, boiling, smoking, salting, fish paste and sauce producing, fermenting and purifying. Among these dry fish, fish paste and sauce are the main stay in daily food. FAO also recommended that fish had become an increasingly important source of protein over the last decade in most of the Asian countries. National per capita consumption of fishery products has increased every year.

4.3 Export of Fishery Product

Since 1972, Myanmar started its Fishery exports by the state. Only after 1994, all the fishery activities were delegated to private sector and the processing plant, cold storage plant; ice plant and fishing vessels were leased or sold. Since then, the exporting of fish and fishery products increases year by year as production of fish and fishery products also increases. Fish and fishery products are not new export items for Myanmar. Myanmar fishery exports included freshwater and sea fish, prawn and other fishery products. According to DOF, records, about 646 species of fish were processed and exported to seafood market. Myanmar fishery products are mainly exported to China, Japan, Thailand and Hong Kong. Myanmar also extended its market to Australia, Belgium, France, United States, EU countries and others. Myanmar fishery products are being exported to over 40 countries. The following table (4.3) shows the fishery export from 2008-09 to 2017-18.

Table (4.6) Fishery Exports (2008-09 to 2017-18)**(Quantity-Metric ton)**

Year	Fish	Prawn	Others	Total
2008-2009	234060.74	18382.10	72267.70	324710.54
2009-2010	277823.74	17439.31	79829.38	375092.43
2010-2011	273043.74	19142.91	81706.06	373892.71
2011-2012	283688.76	17995.03	85297.53	386981.32
2012-2013	266464.97	17267.93	93221.79	376845.69
2013-2014	237142.31	16508.97	91616.08	345267.36
2014-2015	225974.93	17527.33	94788.33	338290.59
2015-2016	246970.93	13673.49	108326.47	368970.89
2016-2017	290580.04	13082.46	135044.01	439706.51
2017-2018	394135.80	15905.44	158186.09	568227.33

Source: Fishery Statistics, 2018.

Fish and fisheries export volume increased from 324.710 thousands metric ton in 2008-09 to 568.227 thousands metric ton in 2017-18. These export quantity and value are earned from both normal trade and border trade. The export of fisheries products is increasing because the area of fish ponds were expended from (440585) acres in 2008-2009 to (491345) acres in 2017-2018 due to the freshwater fisheries law enacted in 1991 and Freshwater Aquaculture Research and Extension Centre from 2014 to 2018 under the project of “Development of Inland Fish Farming Technology in Myanmar”.

By implementing this Freshwater Aquaculture Research and Extension Center, from experience of Korea and Myanmar, human resources and technical support, it will improve modern technology in freshwater aquaculture sector and this Centre is the first research Centre in Myanmar. Also after the fishery sector privatization in 1994-1995 fishery exports have grown this sector began one of the major contributors in foreign exchange earnings.

4.3.2 Top Exported Kinds of Fish and Fisheries

In Myanmar, there are 646 fish and fisheries species. Since the fishery sector has privatized, the kinds of exports fisheries are based on demand. Among them, Rohu, Hilsa, Pink, Live Crab, Live Eel, White prom fret, Tiger Rosy Jew Fish, Ribbon Fish and Dried Prawn are the top ten species of export fish and fisheries product of Myanmar. The table (4.5) shows the volume of top ten species of exported fish and fisheries product of Myanmar in 2013-14, 2014-15, 2016-17, and 2017-2018 fiscal year.

Table (4.7) Top Ten Species of Exported Fish and Fisheries Products of Myanmar (2013-14, 2014-15, 2016-17, and 2017-2018)

