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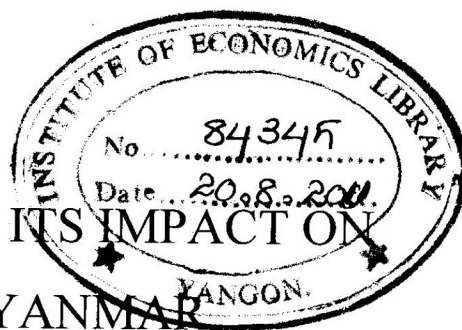## Ph.D PROGRAMME

TRADE LIBERALIZATION AND ITS IMPACT ON FISHERY SECTOR IN MYANMAR

NILAR MYINT HTOO

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TRADE LIBERALIZATION AND ITS IMPACT ON

FISHERY SECTOR IN MYANMAR

A dissertation submitted in partial fulfillment of the requirements for
the degree of Ph.D
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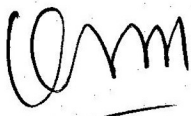Ph.D Ba 1 (2006/07)
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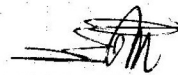
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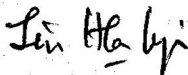
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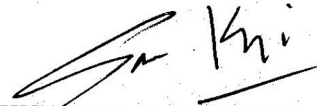(Chairman)
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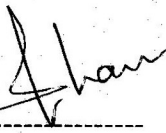Pro-Rector (Retired)
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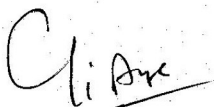
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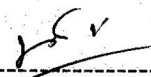
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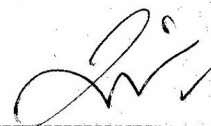
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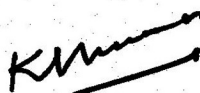
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CERTIFICATION

I hereby certify that the content of this dissertation is wholly my own work unless otherwise referenced or acknowledged information from sources is referenced with original comments and ideas from the writer him/herself.

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ABSTRACT

After trade liberalization in an attempt to transform the economy into market oriented one in Myanmar, the value and volume of fishery exports increased. The main objective of this thesis is to analyze the impact of trade liberalization on fishery production and export in Myanmar. An attempt was also done to explore the sustainable fishery development in search of long-term potentials and appropriate policies for development of the Myanmar fishery sector. Theoretical approaches such as comparative advantage and competitive advantage were used along with quantitative analysis in order to achieve these objectives.

Myanmar as a result of opening up its economy is entering the stage of more exports in the external fish market. It was found that revealed comparative advantage of fish had risen both among primary products and among Asian countries throughout the study period. The challenge is to create more quality fish products in order to strengthen its competitiveness. Myanmar's marine water territories possess sufficient fishery resources and have relatively cheap labour cost. Moreover, expanding market to other countries such as Europe, America, Middle East and South Africa would help decrease the dependency on the Asia market. Constant market share analysis has proved that Myanmar has potential of creating a large market share and competitiveness to sustain it in the near future. Although Myanmar fishery product had competitiveness, non-price competitiveness was weak. Myanmar could not yet export value-added products and quality products in accordance with the international standard. According to interrupted time series analysis, it was found that there was significant long-term impact of trade liberalization on fishery exports. For long-term development in fishery sector, it is necessary to take care of the sustainability of fish resources.

One way for future growth and competitiveness of the whole sector lies upon the capacity building and training of personnel, research and development in this sector. Moreover, the cooperation and collaboration between the state and private sector will lead to sustaining fishing resources as well as enhancing production and export of fishery products.

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LIST OF ABBREVIATIONS

AOA	Agreement on Agriculture
AFTA	ASEAN Free Trade Area
AHA	American Heart Association
AIM	Action Impact Matrix
ARDC	Agriculture and Rural Development Corporation
ASEAN	Association of South East Asian Nations
BEDC	Burma Economic Development Corporation
BOBLME	Bay of Bengal Large Marine Ecosystem
CCC	Customs Cooperative Council
CEPT	Common Effective Preferential Tariff
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Constant Market Share
CPUE	Catch per Unit Effort
CSO	Central Statistical Organization
CTE	Committee on Trade and the Environment
DDA	Doha Development Agenda
DMA	Department of Marine Administration
DoF	Department of Fisheries
DOO	Degree of Openness
FDI	Foreign Direct Investment
EEZ	Exclusive Economic Zone
EP	Export Promotion
ERAP	Environmentally Responsible Aquaculture Practice
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FECs	Foreign Exchange Certificates
FOB	Free on Board
FTAs	Free Trade Agreements
GAP	Good Aquaculture Practice

GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GEL	General Exception List
GHP	Good Hygiene Practices
GMPs	Good Manufacturing Practices
ha	Hectare
H.S	Harmonized System
HACCP	Hazard Analysis and Critical Control Point
HP	Horse Power
HRD	Human Resource development
ICCAT	International Commission for the Conservation of Atlantic Tunas
IL	Inclusion List
IMF	International Monetary Fund
INFOFISH	Information Fisheries
IOE	International Office of Epizootics
IQF	Individual Quick Frozen
ISI	Import Substitution Industrialization
ISO	International Organization for Standardization
ITQs	Individual Transferable Quotas
IUU	Illegal, Unreported and Unregulated (fishing)
JICA	Japan International Cooperation Agency
kg	Kilogramme
KOICA	Korean International Co-operation Agency
LMEs	Large Marine Ecosystems
MCS	Monitoring, Control and Surveillance
MFF	Myanmar Fisheries Federation
MLFDB	Myanmar Livestock and Fisheries Development Bank
MPAs	Marine Protected Areas
MSY	Maximum Sustainable Yield
NACA	Network of Aquaculture Centre in Asia and the Pacific
NAMA	Non-Agriculture Market Access
NCEA	National Commission on Environmental Affairs
NGOs	Non-Governmental Organizations
NIEs	Newly Industrializing Economies

NTBs	Non-Tariff Barriers
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPFC	People's Pearl and Fisheries Cooperation
R&D	Research and Development
RCA	Revealed Comparative Advantage
SAPs	Structural Adjustment Programmes
SEAFDEC	Southeast Asia Fisheries Development Centre
SEEs	State-Owned Economic Enterprises
SL	Sensitive List
SLORC	State Law and Order Restoration Council
SPDC	State Peace and Development Council
SPS	Sanitary and Phyto-sanitary
SPs	Stabilization Programmes
TAC	Total Allowable Catch
TBT	Technical Barriers to Trade
TEL	Temporary Exclusion List
TICA	Thai International Co-operation Agency
TRIMs	Trade Related Investment Measures
TRIPs	Trade-Related Aspects of Intellectual Property Rights
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industries
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
VAT	Value-Added Tax
VERs	Voluntary Export Restraints
WB	World Bank
WCS	Wild-Life Conservation Society
WDI	World Development Indicators
WTO	World Trade Organization

CHAPTER 1

INTRODUCTION

1.1   Rationale of the Study

Myanmar has a long coastal line of 2832 kilometers stretching from the Northernmost of Nerf River to Southernmost Victoria Point. The coast is facing to the Indian Ocean in Rakhine State, the Bay of Bengal in Ayeyarwaddy Region and the Andaman Sea in Tanintharyi Region. Such a long coastline is stretching along the coastal areas forming almost 228,781 square kilometers of continental shelf where the water is so fertile and enriched with nutrient and plankton. Therefore, the motto of the meat and fish sector is "Where there's water, there's fish" and in line with the motto, fish and prawn breeding tasks are being extended[1]. Moreover, Myanmar has rich fisheries biodiversity including 310 freshwater fish species and 465 marine fish species.

Myanmar people are consuming rice and fish as their staple food. Nutrition requirement of Myanmar people are obtained from various preparations of fish such as fresh fish, dried fish, salted fish, fermented fish, fish paste and fish sauce etc. Fishery 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 of a major source of animal protein but also one of the sources of foreign income in a country. *Ngapi* (fish paste) was a vital good of early commerce between the Mon dynasty and the Kingdom of Inwa. Since Myanmar has a saying that "If it is genuine Myanmar curry, it anyhow relates to *Ngapi*, which is fish paste, it can easily imagine the role of fish in Myanmar food''. *Ngan pyaryi* is also important ingredient in making many Myanmar culinary dishes, especially soups. So, long ago, Fishery sector has influence on Myanmar economy. Fish is an excellent source of readily digested, high-quality animal protein. It is high in lysine and essential amino acids. Lysine constitutes more than 10 % of the total protein in fish and only 2.8% in rice.[2]

People in developing countries consume an average of 9.2 kg of fish per person per year, as compared to 27.9 kg per person per year in industrialized countries. But, globally, per capita fish consumption was 24.8 kg, including China, in

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[1] Ministry of Information, (2005), Sustainable Development in Livestock Breeding Sector, p-33

[2] John Kurine, (2005), Responsible Fish Trade and Food Security, FAO, Rome, p-6

2001.[3]Per capita consumption of fish in Myanmar was greater than other developing countries. Moreover, per capita consumption of fish in 1988/89 was 16 kg and increased to 46 kg in 2009/10 (Appendix 1). Therefore, fish plays a key role as a source of protein in Myanmar and it was two-thirds of animal protein consumption.

The Livestock and Fishery Sector contributed round about 8% of Gross Domestic Product (GDP) (Appendix 2). In 1988/89, marine products contributed to 2.80 % of total exports. Myanmar fishery Enterprises was abolished in 1994/95 and private entrepreneurs were given permits to freely export marine products. As a result, the export value of marine products increased to 4.06 % in 2009/10. Therefore, fishery sector was the sixth largest source of foreign exchange earnings. (Appendix 3)

Myanmar government welcomes foreign investment in the fishery sector, and several large investments are on-going or planned for aquaculture in the coastal divisions. Local and foreign investments have been pooled in fishery as it is an economically lucrative venture. The impressive fishery resources brought about a lot of investment in various areas. Since September 1988, Myanmar has changed its economic system to market-oriented economic system. In November 1988 the Foreign Investment Law was introduced along with the removal of restriction on private sector participation in domestic and foreign trade. After trade liberalization and Law Relating to the Fishing Rights of Foreign Fishing Vessels in 1989 encouraged the development of foreign investment. Moreover, many joint ventures and foreign companies carried out fishery in deep sea area and fish culture due to Foreign Investment Law. Total investment of permitted fishery enterprises was only two enterprises and 114.66 million Kyats in 1991/92. The investment in fishery sector had developed after privatization for fishery sector in 1994/95. Total investment in fishery sector increased to 2084.816 million Kyats and total enterprises increased to 17 enterprises in 1997/98. In 2009/10, total foreign investment was 2422.730 million Kyats and total enterprises also increased to 25 enterprises. The share of local investment in fishery sector was 47.37% in 1991/92 and increased to 83.57 % in 2009/10. (Appendix 4) Foreign investment for fishery sector entered into culturing, catching, processing and marketing of freshwater and marine fisheries.

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[3] FAO, (2002), Fisheries Statistical Yearbook, Commodities, Rome, p-204.

The number of people employed in inland waters was 1398,410 fishermen and 1278000 fishermen in marine fisheries in 2000-01[4]. The inland fisheries of Myanmar almost certainly involve more people than reported since many families engage in occasional, seasonal or rice paddy type fisheries, which is unlicensed and largely unreported. Thus this sector is probably impacting a far greater percentage of the population than currently recognized. In 2003/04, the Livestock and Fisheries Sector provided employment for more than 7.98 million person fulltime and 2.6 million part-time, including almost 30,000 fish and shrimp farmers[5].

During the period of Revolutionary Council, the government realized that Fishery sector was important for food security. People's Pearl and Fishery Board was replaced as People's Pearl and Fishery Corporation in 1963 and Myanmar started its fishery exports in 1972. Myanmar adopted the market-oriented economic system in 1988. Stabilization and reform measures had been undertaken to be in line with the new economic system. Privatization of aquaculture, hatcheries, and ponds, processing plants, cold storages, trading and marketing system has been a major stimulating factor in fishery exports. Government has granted export rights to private sector starting from 1988. The privatization of Fishery sector involved the outright sale or lease of its entire fishing fleet, ice plants, cold storage facilities to the private businessmen who have more capability and effective use of these facilities.

In accordance with the market-oriented economic system, arrangements were being made to produce more fish and prawn for the people, enabling self-sufficiency at home. At the same time, tasks were being carried out to promote export of fishery products. To penetrate the markets abroad and to distribute fish and prawn at home on a wide scale, government has encouraged this sector to increase fish production and export through aquaculture and marine fishery.

Aquaculture is widely viewed as being an important domestic provider of much needed high quality animal protein and is also seen as an important provider of cash income and valuable foreign exchange earnings through the production of higher value cash fishes for export such as marine shrimp. In view of these positive characteristics, it is not surprising that aquaculture has been the fastest growing sector

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[4] FAO and NACA(2003), Myanmar Aquaculture and Inland Fisheries, Food and Agriculture Organization of the United Nations, Bangkok. P-6.
[5] FAO,(2006), Myanmar Country Profile, p-11.

for over two decades, exhibiting an over all annual growth rate of over 40 % per year since 1989, compared with 5% for landing from capture fisheries[6]. Production from aquaculture will be the main source of increased fish production, following the opening of new areas for aquaculture, increased production and modern technology, especially in the field of fry production, culture systems, feed and disease control. Therefore, the government is increasingly playing a proactive role in aquaculture development. Further growth in the availability of fish for human consumption is expected to come mainly from aquaculture.

The demand for fish exports increased due to the trade liberalization and increased population. Myanmar can export variety of species not only high-value species but also low-value species. Species and fishery products of high-value on world markets include shrimp, salmon, tuna, ground fish, squid and octopus, as well as fishmeal and fish oil. However, relatively low-value species traded in large quantities, such as tilapia from aquaculture, have also gained increasing importance on world markets. Fish is traded in many forms: fresh or processed in various ways. To penetrate the export of fishery products in the world market, quality control system was upgraded with local and foreign investment. Therefore, trade liberalization improved domestic technology, production process will be more efficient, and productivity in fishery sector will rise.

In 2008, Myanmar possessed 2.78% of world captures production and it was ranked ten in principal producers and produced 1.28% of world aquaculture production and it was ranked twelve in principal producers .Myanmar exported 0.56% of world fishery export in term of value and it was ranked thirty nine in principal exporters[7]. Therefore, Myanmar's fishery sector will become successful sector due to the existing and future prosperity in Myanmar. This study intends to find out how far the impact of trade liberalization is for the fishery sector.

1.2   Objectives of the Study

The objectives of the study are:

-to evaluate the determinants of fishery export growth in international markets

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[6] Hla Win and Khin Ko Lay,(2004),Opportunities and Challenges in Myanmar Aquaculture, DoF Paper,P-2.

[7] FAO(2008), Fishery and Aquaculture Statistics, Food and Agriculture Organization of the United Nations, Rome,2010.

-to analyze impact of trade liberalization on fishery production and export

-to undertake the sustainable fishery development of Myanmar

-to suggest appropriate policies for development of fishery sector and its contribution to the national economy

1.3   Method of the Study

The methodologies of the study are descriptive analysis and analytical time series analysis based on secondary data set.

The descriptive part includes a discussion on the trade liberalization, the consequences of the trade liberalization policies for production and export of fishery, the condition of competitiveness for fishery products in international markets, the relationship between trade policies and overfishing.

The analytical part deploys quantitative different techniques. Revealed Comparative Advantage is used to identify the commodities which are relatively important in the exports and measure a country's comparative advantage. Constant Market Share Approach is used as measures of competitive capacity abroad. Moreover, the level of sustainable yield is estimated using a bio-economic model.

Time series analysis is used to examine the growth trends of fishery production and exports. The study has been based on available secondary data from the Department of Fisheries, Central Statistical Organization, Ministry of Commerce, Yangon Institute of Economics, Yangon University, USIS, UNDP, FAO, Myanmar Fishery Federation, books, newspapers, and legal websites.

1.4   Scope and Limitation of the Study

The study focused on impact of production and exports of the fishery sector for the specific period of 1988/89 to 2009/10. Time series data are used to examine the production and export volume except domestic distribution. Fish and fishery products consist of various species. But the study divided into fish, prawn and others. The value and volume of fishery exports are presented by legally traded available data. Fishery exports are measured in physical terms to avoid the effect of fluctuations in prices and exchange rate fluctuations .Only official export data are used and the illegal trade is not included in the study.

Revealed comparative advantage is a measure of post rationalization and can be static rather than dynamic in nature so that it does not indicate long-run opportunities.

There is a possibility of different conclusions emerging on the relative importance of the various effects depending on the chosen base period in constant market share approach. The choice of coding scheme affects analysis and interpretation, it is important to specify which coding method is being used in interrupted time series. Analyzing the maximum sustainable yield used by bio-economic model, efforts are calculated with available survey data.

1.5   Organization of the Study

The study consists of six chapters. Chapter 1 is an introduction chapter. It includes the role of fishery sector and importance of fish and fishery products for food security and foreign earnings, the objectives, methods, scope and limitation of the study. Chapter 2 deals with the literature review, which consists of international trade theories and policies, trade liberalization and its impacts, domestic and international policies for global fisheries trade and natural resource model. Chapter 3 presents an overview of fishery sector development in Myanmar. It concerns with each type of fishery production. Chapter 4 analyses the impacts of trade liberalization on fishery sector in Myanmar (1988/89-2009/10). Chapter 4 is main chapter and analyzes the growth of Myanmar fishery exports with the revealed comparative advantage and constant market share approach and examines the impact of trade liberalization on fishery sector. Chapter 5 examines a bio-economic model and finds out issues and challenges in fishery sector. And then regulatory frameworks for fishery production and export are presented in that chapter. Chapter 6 is conclusion chapter with findings and suggestions.

CHAPTER 2
LITERATURE REVIEW

Within today's global economy countries trade more intensely and frequently than in the past. Trade has become an increasingly important global economic activity[8]. Trade literature indicated that trade theories began with controlled ideas (such as mercantilism) and followed by liberalization of trade. For example, Adam Smith, the leader of classical economists, commented that the more controlled the trade is the less benefits accrued to the traders of both sellers and buyers. By the time of the classical economists, therefore, free trade became the most popular trade policy of the time, and lasted for centuries up until the present time. The two principles most widely used by the countries involved in the international trade included the comparative advantage and competitive advantage theories. Adam Smith is the pioneer of trade theory and Michael Porter is the pioneer of competitiveness theory[9]. But Porter's theory primarily explained the economies of advanced nations. His model needed to be modified for it to be applied to developing or less developed nations, because the countries had to create international competitiveness without necessarily having any of the four determinants in place. Therefore, nine factors model is useful in explaining the role of different types of people for a nation's competitiveness. It is important for the human factors to compete in international markets for developing countries. It seemed that the nine factor model related more to competitive advantage theory is suitable to use in Myanmar fishery sector.

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[8] A Synthesis Report, (1999), *Trade Liberalization and the Environment*, United Nations, New York and Geneva, p-1.

[9] Dong-Sung Cho and Hwy-Chang Moon, (2000), *From Adam Smith to Michael Porter: Evaluation of Competitiveness Theory*, Asia-Pacific Business Series-Vol.2, World Scientific Publishing Co.Pte.Ltd. Singapore, p-xvi.

2.1 An Overview on International Trade Theories

Regarding the international trade, many theories have been developed since 18th century. In line with the development of international trade, these theories had been modified and emerged as new trade theories based on the various assumptions at economic circumstances. International trade theories had been compatible with the conditions of that time. However the ideas and views on international trade theories have been changed and developed over time.

The systematic thinking and ideas on international trade emerged since late 18th century. Classical economists (Adam Smith and David Ricardo) exposed the causes of trade and patterns of trade based on absolute advantage and comparative cost advantages. Accordingly, even if one nation is less efficient than the other nation in the production of both commodities, there is still a basis for mutually beneficial trade. The first nation should specialize and export the commodity in which its absolute disadvantage is smaller (this is the commodity of its comparative advantage) and import the commodity in which it's absolute disadvantage is greater (this is the commodity of its comparative disadvantage). They explained the reasons why trade occurred and how countries benefits from trade. In the early 19th century, Eli Heckscher and Bertil Ohlin modified the classical comparative cost advantage theory and explored the patterns of trade among countries by factor endowments theory. Though this theory based on the comparative advantage, the comparative advantage is not static but varied in long run due to the changes in factor endowment and the level of technological progress. Hence, the patterns of trade among countries are varying according to the changes of their factor endowment and technological progress through time.

Though the new trade theories have emerged, the implications of these theories based on theory of comparative advantage as a basic guideline for considering industrial and trade policies. Moreover, no single theory is satisfactory in explaining today's international trade because today's world is much more complicated than before. As an engine of growth, international trade is crucial for economic development. Countries across the globe engage in international trade and become more interdependent. In the era of globalization and IT age, countries especially developing countries, face the challenges and competition in world market to grasp the benefits from trade. In real world, countries endeavor to benefit from trade based on comparative advantage and there are more competitive in international

markets. Therefore, a link between the principles of comparative and competitive advantage is established, and a synthesis of the two principles as a guiding force for gauging success of nations and/or firms in international trade is outlined.

The literature on international trade and policy contains a number of reasons why a country may have comparative advantage in exporting a commodity to another country. Most of these reasons may be classified into (1) technological superiority, (2) resource endowments, (3) demand patterns, and (4) commercial policies.

Adam Smith's principle of "absolute advantage" and David Ricardo's principle of "comparative advantage", in general, are based on the technological superiority of one country over another country in producing a commodity. Absolute advantage refers to a country having higher (absolute) productivity or lower cost in producing a commodity compared to another country. David Ricardo's principle of comparative advantage does not require a higher absolute productivity but only a higher relative productivity (a weaker assumption) in producing a commodity. In the Ricardian model, technological differences in two countries are the major source of movement of commodities across national boundaries. A country's comparative advantages in a product can change over time due to changes in any of the determinants of comparative advantage including resource endowments, technology, demand patterns, specialization, business practices, and government policies.

Availability of resources in a country provides another source of comparative advantage for countries that do not necessarily possess a superior technology.

Comparative advantage can be obtained due to differences in relative factor endowments. As propounded by Heckscher and Ohlin, a country has a comparative advantage in the production of the commodity which uses the relatively abundant resource in that country more intensively. Human skills can also be considered a resource. Countries with relatively abundant human skills will have a comparative advantage in products that use human skills more intensively. Government policies aimed at better education and training can create such an endowment.

Linder (1961) emphasized the role of demand in the home market as a stepping stone towards success in international markets. According to Linder, manufacturers initiate the production of a new product to satisfy the local market. In this step, they learn the necessary skills for making the product by more efficient

techniques, which in turn, give these nations comparative advantage in the product vis-à-vis other countries[10].

National policies towards infrastructure, export promotion, education and training R & D policy related to export industries can go a long way in creating and sustaining comparative advantages. Likewise, the commercial policies aimed at restricting imports through tariffs, quotas, voluntary export restraints, import licensing, local content rules, restriction on outsourcing, escape clauses, etc. have been used to the advantage of domestic import competing industries. Policy driven benefits realized by the industries through internal and / or external economies, in the long run, may become a source of comparative advantage to these industries. Further, the policies pursued by international organizations such as the World Bank, the IMF and the WTO can also become a source of comparative advantage to some industries in countries affected by such policies.

Comparative advantage is widely believed by economists to be a key determinant of international specialization, division of labour and trade patterns. In business schools, much greater emphasis is placed on the role of competitive advantage as a predictor of the economic fortunes not just of firms, but nation as a whole. One possible answer is that it is something to do with more competitive markets: lower barriers to entry or simply a large number of firms may give an industry and advantage in competing with foreign rivals.

A different approach to understanding competitive advantage, exemplified by Porter (1990), is to use a case-study evidence to identify the factors, which encourage a nation's firms to achieve high world market shares in their industries.

According to the differences in economic development stage, some nations succeed and others fail in international competition. In the context of competition in international trade, Porter (1990) conducted the research on why a nation achieves success in international trade by National Competitive Advantage Theory (known as Diamond Model)[11]. In his theory, he suggested that the pattern of trade is influenced by four attributes of a nation: (i) factor endowments, (ii) domestic demand conditions, (iii) related and supporting industries, and (iv) firm strategy, structure, and rivalry. And the degree to achievement of international success is a function of the combined

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[10] Linder, S. (1961),An Essay on Trade and Transformation, New York, Wiley. Pp-2-5.

[11] Porter, Michael E. (1990), The competitive advantage of nations. New York: Free Press.

impact of four factors. He argued that the presence of all four components is usually required for this diamond to positively impact competitive performance. He also contended that government policy can influence each of the four components of the diamond either positively or negatively. According to Porter's Diamond Model, countries should be exporting products from those industries where all four components of the diamond are favorable, while importing those areas where all four components of the diamond are unfavorable. Though Michael Porter's diamond model was very popular among the new trade theories related the source of international competitiveness, it was consistent for developed countries, but not for developing countries.

However, Porter is not free from criticism. The single diamond is not so relevant in small economies because their domestic variables are very limited (Rugman, 1991)[12]. The Principle of Diamond itself may hold good-but into geographical constituency has to be established on very different criteria (During, 1993). To solve this problem, the Generalized Double Diamond model has been proposed (Moon, Rugman and Verbeke 1998)[13].

Cho (1994) also argued that Porter's work helped explain the sources of international competitiveness possessed by the economies of advanced nations, but has a limited applications when it comes to explaining the levels and dynamic changes of economies in the less developed or developing countries[14] According to the consideration on economic development of Korea, he categorized the factor endowment by dividing two different groups of human factors and different types of physical factors in explaining a nation's competitiveness.

Cho proposed an extended diamond model by incorporating the role of human factors. This study is primarily based on Cho's nine -factor model. Nine - factor model is more comprehensive and more dynamic than Porter's original diamond model. First, this framework includes 4 groups of human factors in addition to the four physical factor of the original diamond model in explaining a nation's

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[12] Rugman, A. M(1991), "Diamond in the Rough", Business Quarterl 55(3):61-64.

[13] Moon, H. Chang, A. M. Rugman & A. Verbeke,(1998), A generalized double diamond approach to the global competitiveness of Korea and Singapore , International Business Review, pp-135-150.

[14] Cho, Dong- Sung (1994), "Evolution of Competitiveness Theory", World Scientific Publishing Co. Pte.Ltd, p -137.

competitiveness. Therefore, it is more comprehensive in explaining different types of nations, in particular, where the roles different groups of people are important for their economic development. Second, it is more dynamic. The human factors and physical factor interact in order to spur a nation's development .This model embodies Porter's notion that national prosperity is created, not inherited. In addition, government officials are endogenous factors in this new model and thus have direct influence on national competitiveness, while the government factor is an outside variable in Porter's original model.

Human factors include workers, politicians/ bureaucrats, entrepreneurs, and professionals. Physical factors include endowed resources, domestic demand, related and supporting industries, and other business environment. Chance is added as an external factor to these eight internal factors to make a new paradigm of international competitiveness, (Nine-factor model)[15].

Figure 2.1 New Paradigm of International Competitiveness

(The Nine Factor Model)

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[15] Cho, Dong-Sung.(1994*), A Dynamic Approach to International Competitiveness*: The Case of Korea. Journal of Far Eastern Business. Pp 17-36.

Politicians & Bureaucrats

Workers

Business Environment

Endowed Resources

International Competitiveness

Domestic Demand

Related & Supporting Industries

Entrepreneurs

Professional Managers & Engineers

Chance Events
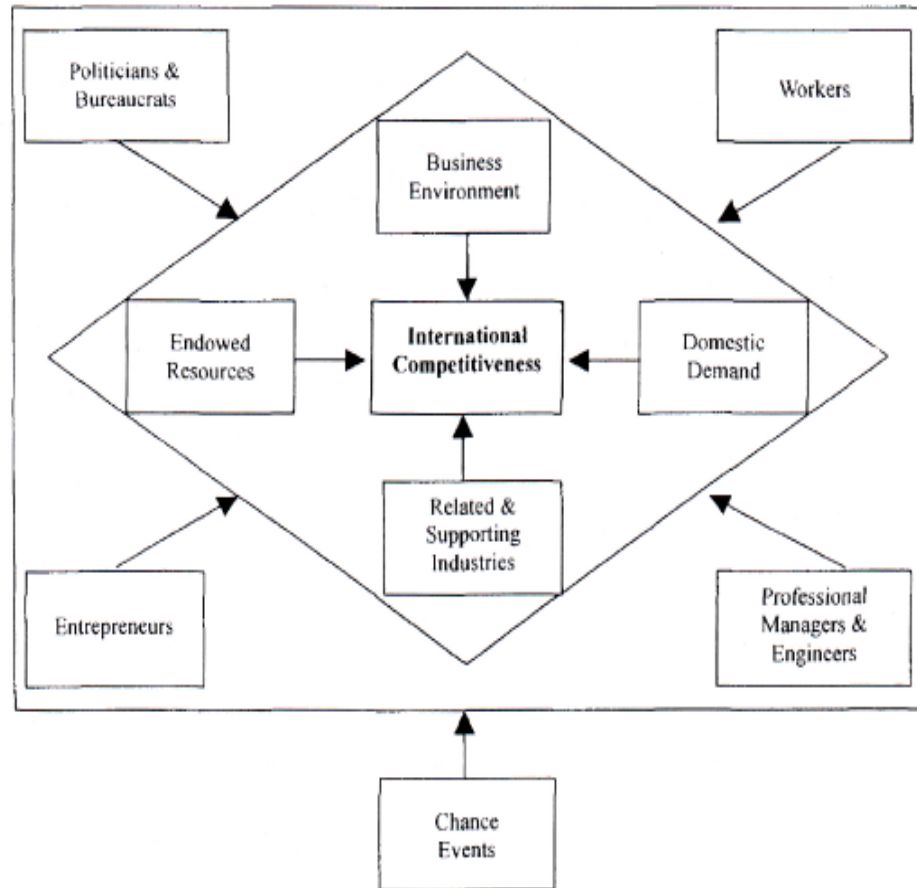
Source: Cho, Dong-Sung.(1994), *A Dynamic Approach to International Competitiveness*: The Case of Korea. Journal of Far Eastern Business. P-143.
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There is a similarity between Porter's model and the nine factor model. Four of the nine factors are identical and the difference is human factors. Moreover the diamond model includes both natural resources and labor in factor conditions, but the nine factor model places natural resources under endowed resources, while labour is included within the category of workers. Human factors mobilize the physical factors to obtain international competitiveness.

The nine factor model can be used to explain the economic development of developing countries.

(1)Physical factor

Endowed resources can be divided into mineral, agriculture, forestry, fishery and environmental resources. Fish stocks are renewable which contribute to a nation's international competitiveness.

Business environment includes at the levels of a nation, industry, company. At the national level, there are visible level (roads, ports and infrastructure) and invisible

level (people's acceptance of market mechanism, producers, merchants and consumers). At an industry level, the number and size of competitors, the degree of product differentiation, determined the attitudes and behaviors of individuals and enterprises.

Related industries are ice plants, cold storages, processing plants, net factories, and hatcheries. Supporting industries are concerned with financial, insurance, information, transportation and other service sectors.

The size of domestic market can determine the scale of indigenous industries and the stability of demand.

(2)Human factors

Human factors include:

Workers concern about levels of education, a work ethic and size of the labour pool will directly or indirectly affect labour productivity.

Politicians and bureaucrats that are committed to growth and success and efficient and non-corrupt bureaucracy can achieve international competitiveness.

Entrepreneurs are enterprising enough to venture on new business to develop a country's competitiveness. Overtime, a country's competitiveness is strengthened by their efforts to diminish risks and maximize returns.

The reduction of production costs which depend on the dedicated work of professional managers and engineers determine the future of nation as well as individual business.

(3)External factor

Chance events include changes in technologies or products, oil crisis, and sharp fluctuations in world capital markets or foreign exchange rates, changes in government policies and outbreak of war, etc.

Accordingly Cho tried to explain Korea's economic development in the past three decades clearly reveals how groups of well-educated, motivated, and dedicated people have played a central role in not only shaping the nation's competitiveness, but also moving the nation dynamically from a less developed staged to and advanced one [16].

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[16] Dong – Sung Cho (1994), "Evolution of Competitiveness Theory", World Scientific Publishing Co. Pte.Ltd, p-137.

From the experiences of recent developed countries in Asia (in case of Korea), the two principles most widely used by the countries involved in the international trade included the comparative advantage and competitive advantage theories. Comparative advantage is the ability of one country to be able to achieve production of a certain commodity at a lower cost than the same commodity produced in other countries or, one commodity produced by one industry than produced by other industries in the same countries.

Competitive advantage, based on lower costs and/or quality or market factor differentiation between one country or industry and another in like products. Competitive advantage theory suggested that states and businesses should pursue policies that create high quality goods to sell at high prices in the market[17]. Korea and Singapore in Asia, for example, was in increase use of competitive advantage theory because it is more efficient and effective than the comparative advantage theory. Compared with these countries, Myanmar which is rich in natural resources endowment has long been in use of comparative advantage theory and is still in use of it. Thus the competitive advantage theory can be applied to be more beneficial from international trade for Myanmar. Fish is considered healthy for humans and an essential product for trade, about 40% of all fish produced are traded internationally (Josepeit, Lem and Lupin, 2001)[18]. Fisheries in many countries are also an important source of foreign exchange because fishery export is essential to the economy. Similarly the fishery sector of Myanmar plays a crucial role in the generation of food, income, employment opportunities and foreign exchange earning. In this regard, fishery sector which has potentiality for sustainable development should be emphasized and developed for the possible efficient and effective use of competitive advantage theory.