2013-2014		2014-2015		2016-2017		2017-2018	
Species	Metric ton						
Rohu	68314.722	Rohu	64016.755	Rohu	53092.447	Rohu	65063.949
Live Eel	12631.090	Live Mud Crab	16471.428	Live Mud Crab	15649.758	Live crab	15562.011
Live crab	15639.167	Live Eel	7496.766	Live Eel	7434.286	Fish Meal	38409.125
Hilsa	10909.868	Pink	10322.550	Soft Shell Crab	3037.631	Ribbon Fish	21205.179
Pink	9838.923	Tiger	4203.400	Fish Meal	37444.871	Hilsa	11379.949
Tiger	3382.562	Hilsa	6106.970	Ribbon Fish	20447.705	Live Eel	8650.734
Ribbon Fish	9547.203	Ribbon Fish	9265.445	Pink	7233.451	Soft Shell Crab	2882.985
Dried Prawn	2653.699	Soft Shell Crab	2835.486	Tiger	2892.161	Pink	9992.875
Soft Shell Crab	2395.283	Fish Meal	21158.450	Hilsa	12003.643	Squid	13362.519
White	2605.128	White	2553.990	Big Eye Croaker	16561.238	Tiger	2902.446

Source: Fishery Statistics, 2018.

According to table (4.7), the above mentioned species are the most popular species in Myanmar and they have greater for importing countries Ribbon Fish is the product which exported in term of volume and provided the most foreign exchange

earnings. Ribbon Fish became more important in fishery exports, Ribbon Fish exports increased from 9547.203 metric ton in 2013-14 to 21205.179 metric ton in 2017-18. The amount of Ribbon Fish export is the highest among the other fish because it is offshore marine captured fishery which is more produced than freshwater fishery.

4.3.3 Export Destination of Fishery Products

Myanmar exports its fish and fisheries products to 27 countries, to ASEAN countries and Asia Pacific countries, European countries, Middle East countries, Some African countries and Australia. The table (4.6) shows the top ten countries imported fishery products from Myanmar.

Table (4.8) Top Countries Imported Fishery Products from Myanmar (2008-09 to 2017-18)

(Metric Ton)

Countries	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
China	58921.26	55991.3	77914.27	92775.645	90780.734	82665.926	75732.900	78217.835	100200.229	117797.366
Thailand	89489.51	122817.59	134634.61	136278.599	137631.665	126645.544	127537.529	149567.763	211097.950	301984.934
Malaysia	23004.36	21351.10	20669.93	23325.904	19288.339	16459.550	16769.467	13682.229	11629.971	12603.042
Singapore	56753.61	46424.56	25413.33	15881.889	26584.477	20086.003	21453.699	27049.903	15076.495	27407.662
Saudi	17702.43	20426.63	19474.26	20771.69	21738.835	19672.380	20689.382	20862.038	21129.759	25411.982
Kuwait	34423.65	58747.92	50643.82	45496.48	34515.926	26196.712	23428.406	20986.639	-	-
Japan	6514.06	6215.54	7197.15	6839.415	6895.203	6490.001	6750.174	5371.332	6049.425	7137.693
UAE	10610.28	13517.21	12292.49	16045.361	15142.596	16008.274	13838.681	14189.191	13884.501	13815.933
UK	5192.63	6285.68	6488.43	6275.849	6341.289	7123.743	5654.002	7008.604	6609.502	7386.898
Bangladesh	14694.98	13993.34	11372.95	17296.858	9529.391	8190.575	7602.536	-	11117.243	11696.075

Source: Department of Fisheries (2018)

According to table (4.6) Thailand was the largest importer of fishery products from Myanmar until 2008-09. The export of fishery to China and increased after 2016-17. Thailand was the largest importer of fishery product from Myanmar, and imported 1537685.394 metric ton and China was the second largest importer of fishery products of Myanmar, and imported 830997.495 metric ton in 2008-09 to 2017-2018.

4.4 SWOT Analysis of Fishery Sector

The past and present situations as well as future possibilities of fishery sector in Myanmar were evaluated using SWOT analysis technique. SWOT stands for Strengths, Weaknesses, Opportunities, and Threats (Henricks, 1999; Houben et al., 1999). This technique is very helpful while exploring current constraints and future possibilities of any sector through a systematic approach of introspection into both positive and negative concerns. The contribution of SWOT analysis in fishery sector can be shown in the following table (4.1).