Both competitive advantage and comparative advantage are important in deriving a nation's advantage in trade. In fact, the forces under competitive and comparative advantage can be seen to reinforce each other in explaining a nation's advantage in international trade. Competitive advantage relies heavily on the firm-specific factors created factors, created demand for the product, and internal economies achieved through innovation.

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[17] http://en.wikipedia.org/wiki/competitive -advantage
[18] Josepeit, H.Lem and H.Lupin, (2001), Aquaculture Products:Quality, Safety, Marketing and Trade, NACA, Bangkok and FAO, Rome, pp-249-257.

Comparative advantage, on the other hand emphasizes nationally endowed factors, differences in international technology/productivity, external economies, and international policies.

In a static world, a country and the firms in that country will enjoy competitive advantage if firms in that country specialize in the products in which a country has a comparative advantage.

In a dynamic world, firms will find it to their benefit to enhance comparative advantage of their nations through forces of competitive advantage, where created factors and cutting-edge technology and innovation assume greater important[19].

The models of comparative advantage used together with models of competitive advantage have the potential of offering a much richer analysis of international trade/business, normally not available with either the model(s) of comparative advantage or the model(s) of competitive advantage alone.

In general, it is found that competitive advantage and comparative advantage as supplements rather than substitutes in determining and sustaining a nation's advantage in international trade.

The study attempts to measure the comparative advantage and competitive strength of Myanmar fishery sector in the world market. Revealed Comparative Advantage and Constant Market Share Analysis were used to determine the competitiveness of Myanmar's fishery export.

Reduction of trade barriers creates competitive pressure and the potential for technology transfer so as to the productivity gains and restructuring of an economy toward its comparative advantage.

The concept of Revealed Comparative Advantage (Balassa 1965, 1977) pertains to the relative trade performance of individual countries in particular[20]. There mainly exist two prominent theories of trade based on comparative advantage: the Ricardian Theory and the Heckscher-Ohlin Theory. The Ricardian Theory assumes that comparative advantage arises from differences in technology across countries while the Heckscher-Ohlin Theory attributes comparative advantage to cost differences resulting from differences in factor prices across countries. The

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[19] Satya Dev Gupta,(2003), Comparative Advantage and Competitive Advantage: An Economic Perspective and a Synthesis, St Thomas University, Canada, P-14.

[20] Balassa, B. (1965), "Trade Liberalisation and 'Revealed' Comparative Advantage", *The Manchester School*,33,99-123 and Balassa, B. (1977), "'Revealed' Comparative Advantage Revisited", *The Manchester School*, 45, 327-44.

predictions of (classical) trade theories are based on the principle of comparative advantage which derives from relative price determination, i.e. differences in pre-trade relative prices across countries, underlined by supply and demand factors.

Measuring comparative advantage and testing the Heckscher – Ohlin Theory had some difficulties (Balassa, 1989:42-4) since relative prices under autarky were not observable[21]. Given this fact, Balassa (1965) proposed that it may not be necessary to include all constituents effecting country's comparative advantage. Instead, he suggested that comparative advantage is "revealed" by observed trade patterns, and in line with the theory, one needs pre-trade relative prices which are not observable. Thus, inferring comparative advantage from observed data was named "revealed" comparative advantage (RCA).

Before Balassa introduced his famous RCA index in 1965, Liesner (1958) had already contributed to the empirical literature of RCA. In this sense, Liesner (1958) proposed simple measure of RCA as follows[22]:

$RCA_i = X_{ij}/ X_{nj}$

where X represents exports, i refers to a country, j refers to a commodity (or industry), and n refers to a set of countries (e.g the EU).

The definition of RCA has been revised and modified such that an excessive number of measures now exist. Some studies measure RCA at the global level (eg. Vollrath, 1991)[23], others at a sub-global/regional level (eg.Balassa's original index), while some others evaluate

the measurement as bilateral trade between two countries or trading partners (eg.Dimelis and Gatsios, 1995)[24]. But Balassa's RCA is a commonly accepted method in analyzing trade. The Balassa index tried to identify whether a country has a "revealed" comparative advantage rather than to determine the underlying sources of comparative advantage.

[21] Balassa, B. (1989), *Comparative Advantage, Trade Policy and Economic Development*, Harvester Wheatsheaf, New York.

[22] Liesner, H.H. (1958), "The European Common Market and British Industry", *Economic Journal*, 68, 302-16.

[23] Vollrath, T.L. (1991), "A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage", *Weltwirtschaftliches Archiv*, 130, 265-79.

[24] Dimelis, S. and K. Gatsios (1995), "Trade with Central and Eastern Europe: The Case of Greece", in R. Faini and R. Portes (eds.), *EU Trade with Eastern Europe: Adjustment and Opportunities*, London: CEPR.

The study analyses on the determinant of Myanmar's fishery competitiveness by using Constant Market Share Analysis based on three separate effects, namely, size of market, distribution and competitiveness. The CMS Analysis is a decomposion method that was applied for the first time to international trade flow by Tyszynski(1951)[25]. It is a method to examine a country's export growth, and followed by Leamer and Strem (1970).[26]Constant Market Share Analysis and measurement are presented in Appendix5.

Moreover, there are two prerequisites for a good competitiveness theory. One is that the theory should be comprehensive enough to capture more than one variable, such as natural resources or labour, to explain the ever increasing complexity of the real world. The other is that the theory should be dynamic enough to explain the changing nature of national competitiveness, which cannot be well explained by the classical theories such as absolute advantage and comparative advantage principles.

2.2 An Overview on International Trade Policies

Development experience suggests that a country's trade policy has a great deal of influence on its competitiveness. Economists typically classify countries by their trade policies into inward and outward-oriented economies. The difference between them is in terms of the effective protection granted to production for the home market compared with exports. An inward-oriented trade policy grants significant protection for home market production and is biased against exports where as an outward-oriented policy has limited protection and favours exports. Economists agree that an outward-oriented trade policy is better associated with improved export competitiveness than the inward-oriented one. An outward-oriented trade policy induces better resource allocation according to comparative advantage[27]

Wong and Heiduk (2005*) stated that world trade is a very complicated phenomenon because it is not just an economic but also a social and political matter. Implementing a right trade policy will enhance the economic welfare and growth of

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[25] Tyszynski. H, (1951), World Trade in Manufactured Commodities, 1899-1950,The Manchester School of Economic and Social Studies 19:272-304.

[26] CMS method has been widely used and developed by many international economists. Leamer and Stern published in their influential book "Quantitative International Economics" Chapter 7, 1970.

[27] Ganeshan Wignaraja,(2003), Competitiveness Strategy in Developing Countries, Commonwealth Secerariat, pp-2-34

the economy.[28] Therefore they proposed strategic trade policy in line with their macroeconomic goals.

Regarding the trade policy, every country has a trade policy at national level to direct its external trade to determine the nature of its trading relations with the rest of the world. Trade policy is a collection of rules and regulations which pertain to trade. The purpose of trade policy is to help a nation's international trade run more smoothly, by setting clear standards and goals which can be understood by potential trading partners. In many regions, groups of nations work together to create mutually beneficial trade policies. Trade policy alongside other factors such as the export infrastructure, level of education, marketing and standardization institutions- is an important potential instrument for the implementation of national development policies.

Trade policies include not only border measures but also ostensibly domestic measures which directly affect the competitiveness of domestically produced output vis-à-vis foreign produced output and affect the course of macro economic development. Trade policy also has links with the foreign affairs policy. Further, trade policy must be characterized by feasibility, coordination, consistency, timelines, transparency and continuity in order that the policy may be implemented. Some are approaching towards full protectionism, and some are fully trade liberalized and some are simultaneously liberalizing trade in some sectors while raising barriers in other sectors of their economies. Theoretically, a country's trade policy can lie anywhere between complete free trade norms (completely non-interference by the government) or a completely protective policy that controls every transaction of a country with a foreign country.

Traditionally trade was regulated through bilateral treaties between two nations. For centuries under the belief in mercantilism most nations had high tariffs and many restrictions on international trade.

In the classical economics, David Ricardo and Adam Smith were strongly in favor of free trade, believing that it led to the economic prosperity of civilizations. They pointed to examples of civilizations that had flourished as a result of increased trade liberalization. Ricardo's first goal was to demonstrate that trade between countries is naturally, beneficial, and second, to illustrate the importance of a free

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[28] Woong,Kar-yiu, and Gunter Heiduk,(2005), WTO and World Trade: Challenges in a New Era.Heidelberg,Physica-Verlag,pp11-16.

trade policy. A prerequisite for the optimal workings of the neoclassical economists Eli Heckscher and Bertil Ohlim model is a free trade environment. Heckscher argued that free trade was the best commercial policy simply because it creates the possibility of maximum satisfaction of human want. Furthermore, free trade was believed to promote efficiency in the allocation of resources thereby shifting the economy's production possibility frontier outwards[29].

In the 19th century, especially in the UK, a belief in free trade became paramount. This belief became the dominant thinking among Western nations since them. In the years since the Second World War, controversial multilateral treaties like the GATT and the WTO had attempted to promote free trade while creating a globally regulated trade structure. Free trade is usually most strongly supported by the most economically powerful nations, though they often engage in selective protectionism for those industries which were strategically important such as the protective tariffs applied to agriculture by the US and Europe[30].

In underdeveloped countries, where industries are just beginning to come up, a free trade policy will affect their infant industries by exposing them to severe competition from imports, which is detrimental to their development. Thus those nations aiming for industrialization should not adopt a free trade policy unless their industries become mature enough to compete with external rivals. Moreover, the country can become over-dependent on imports rather than achieve self-sufficiency with domestic production, and the volume of imports may become enlarged because of uncontrolled flow and low price of consumer imports under free trade policy. With some developed countries that are able to subsidies their exports strongly while poorer countries do not have the resources to do so, it can lead to cutthroat competition in international markets resulting in the possibility of dumping. If a developing country's exports cannot increase as fast as import grows, it would adversely affect the current account and if sufficient external resources are not forthcoming, there would be severe balance of payments problems as soon as foreign exchange reserves are drawn down.

The developed countries placed several trade and non-trade restrictions on exports of developing countries. The increasing uncertainties and price fluctuations in

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[29] Ingrid Wik (2007), "Trade liberalization: The right engine of growth?", University of Bergen, pp-7-9.

[30] Jimmy Wales ,Trade Liberalization and Protectionism. http://wikipedia/trade liberal/

the volatile world commodity markets, and the non-tariff barriers imposed by developed countries are severely reflected in the economies of many developing and underdeveloped countries in particular. Developing countries across the world are often found to impose various types of restrictions and controls on their own international trade.

But the new trade theory is not as rigid as its former predecessors regarding trade policy. Krugman (1987) argued that protectionism can be advantageous due to imperfect markets[31]. Protectionist policies which aim to promote sectors can create spill – over effects to other parts to the economy and internationally, which is positive. However, Krugman pointed to adverse effects associated with protectionism. Protectionist policies would affect the distribution of income. The politics of policy formation can be dominated by issues concerning distribution rather than efficiency. This can lead to a "beggar-thy neighbor" component, which can lead to retaliation and a mutually harmful trade war. Second, the gains from intervention could be captured by special interests at the domestic level, and turn into an inefficient redistribution program. Therefore protectionism is only viewed as a second – best policy, as free trade is viewed as the ultimate and universal goal (Krugman, 1983). Trade literature indicated that trade theories began with controlled ideas such as mercantilism and followed by liberalization of trade.

Modern economists who favor trade liberalization cite evidence that it creates jobs, fosters economic growth, and improves the standard of living because of increased consumer choice in the marketplace.

Economists have engaged in a lively debate over the benefits and pitfalls of free trade and protectionism. Many economies have adopted free-trade policy, or an economy in which trade tariffs and barriers have been lifted allowing for the free flow of trade between one or more nations. Free trade, on the other hand, lifts barriers to allow for the free flow of trade between two or more nations. Trade agreements can foster economic growth by increasing trade for a nation. Free trade opens markets and economic opportunities. Free trade allows for fair competition and non-discriminatory regulations. Free trade is a trade policy that allows traders to transact business without any sort of interference or intervention from the government. It is believed that free trade leads to mutual benefits for both the trading partners. There are the following

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[31] Krugman, Paul. (1987). "Is Free Trade Passé?", *The Journal of Economic Perspectives* Vol. 1, No. 2:131-44.

advantages to free trade: [32]increased production, increased efficiency, consumer satisfaction, increase employment, increase economic growth, foreign exchange gains, decreased poverty, increased exports, minimize wars, increased innovations.

Moreover, there are disadvantages of free trade. Although free trade has benefits, there are a number of arguments put forward protestors who oppose free trade and trade liberalization. These include: with the removal of trade barriers, structural unemployment may occur in the short-term. This can impact upon large number of workers, theirs families and local economies. Often it can be difficult for these workers to find employment in growth industries and government assistance is necessary.

Free trade can lead to pollution and other environmental problems as companies fail to include these costs in the price of goods in trying to compete with companies operating under weaker environmental legislation in some countries.

Increased domestic economic instability from international trade cycles, as economies become over dependent on global markets. This means that businesses, employees and consumers are more vulnerable to downturns in the economies of their trading partners, lower GDP, falling incomes, lower demand and rising unemployment.

Developing or new industries may find it difficult to become establish in a competitive environment with no short-term protection policies by governments, according to the infant industries argument.

Thus, the government of LDCs attempted to practice protectionism and trade policy after World War II. Protectionism refers to policies where nations restrict imports and exports. As protectionism helps to protect domestic industries, governments utilize protectionist economic policies to restrict imports and exports.
Moreover, new trade theorists perceived that national competitive advantage can be affected by the government policy in international trade. Trade liberalization and free trade policies are the reason for Asia's success. The market alone could not play the coordinating role given the imperfect nature of information and competition, so regulatory intervention became necessary to address the imperfections. Yip viewed the role of government as a facilitator of trade liberalization, public procurement and

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[32] Joshua Megee (2009), "10 Advantages of Free Trade", pp 1-5.

privatization of state-owned enterprises[33]. Moreover, Hamel and Prahalad saw government as a liberalizer and active participant in the creation of national competitiveness[34]. Stiglitz identified six areas of state intervention which have played a primary role in the growth dynamics of Asia. These include the promotion of education, the acquisition of new technologies, support to the financial system, infrastructure development, environment protection and the satisfaction of such basic needs as health. Two main traditions appeared to stand out regarding trade policy: on one side, the classical and neoclassical school of thought which constitutes the advocators of free trade policies as a "universal medicine" of growth. On the other side, heterodox theorists advocate protectionist trade policies for developing countries as the preferred growth strategy.[35] Protectionism helps to protect nations from an increase in the amount of imports, which could affect domestic production. One of the most common protectionist policies includes raising the price of imports via tariffs, keeping industry in the nation more competitive in the domestic market. Protectionism can also include import quotas, or the restrictions on the quantity of imports allowed to enter a country. Some nations attempt to protect their local industries with trade policies which place a heavy burden on importers, allowing domestic producers of goods and services to get ahead in the market with lower prices or more availability.

When nations trade with each other regularly, they often establish trade agreements. Trade agreements smooth the way for trading, spelling out the desires of both sides to create a stronger, more effective trading relationship. Many trade agreements are designed to accommodate a desire for free trade, with signatories to such agreements making certain concessions to each other to establish a good trading relationship.

Despite the idea of trade being the 'engine of growth' and 'free trade maximizing welfare', protectionist theories and practice saw an upsurge since the Great Depression. There are bilateral and multilateral discussions among countries seeking to liberalize trade. Nowadays liberalization in trade is more and more

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[33] Yip,G.(1992), *Total Global Strategy*, New Jersey: Prentice Hall, pp 16-34.

[34] Hamel,G.and Prahalad,C.K.(1994), Competing for the Future, Boston,Harvard Business School Press,pp-12-26.

[35] Ingrid Wik (2007), *Trade liberalization: The right engine of growth?,* University of Bergen, p-5.

important in international trade and economic development by series of round trade negotiation under the auspices of WTO.

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2.3 Trade Liberalization and its Impacts

Policies that make an economy open to trade and investment with the rest of the world are needed for sustained economic growth. No country in recent decades has achieved economic success, in terms of substantial increases in living standards for its people, without being open to the rest of the world.[36]

Liberalization refers to a relaxation of previous government restrictions, usually in areas of social or economic policy. In the area of social policy it may refer to a relaxation of laws restricting for example divorce, drugs etc. Most often, the liberalization term is used to refer to economic liberalization, especially trade liberalization or capital market liberalization. Economic liberalization is often associated with privatization.[37]

Some specific policies in line with the trade liberalization are:

1.   No restrictions on profit remittances
2.   No or very limited restrictions on foreign investment (e.g. geographically, sectorally, or in percentage of local content)
3.   No special treatment for local businesses over foreign investors
4.   No high taxes on investment income or corporative earnings
5.   Minimal or no tariffs (taxes on imports)
6.   No quotas or other non-tariff barriers
7.   Clear, strong, enforceable patent and intellectual property right protections
8.   Strong legal protections for investors
9.   Privatization: reducing the state's direct involvement in the provision of goods and services by selling-off state-owned enterprises or contracting out production or services to the private sector.

The steps that every country must take to liberalize its trade are (1) end the government monopoly on trade by permitting new enterprises to enter; (2) link domestic prices to world prices; (3) adopt an explicit trade policy concerning tariffs,

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[36] IMF Staff (2001) "Global Trade Liberalization and the Developing Countries", IMF Issues Brief, pp 2-5.

[37] http://en.wikipedia.org/wiki/liberalization

quantitative restrictions, and so forth; (4) develop polices toward foreign investment; and (5) unify the exchange rate while choosing an exchange rate system.

Trade liberalization refers to the removal of government incentives and restrictions from trade between nations. Trade liberalization opens foreign markets, expanding the demand for domestic firm's goods and enabling them to serve a larger market and realize gains from economies of scale. Trade liberalization may make available a range of inputs at lower prices, lowering costs of production. Liberalization may also introduce more competition from foreign firms to the domestic economy, which may result in improvements to the efficiency of local production.

The history of trade between nations had been developed and punctuated by wars and dramatic changes in beliefs about trade. Because of the economic impact that trade had always had on civilizations, governments often became involved in trade with the goal of producing a particular economic outcome for their countries. In 1950s and 1960s, trade policies in the populous Latin America and Asia (Chile, Argentina, India, Pakistan, the Philippines, and Bangladesh) were heavily inward-oriented. However, since the mid-1960s, export promotion strategy had been primarily adopted by Newly Industrialized Economies (NIEs).

However, the world economy from the early 1980s to the present had in fact been characterized by reducing state involvement, opening up the economy, and generally following a more market-oriented approach.

Developing countries undertook trade liberalization and economic reform since early 1980s. It was be argued that the failure of traditional import substitution (IS) strategies of 1950s-1970s had been followed by the lack of success, in most cases, of export promotion (EP) strategies of 1980s-1990s by countries, which implemented the reform programmes and trade liberalization policies. The philosophy behind the reform programmes was that the role of government in making decisions on resource allocation should be minimized and the incentive structure should change in favour of exports through import liberalization in order to follow an export promotion path instead of import substitution.

Although the origin of the literature on trade liberalization and economic

reform goes back to the publication by Little et al.(1970)[38], followed by Krueger (1974)[39], in the 1970s, the process of the reform started by the introduction of the Structural Adjustment Programmes and Stabilization Programmes of the World Bank and the International Monetary Fund in early 1980s. The literature on development reflected a broad consensus on the positive impact of trade liberalization on growth and economic development. Opening up to external markets would ensure better allocation of resources and promote the orientation of investments towards exporting sectors which had previously been held back by development strategies focused on domestic markets; causing considerable distortions in the functioning of the laws of the market in the developing countries. Protective measures applied since the 1960s led to misallocation of scarce resources and weak growth and productivity in those economies. Trade liberalization should therefore correct these distortions and promote optimal allocation of resources and investments in the developing countries. It would also revive economic growth and enable developing economies to play a more competitive role in a globalized world.

The agreement on the beneficial effects on growth and development of trade liberalization goes back to the emergence of the Washington Consensus in the early 1980s[40]. The Washington Consensus, as framed by Williamson (1989) concerns various programs for multilateral trade liberalization, whether at the global (WTO) or regional level. This concern described a set of ten specific economic policy prescription that he considered should constitute the standard reform package promoted for crisis – wracked developing countries by Washington, D.C based institutions such as the IMF, WB and the US Treasury Department. The consensus included ten broad sets of recommendations; fiscal policy discipline, redirection of public spending form subsidies, tax reform, interest rates, exchange rate, trade liberalization, liberalization of inward foreign direct investment, privatization of state enterprises, deregulation, legal security for property rights. The Structural Adjustment

Programmes (SAPs) inspired by the Consensus and implemented with support

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[38] Little IMD,Scitovsky T and Scott M,(1970), Industry and Trade in some Developing Countries, Oxford University Press, Oxford, P-3.

[39] KruegerAo, (1994), The Political Economy of the Rent-Seeking Society, American Economy Review 64(3): 291-303.

[40] Hakin Ben Hammouda , (2004), "Trade Liberalization and Development: Lessons for Africa", Economic commission for Africa, p-7.

from the Bretton Woods institutions were designed to help countries restore major macroeconomic balances and carry out structural reforms needed in order to reduce distortions and rents that had arisen in the recent history of the economic development process. These macroeconomic reforms also focused on economic structures through a major reduction in State intervention so that prices in the various markets could be determined freely by supply and demand. Structural reforms would act mainly on the supply side and reabsorb sectoral imbalances in order to promote the production of export goods, thereby restoring balance-of-payments equilibrium in the long term. The decision to liberalize external trade was part of a broad set of reforms aimed at restoring major macroeconomic balances, promoting growth and improving the global integration of developing countries.

Trade liberalization has been integral to economic reforms in most countries. Economic reforms around the globe in recent times have been carried out in keeping with the policies of liberalization and globalization. Globalization requires the free and fast movement of capital, goods and services across geographical boundaries. This cannot be achieved in the presence of international trade restrictions imposed by the individual economies. Effective and successful economic reforms in different countries have incorporated extensive trade liberalization.

Universal and uniform trade liberalization was a part of that "Consensus". "Universal" implies that all developing countries are to follow the same trade policy regime-trade liberalization-irrespective of their levels of development and industrial capacities. "Uniform" implies that all sectors and industries are to be subject to the same tariff rates-preferably zero rate, or low rate. Apart from trade liberalization, such reform programmes included mainly: capital account liberalization, devaluation at the early stages of reform to compensate for trade liberalization, fiscal and financial reform through contractionary macroeconomic policies such as budget cuts, increase in interest rates and privatization. Many developing countries have gained competitive advantages in the manufacturing sector by implementing economic reforms and trade liberalization.

In order to facilitate trade liberalization, major changes must be brought into fiscal and regulatory policies as a part of the economic policy reforms. Fiscal policies need to be changed in favor of tax and tariff relaxations for international trade to boost it up. Regulatory reforms need to be reformed to bring down the level of government intervention in the form of rules and regulations than restrict international

trade.[41]

Trade liberalization may, through various channels, affect the rate of economic growth[42]. The supposed correlation between trade liberalization and growth has only recently become the subject of major discussions and debates in development economics, following the seminal article by Rodrik and Rodriguez[43]. The Stigritz and Andrew Charlton argued article the main studies suggesting a strong positive correlation between external openness and economic growth in developing countries. One of the major purposes of trade liberalization is to promote economic growth by capturing the static and dynamic gains from trade through a more efficient allocation of resources; greater competition; an increase in the flow of knowledge and investment and, ultimately, a faster rate of capital accumulation and technical progress. Opening up to external markets would ensure better allocation of resources and promote the orientation of investments towards exporting sectors.

International trade cannot exist without the trade openness of the countries involved. Trade openness refers to trade relations with reduced or eliminated tariffs and non-tariff trade barriers. Trade openness-generally considered trade liberalization-is a vital condition for the creation of a favorable position on international markets.[44]

The definition of openness often limits extent of useful conclusion for policy (or closed) economy as one where there is one of the following:

- a certain level of non-tariff barriers;
- a certain average tariff rate;
- a socialist economy;
- a state monopoly on major export
- a country with a black market-official exchange rate differential that has substantially decreased as exchange rate controls can be a form of trade or capital restriction.[45]

Crude proxies for the openness of policy are often used even though a number of authors including Balassa (1965) and Corden (1966) have attempted to develop

[41] http://mapsofworld.com

[42] Dani Rodrik and Rodriguez (1999), "Trade Policy and Economic Growth", Working paper, National Bureau of Economic Research, pp 5-9.

[43] Joseph E. Stiglitz and Andrew Charlton (2005), "Fair Trade For All", Oxford University Press, pp 24-40.

[44] Lacramioara Dominte "Determinants and Effects of Economic Openness", pp 8-13.

[45] Luke WiCard,(2000), "Does Openness Promote Growth", Agenda, Volume 7, No. 3, p-256.

more sophisticated measures of rates of protection. For example, the relative size of imports and exports to GDP is often used as a measure of trade openness.

A wide variety of measures have been used for openness. There are some measures of trade openness[46]:

(1)   Import trade intensity is measured as imports divided by country i's nominal income GDP or M_i/GDP_i,

(2)   Export trade intensiy is measured as exports divided by country i's GDP (or) X_i/GDP_i

(3)   Trade intensity or degree of openness is measured as exports and imports divided by country i's GDP, (or) $(X + M_i)/GDP_i$,

(4)   Real trade intensity is used by A Leala and Ciccone (2004) where the demominator is purchasing power parity adjusted GDP or real GDP.
        $X + M / rGDP_i$.

(5)   Adjusted trade intensity is suggested by Frankel (2000).
        It stated that $1 – [(X + M)_i/2GDP_i] \times 100$.

Apart from the positive impact of trade liberalization, it will also affect inequality. Opening up to trade does not make everyone in a country better off. Instead it changes the distribution of income and creates winners and losers. The standard economic argument is that the net gains from trade liberalization are positive so the gainers can compensate the losers and leave the country better off overall. Unfortunately, such compensation seldom occurs.

Barriers to trade and anti-export bias will reduce export growth below potential. Import controls are likely to reduce efficiency[47]. For all countries, liberalized trade creates an economic environment in which there can be more competition than in a closed economy, and one in which domestic producers are exposed to international best practice. Developing countries especially stand to gain if the impasse is broken in multilateral trade negotiations.

Barriers to competition produce the opposite effect-less efficient domestic industries; higher costs, poorer quality, and fewer choices of goods and services; less

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[46] Jay Squalli and Kenneth Wilson, (2006),A New Approach to Measuring Trade Openness, Economic and Policy Research Unit, Dubai, UAE, p-22.

[47] Amelia Santos – Paulino and A.P. Thirbwall (2004), The Impact of Trade Liberalization on Exports, Imports and the Balance of Payments of Developing Countries, *The Economic Journal*, Blackwell Publishing, Oxford, pp 7-24.

innovation; and slower economic growth. Lall et al.(1994) distinguished four groups of activities within a country as far as the impact of trade liberalization is concerned[48].

The first group includes those with strong resource advantage or well-developed capabilities so they are already competitive internationally, and those that benefit from natural protection because they are heavy and difficult or expensive to transport, or require close producer-buyer interaction. They benefit from liberalization. The second group consists of those which are in "a short distance from the technological frontier", i.e. those which are near the stage of maturity. They may also benefit from liberalization. The third group includes activities which are potentially viable, but require time to learn, i.e. are still at the stage of infancy. Sudden liberalization of imports will hurt them. Finally, there are activities, which are not economically viable currently, or potentially. Such categorization would imply that protection/liberalization should take place on selective basis.

2.4 International Negotiations and Trade Liberalization

The economic history of the 20th century provides a potent demonstration of the vast benefits of trade liberalization for hundreds of millions around the world and a dramatically painful lesson on the global costs of trade barriers. From the mid 1930s until about 1980 the U.S and other advanced countries gradually removed tariffs and some other barriers to trade and by so doing aided a rapid increase in international integration. Most economists believe that this progressive trade liberalization was highly beneficial. The great postwar liberalization of trade was achieved through international negotiation.

Integration into the world economy has proven a powerful means for countries to promote economic growth, development, and poverty reduction. When the General Agreement on Tariffs and Trade was created in 1947, the world trading system has benefited from eight rounds of multilateral trade liberalization, as well as from unilateral and regional liberalization. GATT agreement was officially designated as engaged in its efforts to promote international trade through tariff reduction. GATT was the only multilateral instrument governing international trade for 1948 until the WTO was established on Jan 1, 1995.

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[48] Lall et al.(1994) Technology and Enterprise Development, Ghana under Structural Adjustment, London, MacMillan, p-5.

From its original 23 founding members under the GATT in 1947, the WTO had

153 members in 2010 (almost all of the 123 nations participating in the Uruguay Round signed on at its foundation, and the rest had to get membership. The goal remains the same: to lower barriers to trade and spur new trade flows among nations, thereby unlocking the benefits of economic growth and development on the broadest basis. Trade rules also provide certainty, transparency, and predictability in international commerce, help foster the rule of law, and allow for countries to settle their trade disputes peacefully. The multilateral trading system was developed through a series of trade negotiations, or rounds, held under GATT. Trade round means a large group of countries get together to negotiate a set of tariff reduction and other measures to liberalize trade. The first round (1947) dealt with tariff reductions volitions but later negotiations included other areas such as anti dumping and non-tariff measures. The fifth trade rounds (1960) under the GATT took the form of 'parallel' bilateral negotiations, when each country negotiates pair-wise with a number of countries at once. The sixth multilateral trade agreement known as Kennedy Round was completed in 1967. It involved an across-the-board 50% reduction in tariffs by the major industrial countries except for specified industries whose tariffs were left unchanged. At the seventh round, the Tokyo Round (1979), the negotiation agreed to cut customs duties on goods by 20 to 30%.

A list of WTO's agreements can be found as follows.[49]

(1)Agreement on Agriculture (AoA)

The AoA can into effect with the establishment of the WTO at the beginning of 1995. The AoA had three central concepts, or 'pillars': domestic support, market access and export subsidies.

(2)The Agreement on the Application of Sanitary and Phyto-sanitary Measures(SPS)

It also known as the SPS Agreement which was negotiated during the Uruguay Round of the GATT, and entered into force with the establishment of the WTO at the beginning of 1995. Under the SPS agreement, the WTO sets constraints on members'

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[49] http://www.wto.org/aggrements

policies relating to food safety (bacterial contaminants, pesticides, inspection and labelling) as well as animal and plant health (important pests and diseases).

(3)   Agreement on Technical Barriers to Trade (TBT)

The Agreement on Technical Barriers to Trade - also known as the TBT Agreement is an international treaty of the World Trade Organization. The objective of the TBT Agreement is to ensure that technical negotiations and standard, as well as testing and certification procedures do not create unnecessary obstacles to trade.

Uruguay Round in December 1993, the eighth GATT and most ambitious round of multilateral trade negotiations in which 123 countries participated, was completed after seven years of tortuous negotiations. The Uruguay Round negotiations succeeded in imposing greater trade liberalization. Together with lower customs duties, less progressive tariffs and the reduction of tariff peaks, they also imposed the transformation of non-tariff barriers into tariff s, and their reduction. The Uruguay Round also required States to undertake to reduce all forms of export subsidy apart from those on agricultural products. The WTO, which arose out of the Uruguay Round, aims to bring about greater openness in global markets and thereby to reduce all obstacles to trade. Significant implications for food safety   and quality arise from the Final Act of the Uruguay Round, especially from two binding agreements: the SPS and the TBT agreements.

There were continued tariff and non-tariff barriers by the rich countries on developing-country exports and developing countries had to implement their own obligations under the new agreements, such as those on Trade – Related Aspects of Intellectual Property Rights (TRIPs), Trade – Related Investment Measures (TRIMs), and agriculture. The promised benefits from liberalization had not materialized.

The WTO launched the Doha Development Agenda (DDA) or Doha Round in November 2001. The Doha Round, the ninth trade round, always ground work for a trade liberalization agenda, was a starting point for greater development growth, opportunity and openness around the world. A program lays out ambitious objectives of the agriculture market such as agricultural liberalization and reduction of tariffs on non- agricultural goods.

Developing countries are potentially large beneficiaries of further multilateral trade liberalization in agriculture, manufactured goods, and services through the WTO Doha Round. The Doha Round holds great promise for win-win situations with regard

to trade and environment, whereby liberalization yields positive environmental outcomes. Countries "win" when they remove environmentally harmful trade restrictions in their own countries, other countries "win" when they grow owing to the improved market access that follows[50]. The WTO system is based on a series of agreements whose aim is the gradual opening of international markets in goods, with the GATT, services, with the General Agreement on Trade in Services (GATS) and traded inventions, with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs). GATT provides for the liberalization of trade in goods through gradual reduction of tariffs, conversion of non-tariff import restrictions into tariffs (tariffication) and elimination of trade-distorting domestic support.

Developing countries would strengthen their own economies (and their trading partners') if they made a sustained effort to reduce their own trade barriers further[51]. International trade in the first decade of the 21st Century had been freer than at any time in world history.[52]

Increased trade has integrated many local and domestic fisheries in developing countries with foreign markets all over the world. Continued access to foreign markets is a major factor for developing countries to increase and maintain their high performance in fish trade. Removal or easing of many traditional barriers to trade such as tariffs and quantitative restrictions through the GATT and more recently the WTO have played a significant role in increasing fish trade.[53] International fish trade is governed by rules set out under the WTO. With WTO rules governing fish trade, the advantages are, among others:

1. Clearly defined set of rules;

2. Trade liberalization and improved market access;

3. Dispute settlement and

4. Trade related capacity building measures.[54]

On a global level, WTO and the UN organizations are the main actors that shape the regulatory framework on fish trade. The WTO provides the institutional

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[50] Gary P. Sampson(2005), *The WTO and Sustainable Development*, United Nations University Press,2nd ed., P -58.