Table (4.9) SWOT Analysis of Myanmar Fishery Sector

<u>STRENGTHS</u>	<u>WEAKNESSES</u>
<ul style="list-style-type: none"> • Many natural and dammed lakes • Good protein resource • Providing the employment • Different kinds of fish • Credit available • Many Fishery Institutions • High potential for export 	<ul style="list-style-type: none"> • Non-educated employees in sector • Weak infrastructure • Protection problems • Low fish prices • Insufficient human capacities • Inadequate cooling chain
<u>OPPORTUNITIES</u>	<u>THREATS</u>
<ul style="list-style-type: none"> • Increasing fish demand • Diet and fishery products • Changes in consumer preferences • Improve health knowledge in public • Price parity between fishery products and other meats • Increased investments • Providing financial and technical aid for fishery products 	<ul style="list-style-type: none"> • Over fishing and pollution • Low educational level of farmers and workers • Financial difficulties • Unconscious capturing by farmers or workers • Shortages of fishery at regional level • Damages the ecology

Strengths

According to the table (4.9), many natural and dammed lakes, good protein resource, providing the employment, different kinds of fish, credit available, many Fishery Institutions High potential for export and can be found as strengths in fishery sector. In these strengths, many natural and dammed lakes, providing the employment and good protein resource are very important strengths for fishery sector because there are numerous north-south flowing river systems with broad deltas for fresh water resources. Myanmar possesses a long coastal line that stretches to 2,832 kilometer and 8.2 million hectares of inland water bodies. So, any fishery enterprises can be worked in Myanmar. The fisheries sector in Myanmar provides employment to 3.2 million people (800,000 full-time and 2.4 million part-time). The more considerable and substantial contribution of fisheries is the supply of highly nutritious

animal protein for human consumption and the employment and income generation in often-remote coastal areas.

Weaknesses

In the table (4.9), there are many weaknesses in Myanmar fishery sector. Among them, weak infrastructure, protection problems and non-educated employees in sector are found to prepare as well fishery sector because the fisheries sector creates employment and livelihood opportunities for some of the most socio-economically disadvantaged in our societies, including the least educated, the rural poor and women. Many small-scale fishers and aquaculture producers are poor and often depend on unpaid family labour, including that of women and sometimes children. They face numerous obstacles in raising their productivity and income levels, including limited access to credit, knowledge and inputs. The other weaknesses are insufficient human capacities, low fish prices and inadequate cooling chain.

Opportunities

Increasing fish demand, diet and fishery products, changes in consumer preferences, improve health knowledge in public, price parity between fishery products and other meats, increased investments and providing financial and technical aid for fishery products are found as opportunities in the table (4.9). Increasing fish demand, improve health knowledge in public, price parity between fishery products and other meats, increased investments and providing financial and technical aid for fishery products are really important opportunities to encourage the fishery sector for employers and employees. Because demand for fish continues to increase in line with population growth as well as increases in consumption of animal protein associated with urbanization and rising incomes.

Threats

At last, overfishing and pollution, low educational level of farmers and workers, financial difficulties, unconscious capturing by farmers or workers, shortages of fishery at regional level and damages the ecology are evaluated as the threats in the fishery sector. Overfishing and pollution, low educational level of farmers and workers and financial difficulties can be found as real threats to notice and prepare the fishery sector. Damage to fish habitats caused by some destructive

fishing practices (e.g, dynamite) are deterrents to tourism. The destruction of coastal wetlands and mangrove areas by aquaculture pond construction and water pollution by intensive coastal aquaculture can have the same sort of effect. . Overcapitalization and overfishing may also result from heavy subsidization in the absence of effective fisheries management.

According to the SWOT analysis, the fishery sector in Myanmar will develop in the future by evaluating the opportunities with its strengths. Increasing trend in fish demand in the world will make pressure to raise the fish supply and intensify the competition in the markets.

CHAPTER V

CONCLUSION

State law and Order Restoration Council (SLORC) took the power in 1988, and practiced the market-oriented economic system. The change of market-oriented economy system in 1988-89 gave strong impacts to the economy as well as the fisheries sector. Since then, Myanmar Fishery Enterprise operated the fishery activities until 1994-95 as the State-Owned Economic (SOE) enterprise. Foreign business was also granted fishing rights within the specific areas in the exclusive economic zone. In 1992, the state allowed forming joint venture with the state and those foreign investors carried out production and marketing of marine products.

The process of privatization has pushed the fishery sector to develop with a momentum. The infrastructures, such as fishing vessels, ice plants, cold storages were sold or lease to private enterprises. Fishing rights relating to the periods, areas, species, gears and method are granted by Department of Fisheries. Permits are purchased by an auction system every year. Increased productions of fishery sector have contributed not only for domestic consumption but also provided foreign exchange earnings from exports and employment and industrial output to society. As part of the liberalization of fish trade, fishery sector has been promoting the export of surplus fish production. However, there are natural threats of global warming, environmental degradation of fishing grounds and over fishing for lion term. There are reductions in marine resources caused by the degradation of the coastal.

In Thanintharyi Division, there are 301 fish and fisheries processing establishments, 105 in Yangon Division, 97 in Bago, 91 in Ayeyarwaddy, are the highest numbers. There are 10 fish and fisheries processing establishments in Sagaing Division, 9 in Kayin State, 8 in Rakhine and only 3 in Mon State. From those fish processing plants, their major products are dried fish, fish paste, fish sauce and prawn. Other products are fermented fish, salted fish, dried prawn, shrimp and dried shrimps. And the Yangon Division, Ayeyarwaddy Division, Thanintharyi Division and Bago Division are the largest producers.

5.1 Findings

Myanmar Fisheries Federation performs many supporting roles. It is able to support application made by its members to Department of Fisheries to undertake fisheries and aquaculture activities. It also can recommend application to the Livestock and Fisheries Bank for loan application. Moreover it has a good support from the government and can negotiate directly for member's benefits. It helps with negotiation of selling and harvesting of fish; and shrimp and working collectively.

In the modern age, training and education are getting more important than ever before. As all know, human resource development is recognized as the most important factor for the economic development. Likewise, human resource development in fisheries management is an important role in the fishery sector, Consequently, fisheries training are the prime factor to become able and qualified in its sector. The DOF conducted the following courses are On-site Training Courses for Food Safety and Quality Assurance of Frozen Products, Aquaculture Training Course, Laboratory Training Course, Food Safety Training Course, Fishery management on-job Training Course, Fishing Gear Training Course.

Myanmar fisheries are categorized into inland (freshwater) fisheries and Marine fisheries. Inland (fresh water) Fisheries involve Aquaculture fisheries, leasable fisheries and open fisheries. The total production of fisheries increases because of the Governments four relevant fisheries laws. They are law relating to the fishing rights of foreign fishing vessels in 1989, Aquaculture Law in 1989, Myanmar Marine fisheries law in 1990 and Freshwater Fisheries law in 1991. They encourage the development of fishery sector and also make actively participation of local and foreign fisheries enterprises in Myanmar.

In total, fish and fisheries export volume increased from 324.71 thousands metric ton in 2008-09 to 568.227 thousands metric ton in 2017-18. These export quantity and value are earned from both normal trade and border trade. The export of fisheries products is increasing because the area of fish ponds were expanded from 440585 acres in 2008-09 to 491345 acres in 2017-11 due to the freshwater fisheries law enacted in 1991. After the fishery sector privatization in 1994/95, fishery exports have grown and this sector became one of the major contributions in foreign exchange earnings. In Myanmar, there are 646 fish and fisheries species. Since the fishery sector has privatized, the kinds of exports fisheries are based on demand. Among them, Rohu, Hilsa, Pink, Live Crab, Live Eel, White prom fret, Tiger Rosy Jew Fish,

Ribbon Fish and Dried Prawn are the top ten species of export fish and fisheries product of Myanmar. It earned the largest amount of foreign exchange from Thailand. The value was US\$ 258.808 million in 2017-18 fiscal year. Myanmar exported its fish and fisheries products through border trade and normal trade.

During the study period from 2008-09 to 2017-18, total consumption is 3217479.46 metric ton to 5298652.67 metric ton and per capita consumption is from 45kg to 66kg. Total consumption and per capita consumption increase due to the expansion of inland and Marine water fisheries in Myanmar. These findings indicate that there is a strong need for resources management for sustainable fisheries. Technologies need to be upgraded to increase the productivity of the aquaculture sector and make prices more competitive in the international market. Myanmar with its suitable climate conditions has a very good opportunity to improve fishery sector. This sector has a great potential to improve in the future if the opportunities are evaluated with strengths and Myanmar's production capacity for both marine and inland fishery will enlarge and gain bigger shares in the domestic and international markets.