[51] IMF Staff, (2001), "Global Trade Liberalization and the Developing countries", IMF Issues Brief,p-4.

[52] Anne O.Krueger (2009), Trade openness is now more important than ever, World Bank Institute, Special report,p-12.

[53] Mahfuzuddin Ahmed (2007), "Fish to 2020 in changing global Markets: FAO, Italy p-33.

[54] http:www.globefish.org/trade/index.

structure for the opening of world markets while UN organizations address the issues of sustainable development, trade and its impacts on the environment, environmental conservation and food security as targets world trade liberalization must meet[55]. The FAO programme areas cover every aspects of fisheries management including global fisheries assessment and analysis, policy development, treaty monitoring, coordination, and technical assistance.

Negotiations facilitated by the WTO have successes in reducing average tariffs for fish by 25 %. After the Uruguay Round (1993), the average tariff on fish produce was 4.5 % for developed countries and below 20% for developing countries. However, this success masks the tariff peaks and tariff escalation that remain, applied predominately to processed or value-added fish products in key import markets. Such import duties, as well as countervailing duties and the proliferation of non-tariff barriers (often in the form of the technical, safety or hygiene standards), continue to hinder processing and the economic development of fishery industries in many developing countries (FAO-Globefish, 2000)

Several agreements established under the WTO have some bearing on fish trade. The DDA, among other sectors, included the Fishery sector with regard to fisheries subsidies and tariff reduction. The tariff reduction for fishery products was negotiated as a non-agricultural product together with other industrial products under the Non-Agriculture Market Access (NAMA) which became an issue of dispute.

The WTO ministerial meeting held at Doha, Qatar in November 2001 raised three issues of particular relevance to fisheries. First, the final declaration of the meeting spoke of the intention to clarify and improve WTO disciplines on fisheries subsidies. Second, under Market access for Non-Agricultural Product, which is the WTO category that covers fish trade, the declaration spoke of the need to reduce tariffs. This could be of particular importance for the export of canned and other processed products to the United States and the European Union. Third, the multilateral environmental agreements, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Commission for the Conservation of Atlantic Tunas (ICCAT), have set out specific

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[55] http://www.globefish.org/fish.trade-regulations-on.the.web.htlm. Camilla Caterci, Fish Trade Regulations, p-4.

trade obligation in the past, the Appellate Body of the WTO upheld the United States position.

Despite significant tariff reductions by both developing and developed countries, the selective use of tariffs, including tariff peaks, tariff escalations, countervailing duties, and several different types of non-tariff barriers related to food and environmental safety standards, continue to limit access to international markets.

Whether bilateral, regional or multilateral trade agreement, the objective is to reduce and ultimately dismantle tariff barriers which are good for seafood exporting countries. Overall, market access and liberalization in both developed and developing countries have a significant bearing on the future patterns of fish trade, both among developing countries and between developed and developing countries.

Lower import tariff in developed markets is important for developing countries. More than 80 % (value) of fishery products are imported by the developed countries from the developing world. According to FAO study, the actual average import tariff seafood in Canada was only 1.3%, EU 5.2%, Japan 5.4% and the USA 1.4%.[56] Generally, tariffs are much lower in the developed markets than the developing countries. On the other hand, non-tariff barriers (NTB) are generally higher or stricter in developed markets than in the developing countries.

Lower import tariffs by developed countries are intended to encourage seafood exports from developing countries which are the major producing nations of fishery products. It is also intended to keep prices at a reasonable level, acceptable to consumers or for raw materials to keep their plants running. There are at the same time non-tariff barriers imposed in the name of quality, food safety and health to protect consumers which are more stringent in developed countries. Higher tariffs are applied for processed fish or value added products (called as tariff escalation). For example the average tariff for fresh is 11.9 % while 15.3 % is levied for processed fish[57].

Moreover, Free Trade Agreements (FTAs) have come to be seen as vehicles for deeper, faster and broader liberalization. Generally the benefits from FTAs include better market access for agricultural and industrial goods, service sector, concession

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[56] Sudaric Pawiro, (2009), *FTA and Fish Trade Liberalization*, Bulletins, Issue 14, p-13.
[57] Ibid.p-14,

in certain standard requirements and investment as well as technology transfer. Developed markets mainly North America (US, Canada), Japan and the EU, import around 80 % (in value terms) of the global seafood imports while developing countries account for around 50% of the total global seafood exports. So, for exporting nations like Thailand, Chile, China etc, seafood is an important component in the FTA negotiations for better market access through preferential treatments.

FTAs not only improve access for seafood exporters in key markets by eliminating or reducing tariff and non-tariff barriers, they can also boost investment, output and employment in the seafood industry, particularly in fishing communities, including through investment in new technologies and in joint ventures, boosting developing of the local industry all along the supply chain, including in the fast emerging aquaculture sector..[58]

2.5   Domestic and International Policies for Global Fisheries Trade

Trade liberalization may indirectly benefit a nation's natural and environmental resource bases, as increased trade-related fiscal revenues can provide national governments with new financial resources to support environmental protection, conservation and remediation efforts.

Even though most caught, farmed and traded fish are clearly food products, fish regardless of production method- are not included within the GATT Agreement on Agriculture. Therefore, negotiations regarding trade liberalization for fish have proceeded much differently than agricultural commodities. There were nations that wished to include fish in the Uruguay Round of GATT negotiations on agriculture. However, several nations were opposed, including the EU, Japan and Korea. The concern was that fishing as an industry was not just concerned with market access, but resource access is as well an issue, unlike agriculture, and therefore trade liberalization in fisheries should be treated differently than agriculture.

Similar to agriculture, tariffs have been reduced with every trade round, and the Agreements on Sanitary and Phyto-sanitary Measures, Technical Barriers to Trade, Anti Dumping Measures, Rules of Origin, Import Licensing Procedures and Safeguards have all been applied to fisheries trade. However, unlike agriculture, subsidies in the fishing industry fall under the Agreement on Subsidies. The current

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[58] NiColas Brown (2007) "Free Trade Agreements: Implications for global seafood supply and demand " FAO, Rome, p.24.

primary issue within the capture fisheries raised by the Committee on Trade and the Environment (CTE) of the WTO is the application of fishing subsidies.[59]

There are several institutional influences on trade and marine resource policies. Every one of the approximately 200 exporting nations of fishery products, whether developing or developed, faces constraints to trade from trade barriers. However, there are also domestic and international policies regarding marine resource use that have significant constraints on international trade in fish products. Changing any of these policies will have an impact on quantities traded internationally in fishery products and the welfare of producers and consumers in exporting and importing countries. The domestic and international policies and institution are most relevant to global fisheries trade.

2.5.1 Domestic Policy Intervention - Fisheries Management Policies

Regarding fisheries management policies, to fully understand the impact of trade liberalization on fishery products, one first needs to understand factors that influence supply. The impacts of trade liberalization will differ depending on several factors, including production method (capture or aquaculture) and domestic fisheries management policies.

Fish in capture fisheries belong to a common pool. Prior to 1977, jurisdiction of most nations over fishing grounds extended only as far as 12 nautical miles from shore. Expansion to 200- mile EEZs was agreed to by nations at the Third Law of the Sea Convention. (Hannesson 1996) EEZs cover 40% of the world's oceans and 90 % of its living marine resources (Deere, 2000). Establishment of EEZs stemmed from a need for industrial efficiency and enhanced "sustainability" for global fisheries. Management policies can be categorized as being either an input or output control. Input controls are the oldest type of fishery management tool, and are designed to either limit the number of people fishing or the efficiency of fishing (NRC, 1999b). Output controls are management techniques designed to directly limit catch.

There are several types of input controls, including season restrictions, gear restrictions, vessel restrictions and licenses. A closed season is one in which no one is allowed to fish- often during spewing season. Gear restrictions often limit the size of the mesh in a net or type of gear used (purse seine, gillnet, logline, dredging, etc).

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[59] Cathy A.Rohein, (2004), *Trade Liberalization in Fish Product,* The World Bank, Washington DC, pp- 275-295

Vessel restrictions may place a limit on types, size or power of vessels used in a particular fishery. Licenses may be used to certify fishermen or vessels and may or may not be limited.

Output controls are devices to limit the amount of catch from any given fishery. Total allowable catch (TAC) restrictions are set by managers as the total amount of fish to be caught in a particular time period from a particular fishery, where the TAC approximates an appropriate amount of harvest, aimed at maintaining a sustainable fish stock. TACs are based on stock assessments and other indicators of biological productivity.

2.5.2 Trade Barriers

(i) Tariffs

Tariffs are a form of barrier to trade for exports, regardless of the developing versus developed nature of the economies. Tariffs on seafood in developing countries are generally higher and more transparent than those in OECD countries. The structures of the tariff regimes, however, differ considerably among developing countries.

(ii)Non-tariff Barriers (NTBs)

Several new and emergent regulatory measures such as sanitary and phyto-sanitary (SPS), quality and composition standards, and labeling, source and origin are becoming real barriers to trade, and would have similar negative impact on market access as tariff and quantitative restrictions.

(iii) Technical Barriers to Trade (TBT)

The TBT Agreement has the objective of encouraging development of international standards and conformity assessment systems as well as eliminating unnecessary obstacles to trade without undermining the legitimate domestic regulations or standards regarding such aspects of public policy as health and consumer and environmental protection.

In recent years, there has been a large increase in policies that could potentially come under the heading of technical barriers to trade. Among them are labeling programs and the resultant traceability capability it requires.

(iv) Sanitary and Phyto-sanitary Measures

Import regulations based on HACCP principles, adopted by many of the major importing nations, have been regarded as non-tariff barriers by many developing countries, as the investment required to bring processing plants up to code can be substantial (Filhol 2000). The FAO has highlighted the need for a more rapid harmonization of fish safety and quality standards in accordance with rules of the WTO Agreements on the Application of Sanitary and Phytosanitary Measures (FAO, 2002).

(v) Anti- dumping and Countervailing Measures

As tariff barriers have been relaxed, and the aquaculture industry has boomed globally, more and more fishing industries in the U.S. have found themselves competing with lower priced imports. Thus, the U.S, in particular, has been quite active in pursuing anti-dumping and countervailing duty suits against foreign fish product competitors. The U.S. has brought forward anti-dumping and countervailing charges against import of Norwegian farmed salmon in 1990, Chilean farmed salmon in 1997, Crawfish from China in 1997 and farmed catfish from Vietnam in 2003.

2.6 Natural Resources Models

The trade policy towards liberalization has contributed to a significant growth of the export sector. Although fishery is renewable resource, it can be over-exploitation or over-fishing. Fish is also predominantly an open-access resource which is operated on a common property basis. Consequently, this gives rise to major economic problems including the possibility of inefficient use of factor inputs, low returns to fishing industries, over-fishing and extinction of fish species. This calls for some sort of regulation in the fishing industry.

 The analytical part deploys quantitative techniques, which examine sustainability of the marine Fishery sector. The level of sustainable yield is estimated using a bio-economic model developed by Schaefer (1957) because Bio-economic model has less data requirements than other models and this model are relatively easy to implement with available data. Another useful model is Action Impact Matrix (AIM). An AIM methodology investigates individual parameters of trade liberalization, and in an integrated manner closely related Fishery sector development

decisions with priority economic, environmental and social objectives. (Munasinghe and Cruz, 1995)[60].

The Action Impact Matrix approach identified a number of parameters relevant to the relationship between trade liberalization and exploitation of fishery. They included annual exploitable stocks of fish, export and local market prices, fishing effort, cost of effort, temporal impact of liberalization measures. Therefore, AIM model is difficult to obtain data such as market prices.

Sustainable yield for any given stock size is the yield that can be harvested each year without affecting the fish stock since the yield would be equal to the rate of growth of the fish stock. In a sustainable fishery the relationship between effort and yield is such that the total yield will increase with the increase in the effort up to the point of maximum sustainable yield (MSY) which can be obtained without impairing the capacity of the resource to renew itself[61]. Any fishing effort beyond MSY leads to a decline in total yield because the fish stock declines due to over-fishing.

In Figure 2.2 it can be observed that two different levels of fishing effort can produce the same yield Y 1. Fishing effort at level E 1 is the situation where there is under-fishing. Net growth of Y 1 can be obtained with a small population. But fishing effort E 2 represents over-fishing as this level is beyond MSY[62]. The growth can be obtained with a large population.

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[60] Munasinghe. Mohan and Wilfrido Cruz, (1995), Economy-Wide Policies and Environment: Lesson from Experience. World Bank Environment Paper No.10, The World Bank, Washington DC.

[61] : Fahmida. A Khutun, (2002) Environmental Impact of Trade Liberalization and Trade-Releated Policies on the Marine Fisheries Sector in Bangladesh, Centre for Policy Dialogue, Dhaka, p-21.
[62] Schaefer, M. 1957." *Some Considerations of Population Dynamics and Economics in Relation to the Management of Commercial Marine Fisheries", Journal of Fisheries Research*, Board of Canada, pp 669.

Figure 2.2 Sustainable Yield Curve
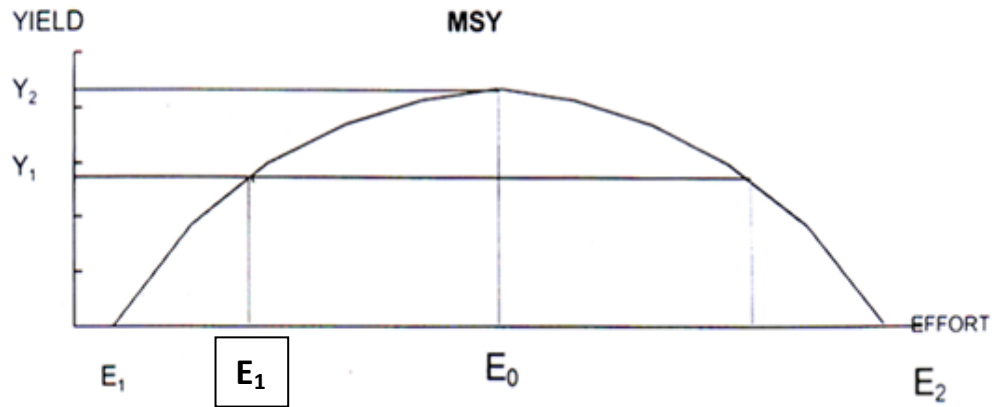
Source: Fahmida. A Khutun, (2002) Environmental Impact of Trade Liberalization and Trade-Releated Policies on the Marine Fishery sector in Bangladesh, Centre for Policy Dialogue, Dhaka, p-23

The analytical framework presented shows that in the Schaefer model catch per unit of effort is a linear function of effort.[63] If Y is the sustainable yield, f is the effort and a and b are constant, the yield function can be expressed as:

$$Y / f = a - bf \qquad (1)$$

Alternatively, $Y = af - bf^2$ $\qquad (2)$

Differentiating Equation (1) with respect to F and setting dY/df=0 the level of effort (F_{msy}) giving maximum sustainable yield (Y_{msy}) can be derived:

$$dY/df \quad = \quad a - 2bf = 0$$

$$a \quad = \quad 2bf$$

$$f_{msy} \quad = \quad a/2b \qquad (3)$$

The maximum sustainable yield (Y_{msy}) can be obtained from Equations (2) and (3).

$$Y_{msy} \quad = \quad a(a/2b) - b\,(a^2/4b^2) = \ a^2/4b \qquad (4)$$

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[63] Falmida A.Khatun (2002) "Environmental Impact of Trade liberalization and Trade-Related Policies on the Marine Fisheries Sector in Bangladesh", *Centre for Policy Dialogue*, p-24.

The parameters a and b have been estimated by a linear regression of the yield function.

CHAPTER 3

AN OVERVIEW OF FISHERY SECTOR IN MYANMAR

3.1   A Brief History of Fishery sector

The history of Myanmar fisheries can be traced back to the mid of 1800s during the Kingdom of Ava. 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. In colonial times, the Burma Fisheries Act, 1875, was enacted nearly a quarter of a century earlier than the All-India Act. The purpose behind the Act was to raise revenue from the Fishery sector. Later, reforms were advocated by fisheries researchers and revenue officers. They were given the task of redrafting a new Myanmar Fisheries Act in 1905. The rules under the Act came into force in 1911[64].

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[64] U Khin(1948), Fisheries in Burma, Rangon, Supdt. Govt. Printing and Stationary Burma, pp 1-5.

The government institution for Fishery sector was set up in 1948 as Fisheries Bureau under Agriculture and Rural Development Corporation (ARDC). In 1951, Burma Economic Development Corporation (BEDC) was formed by the Defense Services. Burma Fishery Limited was formed in 1961 under Burma Economic Development Corporation (BEDC). Burma Fishery Limited was replaced by People's Pearl and Fishery Board which was established in 1962 to promote marine fisheries. In the early 1970s the Peoples Pearl and Fisheries Board was restructured and transformed as People's Pearl and Fisheries Cooperation (PPFC) in 1963. Myanmar started its fishery exports in 1972.

In 1983, the People's Pearl and Fishery Corporation was transferred from the Ministry of Agriculture and Forestry to Ministry of Livestock and Fisheries. After 1988, the Department had taken important changes in fishery sector to be in line with principles of market-oriented economy.

The structural economic changes in 1988 /89 gave strong impacts to the whole economy as well as the Fishery sector. Since the introduction of market-oriented economic system, Myanmar Fishery Enterprise, formerly People's Pearl and Fishery Corporation, operated the fishery activities until 1994/95 as the State-Owned Economic Enterprise. Foreign businesses were granted fishing rights within the specified areas in the Exclusive Economic Zone. Joint ventures with the state and foreign companies carried out production and marketing of marine products and more fishing permits were granted in 1992.

Myanmar Fishery Enterprise was abolished and Department of Fisheries (DoF) was established in 1994, August 15. All fishery activities were delegated to the private sector. That privatization upgraded the fishery sector and it developed with a forceful momentum. The state-owned fishing vessels, ice plants, cold storages, and other infrastructures were sold or leased to private.

3.2 Organizations and Institutions

3.2.1 Directorate of Livestock and Fisheries

Directorate of Livestock and Fisheries is directly responsible to the Minister for Livestock and Fisheries, and formulate plans, coordinates, supervises, monitors and evaluates the performance of the livestock and fishery sector of the Union of Myanmar. The Directorate also gives guidance on formulation of projects and conducts foreign relations.

3.2.2 Department of Fisheries (DoF)

The DoF, under the Ministry of Livestock and Fisheries is the major government institution responsible for the management of fishery sector development. The main objectives of fishery sector are:

(a) To increase fish production for domestic consumption and export

(b) To encourage the expansion of aquaculture both in marine and freshwater environment

(c) To shore the surplus marine resources with neighboring countries by establishing joint ventures and

(d) To upgrade the socio-economic status of fisheries communities.

DoF took only supervisory measures of model fish farms, shrimp farms and hatcheries. The state granted permission to import offshore fishing vessels. With the abolition of Myanmar Fishery Enterprise, DoF took over the shrimp farming and management of marine fishery sector. DoF was reorganized in 2002 due to the crucial importance of aquaculture in Myanmar. The new administrative structure has four main Divisions dealing with capture fisheries, aquaculture, research and development, administration and budget. There were 1829 staffs including 191 officers in 2010[65]. The Department holds the responsibility for managing and administration of Myanmar fisheries and aquaculture.

The responsibilities of DoF for development and management are: conservation and rehabilitation of fishery resources; promotion of fisheries researches and surveys; collection and compilation of fishery statistics and information; extension services; supervision of fishery sectors; and sustainability of fishery resources.

DoF is leading the fishery sector, encouraging the private industry development, carrying out the research and extension services, enforcing laws and regulations. It also practiced the fishery legislation widely in order to conserve the fishery resources. Major Day, Inspector General of fisheries in India, visited Myanmar in 1869 and made recommendations resulted in the first Burma Fishery Act (Act VII of 1875). In 1895-96, Colonel Maxwell was placed on a special duty for further investigation, into

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[65] Ministry of Livestock and Fisheries, (2010). *Fishery Statistics (2009/2010)*, Department of Fisheries, Myanmar, p-ii.

Myanmar fisheries. A report, which was submitted after two- year investigation, contained certain recommendations for fundamental changes in the existing fishery laws and administrative procedures. The rules and directions in the Burma Fishery Act (ActIII of 1905) were direct outcomes of that report. The 1905 Act replaced earlier Act as a whole. At present, fishery sector is carried out systematically under the following fisheries laws:

(1) Law Relating to the Fishing Rights of Foreign Vessels (Law No.11/89)

Fishing rights were being granted to foreign companies in Myanmar Exclusive Economic Zone in accordance with this law to promote foreign exchange earnings. The law amending this law was passed in 1993.

(2) Law Relating to Aquaculture (Law No.24/89)

This law enforced aquaculture and as a result successful industry evolved in a short time.

(3) Myanmar Marine Fisheries Law (Law No.9/90)

Inshore and offshore fishing became systematic industry under this law and developed with a forceful momentum. This law was amended by the law amending Myanmar Marine Fisheries Law in 1993.

(4) Freshwater Fisheries Law (Law No.1/91)

Freshwater Fisheries Law was enacted in 1991 in accordance with the objectives of safeguarding the freshwater, further development of fishery sector and earning the state revenue.

With the aim for proper fishery management, the following salient features are included in these laws: reduction and eradication of mortality caused by men apart from legal fishing, preservation of areas, habitats and fishing grounds, protection of specific stocks and species, exploitation of resources on rational basis and inhabitation of environmental adverse effect on the industry and vice visa.

The Ministry of Livestock and Fisheries has laid down Thirty-Year Long -term Plan for the development of fishery sector, covering the period of 2001to 2031. The long-term plan aims at the following policy targets:

- to upgrade the development of rural areas by promoting fish farming;
- to boost the multi-sectoral development of the fishing industry without affecting the ecosystem;
- to promote the participation of all stakeholders in the sustainable development of the fishing industry;

- to achieve the common target of the Fishery sector of the ASEAN member countries at the end of the Fourth Five-Year Plan in 2020 to 2021; and

- to achieve equal status of the fishing industry with the developed nation of the end of the planning period 2031.

As the fishery sector is one of the main veins in day to day supply of food, the government has laid down the fishery development plans for high production to cope along with the increased demand for consumption. The objectives of national policy are:

-to promote all round development in the fisheries sector;

-to increase fish production for domestic consumption and share the surplus with neighboring country;

-to encourage the expansion of marine and freshwater aquaculture; and

-to upgrade the socio - economic status of fishery communities.

DoF is responsible for managing all fishery activities, taking actions in accordance with the enacted laws and collecting revenues. Revenues are collected from fishing, marketing, culturing and exporting cash down or in installments. Fishery income provides a considerable proportion to State revenue. The kinds of fishery revenues are tender fees, registration fees, license fees, inspection fees, fees payable for fishing vessels, fresh fish duties, export duties, fines and other duties.

3.2.3 Myanmar Fisheries Federation (MFF)

Myanmar Fisheries Federation was reformed in 1998 as a replacement of Myanmar Fishery Association which was established in 1989. Myanmar Fisheries Federation is one of the highest NGOs commercial organizations to encourage and promote fishery industries of Myanmar. It was created by Myanmar Fisheries Association in order to enable the fishery entrepreneurs from states and divisions to join it on 1st December 1998.

Moreover, Myanmar Fisheries Federation was constituted as a member of ASEAN Fisheries Federation in 2002[66]. With its technical support, it renders a great

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[66] Ministry of Livestock and Fisheries, (2010). *Fishery Statistics (2009/2010)*, Department of Fisheries, Myanmar, p-100.

help towards the benefit of the fishery sector as well as to those who are engaged in fisheries.

DoF and MFF have teamed up to work together in order to provide and support to those who are engaged in fisheries and the related persons in fishery industries as well as the members of MFF. In order to exchange views and to get the update livestock and fishery sector, regular weekly meetings are held at the Conference Hall in the MFF every week since June 6, 2005 for the development of Myanmar fisheries.

The objectives of Myanmar Fisheries Federation are:

(1) To cooperate among members for mutual benefits with a view to gaining economic success;

(2) To distribute fishery in relation to knowledge and rendering consultant service among members regarding government policies, regulations and global economic situation;

(3) To produce fish and shrimp for sufficient quantity and export for surplus through marine capture fisheries and aquaculture;

(4) To participate members in the fields of fishery researches with the aim of producing high quality products for international markets and conservation of fishes and

(5) To provide extension services to fishery workers.

The Federation has national and local coverage; most of the larger fish farmers, fishing industries and fish processors are the members of local MFF branches. Central Executive members play most of coordinating roles with office tenure for 3 years. The present office holders are elected from academia and the private sectors. There are 10 MFF local branches in states and Divisions. Federation members composed of fishery operators, fish farmers, fish processors and fishery -related industries.

Myanmar Fisheries Federation has many supporting roles to its members;

- Able to support application made by its members to Department of Fisheries to undertake fisheries and aquaculture;

- Recommend application to the Livestock and Fisheries Bank for loan application;

- A good support from the government and can negotiate directly for members' benefits and

- Helps with negotiation of selling and harvesting of fish; and shrimp and working collectively.

MFF is the highest national level and non-profit organization to encourage and promote the fishery industries of Myanmar.Associations under the umbrella of MFF are:

(1)Myanmar Shrimp Association (5.5.2004)

(2) Myanmar Fish Farmers Association (2.10.2004)

(3) Myanmar Fishery Products Processors and Exporters Association (2.10.2004)

(4) Myanmar Aqua-feed Association (14.7.2005)

(5) Myanmar Marine Fisheries Association (29.4.2006)

(6) Myanmar Freshwater Capture Fisheries Association (20.11.2006)

(7) Crab Entrepreneurs Association (5.12.2006)

(8) Eel Entrepreneurs Association (5.12.2006)

(9) Ornamental Fish Entrepreneurs Association (5.12.2006)

There are many members with small property. The membership fee is Kyats 300 per year and Kyats 5,000 for life.

3.2.4 Myanmar Livestock and Fisheries Development Bank (MLFDB)

State Peace and Development Council (SPDC) established the Myanmar Livestock and Fisheries Development Bank in 1996 with the purpose of assisting those who actually require financial investment for the expansion of fisheries-related businesses. Based on the recommendation, depending of loan requested, MLFDB issued the loans up to 100,000 Kyats per acre of fish pond to those who have La / Na 39and it will be only 50,000 Kyats for those who do not possess La / Na 39. MLFDB has already loaned out 65.20 billion Kyats to the owners related to fishery sector in the 2009/10 fiscal year. Total loan increased by 13 times from 4830 million Kyats in 2001/02 to 65200 million Kyats in 2009/10. The amount of loans from MLFDB is shown in Appendix 6. The MLFDB loaned to the owners of aquaculture, and factories in Myanmar for the development of fishery sector. Currently, Myanmar Livestock and Fishery Development Bank are running with 9 branch offices, headed in Yangon.

3.2.5 Related and Supporting Industries

To meet the standards of importing countries, many ice plants and cold storages are needed to build. Total ice plants were 127 and total fishery export was 67 thousand metric tons in 1997/98.Total ice plant increased to 159 and total fishery export was 144 thousand metric tons in 2001/02 (Table 3.1).

In 2005/06, there were 372 ice plants in the country and total capacity of ice plants were 5728 metric ton per day. Majority of the ice plants and cold storages were located in Yangon (38% of total ice plants) and they can operate 1711 metric tons per day. But there were 42 ice plants in Taninthayi and their capacity were 1829 metric tons per day. They can operate better than capacity of Yangon's ice plants.

In 2009/10, there were about 73 ice plants in Yangon and over two hundred around the country. These plants declined especially in Yangon and Taninthayi. Most of the plants were moved or closed due to construction of roads around the cities, establishment of industrial zone and lack of raw materials. Moreover, Cyclone Nargis hard hit Myanmar on May 2008, severely affecting Ayeyarwady and Yangon Divisions. Some fishing infrastructure were damaged such as small fishing boats, off-shore fishing vessels, fish ponds, hatcheries, jetties, ice plants and cold storages.

Table 3.1 Ice Plants by States and Divisions (Number)

Year	Yangon	Taninthayi	Rakhine	Ayeyarwady	Mon	Mandalay	Shan	Total
1997/98	66	10	22	3	24	1	1	127
2001/02	81	13	27	3	30	3	2	159
2005/06	145	42	60	75	39	8	3	372
2009/10	73	26	39	70	29	7	2	246

Source: DoF, Fishery Statistics, Various Issues.

Half of the fish is consumed fresh by humans while the other half undergoes some processing. When fish is processed, it is often frozen, but it can also be canned, cured, dried, salted, smoked, etc. In developed countries, most of the fish for human consumption is processed. In developing countries, fish is mostly consumed fresh and processing focuses on less sophisticated methods like salting or drying. However, fish processing is increasing in many developing countries to meet demands of domestic markets or the requirements of exports. Table 3.2 shows the location of fishery processing plants by states and Divisions. Those plants produce various fish and fishery products in chilled, frozen alive or dried forms. There were 27 cold storages in 1997/98 and increased to 143 cold storages in 2005/06. Majority of cold storages were located in Yangon (59% of total). But there were 134 processing plants operating in fishery sector in 2009/10 because some cold storages were damaged in Ayeyarwady Division by Cyclone Nargis.

Table 3.2 Cold Stores by States and Divisions (Number)

Year	Yangon	Rakhine	Mon	Taninthayi	Ayeyarwaddy	Shan	Total
1997/98	14	6	1	6	-	-	27
2001/02	40	17	2	19	-	-	78
2005/06	84	18	9	24	8	1	143
2009/10	90	11	10	19	4	1	134

Source: DoF, Fishery Statistics, Various Issues.

DoF has taken measures for the fish quality and safety of fishery products in the world market. It has stated that the validation and verification of HACCP System and GMP System have been implemented. There are two canning plants in Myanmar. Canned factories are very few in number because of the lack of raw materials to make tin. The cost of production is high since these raw materials are imported from foreign countries.

3.2.6 Other Organizations

Myanmar, being member of Network of Aquaculture Centre in Asia and the Pacific (NACA) as well as Southeast Asia Fisheries Development Centre (SEAFDEC) under the cooperation with other fishery agencies conduct the technical assistance in supporting and building up of human resources. DoF, Myanmar has already sent many of its staffs to go abroad for training and to attend the Divisional workshops/ seminars, to study toward trade fair sponsored by NACA, SEAFDEC, FAO, INFOFISH, UNDP, JICA, TICA, KOICA, WCS etc. Moreover, the DoF of Myanmar is working closely in collaboration and coordination with FAO, NACA, SEAFDEC, JICA, BOBLME Project and other Divisional and international organizations related to fisheries in order to strengthen capacity building on improving fishery statistics for the better management of fisheries.

(i)   Network of Aquaculture Center in the Asia Pacific (NACA)

NACA is an intergovernmental organization that promotes rural development through sustainable aquaculture. Myanmar has become a member of NACA in 1990.The NCEA (National Commission on Environmental Affairs) serves as the national focal point and coordinating agency for environmental matters. The Commission was established with the following objectives:

(1) To develop sound environmental policies in order to safeguard the

environment and prevent its degradation,

(2) To set environmental standards, rules and regulations for pollution control,

(3) To formulate environmental plans, programmes and strategies and

(4) To promote environmental awareness and public participation in environmental activities.

In accordance with its objectives and with the aim to establish sound environmental policies in the utilization of land, waters, living and nonliving resources, the NCEA(National Commission on Environmental Affairs) formulated the National Environment Policy, which was adopted in 1994, forming the basis for developing environment strategies, environmental programmes and plans.

(ii) Southeast Asian Fisheries Development Center (SEAFDEC)

SEAFDEC is an inter-governmental organization in fisheries through providing technical supports to the ASEAN member countries in the field of training, research and information dissemination for over 40 years. Myanmar has become a member of SEAFDEC in 1999. With regard to responsibilities, HRD is given the priority to attend develop their capacities of human resources involving their Fishery sector, mostly on food security and poverty alleviation through fisheries intervention project in the ASEAN countries.

(iii) Food and Agriculture Organization (FAO)

FAO provided projects of environmentally sustainable food security and micro income opportunities in some Division. There was also a project implemented in Rakhine State under United Nations High Commissioner for Refugees (UNHCR) program for agricultural and natural resources management in 2001.There are other external fishery organizations: Korean International Co-operation Agency (KOICA) (1995), Wild-Life Conservation Society (WCS) (2002), Thai International Co-operation Agency (TICA)(2006), Information Fisheries (INFOFISH) (2008).

3.3 Fisheries Production in Myanmar

Myanmar is the largest country in the mainland of South East Asia, stretching over 2,000 kilometers from North to South. Myanmar possesses a long coastal area from Rakhine to Tanintharyi coast and total territory in 2,832 kilometers. The

continental shelf spreads over 228,751 square kilometers and the Exclusive Economic Zone, extends to a distance of 200 nautical miles from the shoreline of 486,000 square kilometers which offers a good condition for coastal fishing.

Myanmar water line consists of the Rakhine coastal Division at the western part of Myanmar about 740 kilometers, Tanintharyi coastal Division in the Bay of Bengal and Andaman Sea about 1,200 kilometers and Ayeyarwaddy Delta and the Gulf of Mottama coastal Division about 460 kilometers.(Appendix 7)

The types of fisheries in Myanmar can be classified by nature of catch: fresh water fisheries and marine fisheries. Freshwater fisheries consist of fish culture, leasable and open fisheries. Marine fisheries include inshore fisheries and off-shore fisheries.

The inland waters are made up mainly of Ayeyarwaddy(2,150 kilometers), Chindwin (844 kilometers), Than Lwin (2,400 kilometers) and Sittaung (563 kilometers). Leasable fisheries are main categories of the inland fisheries.

Since 1988 Myanmar made reforms in social, political, economic fronts. From that time onwards, the market-oriented economic system has been adopted in Myanmar. After 1988, fishery culture, catching, processing and exporting were allowed to private sectors. Consequently, all state-owned infrastructure of fishery sector such as, fishing vessels, ice-plants, processing plants, cold stores, fish meal plants, canning plants etc. were sold out or leased to the private owners by the Government.

Production of fish and prawn by nature of catch from 1988/89 to 2009/10 is shown in Table 3.3 and Figure 3.1 and 3.2. The production of fish culture was the lowest among the freshwater fisheries and was 5.31 thousand metric tons (4.4% of total fresh water fisheries) in 1988/89. Open fisheries were the highest among the freshwater fisheries and were 42.25 thousand metric tons in 1988/89 (35.1% of total freshwater fisheries).

The production of inshore fisheries was 311.58 thousand metric tons which were the highest among the marine fisheries (53.7 % of total marine fisheries) in 1989/90. The production of leasable fisheries was 52.48 thousand metric tons which were the highest among the freshwater fisheries (37.8% of total freshwater fisheries).

In 1991/92, the production of fish culture was 25.97 thousand metric tons and increased over three times of previous year because the area of fish ponds was expanded according to Freshwater Fisheries Law in 1991.

In 1994/95, the production of open fisheries increased to 83.65thousand metric tons because flood fisheries were determined as leasable fisheries and open fisheries according to the Freshwater Fisheries Law. The production of offshore was 381.54 thousand metric tons (63.2% of total marine fisheries) which increased five times of previous year. Onshore fishing was determined as inshore and offshore fishing according to the Myanmar Marine Fisheries Law.

The production of leasable fisheries increased from 152.69 thousand metric tons in 2005/06 to 170.20 thousand metric tons in 2006/07 because the new auction of long-term system (nine years). In 2009/10, offshore fishery production, the largest fishery production in Myanmar, were 1289.29 thousand metric tons (33.10% of total production). The second largest fishery production was from fish culture production which produced 858.76 thousand metric tons (21.89 % of total production). Inshore fisheries, leasable fisheries and open fisheries increased respectively.

Although marine fisheries were still contributing over half of total landing, contributing of freshwater fisheries in total fish landing increased dramatically. In 1988/89, production of freshwater fisheries was 120.21 thousand metric tons which was 17.63 % of total production. But it increased to 1861.19 thousand metric tons in 2009/10 which was 47.45% of total production.

The production of marine fisheries in 2009/10 was about three times larger than that of 1988/89. But the production of freshwater fisheries was about 15 times larger than that of 1988/89. Therefore, freshwater fisheries became important. . During the 1990s most of all fisheries landing was from marine fisheries (60 % to 70 %). However the composition started to decline since 2000/01. Since the introduction of trawl fishing in the early 1970s, the coastal resources have been heavily exploited. Even without detailed landing data, the signs of resources decline were visible. Some fishing vessels reported the decline of catch rate.

To estimate the growth potentials of fishery production, Semi-log trend model is used in this section (Appendix 8). The results of compound growth rates (over the study period) are summarized in Table 3.4.

Table 3.3 Production of Freshwater Fisheries and Marine Fisheries

(1988/89 to 2009/10)

(Thousand metric tons)

Year	Freshwater Fisheries				Total Fresh water Fisheries	Marine Fisheries			Total Marine Fisheries	Total
	Fish Culture	Leasable Fisheries	Open Fisheries	Flood Fisheries		Onshore Fisheries	Inshore Fisheries	Offshore Fisheries		
1988/89	5.31	32.39	42.25	40.26	120.21	198.80	301.94	61.08	561.82	682.03
1989/90	6.55	52.48	43.34	41.16	143.53	205.09	311.58	69.46	586.13	729.66
1990/91	8.82	52.55	42.83	41.18	145.38	206.19	310.28	71.89	588.36	733.74
1991/92	25.97	55.93	43.97	41.47	167.34	207.99	311.74	70.91	590.64	757.98
1992/93	51.71	56.17	44.29	41.70	193.87	207.99	311.58	78.45	598.02	791.89
1993/94	64.62	56.18	46.50	43.78	211.08	209.34	314.95	75.97	600.26	811.34
1994/95	71.75	64.79	83.65	x	220.19	*	221.73	381.54	603.27	823.46
1995/96	71.55	61.04	85.55	x	218.14	*	168.60	287.09	455.69	673.83
1996/97	82.80	62.61	86.55	x	231.96	*	233.70	234.53	468.23	700.19
1997/98	96.73	62.66	86.71	x	246.10	*	252.07	429.21	681.28	927.38
1998/99	91.17	67.87	91.98	x	251.02	*	281.26	478.90	760.16	1011.18
1999/00	102.60	83.06	113.00	x	298.66	*	331.94	565.19	897.13	1195.79
2000/01	115.87	90.94	144.58	x	351.39	*	344.87	587.22	932.09	1283.48
2001/02	190.12	95.95	158.93	x	445.00	*	380.00	648.56	1028.56	1474.46
2002/03	252.01	109.53	180.61	x	542.15	*	389.88	663.84	1053.72	1595.87
2003/04	400.36	122.29	332.03	x	854.68	*	418.97	713.37	1132.34	1987.02
2004/05	485.22	136.79	366.75	x	988.76	*	454.62	774.09	1228.71	2217.47
2005/06	574.99	152.69	478.43	x	1206.10	*	509.00	866.67	1375.67	2581.78
2006/07	616.75	170.20	548.45	x	1335.40	*	564.73	961.58	1526.31	2861.71
2007/08	687.67	191.05	612.44	x	1491.16	*	625.21	1064.55	1689.76	3180.92
2008/09	775.25	209.72	689.71	x	1647.68	*	690.98	1176.53	1867.51	3542.19
2009/10	858.76	237.46	764.97	x	1861.19	*	762.49	1298.20	2060.69	3921.97

Source: DoF, Fishery Statistics, Various Issues

Note :   x - Flood fisheries were determined as leasable fisheries and open fisheries according to the Freshwater Fisheries Law.

*-Onshore fishing was determined as inshore and offshore fishing according to the Myanmar Marine Fisheries Law.

Table 3.4 Estimation of Average Annual Growth Rates for Fishery Production
(1988/89 to 2009/10)

Particulars	Growth Rate (%)	R_a^2	Computed F - value
Fish Culture (FPQ)	25.48	0.928	272.775*
Leasable Fisheries (LFPQ)	8.44	0.940	331.755*
Open Fisheries (OFPQ)	16.65	0.950	400.381*
Inshore Fisheries (INFPQ)	4.71	0.592	31.481*
Offshore Fisheries (OFFFPQ)	17.00	0.887	166.355*
Total Fisheries (TFPQ)	9.31	0.899	188.540*

*significant at 1% level

According to the semi-log trend model, average annual growth rate of fish culture production was the highest in fisheries production because the area of fish ponds and the production of fish culture increased after the enactment of Freshwater Fisheries Law in 1991, Moreover, the first aquaculture plan (2000 to 2003) were introduced in Myanmar in the year 2000.In order to development status, the short and long term plans from the year 2001/02 to 2030/31 have formulated to be functioned and undertaken by the DoF. The objective of the plans mainly focuses to extend fisheries activities focusing to increase fisheries production through the proactive of aquaculture, inland fisheries and marine fisheries. Implementation procedure for the "Three-Year National Plan for Aquaculture" involved upgrading fish farming method, looking at feasible methods in relation to condition, monitoring effectiveness, supporting access to electricity and fuel, and safeguarding of fish farmers. In 2000, the Government of the Union of Myanmar formed a State Level Committee to launch the special operation on the development of shrimp aquaculture industry. Since 2003/04, DoF had initiated stocking of quality fish seed into paddy fields in order to

sustain subsidized fish production. DoF had taken continuous measures to maintain and enhance the inland fishery resource by stocking of quality fish seeds into open waters, dams, rivers, man-made reservoirs and natural lakes. Moreover, Myanmar's Prawn Enterprise was established in May 2004, and joined together DoF and opened the training of freshwater prawn breeding. Major culture species are Rohu, Mirgal, Kalta, Pangush, Tilapia, Freshwater prawn and Sea water prawn (Tiger).

Average annual growth rate of offshore fishery production was the second largest because it was operated with active fishing gears with fishing vessels more than 30 feet in length and engine power more than 12 HP[67]. Majority of marine catch landed from coastal fisheries using bag net, gill net and line fishing. However, offshore activities by medium size trawlers, purse seiners and long liners are important for marine fishing. The major catch species are Grouper, Snapper, Sea Bass, Hilsa, Pomfret, Crustacean, Thread fin, Mackerel, Sea water prawn (Pink, Tiger, White) etc. Average annual growth rate of open fishery production was 16.65% .Freshwater fisheries apart from the leasable fisheries and freshwater ponds were considered as open fisheries. Moreover flood fisheries were determined as leasable fisheries and open fisheries according to the Freshwater fisheries Law. Average annual growth rate of leasable fishery production was 8.44% only because global climate became warmer which caused the fish catch in lakes and effected animal species especially fish. Average annual growth rate of inshore fishery production was lower than others because inshore fishery vessels included mostly non-mechanized boats. Although mechanized boats were used in inshore fishing, fish catching and fish size were steadily declining.

3.3.1 Freshwater Fisheries

Before the development of freshwater fish breeding, Myanmar people mainly consumed varieties of fishes from freshwater such as natural inns, lakes, streams and rivers. Myanmar people consumed not only fresh fish in cooking, but also in the forms of dried fish, salted fish, pickled fish, dried prawns, pickled prawns, fish sauce, shrimp sauce and smoked fish. Myanmar seldom consume fish from marine waters

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[67] Ministry of Livestock and Fisheries, (2005), Fishery Statistics, (2004/05), Department of Fisheries, p-88.

through the ages and it showed that they preferred fish from inland water and consume various kinds of fishes in many ways.

Fish breeding was introduced by China and it started systematically only in 1953 in Myanmar as there are many natural habitats, lakes, streams and rivers in which varieties of fish and prawns were abundant. First attempts of fish culture were made in 1953 with the exotic species like common carp, tilapia and gouramy. Myanmar has high quality fishes like major carps such as rohu (*Labco rahita*), catla (*catla catlo*), marigal (*cirrhinus mrigala*), butter fish (*silondia Spp*) etc., but biotechnology was not well-established among the local farmers. In 1958/59, Tatmadaw Fresh water Plan was started in Tartabaw village in Maubin with 23 acres, 42 acres in Twentay under the government guidance. Later, in 1961/62, there were about 40 fish breeders and about 200 fish breeding areas. In 1962/63, there were about 60 fish-breeders and 600 areas In 1964/ 65, People's Pearl and Fishery Enterprise had raised 500 acres in Twentay.

Simultaneously, there were 37 acres in Hlawga. In 1968, induced breeding of indigenous major carps was successfully conducted. At present, fresh water aquaculture was well-established in terms of seed production and grow-out culture of more than 20 species including indigenous and exotic species. The species was imported from China and Indonesia.

Freshwater fishery was carried out in accordance with the following objectives:
(a)   to further develop the fisheries;
(b)   to prevent the extinction of fish;
(c)   to safeguard and prevent the destruction of freshwater fisheries water;
(d)   to obtain duties and fees payable to the state;
(e)   to manage the fisheries and to take action in accordance with the law.

Legend of freshwater aquaculture development can be categorized as four periods as follows:
(1)1954 to 1970: Freshwater finfish culture was initiated with exotics species like gouramy, tilapia and common carp that were not so much favorite among farmers. In 1967, induced breeding on rohu was successful. However, that period can be identified as early period of freshwater aquaculture.

(2)1971 to 1990: During that period, seed production of major carps, Chinese carps and other commercially important species was succeeded. Freshwater fish culture became popular among the farmers.

(3)1991 to 2000: The Law Relating to Aquaculture was promulgated by the State Law and Order Restoration Council and the development of freshwater aquaculture was accelerated due to law enforcement.

(4)2001to 2010: The development of freshwater aquaculture is at its highest level. New technology on catfish (Pangasius hypophltalmus) farming through steel screen cages in the rivers has been introduced and it performs high production. Also technology on seed production and grow-out culture of mono-sex tilapia has been widely established.[68]

Freshwater lobster breeding started in Myanmar in 1980. At first, DoF collected the young from lakes, streams and rivers in the breeding lakes. Later People's Pearl and Fishery Enterprise produced the young lobsters and made breeding in Tha-nat-pin, Hmaw-bi, Twan-tae and Ma-U-Bin and they gained experience of lobster breeding. Although there was increase in number of people who made lobster breeding during five years from 1990, they could not produce enough spawner to meet the need. They had to order spawners from Thailand. 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. Later, the technology of hatchery operation became well established in both public and private sectors.

Marine shrimp culture with very primitive practice of "Trap and hold" had been commenced since 1970s in the western coastal area that is close to the border line of Bangladesh.

Freshwater fisheries are mainly situated on the riverine system of the country. The freshwater fisheries (inland fisheries) are mainly provided to the people of Myanmar for food security, as well as for getting the opportunity of employment in fishery communities from rural areas.

There are four types of freshwater fish culture in Myanmar. They are pond culture system, poly culture system, mono culture system, and cage culture system.

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[68] Ministry of Livestock and Fisheries, (2009). *Fishery Statistics (2008/2009)*, Department of Fisheries, Myanmar, p-90.

Rohu fish was breeded in poly culture system. In Myanmar, the most important fish culture system is poly culture.

Fish ponds and fish culture production are shown in Appendix 9. Aquaculture had been the fast growing industry for over a decade. The aquaculture industry consists of freshwater aquaculture and coastal and marine aquaculture. As to the opening of new areas for aquaculture industries, an increase in production and development of modern technology, especially in the fields of fry production, culture systems and feed and disease control are upgraded and fruitful.

Moreover, Freshwater Fisheries Law was enacted in 1991. So the area of fish ponds was expanded from 8,328 acres in 1990/91 to 42,523 acres in 1991/92. Therefore, the production of fish culture increased from 8.82 (thousand metric tons) in 1990/91 to 25.97 thousand metric tons in 1991/92 which was about 3 times from 1990/91. (Appendix 9)

In 1995, the Ministry of Livestock and Fisheries recognized the shrimp technicians and encouraged a pilot scale of technical demonstration in terms of both hatchery operation and semi-intensive type of shrimp grow-out farming. In 2000/01, area of fish pond was 131,312 acres. In 2000, the Government of the Union of Myanmar formed a State-Level Committee to launch the special operation on the development of shrimp aquaculture industry. After that the industry is well - developed and very common among the potential investors. Fish and prawn culture production increased from 115.87 thousand metric tons in 2000/01 to 190.12 thousand metric tons in 2001/02.

The first aquaculture plan (2000/03) was introduced in Myanmar in 2000. Implementation procedure for the 'Three-Year National Plan for Aquaculture" involved upgrading fish farming method, looking at feasible methods in relation to condition, monitoring effectiveness, supporting access to electricity and fuel, and safeguarding of fish farmers. The Three-Year Plan was formed with targets for production of fry and fingerling, stocking of coastal aquaculture, expansion of fish hatchery and the development of research programme and demonstration sites.

After implementation of Three-Year Plan, both the area of fish ponds and fish culture production increased. Fish ponds areas were 219,421 acres in 2002/03 and reached 329,921 acres in 2003/04. Also total fish culture production were 252.01thousand metric tons in 2002/03 and reached 400.36 thousand metric tons in 2003/04 which was about one and half times from 2002/03 production. From 2000 to

2003, it was the golden age of prawn breeders and the marine prawn breeding was successful. In 2004/05, DoF had established 24 fishery stations at strategic areas in all state and Divisions. Those fishery stations produced the fish seed of 586.78 millions. DoF has initiated stocking of quality fish seed into paddy fields in order to sustain subsidized fish production. Therefore area of fish ponds had been increasing after the 2003/04 and reached 440,947 acres in 2007/08. DoF had taken continuous measures to maintain and enhance the inland fishery resource by stocking of quality fish seeds into open waters, dams, rivers, man-made reservoirs and natural lakes.

Myanmar's Prawn Enterprise was established in 2004 and joined together with DoF and opened the training of freshwater prawn breeding. Therefore, total fish production increased 485.22 thousand metric tons in 2004/05 and reached to 687.67 thousand metric tons in 2007/08. In 2008, there were 8 freshwater spawner private stations. In addition to indigenous species of Penaeus monodon, the shrimp farmers have become more interested in culturing a new exotic species of P.Vannamei. DoF, as the sole competent authority of fishery sector fully understands that P. Vannamei has many advantageous factors for culture. Seed production and hatcheries increased. Seed production was 736.760 million seed and there were 28 hatcheries of fish and 8 hatcheries of prawn under DoF. Fishery stations mainly conducted seed production and research works in terms of freshwater aquaculture purposes. In 2009/10, department station cum hatcheries produced 708.3 million fish seed. In 2009/10, there were 442704 acres of fish ponds and produced 858.76 thousand metric tons. Both the area of fish ponds and total fish culture production increased over 60 times and over 100 times from 1988/89 to 2009/10 because the state allowed and helped to expand fish breeding. After the enactment of Freshwater Fisheries Law in 1991, the fish breeding became more systematic, various fish species could be bred, the fish breeding acres and fish production increased.

(b)   Leasable Fisheries

Leasable fisheries mean fisheries waters in which fishing rights are granted under a lease by the Department of Fisheries, subject to stipulation relating to the area, species, fishing implement, and period and fishing method etc. Myanmar people consumed freshwater fishes mostly and mainly produced freshwater fishes from *'inn",* natural lake and ponds. *Inns* are the natural ponds developed due to the weather effects as well as the geographical situation. Some of the *inns* contain water only in

the rainy season while some contain water throughout the year. There are exclusively key fishing grounds on floodplains. The peak season involves capturing fish migrating off the flood plain 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. Leases have been auctioned every year but DoF is extending the lease period to up to nine years to promote improved long-term management since 1994. There is no government-owned leases. Myanmar Fishery Manual Code used in managing *inns* during 1905 to 1989 showed the different types of *inns*: Hire-purchase grant *inns*, Special *inns*, Restricted *inns* and Open fisheries. Myanmar's leasable fisheries are the land and water resources which earn money and supply of food for the citizens. Some fisheries from inn earned high prices as foreign export. DoF is releasing the fingerlings in every monsoon season as a special plan concerning to the leasable fisheries. The extension of lease period is also one strategy that attracts the lease holders with the long-term incentive to sustain the lease waters. Cage culture was being introduced in the lease and production can be higher with the development of the culture -based fishing system.

Number of leasable fisheries and production of leasable fisheries are shown in Appendix 9. There were 3,722 leasable fisheries in Myanmar of which 3,451 were still exploitable in 2009/10. Of these 1738 (52.3%) were located in Ayeyarwaddy Division (the lower floodplains and delta of the river). Production of leasable fisheries increased from 32.39 thousand metric tons in 1988/89 to 237.46 thousand metric tons in 2009/10 which was about 6 times from the year 1988/89. In some years, number of leasable fisheries declined because some of the leasable fisheries sites were transformed to agriculture due to the paddy were pillar crop. Moreover, deepwater rice cultivation by private sector interests has been the transformation of substantial areas of leasable fisheries into agricultural land. Moreover, new reservoirs were built for agriculture purposes. Reservoir fisheries support livelihoods of thousands of families, contribute fish supplies and national revenue. Since 1995, by the instruction of the Department of Irrigation, major fishing activities in reservoirs had been suspended.

(c) Open Fisheries

The Freshwater fisheries apart from the leasable fisheries and freshwater ponds are considered as open fisheries. Fisheries waters in which fishing rights are granted

by issue of fishing implement license. The entire fishing is closed during June, July and August to allow spawning enforced only for the 'inn' fishery (leasable fishery), tender fisheries and larger gears. Small-scale fishery operates year-round although it is considered technically 'illegal'' during these months. Open fisheries are very much important for rural population, particularly landless because its needs low investment in comparison with other kinds of fishing activities.

Production of open fisheries and its share in freshwater fisheries and total fisheries are shown in Appendix 9. The production of open fisheries increased from 42.25 thousand metric tons in 1988/89 to 764.97 thousand metric tons in 2009/10. Production of open fisheries increased more than 14 times in 1988/89. Share of open fisheries provided round about between 20% and 40% of freshwater fisheries. But the share of open fisheries contributed over 5% in total fisheries production and recruitment. After 1993/94, the percentage of open fisheries in total fisheries doubled because flood fisheries were determined as leasable fisheries and open fisheries according to the Freshwater Fisheries Law.

3.3.2 Marine Fisheries

Myanmar has a long coastline of 2,832 kilometers and mangroves are found along the coastlines with 382,023 (ha). Myanmar possesses the fourth largest mangroves area in Southeast Asia. The distribution of mangroves area in Myanmar consisted of Rakhine State with 64,752 areas (ha), Ayeyawaddy Divission with 177,147 areas (ha) and Tanintharyi Division with 140,024 areas (ha). Ayeyawady Division possesses 46.4% of total mangrove area and the largest of mangroves area in Myanmar.[69]

Myanmar endowed with huge fisheries potential marine water in which fishing zones are allocated. The territorial fishing zone is within 12 nautical miles off shore from the baseline and the EEZ covers 200 nautical miles off shore from the base line. The total marine fisheries areas in Myanmar including exclusive economic zone is about 486,000 square kilometers.[70]

In Myanmar, marine capture fisheries are previously divided into coastal or inshore fisheries, offshore fisheries and onshore fisheries till 1993/94. From 1994/95

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[69] DoF (2007/08), Fishery Statistics, Ministry of Livestock and Fisheries, Myanmar.

[70] DoF (2006),, Status of and Threats of living Marine Resources in Myanmar, Ministry of Livestock and Fisheries, Myanmar. P-5.

onwards, it was recognized as two sectors by adding onshore fisheries into inshore and offshore fisheries.

The production of marine fisheries for the period from 1988/89 to 2009/10 is shown in Appendix 10. Production of marine fisheries were 561.82 thousand metric tons in 1988/89 and reached to 2060.78 thousand metric tons in 2009/10 which was more than 53% of total production in 2009/10. In 1994/95, onshore fishing was determined as inshore and offshore fishing according to the Myanmar Marine Fisheries Law. So inshore and offshore fishing increased in 1994/95. But inshore and offshore fishing decreased to 168.60 thousand metric tons and 1287.09 thousand metric tons in 1995/96. In 1995/96, some fishing vessels were suspended from catching and marketing of fishery products to foreign market on account of the violation of fishery laws, for example, fishing in prohibited fishing grounds and using prohibited fishing gears.

The offshore fisheries could not operate at its maximum extent and total production was relatively low in that period and reached back to normal condition in 1996/97. After that period, marine fishery production increased gradually.

(a)   Inshore Fisheries

Inshore fisheries mean fisheries carried out in the area five nautical miles away from shore in Rakhine, ten nautical miles in Ayeyarwady and Taninthayi coast respectively. The fishing is undertaken by passive fishing gears (e.g. gill nets, drift nets, long line, and trap) with the non-mechanized boat. If the boats are mechanized to assist moving fishing gears the engine should not be more than 12 horse power and the over all length of the boats should not be more than 30 feet. Inshore fishing is being exploited along the coast line with small and simple fishing gears by local small scale fishermen. Traditionally, inshore fisheries were done mainly based on passive fishing techniques and fishes were caught by luring or by chance. Modern imported fishing net has been used in recent years.

Production of inshore fishery is shown in Appendix 10. It increased starting from 1995/96 and reached to 762.49 thousand metric tons in 2009/10 which represented 37% of marine fisheries and 20% of total fishery production. Inshore fishing vessels increased nearly double in 1994/95 due to the Myanmar Marine Fisheries Law. But some fishing vessels were suspended from catching in

1995/96.Therefore inshore fishing vessels declined to11615 in 1995/96 and the production of inshore fisheries decreased 168.60 thousand metric tons in 1995/96.

(b) Offshore Fisheries

Offshore fisheries mean the capture fisheries being operated by active fishing gears (e.g. trawl nets, purse seine nets etc.) with fishing vessels more than thirty fleet in over all length and engine power more than 12HP. The offshore fishery fishing grounds are from outer area of demarcated inshore fishery areas to end of EEZ. The main fishing gears used for fishing are bottom trawl, purse seine, surrounding net, drift net and long line. DoF permitted the 2150 vessels (nationals) and the 450 vessels (foreign) in 2004/05. There were 140 fishing grounds comprising 30 in Yakhine State, 44 in Ayeyawaddy Division, 52 in Taninthayi Division and 14 in Mon State.

Production of offshore fisheries and number of fishing vessels are shown in Appendix 10. Offshore fishing vessels increased up to 1640 in 1994/95 due to the Myanmar Marine Fisheries Law. Also production of offshore fisheries increased to 381.54 thousand metric tons in 1994/95. But it decreased to 287.09 thousand metric tons in 1995/96 because some fishing vessels were suspended from catching as the violation of Fisheries Law. But the production of offshore fisheries increased after that period. The production of offshore fisheries increased by 21 times from 61.08 thousand metric tons in 1988/89 to 1298.29 thousand metric tons in 2009/10.

Under the Marine Fisheries Law, the national fishermen are given priority to fish in all fishing zones. Local offshore fishing vessels are allowed to operate in the outer area of inshore to the territorial line while the operating under fishing rights agreement and foreign joint venture companies are allowed to fish from the territorial line to the Exclusive Economic Zone. Foreign fishing vessels can obtain permission from DoF to operate fisheries according to the fishing rights and the joint venture programme. DoF carried out inspecting fishing vessels and dishing implements, fishes and fishery to abide by laws and regulations for sustainable fisheries. The number of offshore vessels is limited in accordance with the amount of Maximum Sustainable Yield (MSY) available and the national vessels are given to priority to operate. The types of fishing gears used in marine fisheries are trawl, purse seine, drift net, long lime, stick-held falling net, and trap. The highest numbers of fishing gears were used in Ayeyarwady Division.

CHAPTER 4
IMPACTS OF TRADE LIBERALIZATION ON FISHERY EXPORTS IN MYANMAR

In addition to a source of food and livelihoods, fisheries in many countries are also an important source of foreign exchange. Fish is considered healthy for humans and an essential product for trade, about 40% of all fish produced are traded internationally (Josupeit, Lem and Lupin, 2001)[71]. All fish plays an important role in the economies of many developing countries. The growth of aquaculture for high value species (shrimp, seabass, salmon, seabream) has had an important impact on international fish trade while species of lower value (tilapia and catfish) have successfully entered into international trade (Globefish, 2005)[72].

4.1   Trade Policy Measures in Myanmar

Trade policy is a government policy that directly influences the quantity of goods and services that a country imports or exports. Instruments of trade policies are classified into two categories: tariff barriers and non-tariff barriers (NTBs), such as import quotas, voluntary export restraints (VERs) value-added tax (VAT), restrictions on services trade, trade-related investment measures (TRIMs).

In studying trade policy of Myanmar, it can be seen that it is characterized by the coordination of four fundamental aspects. They are:

1. To systematically implement trade policies in accordance with the market –oriented economic policy.

2. To produce value-added products from primary goods to increase the productivity for export market.

3. To carry out the promotion of trade not only through normal trade but also border trade.

4. To help and facilitate the export and import business.[73]

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[71] Josupeit,H.Lem and H.Lupin,(2001), Aquaculture Products: Quality,Safety, Marketing and Trade,NACA, Bangkok and FAO, Rome, pp 249-257

[72] GLOBEFISH,(2008),Tilapia Market Report-April 2008. P-4.

[73] Ministry of Commerce, Pocket Note, p-106.

Myanmar was a founder member of GATT and a member of the new organization, WTO. Hence, foreign trade policies are generally governed by the multilateral trading system.

Since 1988, government announced and implemented several market liberalization policies including (a) liberalization and/or authorization of private enterprise activities, including internal trade activities, (b) liberalization and/or authorization of international trade (including border trade), and liberalization of foreign direct investment (FDI), (c) financial sector reforms, including allowing of private banking.[74]

In 1988, major reforms included the introduction of Union of Myanmar Foreign Investment Law, removal of restrictions on private foreign trade, regularization (Opening-up) of border trade. In 1989, major reforms were the introduction of State-Owned Economic Enterprises Law, establishment of joint ventures with SEEs and private sector, re-establishment of Myanmar Chamber of Commerce and Industry. A series of reforms were the major reforms allowing 100 % retention of export earnings, introduction of Commercial Tax Law (1990), introduction of Tariff Law, approval of foreign exchange remittance through Myanmar Foreign Trade Bank in 1992, the introduction of Foreign Exchange Certificates (FECs) in 1993 and the approval of representative's offices of 11 foreign banks in 1994. The formation of Privatization Committee was announced in 1995. Myanmar Livestock and Fisheries Development Bank was established in 1996. Government announced the Conservation of Water Resources and Rivers Law (8/2006)[75].

4.1.1 Tariff Policy

Myanmar became the 109th member of the "Customs Cooperative Council" (CCC) in March 1991. Steps were taken to realign the practices in the foreign trade sector with international standards. A new tariff law was enacted in March 1992 to replace the Tariff Act 1953, and as a member of GATT, the "Harmonized Commodities Description and Coding System" (H.S) of import classification was introduced in Myanmar, effective from April 1, 1992, for the modernization and

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[74] Koichi Fujita, Fumiharu Mieno and Ikuko Okannoto, ed., *The Economic Transition in Myanmar after 1988*, p-6
[75] Ibid, p-7.

standardization of tariffs in line with international practice. It has 8 digits level and enables the collection of trade data precisely. There are 5,472 tariff lines, which mean that the tax base has been widened.

The 1996 Harmonized System for tariff and statistical nomenclature had been applied since January 1, 1996. Myanmar received technical assistance from the World Customs Organization for implementation of the 2002 Harmonized System. Regarding the tariff policies, the customs duty of Myanmar was basically of fiscal nature. Previously, the taxation of international trade was based on the Tariff Act (1953). Tariff rates then generally high, ranging from 5 % for certain types of unprocessed foodstuffs to 500 percent for some alcoholic beverages.

In 1997, when Myanmar became a member of ASEAN and participated in AFTA, other institutional requirements like applying CEPT Scheme in its tariff policy was to be initiated. The main implementing mechanism of AFTA is the Common Effective Preferential Tariff (CEPT) Scheme. Myanmar changed its trade policies to be suitable for the ASEAN Free Trade Area. Myanmar reformed the trade policy to encourage wider participation of private and co-operative sectors in foreign trade and to regularize the border trade in order to develop and strengthen relations with neighboring countries and establish Department of Border Trade with trade practices generally governed by WTO trading principles. CEPT is a cooperative arrangement among ASEAN Member States which will reduce intra- regional tariffs and remove non-tariff barriers. Tariffs were completely abolished by 2010 for ASEAN 6 and 2015 for the newer members with flexibility on some sensitive products until 2018.

In the CEPT Scheme, products are classified as those belonging to Inclusion List (IL) included fish and fishery products, Temporary Exclusion List (TEL), Sensitive List (SL) and General Exception List (GEL). CEPT Tariff Rate of Myanmar was between 0~5% 1st January 2008. Finally, the CEPT Tariff Rate of Myanmar will be 0 % 1st January 2015.

4.1.2 Non-Tariff Policies

All the imports are subject to pay the license fees, customs duty and commercial tax. Customs duties together with the commercial tax are collected at the point of entry and the time of clearance of imported goods. Raw materials and other essential imports are taxed at very low rates, while the highest rate is applied to luxury items.

Commercial tax was levied according to the Schedules appended to the Commercial Tax Act 1991, and the rates varied depending on the types of goods and services. For the items not exempted from commercial tax, the rates of tax on imported goods are 5%, 10%, 25% according to the respective schedule of goods. Another schedule represents specific types of foods such as cigarette, liquors, etc. carrying rates above 25%. Commercial Tax, which is basically a kind of turnover tax, is imposed on a wide range of goods and services produced or rendered within the state or imported from abroad. The Commercial Tax Law was promulgated on March 31, 1990 to replace the Commodities and Services Tax Law in order to broaden the tax base, including private sector production, trade, and service activities.

Imports are subject to extensive non-tariff restrictions. Imports of all goods not on two lists (A and B) of priority goods were banned in March 1998. Private importers are required to import 80 % of their imports from List A (essential goods) and 20 % from List B (less essential goods). The number of goods on list B also became concurrent (whereas licenses had previously been issued first for List A goods, and only thereafter for List B goods.) Import licenses are required. Only exporters and others who can document legitimate earnings of foreign exchange are eligible to apply for import licenses.

Exports are also subject to restrictions. Private sector exports of 30 key items (including rice, rubber, and gems) was prohibited in March 1998, for border trade, there is an additional restriction on the private sector export of teak. Private entrepreneurs who carry out reclamation of wetlands are allowed to export 50 % of their output (rice and other restricted products except edible oil seeds); the limit is 55 % for rubber plantations. Exporters were required to pay in foreign exchange an 8 percent commercial tax beginning January 1999 as well as an extra 2 % in income tax.