5.2 Suggestions

The public and private sector need to establish the required onshore facilities such as ice-plants, processing plants and cold-storages. The fishery products such as fish, Prawn, shrimp etc, should be exported as fresh fishery products to abroad. Therefore, international standard in there is an important need to upgrade the fish products to be semi-processed or value-added in order to increase to value. It is good for fishery industries to get electricity regularly Production processes are needed to improve and upgrade until international standard in fishery sector.

For the freshwater fisheries, the fishery sector should develop fishery production through rehabilitating and restoring habitats for freshwater fish and restocking indigenous fish species. For the marine fisheries, the fishery sector should implement comprehensive policies through licensing and community fish rights, the improvement of vessel registration system. Fishery exporters need to comply with the quality of international standard. For export, quality is the crucial determinant for every products especially food products. The export, quality is the crucial determinant for every products especially food products. The skills and expertise of the employees are also important for improving quality in the production process. In this regards, the

fishery exporting companies needs to provide training programs and knowledge and commitment for improving the quality.

The fishery exporting enterprises also needs to care about the promotional activities to entice potential new customers. As the private enterprises solely depends on their regular customers. To take advantage of the bargaining power of buyer, the private enterprises need to attract new customers, not only from ASEAN member countries but also from other regions of the globe. Moreover, ahead of implementing ASEAN Free Trade Agreement (AFTA) in ASEAN in 2015, the companies should maintain or expand market share.

The last not the least, the private fishery exporting companies needs to watch the environmental changes, the possible risks and vulnerability; like unusual bad weather conditions, natural disaster and impacts of climate changes. To overcome all these problems specific steps should be taken such as; fishery courses should be organized by the governmental / nongovernmental organizations at least three or four times a year to get both the producers and the consumers informed about fish capturing and consumption. To increase the awareness educational activities should be given. Especially Ministry of Agriculture, Livestock and Irrigation, as the most responsible foundation in the sector, should prepare educational materials for the sea farmers and marine capturers. To eliminate weaknesses, private sector should be organized under the umbrella of a strong and large cooperative to create a synergy to solve the problems by making compromised decisions that affect the future of the sector. Strategic goals should be defined to enforce fish efficiency at the demand side, stimulate structural changes in the sector.

To exploit opportunities and gain larger market share in the world markets, environmental standards and the environmental requirements of the EU directives should be adopted as early as possible. Conforming those standards will contribute the quality of the products and so the competitiveness and the sales volume. To evaluate the opportunities with our strengths a long-term fishery strategy should be developed by the government that will also incorporate capture and aquaculture fisheries mitigation. The prioritization must always favor projects based on inland aquaculture and capture fisheries.

REFERENCES

- A.J. Lynch (2017), *Globe Environmental Change*, www.elsevier.com/locate/gloenvcha
- Anon (2015). *National Export Strategy –fishery sector strategy 2015-2019*. Myanmar Ministry of Commerce and International Trade Centre, Republic of the Union of Myanmar.
- Aye Malar Thwin, (2013). *Development of Fisheries Sector in Myanmar*, Unpublished Master of Development Studies, Thesis, Yangon Institute of Economics.
- Belton, B. 2018. “The Status of Aquaculture in Myanmar in Regional Context, and Opportunities for Sustainable Growth.” Unpublished consultancy report prepared for the World Bank.
- Belton, B. & Thilsted, S.H. 2014. Fisheries in transition: food and nutrition security implications for the global South. *Global Food Security*, 3: 59–66.
- Central Statistical Organization (CSO), (2018). *Statistical Year Book 2018*. Myanmar.
- Department of Fisheries (DOF), (2018). *National report of Myanmar on the sustainable Management of the Bay of Bengal Large Marine Ecosystem*, Yangon, Myanmar.
- DoF. (2016). *Myanmar Fisheries Statistics*. Department of Fisheries, Ministry of Agriculture, Livestock and Irrigation.
- DOF. 2017. *Fishery Statistics 2017*. Nay Pyi Taw: Department of Fisheries, Republic of the Union of Myanmar Ministry of Livestock, Fisheries and Rural Development.
- FAO, 2016 fishery country profile: the Union of Myanmar https://data.opendevelopmentmekong.net/library_record/fao-fishery-country-profile-the-union-of-myanmar
- FAO. 1995. *Code of Conduct for Responsible Fisheries*. Rome.
- FAO. 2002. *FAO’s role in fishery statistics*. In *The State of World Fisheries and Aquaculture 2002*, p. 6. Rome
- FAO. 2012d. *The State of World Fisheries and Aquaculture 2012*. Rome.
- FAO. 2017. *Water for Sustainable Food and Agriculture*
- FAO. 2018. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. Rome.
- FAOSTAT. (2018). *Statistics Division, Food and Agriculture Organization of the United Nations*. Available at, <http://www.fao.org/faostat/en/#country/28>. Accessed on 28 May 2018.