Trade policy was under the aegis of the Ministry of Commerce which, in turn, was supervised by the Trade Council. The latter was established in 1997 and was chaired by the Deputy Chairman of the State Peace and Development Council. At the beginning of each fiscal year, the Trade Council reviews and approves the general trade policy framework and meets regularly to review current trade issues and approve new policies. The Directorate of Trade, a unit of the Ministry of Commerce, implements trade policies and regulation, including the issuance of export and import

licenses and permits for all local and foreign private enterprises, and certificates of GSP and "Country of Origin" (or) Rule of Origin[76].

Rule of origin is used to determine the nationality of goods traded in international commerce. Each country administers a regional trade agreement and has established its own rule of origin. Rule of origin is essential for policies that discriminate between exporting countries such as quotas, preferential tariffs, anti-dumping actions and countervailing duty. It is also used to compile trade statistics and labels for original products. For all WTO members, rule of origin agreement is required to be transparent, consistent, uniform, impartial and reasonable manner. Countries setting up a free trade area are allowed to use different rules of origin for products traded under their free trade agreement.

4.1.3   Trade Liberalization of Myanmar

Myanmar has changed her economic system from a centrally planned into a market-oriented system since 1988. The market-oriented economic policy was officially adopted only in March 1989.The Foreign Investment Law was introduced along with the removal of restrictions on private sector participation in domestic and foreign trade.

Following the implementation of the Foreign Investment Law, a series of trade liberalization measures were introduced as follows:

(1)   To be in line with the changing economic system, the private individuals or enterprises are allowed to carry out the export import business which was previously monopolized by the state.

(2)   Border Trade was regularized in order to develop and strengthen the bilateral trade relations with the five neighboring countries. Department of Border Trade was established and its 11 branch offices providing one- stop service for border trade matters in collaboration with various departments concerned.

(3)   Export and import procedures were realigned.

(4)   Lowered the technical barriers to trade and simplified export / import procedures geared towards trade facilitation and promotion.

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[76] http://www.comtrade.gov/Directorate of Trade.

(5) Incentives are being given to exporters by allowing 100% retention of export earnings for importation of goods.

(6) Trade notifications are being issued by specifying necessary rules in conformity to the changing internal and external business environment.

(7) Exemption of commercial tax and customs duty on the imported items like fertilizers, agricultural machineries and implements, insecticides and pesticides, medicines and raw materials.

(8) The role of Chambers of Commerce and Industry had reactivated and reorganized the Union of Myanmar Federation of Chambers of Commerce and industry (UMFCCI) for the promotion of trade and industry of the private sector. [77]

Furthermore, major reforms by sectors were introduced. Fishery and aquaculture sector reforms include granting of fishing rights to foreign fishing vessels, marine fisheries, fresh-water fisheries, and aquaculture.

4.1.4 Degree of Openness

When a country liberalizes its economy, it increases its level of openness. Openness shows how open an economy towards other economies is (in respect of external trade)[78].More open countries show a greater tendency to receive technological advances created in leading countries. Therefore, trade liberalization is precondition for growth[79].

Degree of openness (DOO) has taken a critical role in the economic development of a country. Trade openness is an indicator to analyze trade performance. The most commonly used measure is the degree of openness which is defined by exports plus imports divided by GDP.[80]

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[77] http://www.comtrade.gov.mm/eng/dot/trade-regime of myanmar/html

[78] Eva.Chrastine Hiller (2005), Openness, Country Size at Economic Growth, University of Wien, p-9.

[79] Ibid, p-

[80] Arribas, I., Perez, F.^ Totosa-Ausina, E. (2009), Measuring globalization of international trade: Theory and evidence, World Develop.ment pp-127-145

$$DOO = \frac{(X + M)}{GDP}$$

where X is the value of exports, M is the value of the imports, and GDP is the Gross Domestic Product.

Globalization, liberalization, free trade and openness, have been often used to indicate to international markets. Degree of openness in Myanmar after 1988 is shown in Appendix 11. DOO indicates the importance of international trade linkage for a country. Myanmar operates a dual exchange rate system. When government records of trade value with the official rate of around Kyats 6 per dollar was applied, trade share would be smaller and DOO would be decline. But trade share and DOO would be larger if all transactions measured at the parallel market exchange rates. In calculating DOO for simplicity, the value of export, import and GDP were based on dollar value of the United Nations Statistical Yearbooks. The country's trade openness improved after trade liberalization since 1988.

After 1988, the government implemented a number of reforms intended to foster greater economic openness. It began the liberalization of trade by encouraging the expansion of the role of private sector in trade and by eliminating on some rules and restrictions. Moreover, the earlier informal cross-border trade was formalized as a part of trade liberalization process. In fact, the border trade is a mechanism to further develop and strengthen bilateral trade with neighboring countries. Department of Border Trade was established in 1996 and supervises border trade activities under the guideline of the Ministry of Commerce. There are thirteen border trade offices:

(1) Myanmar-China border: Muse, Lewjel, Laiza, Kanpeikree, Chinshwehaw

(2) Myanmar-Thai border: Tachileik, Kawthaung, Myawaddy, Myeik

(3) Myanmar-India border: Tamu, Rhil and

(4) Myanmar-Bangladesh: Maungtaw, Sittway.

Export promotion is being facilitated by private exporters through normal trade as well as through border trade. In 1996 the value of exports raised almost two and half times compared to 1989, but import value rose over three and half times over the same period. Therefore, degree of openness increased to 34.53 %. In 1997, Myanmar became as complementary by investors within the overall production and distribution networks in the Free Trade Areas (FTAs). The principal objective of ASEAN Free Trade Area (AFTA) is to boost ASEAN's attractiveness to foreign

investors, particularly as a base for production for global markets. Trade liberalization in ASEAN countries has made it easier to transfer inputs and outputs across borders among the countries in ASEAN.

Degree of openness increased from 36.35 % in 1997 to 51.90 % in 2007. After 2001, the value of exports exceeded the value of imports because the formidable performance of Myanmar's gas accounted for the bulk of the increase in total exports. But DOO decreased to 39.25% in 2008 because increase in GDP exceeded increase in total trade value. It can be concluded that the total trade value increased by 12 times from 931 million US$ in 1989 to 11249 million US$ in 2008.Therefore, increased openness creates an international interdependency[81].

Moreover, one of the factors that increased in the DOO was the foreign direct investment. Developing countries introduced open economies and practiced FDI. The promoting FDI will lead to faster growth, provide technological assistance, machinery, equipment, improve employment quality and stimulate for R&D. The more the openness in economy, the higher the trade shares in the country, the greater the DOO associated with export and import values. In Appendix 4, total investment was 1312.77 million Kyats in 1991. Total foreign investment increase from 17934.76 million Kyats in 1997 to 102148.301million kyats in 2009. It was found that the foreign investment in 2009 rose over five times compared to 1997. Generally, DOO might rise over time, due to reductions in official obstacles of trade flows.

4.2   Fishery Exports

4.2.1   Domestic Consumption and Export of Fishery Products

Myanmar people normally prefer freshwater fish to marine fish and freshwater fisheries were aimed mainly at domestic food whereas marine and aquaculture were intended for both domestic consumption and exports.

The domestic consumption and exports of Myanmar Fishery products is mentioned in Table 4.1. In 1988/89, 676598.4 metric tons of fishery products (99.2% of total production) went to domestic consumers and the export of fishery products was merely 0.80 % of the total production.

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[81] Michele Alessandriri, Bassan Fattouh, Pasquate Scaranozzino, (2009), "Tariff Liberalization and Trade specialization in India", ADB economic Working Paper Series No 17,p 3

Table 4.1 Domestic Consumption and Export of Fishery Products

<div align="right">(Metric Ton)</div>

Sr. No.	Year	Production	Domestic Consumption		Export	
			Quantity	%	Quantity	%
1	1988-89	682030	676598.4	99.2	5431.6	0.80
2	1989-90	729660	720386.1	98.73	9273.9	1.27
3	1990-91	733740	719712.4	98.09	13927.6	1.91
4	1991-92	757980	743721.0	98.12	14259.0	1.88
5	1992-93	791890	763402.4	96.43	28487.6	3.57
6	1993-94	811340	788124.2	97.15	23215.8	2.85
7	1994-95	823460	726720.0	88.25	96740.0	11.75
8	1995-96	673830	619469.2	91.93	54360.8	8.07
9	1996-97	700190	632789.2	92.28	67400.8	7.72
10	1997-98	927380	853200.1	91.87	74179.9	8.13
11	1998-99	1011180	884306.3	87.45	126873.7	12.55
12	1999-00	1195790	1079180.8	90.25	116609.2	9.75
13	2000-01	1283480	1138856.2	88.96	144623.8	11.04
14	2001-02	1474460	1272793.2	86.32	201666.8	13.68
15	2002-03	1595870	1382870.4	86.65	212999.6	13.35
16	2003-04	1987020	1781556.8	89.66	205463.2	10.34
17	2004-05	2217470	1961689.8	88.46	255780.2	11.54
18	2005-06	2581780	2310709.7	89.50	271070.3	10.50
19	2006-07	2861710	2518283.4	87.99	343426.6	12.01
20	2007-08	3180920	2829268.0	88.90	351652.0	11.10
21	2008-09	3542190	3217479.5	90.83	324710.5	9.17
22	2009-10	3921970	3546277.6	90.44	375092.4	9.56

Source: DoF, Fisheries Statistics, Various Issues

After 1988/89 the share of the domestic consumption declined and share of fish exports increased. The fishery exports increased because not only the State but also the private sector and joint venture companies took part in the export business. In 1994/95, 726720 metric tons (88.25 % of the total production) were distributed to the domestic market and the share of exports increased to 11.75%. The export of 1994/95 included not only border export but also FOB export through the towns of Myeik, Pathien, Sittway and Mawlamyine. In 2009/10, the domestic consumption stood at 3546277.6 metric tons (90.44% of the total production) and the share of the export was 9.56 %.   It was found that the share of export in total production was below 5 % before privatization and it increased nearly about 10 % after privatization.

The total volume of fishery export was apparently increasing, however the proportion ranged between 10 % and 14 % of total production. Fishery products not only freshwater and marine fish and prawns, but also their byproducts such as prawn heads, prawn oil and prawn legs were distributed to the domestic market. Consumers can buy them at the wholesale markets such as Central Sanpya Fish Market, Insein Market, Pazundaung Market, Dala Market, Ahlone Air-conditioned Room and Myanmar Dockyard Piers in Yangon Region.

4.2.2   Fishery Exports of Myanmar

Myanmar fishery exports included freshwater and marine fish, prawn and other marine products. The major export items consisted of sea water shrimp, sea water fish (frozen), sea water fish (chilled), dried fish, lobster, threadfin and live fish. Other marine products were lobster, squid, cuttle fish, crab, sea cucumber, jelly and fish fillet. Most of the exportable fishery products normally come from marine fisheries. Most of the fishery products were block type (frozen with water) and Individual Quick Frozen (IQF) type. According to DoF records, about 646 species of fish were processed and exported to seafood market. Among these species, most popular species were fishes such as rohu, ayer, gowl, hilsa, pam gush, mirka or cat fish, calta, marigal, yellow croaker, barramunadi-fillet, squid, pomfret, red snapper, eel, crab and prawns such as fresh water prawn, tiger, pink, white. The semi-processed wet, dried fish and shrimp, fillets and fish balls are exported to Asia, Middle East, Europe, Canada and Australia.

The main exported culture species of freshwater fish were rohu, mirgal, katla, pomgush (filled), talapia, etc. The main exported capture species of freshwater fish are ayer, bowal, folly, moila, shoil, etc. The exported seawater fish were ribbon fish, hilsa, trash fish, big-eye croaker, palathukae etc. The exported culture species of sea water prawn were tiger and vannamei and capture species of sea water prawn were pink, tiger, white, flower, etc. The other exports mainly consisted of fish meal, live crab, live eel, dried small crab, salted fish, dried prawn, forzen squid, surimi, dried squid, sand crab, fish paste, etc. Moreover, live aquarium fish, live fresh water prawn were also exported to international markets. Appendix 12

Export of fish and fishery products is shown in Table 4.2. Fishery is not a new export item for Myanmar and Fishery products had been exported from Myanmar since 1972. People's Pearl and Fishery Corporation exported fishery products until 1988. Myanmar Fishery Enterprise carried out fishery exports up to 1994. After initiating the economic reform in fishery sector, the government allowed the private participation and liberalized domestic and foreign trade. The government allowed the private sector to export fishery products through normal and border trade legally. Total fishery export volume was 5431.6 metric tons in 1988/89, and increased to 23215.8 metric tons in 1993/94. So the fishery export increased over 4 times compared to 1988-89. Before 1994/95, the export of fishery product was the highest in 1992/93 because the area of fish ponds were expanded from 8328 acres in 1990/91 to 56790 acres in 1992/93 due to 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 contributors in foreign exchange earning. In 1995/96, total fishery export volume was 54360.8 metric tons and increased to 351652.0 metric tons in 2007/08. So the fishery export increased over three times compared to 1995/96.

From 1994/95 to 2009/10, the highest growth rate of fishery export was in 1998/99. The volume of fish export was 45835.7 metric tons in 1997/98 and increased to 70906.4 metric tons in 1998/99. The growth rate of fish exports was 55% from 1997/98 to 1998/99. Similarly the volume of other fishery export was 14859 metric tons in 1997/98 and increased to 42202.8 metric tons in 1998/99. The growth of total fishery export was 71% in 1998/98. This was because number of fishery importing countries from Myanmar increased. There were 42 countries which were importing

Myanmar fishery products in 1998-99. Moreover, not only sea water fish and prawns but also fresh water fish and prawn could be exported.

After 1994/95, the export volume of fishery increased significantly. In 1994/95, Myanmar Fisheries Enterprise was abolished and the fishing boats and cold storages were hired to the private and the fish and prawn catching and exporting were extended by the private sector. The private companies exported with FOB from Myeik, Kawthaung, Pathein, Sittway and MawLamein and the fishery product exports increased to 96740 metric tons in 1994/95. To exceed the fish for the domestic consumption and to export the surplus for earning were one of the Ministry's goals. According to these goals, the investment in Fishery sector has developed since 1994/95. Moreover, Law Relating to the Fishing Rights of Foreign Fishing Vessels (1993) encouraged the development of foreign investment. Under foreign investment law, many joint ventures and foreign companies carried out fishing in deep sea area and shrimp farming.

Export to Thailand was stopped temporarily in 1995/96. Fish and prawns exported to Thailand by border trade were the most. So the export declined to 54360.8 metric tons in that year. The fish and prawn exports increased to 67400.8 metric tons in 1996/97 because the government permits to export directly by giving 15,000 US$ per fishery boat. In 1996/97, the total fishery exports increased twelve folds than 1988/89.

In 1997/98, the EU had imposed 14.4% tariffs on Myanmar fishery products. In late 1998, there was a worldwide crisis in seafood markets and as a consequence fishery prices had fallen. In addition, worldwide rise in oil prices during early 2000 has had repercussions on the marine fisheries. The rise in diesel fuel prices means some fishermen cannot afford to go out to sea. Exports of fish and fishery products decreased to 116609.2 metric tons in 1999/2000.

In 2002/03, the export of fish and prawns increased to 212999.6 tons worth of US$ 317.4 millions. According to the DoF statistics, in 2002/03, 316 local companies and 6 Joint venture enterprises had shipped, including through border trade, to 43 countries.

Table 4.2 Export of Fish and Fishery Products (1988/89 to 2009/10)

Quantity -Metric Ton
Value -US$ million

Year	Fish		Prawns		Others		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1988-89	3819.70	2.10	1312.70	7.60	299.20	0.50	5431.60	10.20
1989-90	7116.90	4.00	2131.60	11.30	25.40	0.10	9273.90	15.40
1990-91	11621.10	5.90	1273.00	7.00	1033.50	0.50	13927.60	13.00
1991-92	11032.00	5.70	2672.90	15.80	554.10	0.10	14259.00	22.50
1992-93	21053.00	12.90	5827.10	34.00	1608.50	0.10	28487.60	51.00
1993-94	12884.10	12.70	6195.00	45.10	4136.70	1.00	23215.80	68.90
1994-95	78590.00	35.30	7940.00	63.20	10210.00	4.10	96740.00	120.60
1995-96	34740.90	28.50	8814.50	72.40	10805.40	10.60	54360.80	113.70
1996-97	41068.30	45.90	12827.80	95.60	13504.70	22.10	67400.80	163.00
1997-98	45835.70	54.20	13467.20	91.90	14859.00	21.00	74179.90	167.10
1998-99	70906.40	70.20	13764.50	96.90	42202.80	34.10	126873.70	201.30
1999-00	72210.00	68.80	15536.00	90.70	28863.10	24.30	116609.20	183.70
2000-01	92302.20	80.70	19477.20	104.20	32844.30	33.30	144623.80	218.30
2001-02	138250.70	103.60	21453.80	94.40	41962.20	53.50	201666.80	251.50
2002-03	136036.20	143.10	22868.10	105.20	54095.20	69.00	212999.60	317.40
2003-04	124615.60	127.20	22983.40	113.60	57864.20	77.70	205463.20	318.50
2004-05	159400.60	162.00	23662.80	113.70	72716.80	71.20	255780.20	346.90
2005-06	173055.70	180.40	23347.70	105.00	74666.90	73.80	271070.30	359.20
2006-07	237581.80	240.80	25511.00	121.70	80333.80	103.70	343426.60	466.20
2007-08	245473.20	315.50	21661.20	109.70	85117.60	135.80	351652.00	561.00
2008-09	234060.74	273.26	18382.10	88.85	72267.70	121.11	324710.54	483.20
2009-10	277823.74	309.85	17439.31	56.33	79829.38	130.40	375092.43	496.59

Source: DOF, Fishery Statistics,
Various Issues.

Figure(4.1)Export of Fisheries Product(1988/89-2009/10)
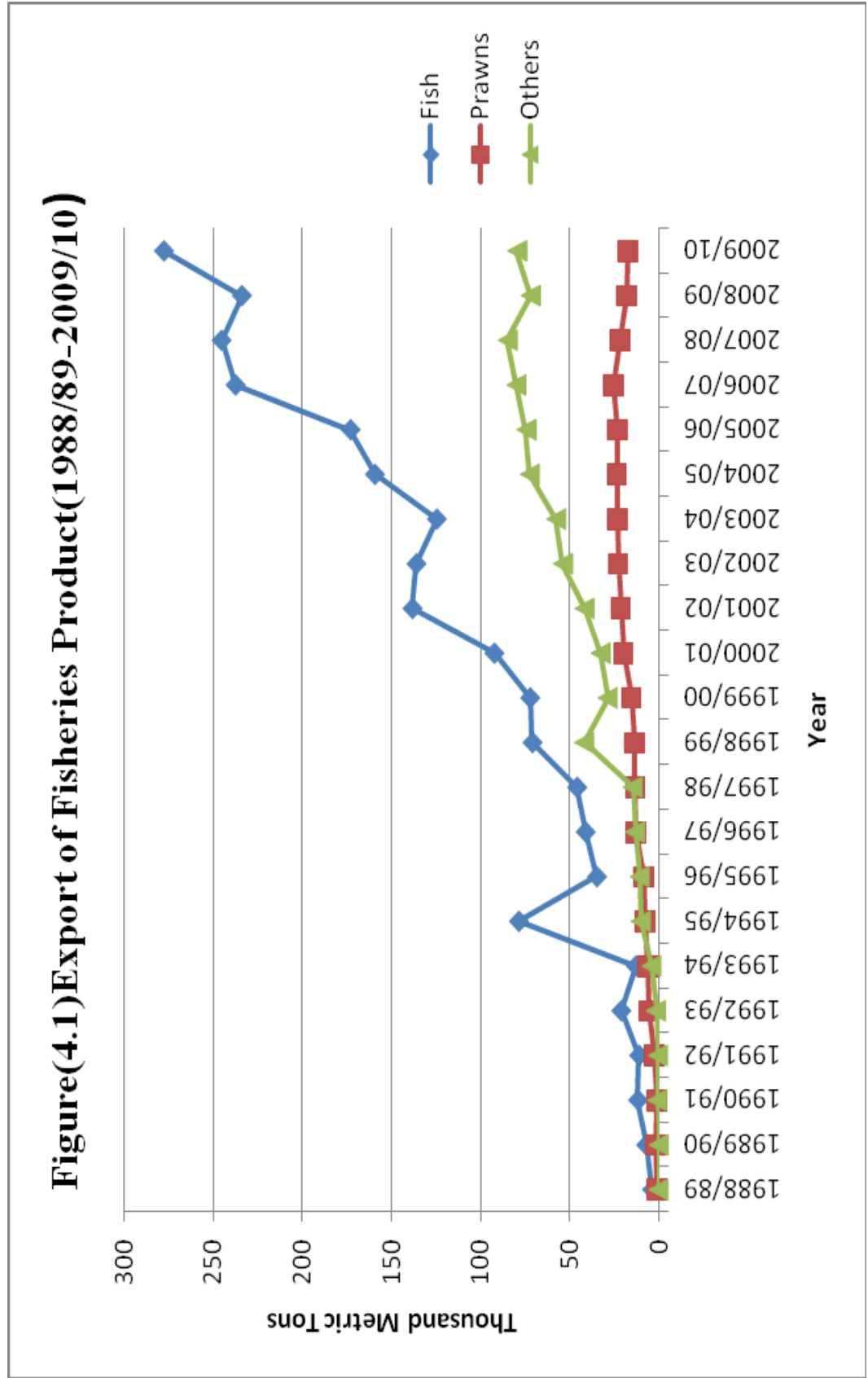
But there were only 20 countries which were importing Myanmar fishery products in 1993-94. Major importing countries of Myanmar fish and fisheries products were Singapore, Thailand, Hong Kong, China, Japan, Malaysia, Austria, Britain, U.S.A and Indonesia. In 2002-03, China is the major importer of Myanmar fish and fisheries, it is also learnt that U.A.E and Bangladesh were imported more fish amount from Myanmar. Most of the products were sold out to China, Thailand and Bangladesh through border trade. China especially bought Myanmar product to sell out to the northern parts of its country and Bangladesh also bought not only iced and chilled fish but also dried fish.

On 29th July 2003, U.S.A executive order imposing economic sanctions on Myanmar. Economic sanction includes prohibition of remitting money directly or indirectly to Myanmar from U.S.A persons or whatever located, made by a foreign persons for financing, facilitating or guaranteeing and any products from Myanmar was prohibited for importation into the U.S after effective date of this order. As a result, the foreign exchange earnings from Myanmar garments (CMP System) and sizeable quantity of fishery products at main area of exports to U.S.A which hurt by the sanctions. It declined to 205463 metric tons in 2003/04.

The country's fishery export was 351652 thousand metric tons in 2007/08 but it dropped to 324710 in 2008/09. Myanmar had made endeavors to attain 850 million dollars in its fishery exports in 2008/09 but failed due to the impact of 2008 May Storm, the global financial crisis and the flash surge of hard currency exchange rate[82].

Fish was exported by 3819.7 metric tons in 1988/89, (70.32 % of total export) and it increased up to 277823.74 metric tons (74.07%) in 2009/10. Prawns were exported by 1312.7 metric tons, (24.17% of total export) in 1988/89 and increased up to 17439.31 metric tons, (4.65%) of total exports. It was compared the fish and prawns exports, prawns export was more than fish export before 1988/89. After 1988/89, fish export volume was greater than export of prawns; it was not because of declined in prawn exports because of increase in fish export. Other fishery export products increased year after year due to increase of export of Surima and Fish meal. New export items like Soft Shell Crab and Trochus Shell Button became popular by export promotion.

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[82] Myanmar Fishery Federation to present paper to 2050, FAO conference, (24/6/2009), Xinhua, Global Times.

In comparison the export value of fish and prawns, fish export value was 2.1 million US$ in 1988/89 and increased U.S $ 315.5 million in 2009/10. Prawns export was US$ 7.6 million in 1988/89 and increased US$ 109.7 million in 2009/10. Prawns export tonnage was less than fish exports, it could earn more foreign exchange than fish exports. It was because prawns can be processed and the price per tonnage was relatively high, compared to fish exports.

To estimate the fishery exports growth potentials, Semi-log trend model is used in this section. The results for each group of exports (from 1988/89 to 2009/10) are shown in Appendix 12 and the summary of average annual growth rate for fishery exports are presented in Table 4.3. The average annual growth rate of other fishery export quantity (OFEQ) was found to be the largest at 34.99%.The average annual growth rate of prawn export quantity (PEQ) was the smallest at 13.88 %. The growth rate of fish export was 20.56% because the export of Rohu increased significantly. Moreover, most of the other fishery products can be exported as raw products and people bought more other fishery product in later years. Myanmar exported varieties of 139 species of other fishery products.

Table 4.3 Estimation of Average Annual Growth Rates for Fishery Exports (1988/89 to 2009/10)

Particulars	Growth Rate (%)	R_a^2	Computed F - value
Fish Exports Quantity (FEQ)	20.56	0.906	203.764*
Prawn Exports Quantity (PEQ)	13.88	0.752	64.767*
Other Fishery Exports Quantity(OFEQ)	34.99	0.779	75.003*
Total Fishery Exports Quantity(TFEQ)	21.05	0.906	203.365*

*significant at 1 % level

4.2.3 Export Destinations of Fishery Products

Fishery exports to major trading countries from Myanmar is mentioned in Table 4.4 and fishery export to other trading countries are shown in Appendix 13. After trade liberalization most of the importing countries of fishery from Myanmar were Asian countries until 1993/94. They included China, Thailand, Singapore, Malaysia, Japan and Hong Kong. Among these countries Thailand was the largest importer of fishery products from Myanmar until 1997/98. After the privatization in 1994-95, private sector carried out export and export had been growing up since then. The import of fishery products of neighboring countries (Thailand, China) from Myanmar increased dramatically. Thailand import of fishery increased to 74325 metric tons (10 times compared with 1993-94. Thailand was main importer of Myanmar's fishery product. Singapore was second largest importer and China was the third largest importer in that year.

In 1998/99, China was the largest importer of fishery products. (48.21% of the total fishery export). China was the largest importer of fishery products from 1998/99 to 2005/06. Thailand was the second largest importer of fishery products of Myanmar and imported 31056 metric tons (24.48% of the total fishery import in Myanmar). Singapore was the third largest importer of fishery products of Myanmar and imported 12092 metric tons (9.53% of the total fishery import in Myanmar).

The import of fishery products from Myanmar for most countries declined in 2003/04 due to world financial crisis. Foreign imports could not buy a lot of fishery. In 2007/08, China's import of fishery from Myanmar stood at 84980 metric ton (24.71%of the total fishery export). Thailand's import of fishery increased to 48820 metric ton (14.19% of the total fishery export) and Singapore increased to 32095 metric ton (9.33% of the total fishery export in Myanmar). China was still the largest importer of fishery products from Myanmar. Fishery import of Japan from Myanmar increased from 1991/92 to 2007/08. But it declined to 6216 metric tons in 2009/10. The export of fishery to China had been a yearly increase after 1994/95. However, a fall in export to China was noticed for the period of 2003/04 because euro currency was accepted during the period of 2003/04. Not only that, Myanmar currency was also accepted in the border areas in selling fishery products. The export of fish and prawns to China had seen a steady decrease beginning with after Nitrofural tests had been performed on them. However, these tests were not undertake on the exports of fish and prawns to Singapore. However, it had been

found that China had been buying Myanmar fish and prawns from Singapore. Therefore, the export of fish and prawns from Myanmar decreased to55991 metric tons for the period of 2009/10, making up 15 percent of the total export of fish and prawns from Myanmar. China and Thailand imported fishery products from Myanmar through various inspection check points. There are 8 check points, Myeik, Kawthaung, Muse, Myawaday, Maung Taw, Sitwe, Thantwe, Tamue. Other countries imported with normal trade.

Fishery exports to Thailand decreased considerably during the period of 2002/03. It stood at 21069 metric tons during this period. However, the export of fish and prawns to Thailand has seen a steady increase since the period of 2002/03. It increased to 121765 metric tons during the period of 2006/07. Thailand succeeded in aquaculture but some ponds were destroyed by water pollution and virus. So, Thailand became the largest buyer of Myanmar fish and prawns in 2006/07. However, Thailand's import of Myanmar fish and prawns considerably decreased to 48820 metric tons during the period of 2007/08.

The export of fish and prawns to Singapore varies considerably every year. It increased gradually after the period of 2006/07 because fish and prawns can be exported to Singapore without having to perform Nitrofural tests and Singapore becomes a re-exporting country to China.

The export of fish and prawns to Malaysia stood at 48 metric tons during the period of 1988/89, making up 0.34 % of the total export of fish and prawns from Myanmar. There had been a yearly increase in export to Malaysia. Malaysia's import was 2974 metric tons in 1998/99 and it reached 80835 metric tons in 2007/08. Malaysia's fishery import dramatically increased 27 times compared with 1998/99. Malaysia became the second largest importer in 2007/08. But Malaysia fishery import from Myanmar declined to 21351 metric ton in 2009/10. Malaysia became the second largest buyer of Myanmar fish and prawns during this period. After buying the fishery from Myanmar, those products are made to value-added product and then Malaysia exported to other countries. Moreover, Malaysia exported oceanic fish to Myanmar and those products were made to value added product in Myanmar. After that, Malaysia bought those value-added products and re-exported to other countries.

Table 4.4 Export Destinations of Fishery Products

Metric Ton

Sr. No.	Year	China	Thailand	Singapore	Malaysia	Japan	Hong Kong	Other	Total
1	1991-92	3508	6143	3701	48	271	508	80	14259
2	1992-93	3954	15590	3720	26	631	3607	960	28488
3	1993-94	5021	6771	6604	301	1624	1860	1035	23216
4	1994-95	4205	74325	7212	480	3467	3282	3769	96740
5	1995-96	7341	25716	8436	3792	2566	4685	1825	54361
6	1996-97	10001	11997	14613	15233	4313	8130	3113	67401
7	1997-98	18828	22058	15528	3177	3485	5295	5808	74179
8	1998-99	61163	31056	12092	2974	3248	4410	11930	126873
9	1999-00	65410	12344	9165	5279	3868	3956	16587	116609
10	2000-01	69015	23585	9519	11306	4293	5543	21362	144623
11	2001-02	77311	62856	7636	11131	4651	5685	32396	201666
12	2002-03	100807	21069	12774	27620	6817	4309	39603	212999
13	2003-04	97246	29262	10966	17804	84654	5879	40348	205463
14	2004-05	115336	49173	13175	8664	10386	5746	53300	255780
15	2005-06	101677	62042	9268	11128	10679	6976	69300	271070
16	2006-07	90197	121765	18362	10288	12211	4365	86238	343426
17	2007-08	84980	48820	32095	80835	10524	3141	91257	351652
18	2008-09	58921	89489	56754	23004	6514	1282	88746	324210
19	2009-10	55991	122818	46425	21351	6216	1187	121104	375092

Source : DoF, Fishery Statistics, Various Issues

Figure 4.2 Exports to Major Trading Countries from Myanmar (1991/92)

1.90%   3.56%

0.34%   0.56%

25.46%1   24.60%

43.08%

⊠China ⊡Thailand ▢Singapore ▢Malaysia ▨Japan ▣Hong Kong ▤Others
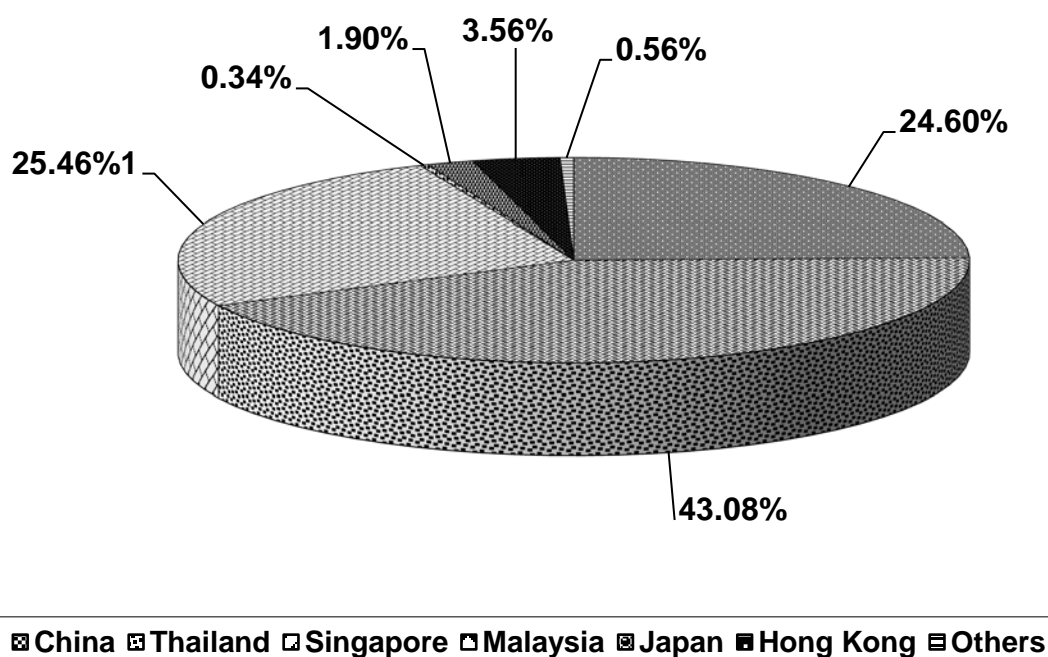
Source: Table 4.4

Figure 4.3 Exports to Major Trading Countries from Myanmar (2009/2010)

32.29%   14.93%

0.31%

1.65%   32.75%

5.69%

12.38%

▢China ⊡Thailand ⊠Singapore ▢Malaysia ▤Japan ▣Hong Kong ▤Others
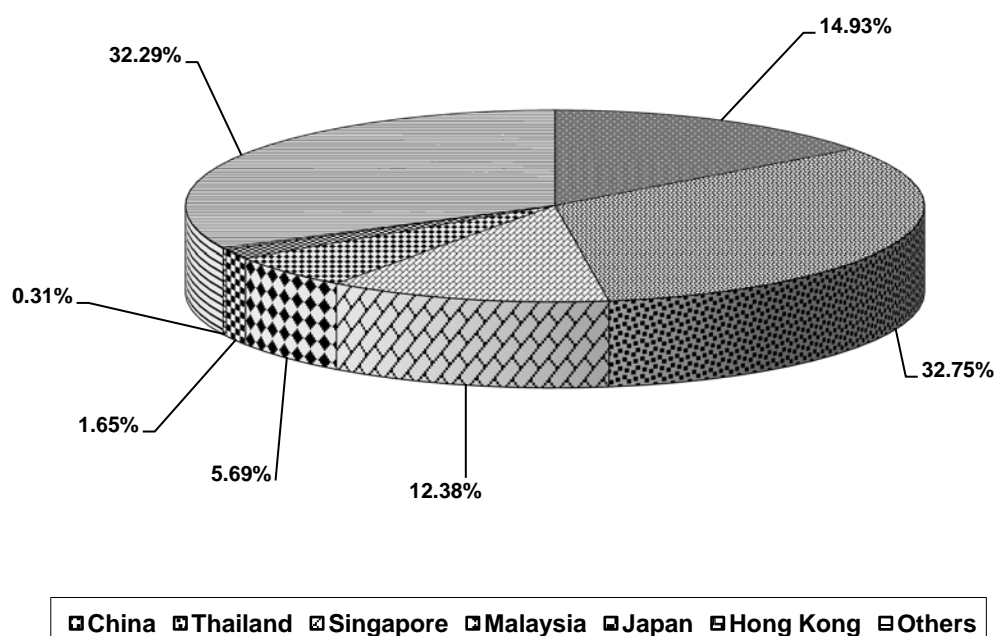
Source: Table 4.4

Export to others countries was significant change in 1998-99 because UK, UAE, Australia, Switzerland, Saudi, Kuwait imported Myanmar fishery increasingly. Export of Myanmar fisheries to others countries were 11930 metric tons (9% of total fishery export) in 1998-99 and increased to 121104 metric ton (32% of total fishery export) in 2009-10. This is shown in Appendix 13. Kuwait, Saudi, UAE influenced the others fishery exporting countries after 2006-07. They imported mostly freshwater fish especially Rohu which was popular in export markets. Kuwait imported 58747 metric tons (15.66 % total fishery export) and became the second largest importer countries from Myanmar fishery in 2009-10. For the export market, Australia made the restriction to import only from Disease Free Country and Disease Free Zone. The charges for inspection of shrimp were increased and fishery export to Australia declined.

After establishing the Department of Border Trade in 1996, there were 13 border trade offices. Fishery export from border was 14747 metric tons (19.88 % of total fishery export) in 1997-98. (Appendix 14). It increased to 50.28 % of total fishery export dramatically and it was round about 50 % of total fishery export after 1997-98. There were six countries related to export by border trade in 2009-10. They were Thailand, China, Bangladesh, India, Malaysia, and Hong Kong. Thailand was biggest customers in border trade of fishery products. Therefore, fishery export from border trade became important as well as normal trade.

4.3 Analysis on Myanmar Fishery Exports

4.3.1 Revealed Comparative Advantage (RCA)

In theoretical models, comparative advantage is expressed in terms of relative prices evaluated in the absence of trade. Since these are not observed, in practice comparative advantage is used indirectly, Revealed comparative advantage indices (RCA) introduced by Balassa (1967), are used to identify the commodities which are of relative importance in the export of Myanmar.

Many different RCA indices have been suggested. The standard Balassa's RCA measure is the most widely used by applied economists and is applied in the study.

(a)RCA index defined in terms of relative competitiveness

Let X_{ij} denote individual country i's export of product j, then the standard Balassa's RCA index can be defined as[83]

$$RCA_{ij} = S_{ij}/S_j$$

where $S_{ij} = X_{ij}/\sum_i X_{ij}$ denotes country i's share in export market j and

$S_j = \sum_j X_{ij}/\sum_i\sum_j X_{ij}$ denotes the share of country i's total exports in the entire world export market. RCA compares country i's share in export market j to its share in the entire world export market.

In other words, RCA, measures country i's, $RCA_{ij} > 1$, which indicates that country i's share in market j is greater than its share in the world market, implies that the country is relatively more competitive in the market j than in other markets. This is often taken as evidence that country i has a revealed comparative advantage in exporting product j.

Conversely, $RCA_{ij} < 1$ implies that country i is less competitive in market j than in other markets, which is often taken as evidence that country I has a revealed comparative advantage in exporting product j.

(b)RCA index defined in terms of relative specialization

Equivalent to above equation, the RCA index can also be defined in another form as[84]

$$RCA_{ij} = C_{ij}/C_j$$

where $C_{ij} = X_{ij}/\sum_j X_{ij}$ represents the proportion of country i's export of product j to its total exports; and

$C_j = \sum_i X_{ij}/\sum_i\sum_j X_{ij}$ represents the proportion of total world exports of product j relative to the total world exports of all products.

RCAij > 1 implies that country i's export specialization in product j is higher than the world average export specialization in the product, which provides another interpretation of country I's comparative advantage in product j.

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[83] Junning Cai, PingSun Leung, Nathanael Hishamunda, (2009), Assessment of comparative advantage in aquaculture, FAO Fisheries and Aquaculture Technical Paper 528, FAO, Rome, p-7.

[84] Ibid,p-8.

Conversely, $RCA_{ij} < 1$ implies that country i has below average export specialization in the product j, which indicates its comparative disadvantage in that product.

After 1988-89, Myanmar has undertaken a series of economic reforms towards opening up of the economy. Notable among these has been the extensive effort to liberalize its international trade. It is therefore expected that trade liberalization in Myanmar would have led to changes in the composition of exports so as to reflect Myanmar's comparative advantage in the global economy.

In Table 4.5, Myanmar's Revealed Comparative Advantage in some products are mainly calculated based on data availability. The revealed comparative advantage index indicates the products that had the potential to penetrate the world market through the product diversification.

Table 4.5 Myanmar's Revealed Comparative Advantage in Products

Commodity	1995	2000	2005	2008
Fish	6.41	10.88	15.88	12.47
Rice milled	70.50	22.95	9.77	3.13
Cereals	15.71	5.63	2.59	0.75
Maize	4.28	6.14	1.69	3.62
Sugar	1.25	1.28	0.03	-
Fruits	0.40	-	0.02	0.009
Coffee	-	0.99	0.09	0.13
Tobacco	0.09	0.48	0.47	0.10
Tea	-	0.05	0.23	0.32
Oil and fats	-		0.02	0.004

Source: Calculation based on FAO Trade Yearbook, Various Issues and FAO
                Statistical Yearbook, Fisheries, Commodities, Various Issues

From the results, among the export items, rice milled showed the highest RCA value and its RCA was 70.50 in 1995, followed cereals and fish. In 2000, rice milled

was highest RCA (22.951). Fish and cereals ranked second and third and their RCA were 10.88 and 6.63. Maize ranked fourth and its RCA was 6.14. In 2005,RCA of fish RCA was the highest. Rice milled stood second and its RCA was 9.77. In 2008, RCA of fish was also the highest (12.47).

RCA value of rice milled was 70.50 in 1995, but it declined dramatically to 22.95 in 2000, 9.77 in 2005 and reached to 3.13 in 2008. RCA value of maize was 4.28 in 1995 and reached to 3.62 in 2008. The RCA value for cereals had been falling; from nearly 16 in 1995 to 3 in 2005 and then 0.75 in 2008. RCA value of sugar was 1.25 in 1995 and had declined to 0.99 in 2000 and reached 0.03 in 2005. RCA of fruit, coffee, tea, tobacco, oil and fats were less than unity. Therefore, those commodities have a revealed comparative disadvantage.

Fish had been rising nearly 3 times from 6.41 in 1995 to 15.88 in 2005. But its RCA declined to 12.47 in 2008. Although rice milled, maize, and cereals had comparative advantage, their RCA's declined in the study period. Thus as expected Myanmar revealed a strong competitive advantage in fish. As the export of fishery increased in both volume and value of fisheries in Myanmar, Myanmar fishery penetrated in world market. Myanmar fishery exporter applied border as well as normal trade channels. Moreover, they distribute either directly or through other enterprises to their customers. The government needs to emphasize on fishery sector for export diversification and to improve quality for the competitiveness to penetrate the world market. Export promotion activities which have to be carried out simultaneously require standardization of the quality of the respective products which should be upgraded to the international level. Furthermore, the government should endeavor and encourage private entrepreneurs of export intensive industries to improve the competitiveness of these commodities, which are already strong in RCA, to penetrate world market.

RCA index of a country is bound to be affected by changes in the exchange rate of the country's currency. To avoid or minimize this effect, this study has employed only US dollar values for export in the model to calculate RCA indices of Myanmar and other selected countries. RCA of fish in some selected Asia countries is shown in Table 4.6.

Table 4.6 RCA's of Fish in Some Selected Asian Countries

Countries	1990	1995	2000	2005	2008
Brunei	0.02	.003	1.21	0.01	0.17
Cambodia	-	4.14	2.79	1.98	1.12
China	0.98	1.08	1.05	1.08	1.28
India	2.51	3.13	3.58	3.16	1.72
Indonesia	3.73	3.64	4.04	2.87	3.35
Japan	0.27	0.16	0.19	0.21	0.37
Lao	-	0.02	0.01	0.00	0.02
Malaysia	0.76	6.45	0.41	0.44	0.68
Myanmar	5.98	6.40	10.88	15.88	12.47
Philippines	4.73	2.87	1.16	1.26	1.97
Singapore	0.67	0.49	0.38	0.27	0.48
Thailand	3.37	7.81	7.112	5.96	6.57
Vietnam	-	9.33	11.81	13.33	10.25

Source: Calculation based on FAO Trade Yearbook, Various Issues and FAO
               Statistical Yearbook, Fisheries, Commodities, Various Issues

From the analysis of computed RCA indices of selected countries that exported fishery product to the world market, Myanmar had the highest RCA (5.98) in 1990. Philippines and Indonesia ranked second and third, their RCA were 4.73 and 3.73, respectively in that year. Thailand ranked fourth and its RCA was 3.37.

Vietnam and Thailand had very high RCA indices in 1995. They were ranked first and second and their RCA were 9.33 and 7.81. Malaysia ranked third and its RCA was 6.45. Myanmar ranked fourth and its RCA was 6.40 in 1995.

Moreover Vietnam had also similar position and its RCA was 11.81 in 2000. But Thailand was ranked third and Myanmar reached the second position in 2000 and its RCA was 10.88.Moreover, Myanmar had the highest RCA which was 15.88 in 2005. Vietnam and Thailand were ranked second and third, and their RCA indices were 13.33 and 5.96, respectively. India was ranked fourth and its RCA was 3.16.

Compared to different periods, Myanmar's RCA indices showed a rising trend. It increased to 15.88 in 2005. But it declined to 12.47 in 2008 but it was the highest in the selected countries in that year. In 2008, Vietnam and Thailand were ranked second and third, respectively. Therefore Myanmar competed with Vietnam and Thailand in Asian fishery market as well as world market.

On the contrary, the competitors experiencing the increases of their RCA indices were Myanmar, Vietnam, Thailand. These countries were able to maintain their comparative advantage in exporting the fishery to the world market. Among these countries, Myanmar indices had increased continuously. Myanmar could maintain its position as the country with the highest value of RCA index among the selected countries in 2005 and 2008. Brunei, Laos, Malaysia, Singapore and Japan were the countries having the comparative disadvantage in all studied period.

4.3.2   The Constant Market Share Approach (CMS)

A country's export market share and the changes in it over time are often used as measures of competitive capacity abroad. However, changes in market share can be influenced not only by actual movements in price and non price competitiveness, but also by the composition of exports, whether in terms of type of product or geographical distinction. For example, if a country specializes in exports of goods where demand is particularly buoyant, the market share will increase even though competitiveness does not improve. This analyses the extent to which changes in the market shares of the fishery product between 1994 and 2008 have been determined by genuine changes in their competitiveness.

For this purpose the Constant Market Share Approach (CMS) is widely used to evaluate export performances and to analyze the determinants of fishery export growth. Among studies which applied this model are Leamer and Sterm (1970), Richardson (1971), Rigaux (1971), Sprott (1972), Bidun Farusi (1980), Bowen and Pelzman (1984) and Fatimah and Roslan (1989).

In analyzing the growth of Myanmar fisheries exports a Constant Market Share Approach is used. According to this theory the growth in the volume of exports of a commodity can be attributed to three factors:

(a)   Size of market effect

Total world export of that commodity may have increased and the country in question has maintained its share in the general growth.

(b)   Distribution effect

The export of the particular country may be concentrated in regions in which demand is growing relatively fast, compared to the world average.

(c)   Competitive effect

The country may have been able to compete effectively with other sources of supply in the same market. At the heart of the method is the assumption that a country's share in the world market normally remains unchanged over time unless it is competitive. The difference between the export growth implied by this constant share norm and the actual export performance is attributed to a residual effect, comprising among other things, of elements of competitiveness.

The distribution effect is that portion of sales gain or loss caused not by changes in market shares but rather by shifts in the relative importance of the designated markets in the total market.

The competitive factor is defined as the export gain or loss of the country which can be attributed to competitive changes in given markets as reflected in its market shares (Rigaux 1971) .Such an effect is zero if its shares remain constant or if rises in its shares of some markets exactly offset declines in its shares of others. The size of market effect can enhance or offset changes associated with the other two effects.

Attempts at empirical analysis utilizing this approach include the work of Gimsburg (1969) Rigaux (1971) and Sprott (1972). Leamer and Stern (1972) provide an elaborate description of the theory underlying this analytical technique which is shown in Appendix 5.

Results of the CMS Approach in Myanmar Fishery Export before 1994-95

In analyzing the growth of Myanmar fishery exports by the constant market share approach as outlined in the previous section the following results were observed in Table 4.7, 4.8 and 4.9.

Table 4.7 Constant Market Share Analysis in Myanmar's Fishery Exports (1991 and 1993)

Markets	World total		Myanmar export		r_j (5)= (2)÷(1)-1	$r_jQ^1M_j$ (6)=(5)x3	rQ^1M_j (7)=rx(3)	$Q^2M_j - Q^1M_j - r_j Q^1 M_j$
	1991 (1)	1993(2)	1991(3)	1993(4)				
China	784	936	3.51	5.02	0.05	0.17	0.21	1.3
Thailand	723	757	6.14	6.77	0.07	0.43	0.37	0.26
Singapore	209	209	3.70	6.60	-0.04	-0.15	0.22	2.68
Malaysia	244	260	0.05	0.30	0.19	0.01	0.00	0.25
Others	15610	16418	0.85	4.53	0.05	0.04	0.05	3.63
Total	17570	18580	14.25	23.22	r = 0.06	0.50	0.86	8.12
	$\sum Q^1_t$	$\sum Q^2_t$	$\sum Q^1M_j$	$\sum Q^2M_j$		$\sum r_j Q^1M_j$	$\sum r Q^1M_j$	

Source : FAO Statistical Yearbook, Fisheries, Commodities, Various Issues and DoF,

Statistical Yearbook, Various Issues

Table 4.8 Components of Myanmar Fishery Export Gain (1991 and 1993)

Actual Export	1991	1993
World (Thousand metric tons)	17570	18580
Myanmar (Thousand metric tons)	14.25	23.22
Myanmar Market Share	0.08%	0.12%

Source: According to Table (4.7)

Table 4.9 Gain for Myanmar (1991 and 1993)

Effects	Thousand metric tons	%
Total gain	8.63	100
(a) Size of market effect = $\sum r Q^1 M_j$	0.86	9.96
(b) Distribution effect = $(\sum r_jQM^1 - \sum rQM^1)$	-0.35	-4.05
(c) Competitive effect = $\sum_j (Q^2M_j - Q^1M_j - r_j Q^1 M_j)$	8.12	94.09

Source: According to Table (4.7).

During the period 1991 to 1993 the world growth rate (r) was found to be + 0.06. However, during the same period Myanmar fishery exports increased from 14.25 thousand metric tons to 23.22 thousand metric tons to thousand metric tons, a growth rate of 0.63% over the period.

Out of the total gain of 8.63 thousand metric tons, the size of market effect accounted for +0.86 thousand metric tons. So total world fishery export may have increased, and Myanmar has maintained its share in the general growth.

The distribution effect was -0.35 thousand metric tons which showed that in 1991 some Myanmar Fishery exports were still concentrated in markets whose growth rates in 1991 to 1993 were lower than average in the world fishery trade for this period. The negative distribution effect in the period was due, in terms of product categories, to the poorer competitiveness of low technology goods. Myanmar's fishery had not been exported yet to good quality markets which were increasing demand. Therefore it was imported not only to expand markets but also to build ice-plant, cold storage, nearby coastal towns in order to export good quality fishery products.

The analysis shows that the growth of Myanmar fishery exports was strongly influenced by the competitive effect which accounted for 94.09 % of the total increase in exports. This large variation cannot be explained only by the price changes of Myanmar fishery exports relatively to its competitors. During the period Myanmar had tried to improve its stability by increasing production and to increase its share established markets.

Results of the CMS Approach in Myanmar Fishery Export after 1994-95

The most important factor of the constant market share is the importance of the choice of the study years because the effects can vary depending on the difference in the study year. Myanmar's market share of fishery exports had been studied by means of constant market share approach and by comparing 1996 situation with 2008 situation depending on the data collection.

After the year 1994 Myanmar Fishery Enterprise was abolished and private entrepreneurs were given permits to do culture and capture business in fishery. Therefore, the production and export of fishery increases and the size of market effect had been positive.

Table 4.10 Constant market share analysis in Myanmar's fishery exports

(1996 and 2008)

Markets	World total		Myanmar export		r_j (5)= (2)÷(1)-1	$r_jQ^1M_j$ (6)=(5)x3	rQ^1M_j (7)= rx(3)	Q^2M_j – Q^1M_j - r_j $Q^1 M_j$
	1996 (1)	2008(2)	1996(3)	2008(4)				
China	1367	3750	10.00	58.92	1.74	17.4	4.7	44.22
Thailand	787	1675	11.99	89.48	1.13	13.55	5.64	71.85
Singapore	197	222	14.61	56.75	0.13	1.89	6.86	35.28
Malaysia	286	304	15.23	23.00	0.06	0.91	7.16	0.61
Others	18663	25328	15.57	96.06	0.36	5.61	7.32	73.17
Total	21300	31279	67.4	324.21	r = 0.47	39.36	31.68	225.13
	$\sum Q^1_t$	$\sum Q^2_t$	$\sum Q^1M_j$	$\sum Q^2M_j$		$\sum r_j Q^1M_j$	$\sum r Q^1M_j$	

Source : FAO Statistical Yearbook, Fisheries, Commodities, Various Issues and DoF,

Statistical Yearbook, Various Issues

Table 4.11   Components of Myanmar Fishery Export Gain (1996 and 2008)

Actual Export	1996	2008
World (Thousand metric tons)	21300	31279
Myanmar (Thousand metric tons)	67.40	324.21
Myanmar Market Share	0.32%	1.04

Source: According to Table 4.10

Table 4.12   Gain for Myanmar (1996 and 2008)

Effects	Thousand metric tons	%
Total gain	264.49	100
(a) Size of market effect = r Q^1 M_j	31.68	11.98
(b) Distribution effect = ($\sum r_jQM^1$-$\sum rQM^1$)	7.68	2.90
(c) Competitive effect = $\sum_j$ (Q^2M_j - Q^1M_j - r_j Q^1 M_j)	225.13	85.12

Source: According to Table 4.10

In other words, with the supply of fishery products increasing, Myanmar's fishery exports rose from 67.4 thousand metric tons to 324.21 thousand metric tons with a growth rate of +3.81 over the period. The size of market effect was 31.68 thousand metric tons in Table 4.10, 4.11, 4.12.

The distributive effect, which had been negative in the (1991-93) analysis, has become + 7.68 thousand metric tons 2.90 % of the total because Myanmar's fishery products were able to exported to good markets after 1994. Myanmar had already succeeded in diversifying her export outlets and her exports have since become concentrated in markets whose growth rates are relatively faster than the average world growth rate. During the study years Myanmar was able to export more fishery products to large market places such as the United Kingdom, the U.S.A., Hong Kong, Canada, Switzerland, Japan and Australia. Besides, Myanmar was able to export more of its fishery products to re-exporting countries such as Thailand, Malaysia and Singapore.

Competitive effect accounted for 85.12 % of the total increase in exports. Competitive effect is also positive because of Myanmar's good packaging, competitiveness in price wars, good quality control by means of modern improved methods quality improving fishery products and expertise in selling its fishery products. Changes in a country's market share depend not only on the behavior of price and non price competitiveness, but also on it export structure. In this studied period, market shares in Myanmar fishery have been marked by changes in the competitiveness of exports.

Results of the CMS Approach in Myanmar Fishery Export (1991-2008)

Myanmar's market share of fishery exports had been studied by means of constant market share approach and by comparing 1991situation with 2008 situation depending on the data collection.

In analyzing the growth of Myanmar fishery exports by the constant market share approach the following results were observed in Table 4.13, 4.14 and 4.15.

Table 4.13 Constant Market Share Analysis in Myanmar's Fishery Exports (1991 and 2008)

Markets	World total		Myanmar export		r_j $(5)=(2)\div(1)-1$	rjQ^1Mj $(6)=(5)\times3$	rQ^1Mj $(7)=rx(3)$	$Q^2M_j - Q^1M_j - r_j\,Q^1\,M_j$
	1991 (1)	**2008(2)**	**1991(3)**	**2008(4)**				
China	784	3750	3.51	58.92	3.78	13.27	2.74	52.67
Thailand	723	1675	6.14	89.48	1.32	8.10	4.79	78.55
Singapore	209	222	3.70	56.75	0.06	0.22	2.89	50.16
Malaysia	244	304	0.05	23.00	0.25	0.01	0.04	22.91
Others	15610	25328	0.85	96.06	0.62	0.53	0.06	94.55
Total	17570	31279	14.25	324.21	r = 0.78	22.13	11.12	298.84
	$\sum Q^1_t$	$\sum Q^2_t$	$\sum Q^1M_j$	$\sum Q^2M_j$		$\sum r_j\,Q^1M_j$	$\sum r\,Q^1M_j$	

Source : : FAO Statistical Yearbook, Fisheries, Commodities, Various Issues and DoF, Statistical Yearbook, Various Issues

Table 4.14 Components of Myanmar Fishery Export Gain (1991 and 2008)

Actual Export	1991	2008
World (Thousand metric tons)	17570	31279
Myanmar (Thousand metric tons)	14.25	324.21
Myanmar Market Share	0.08%	1.04

Source: According toTable 4.13

Table 4.15   Gain for Myanmar (1991 and 2008)

Effects	Thousand metric tons	%
Total gain	320.97	100%
(a) Size of market effect = $\sum r\,Q^1\,M_j$	11.12	3.46
(b) Distribution effect = $(\sum rjQM^1 - \sum rQM^1)$	11.01	3.43
(c) Competitive effect = $\sum_j (Q^2M_j - Q^1M_j - r_j\,Q^1\,M_j)$	298.84	93.11

Source: Table 4.13

During the period 1991 to 2008 the world growth rate (r) was found to be + 0.78. However, during the same period Myanmar fishery exports increased from 14.25 thousand metric tons to 324.21thousand metric tons, a growth rate of 21.75% over the period.

Out of the total gain of 320.97 thousand metric tons, the size of market effect accounted for +11.12 thousand metric tons. So total world fishery export may have increased, and Myanmar has maintained its share in the general growth. After the year 1994 Myanmar Fishery Enterprise was abolished and private entrepreneurs were given permits to do culture and capture business in fishery. Therefore, the production and export of fishery increased and the size of market effect had been positive.

The distribution effect was 11.01 thousand metric tons because Myanmar's fishery products were able to expand to new markets after 1994. Myanmar had already succeeded in diversifying her export outlets and her exports have become concentrated in markets whose growth rates are relatively faster than the average world growth rate. During the study years Myanmar was able to export less fishery products to large market places such as the United Kingdom, the U.S.A., Hong Kong, Canada, Switzerland, Japan and Australia. Besides, Myanmar was able to export more of its fishery products to re-exporting countries such as Thailand, Malaysia and Singapore. The size of market effect and distribution effect represent the structural effect due mainly to changes in the market and in the product pattern of a country. Myanmar should build ice plants, cold stores, nearby coastal towns, canning factories, and establish international ports.

The analysis shows that the growth of Myanmar fishery exports was strongly influenced by the competitive effect which accounted for 93.11 % of the total increase in exports. This large variation cannot be explained only by the price changes of Myanmar fishery exports relatively to its competitors. Competitive effect is also positive. A competitive effect reveals the capacity of a country to increase its market share due to competitiveness factors only, independently of structural developments in the market or in the product trade pattern.

The competitive effect summarizes the changes in price competitiveness as well as changes in non-price competitiveness in the export performance. In Myanmar, there exists price competitiveness compared with other fishery exporting

countries. Market prices of fish and prawns for export markets are determined every three months by Department of Prices under DoF accordance with FAO/INFOFISH prices, local price, and yield percentage. Only average prices of fish and prawns in Myanmar are mentioned in Appendix ( ) because the prices can vary depending on the size of fish and prawns, types of products, their quality and the country they are exported to. The price of prawns per ton was higher than the price of fish per ton because prawns were stored and made processing in cold storage, plant, and processing plants. Fish can be exported by raw products. Fish was bought mainly by neighboring countries from border and normal distribution channels and prawns were bought from normal distribution channels mostly by Japan and Singapore.

As the large share of capture fisheries in total supply and the enormous variety in species offered the increase in price of capture fisheries. Nevertheless, a tendency of increasing prices can be detected for capture fisheries products, where the impact of higher fuel prices, weather condition, and biodiversity are more important, than for aquaculture products. In addition, supplies from capture fisheries cannot be easily increased when demand strengthens. But aquaculture, like agriculture, responds to increase in demand and prices.

Myanmar Fishery products were competitive in price due to Appendix (   ). This table only shows that average price of fishery in selected countries. Myanmar average fish prices have risen along the study periods. But average price of fishery export in Myanmar was lower than other selected countries except Cambodia in 2001 and 2005. While Myanmar fish price increased in 2008, fish price declined in China, Japan, Philippines, Vietnam, and Malaysia. But Myanmar fishery products penetrate in global markets due to lower average fishery price per ton.

The fluctuation in the prices of fish and prawns had an immense effect on export earnings made from their sale. Even though, there is no increase in the export volume of fish and prawns, good export earnings can be made due to the rise in the market prices. So market price is a major factor affecting export earnings.

Prices of products traded internationally would follow a more complicated structure, involving both supply and demand not only by local producers and consumers but also in international markets. It is certain that price is important both as an indicators and a determinant for changes in supply and demand.

Moreover, there had little non-price competitiveness because Myanmar had not been exported yet value-added products. Myanmar had tried to improve its

stability by increasing production and to increase its share established markets. Moreover, Myanmar should comply with HACCP and ISO requirements in accordance with international standard.

Fishery sector should try to improve technology in inspection and control system in order to produce high quality fishery products. At present, thirteen factories in Myanmar received a key certificate that would enable them to export fisheries products to the EU. EU approved factories of fishery in Myanmar is shown in Appendix 15. The factories were inspected by the EU team and were approved to export to the EU from 1 January2009. Though the official approval came on 18 January2009, the factories still need the IUU certificate before they can start exporting to Europe. The IUU certificate is a guarantee that their wild caught products are not illegal.

4.4 Impact of Trade Liberalization on Production and Export of Fishery in Myanmar (An Interrupted Time Series Analysis)

One of the major purposes of trade liberalization is to promote economic growth by capturing the static and dynamic gains from trade. Therefore, an attempt has been made to formulate a statistical methodology for impact of trade liberalization measures on both production and export of fishery products by interrupted times series analysis based on the time series from 1980/81 to 2009/10. A statistical methodology of interrupted times series analysis is presented in Appendix[85].

An Interrupted Times Series (ITS) Analysis is a quasi-experimental method in which multiple observations are made at regular intervals before and after an intervention (the interruption in the time series). Statistical analysis can be used to determine whether there is a change in the scores or trends in scores of the observations after the intervention.

Statistical methodology of interrupted time series analysis is actually regression analysis technique which employs the concept of dummy variables for intervention. Interruption is trade liberalization measures taken. Most researchers referred to use of dummy variable and used multiple linear regressions for their interrupted time series analysis for impact evaluation. The methodology for short-

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[85] Kenneth J.Meier and Jeffrey L. Brudney (1992),*Applied Statistics for Public Administration,* Wadsworth PublishingCompanyCalifornia, 3rd edition, pp375-384.

term and long-term variable referred to use of impact of trade liberalization and privatization is mentioned in Appendix 16.

Short-term and Long-term Impact of Trade Liberalization on Fisheries Production

For analysis of short-term and long-term impact of trade liberalization on fishery production, regression model is expressed as follows:

$$FPQ = \beta_1 INF + \beta_2 EXC + \beta_3 TOT + \beta_4 TLSR + \beta_5 TLSR + \text{\euro}$$

where FPQ   = Fishery Production (Thousand Metric Tons)

INF   =Inflation rate (consumer price index, CSO, Statistical Yearbook, Various Issues)

EXC   =Exchange rate (market exchange rate, World Development Indicators)

TOT   =Terms of trade (Market exchange rate, CSO, Statistical Yearbook, Various Issues)

TLSR   =Trade liberalization impact of short-term(Dummy variable is coded 0 before the introduction of trade liberalization and it   is coded 1 after the introduction of the policy)

TLLR   =Independent variable is coded 0 before the introduction of the trade liberalization and it is coded as a counter variable (1,2,3,…) after the introduction of the policy such as LONG=1 for 1988/89, LONG=2 for 1989/90,…., LONG=22 for 2009/10 respectively.

The multiple linear regression estimated through the method of ordinary least squares (OLS), based on the fishery production data is obtained as follows.

Table 4.16 Regression Results for the Short-term and Long-term Impact Model for Fisheries Production after Trade Liberalization

Independent Variable	Estimated Coefficient	Estimated Std. Error	Computed t-value	Significant p value	Remark
INF	0.8961	2.529	0.35	0.727	F=237.57*
EXC	1.015	0.231	4.39	0.000	R^2=0.978
TOT	5.543	0.552	10.04	0.000	R^2_a=0.974
TLLR	47.065	12.196	3.86	0.001	

*=significant at 1% level

$$FPQ = 1.015EXC + 5.543TOT + + 47.065TLLR$$
$$\quad\quad (4.39) \quad\quad\quad (10.04) \quad\quad (3.86)$$

The dependent variable in this analysis is fishery production (FPQ). The first independent variable is inflation rate. The second independent variable is exchange rate. The third independent variable is term of trade. The fourth independent variable is used to assess any short-term changes. The independent variable (LONG) is used to assess any long-term changes. Using General to Particular Regression Method, the following can be expressed. This results shows that total production positively related to exchange rate, term of trade.

Moreover, TLLR reveals that the fishery production increases by 47.065 thousand metric tons per year with significant t-value 3.86 after the introduction of the trade liberalization. It is concluded that there is an evidence of significant long- term impact on fishery production due to increasing inflation, exchange rate, term of trade, increasing the average of pond and harvest, culturing the more species in hatchery, improving the culture system and fishing technology, limiting fishing activities without licenses, limiting fishing grounds, gears, period and methods to conserve the sustainable fishery resources.

Short-term and Long-term Impact of Trade Liberalization on Fisheries Export

For analysis of short-term and long-term impact of trade liberalization on fisheries export, regression model is expressed as follows:

$$FEQ = \beta_1 PRIV_+ \beta_2 EXC + \beta_3 TOT + \beta_4 TLSR + \beta_5 TLLR + €$$

where FEQ = Fishery export (Thousand Metric Tons)

PRIV = Privatization impact after 1994/95

EXC   = Exchange rate is calculated with market exchange rate which based on world development indicators

TOT   =Term of trade is calculated with market exchange rate which based on

CSO   statistical yearbook

TLSR   =Trade liberalization impact of short-term (Dummy variable is coded 0 before the introduction of trade liberalization and it is coded 1 after the introduction of the policy)

TLLR   =Independent variable is coded 0 before the introduction of the trade liberalization and it is coded as a counter variable (1,2,3,…) after the introduction of the policy such as LONG=1 for 1988/89, LONG=2 for 1989/90,…., LONG=22 for 2009/10 respectively.

               The multiple linear regression estimated through the method of ordinary least squares (OLS), based on the fishery production data is obtained as follows.