- FIQC. (2016). Fish Inspection and Quality Control Section, Department of Fisheries, Ministry of Agriculture, Livestock and Irrigation.
- Food and Agricultural Organization of the United Nations Regional Office for Asia and Pacific, (2018), *Myanmar Aquaculture and Inland Fisheries*, RAP Publication, Bangkok.
- Food and Agricultural Organization (FAO), (2018). *Myanmar Agricultural Review and Investment Strategy, Volume I Sectoral Review*, Myanmar.
- ILO. (2015). Sustainable Management of the Bay of Bengal Large Marine Ecosystem. International Labor Organization.
- International Centre for Trade and Sustainable Development, (2018). *International Trade and Sustainable Development 2018*, RAP Publication, Bangkok, Thailand.
- Keiran, K. (2017). *Fish to 2030, Prospects for Fisheries and Aquaculture*.
- Khin Lay Kyaw, (2011). *Development of Myanmar Fisheries Sector*. Unpublished Master of Public Administration Thesis, Yangon Institute of Economics.
- Khin Maung Soe, (2008). *Trends of Development of Myanmar Fisheries: With Reference to Japanese Experiences*. Visiting Research Fellow Monograph Series, Institute of Developing Economies, Tokyo.
- Matthias, H., (2017). *The Role of Aquaculture in Rural Development*. <http://www.fao.org/docrep/0/0/16847en.pdf>
- Ministry of Livestock and Fisheries, (2011). *Statistics of Exported Fish and Fishery Product (2008-2009)*, Department of Fishery, Yangon, Myanmar.
- Ministry of Livestock and Fisheries, (2018). *Statistics of Exported Fish and Fishery Product (2017-2018)*, Department of Fishery, Yangon, Myanmar.
- Ms. Myat Khaine Mar. (2017). *Fisheries Country Profile Myanmar*. www.seeafdec.org
- Myat Thein. (2004). *Economic Development of Myanmar, Institute of Southeast Asia Studies, Singapore*.
- Nelson, Joseph S. (2006). *Fishes of the World*. John Wiley & Sons, Inc. p. 2. ISBN 0-471-25031-7.
- Nilar Myint Htoo, (2011). *Trade Liberalization and its Impact on Fishery Sector in Myanmar*, Unpublished PhD Dissertation Submitted to Department of Economics, Yangon Institute of Economics.
- Sumaila,U.R.(2017), Trade and Sustainable Fisheries.ADBI Working Paper 676.Tokyo:Asian Development Bank Institute. <https://www.adb.org/publications/trade-and-sustainable-fisheries>
- TRADE SITUATION OF MYANMAR IN 2011-2012 FICAL YEAR TO 2018-2019 FICAL YEAR (UP TO APRIL MONTHLY).

- Tsamenyi, M. (2011). *A Review of Myanmar Fisheries Legislation with Particular Reference to Freshwater Fisheries Legislation*, Food and Agricultural Organization (FAO), Yangon.
- Tun, M.T. Marine Fishes of Myanmar (Pelagic and Demersal)
- UNDP. (2015). Women and local leadership: Leadership journeys of Myanmar's female village tract/ward administrators.
- The World Bank. 2017. *The Sunken Billions Revisited: Progress and Challenges in Global Marine Fisheries*.
- World Bank. 2013. *Fish to 2030: prospects for fisheries and aquaculture*.
- Ye, Y., Barange, M., Beveridge, M., Garibaldi, L., Gutierrez, N., Anganuzzi, A. & Taconet, M. 2017. FAO's statistic data and sustainability of fisheries and aquaculture: comments on Pauly and Zeller (2017). *Marine Policy*, 81: 401–405.
- Zin Mar Soe Win, (2011). *A Study on Competitive Advantages of Fisheries Exporting Companies in Yangon*, Unpublished Master of Public Administration, Thesis, Yangon Institute of Economics.