Table 4.17 Regression Results for the Short-term and Long-term Impact Model for Fisheries Export after Trade Liberalization

Independent Variable	Estimated Coefficient	Estimated Std. Error	Computed t-value	Significant p value	Remark
EXC	0.091	0.030	2.96	0.007	F=535.95*
PRIV	8.122	3.430	2.37	0.027	R^2=0.985
TLLR	3.236	1.305	2.48	0.021	R^2_a=0.984

*=significant at 1% level

$$FEQ = 8.122PRIV_{+}0.091EXC + 3.236TLLR$$

       (2.37)   (2.96)   (2.48)

       The dependent variable in this analysis is fishery export (FEQ). The first independent variable is privatization. The second independent variable is exchange rate. The third independent variable is term of trade. The fourth independent variable is used to assess any short-term changes. The independent variable is used to assess any long-term changes. Using General to Particular Regression Method, the following

can be expressed. This result show that fishery export positively related to privatization and exchange rate.

Moreover, TLLR reveals that the fishery export increases by 3.236 thousand metric tons per year with significant t-value 2.48 after the introduction of the trade liberalization. It is concluded that there is an evidence of significant long- term impact on fishery export due to exporting the more varieties of species, complying with the HACCP, ISO requirements accordance with international standard for international trade, improving technology in inspection and control system, expanding its share established markets.

CHAPTER 5
SUSTAINABLE FISHERY SECTOR DEVELOPMENT

Fish is a renewable resource which can yield a harvestable surplus indefinitely when exploited on a sustainable yield basis. On the contrary the resource will dissipate if it is overexploited. It needs to produce without depleting the existing resources. As marine fishery production contributes about 60% in total fishery production in Myanmar, marine fishery is important for sustainable fishery development. Therefore marine fishery production situation is analyzed by using the bio-economic model.

As fishery production especially marine fishery production provides domestic consumption and export, fishery management is needed to produce and export fishery products without impairing the capacity of the resources. To manage the production and export of fishery products the issues and challenges is needed to be recognized. Government and private sector can efficiently and effectively manage on culture, capture, processing and export of fishery products.

5.1   Sustainability of the Marine Fisheries

The Brundtland Commission of the United Nations on March 20, 1987 stated that sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs[86].At the 2005 World Summit it was noted that this requires the reconciliation of environmental, social and economic demands - the "three pillars" of sustainability[87]. The main objectives of market liberalization and the other structural adjustment measures are to stabilize the macro-economic environment, promote growth, alleviate poverty and increase the openness of the economy. Market liberalization also improves efficiency in resource allocation, supports private sector development and enhances capacity for economic policy analysis. Market liberalization measures,

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[86] United Nations General Assembly (March 20, 1987), Report of the World Commission on Environment and Development: Our Common Future; Transmitted to the General Assembly as an Annex to Document A/42/427. Development and Internal Co-operation: Environment Retrieved on: 2009-02-15.

[87] United Nations General Assembly, (2005), 2005 World Summit Outcome, Resolution A/60/1, adopted by the General Assembly on 15 September 2005.Retrieved on: 2009-02-17.

however, are only one set of the policy changes that drive economies towards better performance. It is thus the sum total of these changes, and impacts of market liberalization policies, that have a direct action-impact relationship with natural resource utilization (Bojo, 1996).[88]

It needs to examine fishery resource utilization after trade liberalization in Myanmar. To estimate the level of maximum sustainable yield, the bio-economic model used in the study is the Schaefer model (Schaefer, 1957) since the advantage of the model is that it can be applied to deal with the fishery sector even with a limited set of data[89]. The analytical framework presented in chapter II shows that in the Schaefer model catch per unit of effort is a linear function of effort.[90]

If Y is the sustainable yield, f is the effort and a and b are constant, the yield function can be expressed as:

$$Y / f = a - bf \qquad\qquad (1)$$

Alternatively, $Y = af - bf^2$ (2)

Differentiating Equation (1) with respect to f and setting dY/df=0 the level of effort (f_{msy}) giving maximum sustainable yield (Y_{msy}) can be derived:

$$dY/df \quad = \quad a - 2bf = 0$$
$$a \quad = \quad 2bf$$
$$f_{msy} \quad = \quad a/2b \qquad\qquad (3)$$

The maximum sustainable yield (Y_{msy}) can be obtained from Equations (2) and (3).

$$Y_{msy} \quad = \quad a(a/2b) - b\,(a^2/4b^2) = \; a^2/4b \qquad\qquad (4)$$

The parameters a and b have been estimated by a linear regression of the yield function using time series data for the period 1988/89 to 2009/2010.Therefore the bio-economic model is used to estimate of the yield curve. Increased fishing pressure in capture fisheries can also be measured in terms of fishing inputs. These include the vessels and engines, the gear used to find and harvest fish, the labour, fuel, and bait

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[88] Jan Bojo(1996)" Impact of Economic Policies on the Environment". Unpublished Invited Paper to the Workshop on Environmental Economics for Planners and Policy Makers, 11 - 13 March 1996, Windsor Lake Victoria Hotel, Entebbe, pp 9-37.

[89] Schaefer, M,(1957), Some Considerations of Population Dynamics and Economics in Relation to the Management of Commercial Marine Fisheries. Journal of Fisheries Research, Board of Canada, No.14. pp 669-81.

[90] Falmida A.Khatun (2002), Environmental Impact of Trade liberalization and Trade-Related Policies on the Marine Fisheries Sector in Bangladesh, Centre for Policy Dialogue. p 24.

used up when catching fish and the processing facilities to render the fish into a consumable product. Combined, these inputs represent total fishing effort[91].

The variety of fishing efforts gives rise to the problem of aggregation of inputs. The difficulty can be overcome by converting the inputs into units of time, for example, hours, days and months of fishing since different types of fishing efforts are complementary to each other. That is, a larger number fisherman also reflects the fact that a larger number of nets and boats are used and vice versa. Thus any of these inputs expressed in units of time could serve as a proxy for the fishing effort. The number of fishing boats could serve as another estimate of the effort. In this study the effort is measured in terms of fishing crafts though the calculation of effort in terms of boats is somewhat complicated. Two types of fishing crafts inshore fishing vessels and offshore fishing vessels with various efficiency levels which are used in the Myanmar marine fisheries have to be converted into one unit. The engine capacity of the inshore fishing vessels varies between 1 to 12 HP, most of them are having a capacity of 5 HP. The engine capacity of offshore is around 12 to 100 HP.

On the basis of field visits from Supervision of Marine Fisheries and Revenue Division at DoF in 1994, and debriefing of the concerned stakeholders, the average horse power of in-shore fishing vessels in Myanmar is assumed to be 5 and offshore fishing vessels 20 HP[92]. Total fishing efforts in terms of horse power is presented in Table 5.1. For convenience, other means of fishing in Myanmar such as net and other gear fishing have been grouped together with inshore fishing vessels since they are also non-mechanized and the amount of catch by them is not significant to make any difference in the estimation.

Using catch and effort data for the period 1988/89 to 2009/10 the yield per unit of effort is calculated from equation 1. Regression results show in Appendix 17. From these results, it is found that the estimated value of a = 13.4834 and b = 0.00004 estimated from the regression are used to derive the yield per unit of effort, sustainable yield function, maximum sustainable yield and the required effort as follows.

$$Y/f \quad = \quad 13.4834 - 0.00004f \qquad\qquad (5)$$

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[91]J.M. Conrad (1999), *Resource Economics*, Cambridge University Press, Cambridge, England. P-96

[92] DoF, (1997), Coastal fisheries Management, Country Report, Department of Fisheries, Ministry of Livestock and fisheries, Union of Myanmar. Pp 1-15.

$$Y \qquad = \qquad 13.4834f - 0.00004\ f^2$$

$$Y_{msy} \qquad = \qquad (13.4834)^2 / (4 \times 0.00004)$$

$$\qquad = \qquad 1136263 \text{ metric tons}$$

$$f_{msy} \qquad = \qquad a/2b$$

$$\qquad = \qquad 13.4834 / (2 \times 0.00004)$$

$$\qquad = \qquad 168543 \text{ HP}$$

With the maximum effort of 168,543 HP a maximum sustainable yield of 1136,263 metric tons of fish can be landed. With a yield of 1136,263 metric tons and effort 168,543 HP at the point of MSY in this model, the estimated yield per unit of effort (HP) will be 6.74 tons. When fishing effort is relatively low and yield is high, the catch per unit effort (CPUE) is high and profits are high[93]. As fishing effort increases and yield decline, the profit gets smaller. The results of this calculation suggest that the yield level of marine Fishery sector has exceeded the point of MSY as the actual yield is above the estimated MSY. The level of effort that is also higher than the estimated level at MSY. This indicates that the marine fishery in the open access is overexploited.

Overfishing has been attributed to a number of factors, the relative importance and the interaction of which remain under debate. Some key factors include[94]:

Open access

The challenges facing fisheries management present the classic characteristics of those associated with managing 'commons' – both at the global and local level. The term 'open access' describes a situation where "no single user has to pay for the right to use the resources nor does that user have exclusive rights to the resource, or the right to prevent others from sharing its exploitation" (Sen, 1994)[95]. In the fisheries sector, the lack of property rights to fish can give rise to a host of problems:

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[93] H.S. Gorden (1954) "The economic theory of a common property", Journal of Political Economics, p- 62

[94] ICTSD (2006) *Fisheries, International Trade and Sustainable Development: Policy Discussion Paper.* ICTSD Natural Resources, International Trade and Sustainable Development Series. International Centre for Trade and Sustainable Development, Geneva, Switzerland. P-18.

[95] Sen, S. (1994). The Environmental Effects of Trade in the Fisheries Sector. pp.5-20. Paris- France: Organization for Economic Cooperation and Development.

overfishing; inefficient use of inputs; and low returns to fishing industries (Stewart, 2004)[96]. Under such open-access conditions, fishermen continuously increase their fishing capacities (by investing in for example more vessels, improved fishing technology, greater effort (e.g. hours at sea), or more labour (e.g. number of fishermen on vessels)) while often neglecting proper safety considerations and working conditions, in order to maintain the level of their catch, a competitive edge and profits.

Technology

The role of technology in the fisheries sector is extremely important. Constant improvements in fishing technologies and equipment (e.g. larger vessels and nets, greater numbers of hooks, sophisticated gear and electronic equipment) have played a key role in enabling harvesters to maintain fish catches even though fish stocks have been declining. Over time, under open access, ever-higher costs must be defrayed over an ever-shrinking resource base which spurs ever-more intensive fishing efforts and further depletion. Ultimately, when resources are no longer able to sustain expansion, competition based on excessive fishing capacities (over-capitalisation) tends to lead to economic and social losses as well as biological overfishing (Sen, 1994).

Subsidies

Subsidies, in particular those that enhance the capacity of the fishing fleet, have been recognized as one of the key economic drivers of over-exploitation. In the absence of sufficient data, discussions, nonetheless, continue on the precise role of subsidies in depleting the world's fish stocks, how they might be used to achieve environmental and socio-economic objectives, and options for mitigating possible negative effects.

Like other renewable resources, most fisheries are open access resources. They are exploited by many individuals. Individual fishermen, like sole owners, however, are interested in fishing for maximum profit. In private fisheries, profit maximization could simply follow if stocks are left to increase to sizes that fetch good prices and to quantities that reduce the cost of fishing. In open access fisheries, this

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[96] Stewart, C. (2004). Legislating for Property Rights in Fisheries. Rome.Italy: United Nations Food and Agriculture. pp 2-15.

rational position never influences the decisions of others to restrain effort. Rather than reduce effort, each fisherman increases his effort as the only way to undercut others.

Trade liberalization affects the expansion of fishing activities. Increased fish prices due to higher demand from a wider market increases fishing activities. Trade liberalization under open access conditions therefore, presents a problem of resource over-exploitation and probable resource degradation.

Fisheries can face serious problems, ranging from sustainability and environmental impacts to the issue of contaminants. These issues are common to both aquaculture and capture fisheries. There are many issues and challenges for over exploitation and resource degradation.

As most countries fisheries operate under an open access, this has permitted increasing numbers of fishermen to exploit limited fisheries resources, which had led to depletion of fish stocks. The quality of coastal and inshore ecosystems has deteriorated significantly as a result of continued and increasing human activities. These areas are critical to a broad range of aquatic organisms as spawning, nursery and feeding zones during their life cycles. Moreover, Significant contributors to the problem of deteriorating fisheries resources are over-exploitation and habitat degradation arising from the use of illegal and destructive fishing gears and practices and non-selective fishing gears.

Other examples of illegal and destructive fishing gears and practices include: the use of cyanide poison to stun and capture fish, but which also kills heads in the process; electrical stunning of fish, which is often indiscriminant and harmful unwanted fish species. Another problem is the use of small-mesh nets. They catch immature and juvenile fish.

The activities of the other user of water resources, such as hydropower, irrigation, extraction of water for industry, polluting industries, etc., may also impact on the aquatic resources and destroy important habitats or inhibit fish migrations.

Overexploitation of many inland capture fisheries is caused by construction of dams and welding water diversion for irrigation and other purposes, river channelization, encroachment from agriculture, industries and human settlements along lakes and rivers have impacted on inland water habitats with repercussions on fish stocks.

According to Bio-economic model, marine capture fisheries are now fully and over-exploited. In many of these fisheries, the degree of over-exploitation has reached critical levels and is a major threat to fisheries resources and sustainable yields. A significant contributor to over-exploitation is excessive fishing capacity and inability to control fishing effort as the actual HP or fishing effort was greater than house power due to the calculation of bio-economic model. There are many fishing vessels (both legal and illegal) harvesting the limited resources.

Table 5.1 Fishing Efforts in Marine Fisheries

(HP)

Year	Fishing Vessels Used in Marine Fisheries		Horse Power of Fishing Vessels			Marine Fisheries Production (Thousand Metric Tons)
	Inshore Fishing Vessels	Offshore Fishing Vessels	IHP= Number of Inshore Fishing Vessels x 5	OHP = Number of Offshore Fishing Vessels x 20	Total Horse Power	
1988/89	6933	754	34665	15080	49745	561.82
1989/90	3120	1392	15600	27840	43440	586.13
1990/91	6032	874	30160	17480	47640	588.36
1991/92	2958	931	14790	18620	33410	590.64
1992/93	8628	979	43140	19580	62720	598.02
1993/94	9588	787	47940	15740	63680	600.26
1994/95	17947	1640	89785	32800	122585	603.27
1995/96	11615	1694	58075	33880	91955	455.69
1996/97	27460	1598	137300	31960	169260	468.23
1997/98	21870	1709	109355	34180	143535	681.28
1998/99	24965	1984	124825	39680	164505	760.16
1999/00	23234	2032	116170	40640	156810	897.13
2000/01	26099	1987	130495	39740	170235	932.09
2001/02	28240	1999	141200	39980	181180	1029.46
2002/03	30420	2309	152100	46180	198280	1053.72
2003/04	29861	2121	149305	42420	191725	1132.34

2004/05	30863	2150	154315	43000	197315	1228.71
2005/06	30460	2022	152300	40440	192740	1375.67
2006/07	30414	1871	152070	37420	189490	1526.31
2007/08	23874	1663	119370	33260	152630	1689.76
2008/09	28670	1758	143350	35160	178510	1867.51
2009/10	30842	1814	154210	36280	190490	2060.78

Source: DoF and own calculation.

IHP   Inshore fishing vessels horsepower

OHP   Offshore fishing vessels horsepower

In these evidences of over-fishing or overcapacity the potential for the marine Fishery sector in Myanmar is tremendous. Therefore there is urgent need to manage sustainable development of fisheries in capture as well as culture. Restricting fishing effort through the following criteria could regulate the amount of catch: (a) number of vessels; (b) fishing power; (c) effective fishing time. The main regulation instruments are; (1) vessels quotas by fishing gear; (2) catch quotas by season; (3) closed areas, marine protected areas; (4) changes in the duration of a closed season.[97] According to Barbault and Sastrapradja (1995), the single greatest threat to species worldwide is the loss of habitat. Indeed, marine areas have endured high levels of habitat destruction. About one-fifth of marine coastal areas have been highly modified by human. Therefore, human factors are important not only for fishery sector but also for economic development[98].

5.2   Regulatory Frameworks for Fishery Production and Export

The long-term sustainability of fisheries resources using appropriate management mechanisms is vital to ensuring stable fish supply and achieving food security and related benefits in the country both now and in the future. Each country has own policy, legal and institutional or regulatory frameworks to manage their respective fisheries, these systems are generally based on short-term objectives and increasing production levels, rather than the long-term comprehensive and sustainable management of fisheries. Therefore, there is a need to improve national fisheries

[97] FAO, *Fishery Bioeconomics: Theory, Modelling and Management.p-5.*

[98] Barbault, R. and S.D Sastrapradja ,(1995), Generation, maintenance and loss of biodiversity: Global biodiversity assessment, Cambridge University Press, Cambridge. P 193.

management frameworks in order to accommodate the various requirements for sustainable fisheries development in the country.

One of the goals of fisheries management is to achieve sustainable fisheries. In order to achieve this goal, various management strategies have been formulated and implemented to control fishing effort and promote rehabilitation and conservation of fisheries resources and marine ecosystems.

According to the Bio-Economic model, Myanmar fishery production is beyond MSY. The systematic surveyed of fisheries resources by RV Dr.Fridtgof of Nensan had estimated about 0.5million metric tons of pelagic fish and 0.55 million metric tons of demersal fish totaling 1.05 million metric tons was marked annual maximum sustainable yield (MSY)[99]. The survey was undertaken in 200 meters depth only covering 225,678 square kilometers i.e only 72 % of the total area; and there were un-surveyed areas covering 164,533 square kilometers where there have huge potential for exploitation[100]. Myanmar marine territory extends about 486,000 square kilometers with Exclusive Economic Zone (EEZ) and provides considerable amount of large fishery resources. There are approximately 770 finfish species identified in Myanmar waters. Among these, 470 species are of marine fishes including 67 commercially important pelagic species. Still several species remained to be identified[101]. The increase in marine fish production can be achieved because of the potential resources in the EEZ. The expected increase in deep-sea fishing will be due to the availability of new technology, upgrading of fishers' know-how, and exploitation of resources. Myanmar's inland water bodies cover 8.2 million hectares consisting lakes, rives and reservoirs, that are producing more than 450,000 tons of freshwater fish and prawns annually[102].

All over the world the important role of aquaculture in food supply and economic growth has been well recognized (FAO, 2000; 2002; 2004; 2006).While aquaculture accounted for only 3.5 % of the supply of aquatic products in the world during the early 1950s, the ratio has risen to 10 % by the early 1980s, 35% by the

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[99] Khin Maung Soe, (2008*), Trends of Development of Myanmar Fisheries: With References to Japanese Experiences*, Institute of Developing Economies, Japan External Organization, Japan. P 48.

[100] Yin Pa Pa Tun (2005), Myanmar Country Report for the Group Training Course in Marine Farming for Stock Enhancement, Department of fisheries, Ministry of Livestock and Fisheries, Myanmar. p-3.
[101] Ibid,p 7.

[102] DoF, (1997), Coastal fisheries Management, Country Report, Department of Fisheries, Ministry of Livestock and fisheries, Union of Myanmar. Pp 1-15.

early 2000s (FAO, 2004) and about 42 % by 2006 (FAO, 2006)[103]. Increasing seafood demands driven by income and population growth under a situation of limited and depleting fisheries resource require aquaculture to play an even more important role in the future (FAO, 2006)[104]. Therefore, the fishery sector in Myanmar should emphasize on culture than capture to be sustainable fishery development.

In Myanmar the DoF under the Ministry of Livestock and Fisheries is the sole competent organization responsible for the management of fisheries, conservation of fisheries resources, provision of extension services, conducting appropriate fisheries research and collecting of fisheries statistics and socio-economy status of the fishery sector and law enforcement.

The Fisheries Laws are intended for the development of fisheries, prevention of extinction of fish, safeguarding and preventing environmental degradation and effective management of fisheries. These laws prohibit fishing operations without a license, creating water pollution, harassing fish and other marine organisms, and using explosive substance, poison, chemicals and dangerous materials in fishing. The convicted fishing vessels and fishermen who broke these laws are prosecuted and fined with punishments or penalties. (Appendix 18)

Freshwater aquaculture contributes to the economy of Myanmar in a number of ways. The production of fish fingerlings and stocking into aquaculture ponds is the typical form of aquaculture and is practiced for a range of species. Due to the continuing deterioration of fish habitat and inland fish stocks the Government has encouraged the industry to increase fish production through aquaculture and aquaculture-based fishery. DoF conducted seed production and research works in terms of freshwater aquaculture purposes. The fishery stations have been established in all States and Regions. DoF so as to replenish the natural resources has produced of fingerlings for sale to aquaculture and leasable fisheries and stocked the quality fish seed into open waters like rivers, dams, reservoirs, lakes, paddy field and impoundments..

DoF has encouraged the expansion of aquaculture through proper management

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[103] FAO.2006.The State of World Fisheries and Aquaculture, Rome (http://www.fao.org/sofia/index -en.htm.)

[104] Ibid.

so as not to cause environmental degradation. The Government, having been empowered by the Forest Law (1992), declared all mangrove forests as protected areas. Fishing within three hundred yards around mangrove areas is strictly prohibited. In order to ensure the sustainable development of aquaculture techniques and to promote mangrove-friendly aquaculture practices strict guidelines were laid down by DoF.

In inland fisheries the leasable fisheries are unique types of freshwater fishery, found only in Myanmar. Leases have been auctioned every year but DoF is extending the lease period to up to nine years since 1994 to promote improved long-term management. There is no government owned leases. Furthermore, the lease also has the obligation to conserve undersize fish for coming years and replenish natural stock with hatchery bred quality fish seeds.

DoF is stocking fish seeds and breeding in natural and man-made water bodies to enhance and sustain commercially important species. DoF also stock the dams, reservoirs, and natural open waters with appropriate kind of fish seeds as to increase the population of fish and to maintain the sound ecosystem in the water bodies. DoF also reserved some fisheries waters where fishing operations are prohibited time-to-time and types of fishing gear are restricted in order to conserve the nature standing stocks.

Culture based capture fishery is being practiced in some leasable waters. As a regulation, the lessee has to purchase fish seeds from the hatcheries and release them to fishery waters. Some lessee practices nursing of fingerling prior to release into fishery waters. New reservoirs are built for agriculture purposes. Reservoir fisheries support livelihoods of thousands of families, contribute fish supplies and national revenue. Since 1995, by the instruction of the Department of Irrigation, major fishing activities in reservoirs have been suspended. Currently the greatest care has been taken by DoF to maintain proper management of fisheries to conserve their habitats and to contribute to the betterment of the socio-economic condition of local fisheries communities. Most of fishermen communities are located along the coast, and includes significant numbers of poor and vulnerable people and a high proportion of people dependent on fisheries activities and aquatic products for income and food security. The development of coastal fisheries and coastal aquaculture are quite limited, but already the livelihoods of perhaps several thousand of people are directly and indirectly involved in the fishery sector.

Management measures that have been implemented by DoF through the legal and institutional frameworks to control fishing effort which include:

(i) Fisheries Control

There are two basic approaches to fisheries control. Input controls regulate fishing effort usually by limiting the number and size of fishing vessels and gear, or by limiting the number of available fishing days (seasons) or fishers allowed to exploit the resources. Every fishing activity in Myanmar's fishery industry is controlled by the licensing and registration system to control both the fishing vessels and their gear. Output controls establish limits on the total catch or landings (e.g., by setting a Total Allowable Catch (TAC) and vessel quota.[105] Currently, there are neither individual transferable quotas (ITQs) nor total allowable catch (TAC) regulations in Myanmar's Fishery sector.

(ii)Direct limitation of fishing effort

A moratorium has been placed on the issuance of new or additional fishing license for vessels to harvest in coastal waters. This is to ensure that the current high fishing pressure on the limited coastal fisheries resources will not be increased, and to prevent overexploitation. Conditions for renewal of licenses are laid down annually from 1 September to 31 August of next year for deep-sea fishery and for the coastal fisheries, 1 April to the next 31 March of every fiscal year.

(iii)Control on size and power of fishing vessels

Any attempt by fishermen to change the tonnage or engine power of fishing vessels or to construct fishing vessels, required permission from the Director-General of DoF.

(iv)Registration of fishermen

This program controls entry of new individuals into the fishing industry. Every fisherman is required to register and everybody working, living, staying on the fishing vessel of fleet or any related vessel must have a fishermen registration card.

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[105] SEASDEC(2001) *Fish for the People.* FAO,Thailand*, pp 72-1189.*

Efforts and measures undertaken to conserve and rehabilitate the fisheries resources and marine ecosystem include:

(i)Closed fishing area and close season

Two fishing zones have been established through a licensing scheme whereby zones are designated for specific fishing gear, classes of vessels and ownership. These two management zones attempted to provide equitable allocation of resources and reduce conflict between traditional and commercial fishermen. Basically the two zones are:

Fishing Zone 1 is from shoreline out to 5 nautical miles in the northern area; 10 nautical miles in southern area of coastline of Myanmar. Fishing Zone 2 is from outer limit of the first fishing zone to end of EEZ. The coastal fishing zone, five to ten miles from the coast locally, are reserved exclusively for artisanal or small scale fishermen using traditional fishing gear, the convicted fishing vessels are prosecuted and fined with severe punishment or penalties.

Commercial fishing vessels, like trawlers and fish purse seiners, are prohibited from fishing in waters less than 5 nautical miles from the shore. The waters within 5 nautical miles of the shore are the nursery grounds of juveniles of prawn and fish. This will reduce fishing pressure from trawlers and fish purse seiners. And DoF took this action of restricted nursery areas. Nursery areas are identified and they have been protected and managed as a reserved fishing area to ensure survival of juveniles of commercially important fish species. There is one fishing ground in Rakhine area, four fishing grounds in Ayeyarwady region, two fishing grounds in Mon area, and three fishing grounds in Tanintharyi region which have been declared as closed fishing areas for three months (June, July and August) annually. To conserve the juveniles fish and shrimp, Rakhine coast 5 miles from shore line and for Ayeyarwady and Tanintharyi coast 10 miles from shore line, the trawlers will not be allowed to fishing in those areas are closed areas[106].

The government has demarcated Marine Protected Areas (MPAs) in some regions. The government has Management and Protection Plan to degradation of marine ecosystem and depletion and lost of biodiversity.

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[106] FAO,(2006), Fishery Country Profile Myanmar.FAO Fisheries Department. Pp-8-10.

(ii)Conservation and Rehabilitation of Resources

Conservation of marine resources has always been the primary concern of the Department. Marine Park and Marine Reserves as well as fisheries protected area have been established under Fisheries Laws, as one of the Department's management measures. This is essential to protect, conserve and manage in perpetuity the marine environment. Public awareness of the need to protect the corals and other marine flora and fauna in the waters surrounding the islands off the coast is being promoted to ensure their conservation. The waters around the island area have declared protected fisheries areas, whereby collection of marine flora and fauna is prohibited unless specifically licensed to do so.

Artificial reefs have not been established yet in Myanmar's fisheries waters as marine resource conservation. They are used as a possible tool for fisheries management in maximizing exploitation, resource conservation, habitat rehabilitation and mitigation of the effects of over fishing. At present, although Myanmar coastal zones are still in intact and not yet threatened to establish an artificial reef, the DoF authorities is determined to apply artificial reefs in specific areas for the conservation and rehabilitation of resources.

(iii)Monitoring, Control and Surveillance Program for Fisheries

MCS System is a system that ensures the monitoring, control and surveillance of fishing activities. Monitoring involves the requirement of continuously observing, collecting, measuring and analyzing data and information on fishing activities. Control refers to specifying the regulatory conditions (legal framework) under which the exploitation, utilization and disposition of the resources may be conducted. Surveillance involves the degree and types of observations required to maintain compliance with regulations. MCS component has sea, air, land satellite technology. At sea, Myanmar Navy conducted MCS system and DoF, DMA, custom, police undertake MCS system. The Andaman Sea sub-region (Indonesia, Malaysia, Thailand, Myanmar and India) initiated the development of MCS network and information sharing[107].

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[107] Khin Maung Aye, U,(2011), Introduce the Monitoring, Control and Surveillance (MCS) Matrix, Department of Fisheries, Ministry of Livestock and Fisheries. P-13.

The introduction of an MCS program for the management of fisheries is another measure taken up by the Department of Fisheries. This program provided for effective and efficient scientific data acquisition for resources evaluation and management of fisheries in Myanmar. It also provides for the design of effective monitoring and control of fisheries enforcement activities to ensure that only authorized or license holder fishing vessels conduct their fishing activities within designated. All fishing vessels (national and non nationals) are subjected to inspect at the port. The inspection is undertaking by a team composed with DoF, Immigration, Port authority, Custom, Police Force etc. The fishing vessels which are licenses fishing rights or joint venture are inspected in priority of port.areas in Myanmar's fisheries waters. MCS system is essential for effective controlling of fishing capacity and IUU fishing. MCS system is essential for effective controlling of fishing capacity and IUU fishing. Collaboration and cooperation of adjacent coastal nations would be most effective in combating IUU fishing[108].

(iv)Prohibition of Fishing Gear

Under "Law Relating, to The Fishing Rights Of Foreign Fishing Vessels" and "Myanmar Marine Fisheries Law" and related regulations, fishing gear that is destructive to the environment and the fisheries resources are banned. These gears includes pair trawl fishing, electric fishing, fishing using poisons, chemicals and explosives, push net, Purse seine net less than 1 inch mesh size, for trawl net cod-end mesh size less than 2 inches, drift net less than 4 inches mesh size, trammel gill net for less than 1.5 inches mesh size etc.

The marine capture fisheries are characterized by various types of fishing gears used by the fisherman to exploit large diversity of marine species found in Myanmar waters. The fishing gear is classified into commercial fishing gear, such as trawl fish, purse seine, drift net, gillnet, and traditional fishing gear, including hook and line, bag net, lift net, traps. However, the fishing gears that contribute the bulk of the landings are trawls, purse seines, driftnets. Total fishing gears were 1609 in 1996/97 and increased to 1999 in 2001/02 because trawl increased significantly from 726 in 1996/97 to 939 in 2001/02. Otter bottom trawl nets are the main gear for

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[108] IUU fishing include fishing in unauthorized areas, over limited fishing days, use of prohibited fishing method, fishing with unregistered and unlicensed vessel, fishing in closed season and closed areas.

demersal finfish and penaeid prawns. As the trawlers landed a large number of fish species, that gear was used widely. The purse seine is a major fishing gear, used to exploit the pelagic fish resource. . The drift net and gillnets mainly target higher valued commercial pelagic fish species, Similarly driftnet, long line, purse seine and trap increased in that period. In 2005/06, driftnet was used till 1001 and total fishing gears increased to 2022. But driftnets decreased to 606 in 2009/10. Therefore, total fishing gears were 1814. (Appendix 19)

(v) Environmental Issues and Biodiversity

Marine living organism depends entirely on the sustainability of the coastal mangrove and other forest resources. These resources serve as breeding ground, nursery ground, shelter and also a source of detritus for living organism.

DoF, the responsible organization for Fishery sectors of Myanmar, is much aware of environmental degradation and conservation of aquatic ecosystem. Mangrove forests are abundance around coastal shoreline in Myanmar. Mangrove forest ecosystem is very important for the marine life and the environment. Degradation of mangrove resources will be affect the fisheries production and may cause environmental disasters. The extent of Myanmar mangrove is about 382,032 hectares, out of which 177,256 ha can be found in the Ayeyarwady delta, 140,024 in the Tanintharyi and 64,752 in the Rakhine[109]. There are a wide range of direct and indirect products from mangrove which forms the basics for mangrove dependent economic activities vital to many coastal peoples in Myanmar. Firewood and charcoal are the main products extracted from the Delta. Mangrove area is being harvested for the purpose of fuel wood, building house, construction of fishing gear and for fodder. Human activities have extensively degraded or completely destroyed the ecosystems. Therefore, DoF also prohibited strictly, fishing, catching within 300 yards around mangrove area for marine fisheries resources conservation. But the productivity of these ecosystems can be enhanced through human intervention. On the other hand, many mangrove areas are destroyed by the human activity.

The introduction of man-made structures, including artificial reefs, aquaculture facilities, breakwaters, stationary nets and jetties has been shown in many areas to enhance local populations of aquatic organisms. Myanmar has a mixture of sandy beaches and muddy seabed influenced by the effluent of large river systems and

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[109] Department of fisheries, (1997), Status of and Threats of Living Marine Resources in Myanmar, p-9.

the monsoon climate. These areas are interspersed by mangroves, sea grass beds and coral reefs, and represent high productivity zones of the tropical coastal ecosystem.

(vi)Research and Development

A cornerstone for sustainable fisheries is the development of R & D and well-trained people. Myanmar, being as a member of NACA as well as SEAFDEC conducts the technical assistant in supporting and building up of human resources. DoF, Myanmar has already sent many staffs to go for training to attend the regional workshop or seminar, to study tour and trade fair sponsored by NACA, SEAFDEC, FAO, INFOFISH, UNDP, JICA, TICA, KOICA, WCS, European Commission.

With a view to implement the National Environment Policy, NCEA prepared Myanmar Agenda 21, based on the Global Agenda 21 laid down by the UN Conference on Environment and Development for achieving sustainable development. It was published in 1997. In the area for achieving sustainable management of coastal, marine and island ecosystems, Myanmar Agenda 21 aims to address the following activities.

(1) To promote research and monitoring programmes

(2) To develop and implement strategies for the sustainable use of marine resources

(3) To strengthen legal and regulation framework

(4) To enhance education and awareness campaign

(5) To conserve marine biological diversity

(6) To establish a coordinating mechanism

(7) To promote coastal zone management and development[110].