WEBSITES

<https://www.adb.org/publications/trade-and-sustainable-fisheries>

[https://en.wikipedia.org>wiki/fish-as-food](https://en.wikipedia.org/wiki/fish-as-food)

[https:// en.wikipedia.org>wiki/fishery](https://en.wikipedia.org/wiki/fishery)

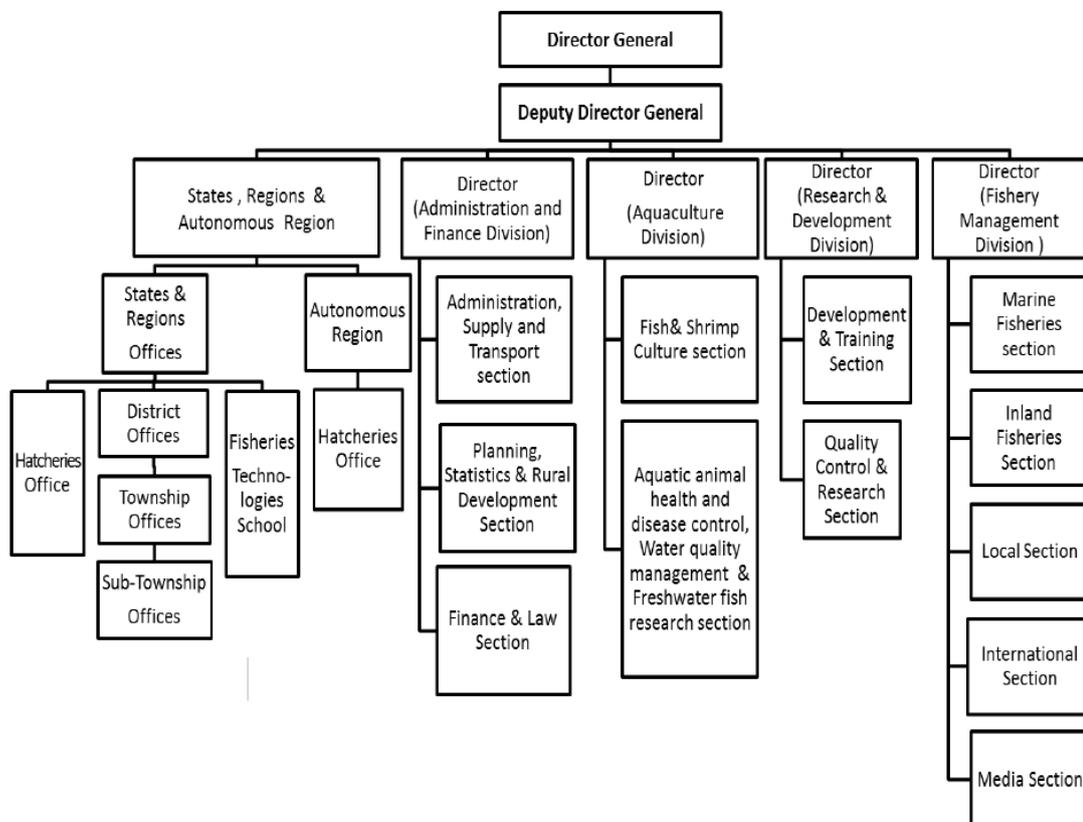
[https:// en.wikipedia.org>wiki/Oily-fish](https://en.wikipedia.org/wiki/Oily-fish)

[https:// en.wikipedia.org>wiki/seafood](https://en.wikipedia.org/wiki/seafood)

www.fao.org/3ab980e07.htm

Appendix 1. Organizational Structure Of Department Of Fisheries, Myanmar

Officer	Other	Total
365	2104	2469



Source: Fisheries statistics, 2018.