Environmental management pattern in Myanmar is largely sectoral, with existing policies and regulations relating to environmental management being formulated and administered by the sectoral ministries and departments concerned.

(vii)Quality Control and Food Safety System of Fishery Products

Fish marketing for both domestic and export markets require guaranteed fish quality, safety, and proper management systems if export markets are to be sustained.

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[110] Department of Fisheries, (2009), Fisheries Development and Management in Myanmar, seminar Paper, Wuri, Jianjsu, China, p-5.

Fish exports largely depend on the quality and safety of fish. Thailand and China were major buyers or customers for Myanmar fishery products. To penetrate the European market, it must be able to give high-quality assurance of its fish to get good export earnings. Therefore, quality has become a major factor in expanding and sustaining markets.

The quality and safety of fish products in Myanmar are of high concern throughout the catching, handling, processing and distribution chain for both the domestic and export markets. Regarding this, fish quality, safety and management systems are required to ensure healthy and wholesome fish products.

The national fish quality, safety and management systems and the reference standards used are of considerable importance for international trade. Fish and fishery products safety management system emphasize on prevention of diseases and to meet the standards of importing countries. The implementation of Good Manufacturing Practices (GMPs) and HACCP as a quality management system is currently the most important among the food manufactures.

Under the Agreement on the Application of Sanitary and Phyto-sanitary Measures (SPS Agreement), governments may apply sanitary measures only to the extent required to protect human health. The Agreement on Technical Barriers to Trade (TBT) seeks to ensure technical regulations and standards that include packaging, marking and labeling requirements. The increasing globalization of world markets is forcing ASEAN countries including Myanmar to comply with these international standards.

Among various management systems, Codex recommends a Hazard Analysis Critical Control Points (HACCP)-based approach for food safety. HACCP systems are particularly important for export to several major markets. HACCP differs from other systems by placing obligation on producers to remove risks to food safety.

Compliance with HACCP and with EU Directives has major concerns of fishery sector. Such quality system has urged the government to initiate a move by which the sector can comply to maintain the country position in the highly competitive seafood trade. In 2010, thirteen factories received a key certificate that would enable them to export fishery products to the EU.

To compete with other fishery exporting countries in the world market, factories should apply relevant quality control system in line with the international standard. To achieve sustainable development in the Fishery sector, fish handling and

processing and fishery related industries are the most important. Insufficient onshore facilities in Myanmar limit the export potential of many fishery products. To increase fishery production and export, there is to a large extent, a need for construction of ice plants, cold storage facilities, fish meal plants, canning plants and establishment of hatcheries.

All these are in fact included in the sectoral development plans of DoF in Myanmar. Generally, fisheries are exported in the form of raw products. This consequently leads to more intensive need for improved and modernized facilities. In Yangon and other places where fishing is heavily done, there is an insufficient amount of ice plants along with other necessities.

There were altogether (134) cold storages, (246) ice plants and (2) canned factories in 2009/10. Canned factories are very few in numbers in Myanmar because of the lack of raw materials to make tin. The cost of production is high since these raw materials are imported from foreign countries.

There is still a long way to develop the needed infrastructure in Myanmar. One important element is the electricity supply, which is totally insufficient for cold storage and ice plants. The government needs to concentrate more on developing these infrastructures, since the inadequate supply of electricity simply leads to higher demand for fuel bought in the unofficial market at unreasonably high prices.

CHAPTER 6
CONCLUSION

Myanmar is endowed with big rivers, huge network of tributaries, and a long sea coast that possess rich fishery resources. Both freshwater and captured fisheries are important domestic consumption items as well as crucial export items in international trade. The fishery sector is in fact, one of the most essential economic sectors in Myanmar playing a significant role in the national economy. Apart from direct contribution to the growth of GDP, it is also a source of income, employment, and foreign exchange. Fishery products on the other hand are considered one of the main sources of protein supply.

Myanmar has long been involved in the fishing industries. During the socialist days between 1962 and 1988, it was the state sector that handled all economic activities concerning production, distribution and trade in the fisheries industry. Soon after the 1988 macroeconomic reforms in the country, the whole activities in the Fishery sector were transferred to the private sector. In trying to strengthen the Fishery sector, the government introduced a series of laws permitting the production and exports to foreign markets.

Theoretical aspects of international trade were studied in the earlier part. These include both the theories on comparative advantage and competitive advantage. Further, the study emphasized on the theoretical considerations and calculations to analyze the determinants of growth in fishery exports after trade liberalization. It is believed that the study will provide valuable insights and lay necessary guidelines for production and distribution both in the local as well as the external market.

6.1 Summary of Findings

According to study, the impact of trade liberalization can be seen as significant and vital to the Fishery sector in terms of overall production and exports. The growth in these two factors is crucial for both the long-term survival of the

Fishery sector and more importantly fulfilling the needed foreign exchange for economic development.

Liberalization of the economy means increasing the level of openness. Trade openness in Myanmar improved only after trade liberalization in 1988. This is clearly seen in terms of Degree of Openness (DOO). Myanmar experienced an increasing Degree of Openness since early 1990s up to 2002. A slight decline in DOO was seen after 2002. However, it increased again in 2003 and a steady climb up to the period of 2007. The impact of trade liberalization was rather great on the overall economy in general and the Fishery sector in particular. A clear indication of policy impacts were seen when the DOO doubled from 19% in 1989 to 39 % in 2008. Throughout the years of fisheries trade in the export market, trade liberalization has impact in both the volume of production and exports.

According to average annual growth potential, the average annual growth rate of other fishery exports happens to be the largest while the growth rate of fish exports was only second in line. This clearly indicates that the Myanmar fishery sector should specialize and export on fish products especially that of Rohu, Hilsa, Ribbon fish and other fishery products especially that of live crab, live eel, fish meal, and surimi. Another important finding is that the Myanmar fishery exports are slightly changing their destination. Although the major export markets include Thailand, China, and Singapore, fishery exports were heading towards others countries outside the Asian region after 1998/99. Those countries included UK, UAE, Australia, Switzerland, Saudi Abrabia, and Kuwait whose imports from Myanmar are increasing. Fishery exports to Kuwait and Saudi Arabia among others were only significant after 2005/06.

Therefore, Myanmar should encourage to produce traded fish species especially Rohu. As China prefers Hilsa, there are offers to import Hilsa in the form of exported products as well as fingerlings. The Fishery sector should culture Rohu together with Hilsa by poly- culture systems. Instead of exporting only Rohu, new culture species (for example- Hilsa) should be cultured and exported to new export markets.

Myanmar has many commercial and cultivable species such as grouper, snapper, sea bass, mullet, milkfish etc. Among these species, grouper, snapper and sea bass are found as the most common and popular species that command relatively higher prices. The increasing export market in recent years included sea bass (fillet, whole) and groupers (mostly alive). This has led to more exploitation of fish and

increased attempt for culturing of such fish such as sea bass and groupers. Live groupers are usually sold buyers from Hong Kong and Singapore. Moreover the sector should attempt to export new commercial species.

The Fishery sector in Myanmar is seen comparative advantage through calculation of the Revealed Comparative Advantage (RCA). Comparative advantage is a measure comparing relative costs and indicating the species and markets where there is the greatest success. This has been calculated on both the commodity and country-wide basis. It was found that fishery products have a comparative advantage among the primary products in Myanmar. With this potential, the government should make tremendous endeavors on fishery exports to help improve the competitiveness in world markets.

Trade liberalization fosters an increasingly competitive environment. RCA indices in Myanmar showed a rising trend indicating more competitiveness. The calculations showed that Myanmar has the highest RCA among the some Asian countries. There has clear evidence that Myanmar fishery has the potential to compete other fishery exporting countries in Asia and the world markets. Depending on government policies, there is an urgent need to allocate more resources to the fishery sector.

Another crucial finding is that Myanmar has a competitive advantage in exporting fishery products through the calculation of Constant Market Share (CMS). In analyzing the growth of Myanmar fishery export competitiveness by the CMS approach, the distribution effect was found to be negative before 1994/95. This is due to the fact that the Myanmar fishery sector was not yet involved in high quality markets with increasing demand. However, after 1994/95, the distribution effect became positive indicating that Myanmar has gained an increasing market share. After the mentioned period, Myanmar was able to capture more of the market share in terms of increased exports to larger markets where the overall demand is usually high. In the context of export expansion, Myanmar exported more fishery products to re-exporting countries like Singapore and Malaysia.

Myanmar must not only increase or maintain its market share, but also expand into higher quality fish exports. Myanmar's competitive strength in fishery trade depends on her cheap labour, skilled labour force, and government policy reforms which creates opportunities for private entrepreneurs, improves the investment and market environment, and advance their competitive positions. In order to develop

market expansion in the near future, the country needs more skilled labor, capital and advanced technology in fishing as well as cold storage facilities. Capacity building of manpower on a large scale will be urgently needed. This calls for both local and foreign trainers to intervene in human resource development.

Trade liberalization effects are pronounced in terms of changing from a situation of 'comparative advantage' to one of 'competitive advantage'. This change is mainly on account of the 'human factor'. In trying to achieve the goal of competitive advantage, Myanmar has clear evidence that human resources have to be developed to international standards. Not only human resources, but also capital and advanced technologies are equally important for both growth and development of the sector.

The study has used Interrupted Times Series (ITS) Analysis which is a quasi-experimental method. It is actually a regression analysis technique that employs the concept of dummy variables for intervention. This is used to analyze the impact of trade liberalization on fishery production and export .Trade liberalization was introduced in 1988/89 and privatization was implemented in 1994/95 in fishery sector. It is found that short-term impact of trade liberalization on fishery production and exports were insignificant. There exists no evidence of immediate impact of trade liberalization.

There is an evidence of significant long-term impact on total fishery export. Total fishery export increases due to improving quality accordance with in international standard, expanding markets and exporting more commercial species.

Growth of fishery production and export will not go on for ever. There is a limit to how much food including fish, individual will consume, and long-term ceiling for consumption and will be established.

According to Bio-economic model, yield level of marine fishery exceeded maximum sustainable yield. Therefore, there is urgent need to manage sustainable development of fisheries in capture as well as culture. The decline in marine fishery has been largely offset by increased aquaculture production. The growth of fish culture production showed a high percentage (25.48%) as clearly seen in the semi-log trend model. Production from aquaculture will be a major source of increased fish production. There are huge considerable potential and opportunities for further development in aquaculture, especially Mariculture. It has been envisaged that with concerted effort by both state and private sector, aquaculture will boom in the near future.

6.2 Recommendations and Suggestions

      With a view to sustain and further develop Myanmar Fisheries, the following recommendations are made.

(1) Assessment of Standing Fishery Resources

      According to the results, the trend is leading to depletion of quality fishes. Thus the proper reporting and record keeping system from all standings of inshore and offshore fisheries is urgently needed. Meanwhile the approaches should be rendered to FAO, SEAFDEC, JICA and ODA for assistance to make comprehensive fishery resources assessment in Myanmar marine territorial water.

(2) Marine Fisheries Management

      The Fishery sector should establish and implement comprehensive policies for innovative fisheries management, such as the progressive introduction of rights-based fisheries management through licensing and community fishing rights, the improvement of vessel registration systems and the development of supporting legal and institutional frameworks.

      The Fishery sector should take measures to prevent unauthorized fishing and eliminate the use of illegal and destructive fishing gears, to encourage coordinated and effective planning for coastal fisheries management programs, to restock commercially important fish species and to develop human resources for the implementation of such programs.

(3) Aquaculture Fisheries Management

      The Fishery sector should develop and maintain freshwater fisheries through promoting awareness of the importance of freshwater fisheries for local food security, rehabilitating and restoring habitats for migratory freshwater fish, restocking indigenous fish species to enhance productivity, providing for public and private hatchery development, developing domesticated brood stocks and fish reproductive technologies, formulating guidelines for the use of chemicals in aquaculture and encouraging culture-based freshwater fisheries where appropriate.

(4) Fish Trade and Quality Control

In fact, the export quantity of fishery products is still relatively unmatched to its potential due to shortage of the market structure, insufficient on-shore facilities such as ice plants, cold storage, fish-meal and value- added fish processing plants. In order to fulfill the gap, Myanmar needs to build a comprehensive industrial infrastructure and system integrating aquaculture such as fishing, processing, marketing, technology, fishing ports, fishing vessel dockyards, net factories etc. The whole infrastructure will have to be modernized in order to produce sufficient amount of quality fish products.

In general, importing countries in international trade are much cautious about quality. In recent years, quality has become a big issue in fish trade. Certain trade measures such as TBT and SPS frustrate efforts to enhance diversification of production and exports of high value-added processed fisheries products in developing countries.

For promotion of fish exports, it is important to have quality control in Myanmar. The Fishery sector should develop and apply fish quality and safety management systems that support the current competitive position of Myanmar fishery products in the regional and world markets through the implementation, validation and promotion of HACCP, GAP, and GHP and improved laboratory practices, the promotion and conduct of training programs to upgrade the technical skills and competencies of personnel in the private sector and the strengthening the compliance of fisheries industry to regional and international requirements.

(5) High Value-added Product

The global trends of consumers market indicate that there is a higher demand for simple and easy-to- cook fish base ready meals with high value adding. New production and processing technology are being increasingly introduced. Most of Myanmar fishery products are exported as raw materials. The importers reprocess or transform these raw fisheries from Myanmar for further marketing them into other external markets.

In this regard, there is an important need to upgrade the fish product to be semi-processed or value-added in order to increase its valueAdditionally, the approaches to upgrade traditional fishery processing and preservation methods as well as market promotion are also crucial for the effective utilization of fisheries resources.

(6) Provision for Research and Development, Training, Human Resource Development and Capacity Building

The development of fishery industries has a close link to research and development which will continue to make a significant contribution to the growth of the Fishery sector.

Research and development should strengthen and develop cooperation among ASEAN member countries. Myanmar in joint collaboration with advanced fishing countries should be involved more in research and development programs sharing technical knowhow in the field of aquaculture, captured fisheries, post harvest technology and inland water management. Myanmar fishery sector should conduct regional workshops meeting, training and seminars on fishery research and development.

It is necessary to establish short-term and long-term training programs for fishery and fishery-related workers within the framework of available resources. Thus it would be wise to encourage and improve the capacity of Institute of Fisheries Technology in order to render more efforts to disseminate training on fishery resources management.

The Fishery sector itself should concentrate more on research works so as to contribute to production as well as marketing. To properly address the market demand by retailers, consumers and producers, there is a need to promote human resource development and capacity building through training, extension, education, the transfer of appropriate technology, and improved access to information.

Furthermore, the general public needs to be widely educated and informed concerning the conservation and protection of fishery resources. For this purpose, the DoF should effectively distribute pamphlets and posters as well as inserting educational programs in media such as newspaper, magazines, journals television, video show and public awareness talks.

(8) Government Activities

All conditions point to the need for increased cooperation and collaboration between the private and public sectors engaged in all stages of the fishery development process. Cooperation and coordination between the Ministries of forest, agriculture, irrigation, energy, fisheries and Myanmar navy are indeed essential to

prevent further loss of fisheries and promote sustainable development of fisheries resources.

Human factors that include fishermen, farmers, processors, government officials, entrepreneurs, businessmen, professional managers, engineers, zoologists, biologists are crucial to sustainable fishery sector development in Myanmar according to the nine factors model. The most important contribution of this study is to emphasize the role of human factors and internationalization. In the absence of abundant natural resources, the less competitive countries can gain a competitive momentum by remobilizing their human resources and opening up their economies.

The government in Myanmar should take absolute care to establish the concrete balance between sustainable development and sustainable environment. The DoF is taking two important responsibilities under the name of conserving biodiversity and their habitats on one hand and providing assistance to all aquacultures and marines in sustainable fishery development on the other hand. For the twin goals of sustainable development and sustainable environment, the government must build effective communication channels with involved fishing communities.

Fishery sector which have been fully liberalized can perform very well in both production and export of fisheries products. Despite liberalization of the economy, the government still plays a dominant role in the provision of inputs, in the procurement, catching, culturing, processing and marketing of fisheries products.

Government activities are in fact the most important among all factors leading to the overall growth and development of the Fishery sector itself. In fact, Government activities are the only ones that can enhance the capabilities of the workforce in the Fishery sector and more importantly the move towards internationalization. The Fishery sector is too important to be left alone to the private sector. Without government activities there is only a slight tendency for the Fishery sector to survive in the long-term. Therefore, government activities are considered as crucial and essential.

RCA method is more descriptive and less predictive potential than the DRC approach but it has the advantage of data availability. But the DRC method is dynamic and more predictive potential.

Constant market share analysis is a useful tool in analyzing the extent to which the country is exporting to markets with relatively unfavoured or favoured

growth rates. Therefore the analysis can be useful for policy makers in determining the preferred distribution of exports.

Interrupted time series analysis can be used to study the effectiveness of some other government interventions, e.g, economic integration, privatization, petroleum prices etc.

APPENDIXES

Appendix 1

Per Capita Fish Consumption in Myanmar

Year	Production (Thousand Metric Tons)	Per Capita Fish Consumption (kg)
1988/89	682.03	16
1989/90	729.66	17
1990/91	733.74	17
1991/92	757.98	17
1992/93	791.89	17
1993/94	811.34	17
1994/95	823.46	16
1995/96	673.83	15
1996/97	700.19	17
1997/98	927.38	18
1998/99	1011.18	18
1999/00	1195.79	22
2000/01	1283.48	23
2001/02	1474.46	25
2002/03	1595.87	26
2003/04	1987.02	33
2004/05	2217.47	36
2005/06	2581.78	41
2006/07	2861.71	44
2007/08	3180.92	44
2008/09	3542.19	45
2009/10	3921.97	46

Source : DoF , Fishery Statistics , Various Issues

Appendix 2

Sector Wise Contributions to GDP, Union of Myanmar
(At 1985-86 Constant Producers' Prices)

(% Share)

Year	Agriculture	Livestock and Fishery	Processing and Manufacturing	Construction
1988/89	38.5	8.0	8.7	1.4
1989/90	39.1	7.4	9.3	1.9
1990/91	38.7	7.2	8.8	2.5
1991/92	38.4	7.3	8.8	2.9
1992/93	38.4	7.3	8.8	2.9
1993/94	37.9	7.2	9.1	3.3
1994/95	37.6	7.1	9.2	3.3
1995/96	37.1	6.8	9.3	3.9
1996/97	36.2	7.2	9.1	4.6
1997/98	35.2	7.3	9.1	4.8
1998/99	34.5	7.5	9.1	4.9
1999/00	34.4	7.9	9.4	4.6
2000/01	33.6	8.3	10.1	4.2
2001/02*	47.3	8.0	7.8	2.1
2002/03*	44.3	8.1	9.0	3.0
2003/04*	42.5	8.9	9.6	3.2
2004/05*	41.2	9.1	20.6	3.2
2005/06*	40.2	9.5	11.4	3.1
2006/07*	37.0	7.6	14.0	3.8
2007/08*	36.0	7.6	14.9	4.0
2008/09*	33.7	7.5	16.0	4.7
2009/10*	31.9	7.6	17.3	4.4

Source: Statistical Yearbook, Various Issues.

*At 2000-01 constant Producers' Prices

Appendix 3

Sector wise Compositions of Total Exports, Union of Myanmar

(% Share)

Year	Agricultural Products	Animal Products	Marine Products	Forest Productivity	Minerals and Gems	Gas	Garment	Base Metal and Ores
1988/89	5.9	0.24	2.8	30.47	2.8	-	0.37	3.23
1989/90	15.24	0.09	4.73	31.44	3.07	-	0.49	2.40
1990/91	31.80	0.16	5.57	33.72	2.90	-	0.27	2.43
1991/92	34.55	0.15	5.40	31.82	1.85	-	2.02	1.64
1992/93	36.18	0.05	7.21	26.43	3.01	-	2.70	0.75
1993/94	32.12	0.12	11.40	29.35	3.90	-	5.20	0.69
1994/95	45.85	0.09	11.42	18.80	1.94	-	6.35	1.13
1995/96	46.12	0.14	12.22	20.82	2.72	-	5.96	1.39
1996/97	36.10	0.17	16.16	17.95	2.90	-	7.33	0.60
1997/98	30.28	0.12	14.66	13.23	3.21	-	6.76	0.47
1998/99	27.98	0.50	13.93	11.68	2.21	0.07	6.97	1.09
1999/00	11.20	0.31	9.02	10.34	2.45	0.35	30.42	3.23
2000/01	18.15	0.29	7.33	6.30	2.85	8.72	29.72	2.54
2001/02*	17.63	0.25	5.03	10.97	0.74	24.79	17.34	1.68
2002/03*	14.07	0.11	5.59	9.38	1.25	29.66	14.91	1.41
2003/04*	16.59	0.09	6.84	14.51	2.53	24.63	13.92	2.41
2004/05*	10.95	0.10	6.20	13.43	3.69	34.81	7.41	3.28
2005/06*	12.28	0.10	5.56	13.32	6.58	30.20	7.68	3.13
2006/07*	13.31	0.06	4.52	9.79	7.43	38.89	5.34	2.13
2007/08*	13.26	0.06	4.68	8.40	10.08	39.49	4.41	1.35
2008/09*	15.53	0.07	4.06	5.97	9.72	35.10	4.30	0.48

Source: CSO, Statistical Yearbook, Various Issues.

Appendix 4

Total Investment of Permitted Enterprises by Sector, under the Foreign Investment Law

(Value - Million Kyats)

Year	Investment in Fishery				% Share of Local Investment in Fishery Sector	% Share of Foreign Investment in Fishery Sector
	No. of Enterp-rises	Investment	Local	Foreign		
1991-92	2	114.66	60.34	54.32	52.63	47.37
1997-98	17	2084.816	390.395	1694.421	18.73	81.27
2001-02	20	2167.435	390.065	1777.370	18.00	82.00
2005-06	24	2350.730	398.084	1952.646	16.93	83.07
2009-10	25	2422.730	398.084	2024.646	16.43	83.57

Source: CSO, Statistical Yearbook, Various Issues.

Year	N Tons	Fishery Export (Kyats-million)	Total Exports	
1971/72	13.9	0.21		
1972/73	59.8	0.79	679	0.12
1973/74	38.7	0.58	953	0.06
1974/75	45.0	0.49	912	0.05
1975/76	123.3	2.87	1192	0.24
1976/77	569.4	13.75	1414	0.97
1977/78	1086.2	26.70	1728	1.55
1978/79	1807.6	45.82	1842	2.49
1979/80	1823.9	50.65	2679	1.89
1980/81	2252.7	58.36	3176	1.84
1981/82	2664.6	77.58	3432	2.26
1982/83	2359.2	87.75	3003	2.92
1983/84	1188.8	45.85	3373	1.40
1984/85	2600.0	101.43	3133	3.23
1985/86	2253.9	76.55	2566	2.98
1986/87	4446.8		2433	
1987/88	3578.7		1655	
1988/89	5431.6	61	2169	2.8
1989/90	9273.9	134	2834	4.73
1990/91	13927.6	165	2962	5.57
1991/92	14259.0	158	2926	5.40
1992/93	28487.6	259	3590	7.21
1993/94	23215.8	368	4228	11.40
1994/95	96740.0	617	5404	11.42
1995/96	54360.8	615	5033	12.22
1996/97	67400.8	887	5488	16.16
1997/98	74179.9	945	6447	14,66
1998/99	126873.7	941	6756	13.93
1999/00	116609.2	807	8947	9.02
2000/01	144623.8	934	12736	7.33
2001/02	201666.8	861	17131	5.03
2002/03	212999.6	1116	19955	5.59
2003/04	205463.2	966	14119	6.84
2004/05	255780.2	1036	16697	6.20
2005/06	271070.3	1147	20647	5.56
2006/07	343426.6	1357	30026	4.52
2007/08	351652.0	1653	35297	4.68
2008/09	324710.5	150	37028	4.06

Appendix 5

Theory and Measurement

Leamer and Sterm (1972) provided an elaborate description of the theory underlying this analytical technique. Assuming that the supply of a commodity is confined to two competing sources, say from country i and the rest of the world, j, demand for exports in a given market from the competing sources can be expressed as follows:

$$\frac{q_i}{q_j} = f\left(\frac{P_i}{P_j}\right) \qquad (1)$$

Where q_i and q_j represent the volume of exports of a given commodity from two competing sources of supply and Pi and Pj are their respective prices. Equation (1) is the basic form of the elasticity of substitution and may be altered by multiplying by $\frac{p_i}{p_j}$ to obtain:

$$\frac{P_i\, q_i}{P_j\, q_j} = \frac{P_i}{P_j} \times f\left(\frac{P_i}{P_j}\right) \qquad (2)$$

The equation (2) implies

$$\frac{P_i\, q_i}{Pi\, q_i + P_j q_j} = \left(1 + \frac{P_j q_j}{P_i + q_i}\right)^{-1}$$

$$= g\left(\frac{P_i}{P_j}\right) \qquad (3)$$

The above equation indicates that country's share of the market will remain constant except as $\left(\frac{P_i}{P_j}\right)$ varies, This is the basic of the constant share norm, which suggests that the difference between export growth implied by the constant share

norm and actual export growth may be attributed to changes in relative prices, defined as the effect of competitiveness. When a country fails to maintain its share in world markets, the competitiveness effect will be negative and will indicate that the prices of the country in question are somewhat greater than those of its competitors for the identical product.

The following notation is used in the analysis of Myanmar fish export growth.

QM^1, QM^2 = Myanmar exports of fish in periods 1 and 2.

QMj^1, QMj^2 = Myanmar exports of fish to country j in periods 1 and 2.

r = Percentage increase in total world exports of fish during periods 1 and 2.

rj = Percentage increase in world exports of fish to country j during periods 1 and 2.

Constant share norm provides the following identity:

$$QM^2 - QM^1 = r\,QM^1 + (QM^2 - QM^1 - r\,QM^1) \text{ -----------------------------(4)}$$

which can be aggregated as

$$\sum(QM^2 - QM^1) = \sum r_j QM^1 + \sum\nolimits_j (QM^2 - QM^1 - r_j QM^2) \text{ ------------------ (5)}$$

$$\sum(QM^2 - QM^1) = \sum r\,QM^1 + (\sum rjQM^1 - \sum rQM^1) + \sum j(QM^2 - QM^1 - r_j QM^1) \text{------(6)}$$

Equation (6) representing the rise in Myanmar exports, can be segregated into three effects:

(a)   The general rise in world export, $\sum rQM^1$

(b)   The market distribution effect, $(\sum rjQM^1 - \sum rQM^1)$

(c)   The residual effect, $\sum (QM^2 - QM^1 - r_j QM^1)$

The market distribution term in equation (6) indicates the extent to which Myanmar exports are concentrated in markets with growth rates greater than the world average. If (r_j) is greater than (r) the market distribution term would be positive which means that Myanmar exports are concentrated in markets which are growing

relatively fast. A negative term would mean that Myanmar had concentrated its exports in a more stagnant region.

Appendix 6

Total Loan from MLFDB

(Million Kyats)

Year	Total loan
2001/02	4830
2002/03	6627
2003/04	10771
2004/05	13888
2005/06	15417
2006/07	31563
2007/08	52146
2008/09	59646
2009/10	65200

Source: Myanmar Livestock and Fisheries Development Bank

Appendix 7

Department of Fisheries
Fishing Grounds of Myanmar (Zone wise)

Appendix 8
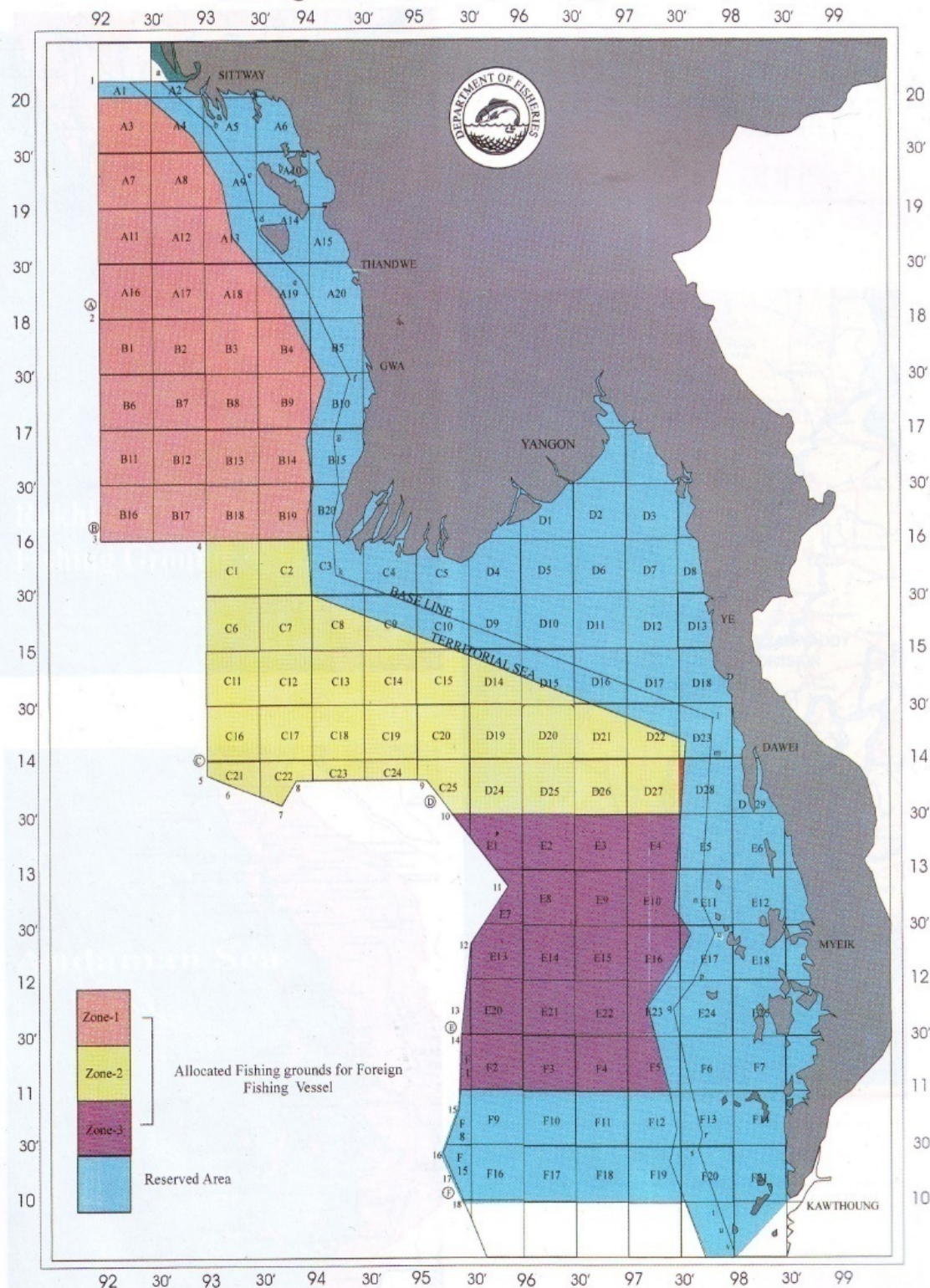
Semi-log Trend Model: Measuring Compound Growth Rate

To estimate the fishery production growth potentials, Semi-log trend model is used in the study. Let Y_t be a variable of interest at time (year) t (t = 1, 2, ……, n). Semi-log trend model of Yt is given by:

$$\ln Y_t = \beta_0 + \beta_1 t + \varepsilon_t \quad \text{-------------------(1)}$$

where β_0 and β_1 are unknown parameters and ε_t is a disturbance term which is assumed to satisfy the assumptions with zero mean and constant variance.

If $\ln Y_t = Y_t^*$

$$Y_t^* = \beta_0 + \beta_1 t + \varepsilon_t \quad \text{--------------------(2)}$$

Since equation (2) is in the form of simple linear trend model of Y_t^*, the unknown parameters β_0 and β_1 can be estimated together with the related statistics, with the Ordinary Least Squares (OLS) method.

However, the compound rate of growth of Y_t over the given period of time can be computed as follows:

Let $\hat{P}$ be estimated compound rate of growth of Yt over the period of n years in the above setting, then $\hat{P} = \{\exp(\hat{\beta}_1)-1\} \times 100\%$

Based on the fish production by nature of catch (in metric tons) over the study period (1988-89 to 2009-10), Semi-log trend (that is log-linear trend) equations and compound rates of growth are estimated. The regression results for each nature of catch are as follows:

(1) Fish Culture Production Quantity (FPQ)

Ln (FPQ) = 2.128   +0.227 TIME

SE   (0.014)   (0.180)

t   (11.799)*   (16.516)*

R^2 =0.932 R_a^2=0.928   Computed F value = 272.775*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth =25.48%

(2) Leasable Fish Production Quantity(LFPQ)

Ln (LFPQ) = 3.545   +0.081 TIME

SE   (0.058)   (0.004)

t   60.957)*   (18.214)*

R^2 =0.943 R_a^2=0.940   Computed F value = 331.755*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth =8.44%

(3)Open Fishery Production Quantity (OFPQ)

Ln (OFPQ) = 3.173   +0.154 TIME

SE   (0.101)   (0.008)

t   (31.416)*   (20.010)*

R^2 =0.952 R_a^2=0.950   Computed F value = 400.381*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth = 16.65%

(4) Inshore Fishery Production Quantity (INFPQ)

Ln (INFPQ) = 5.359   +0.046 TIME

SE   (0.107)   (0.008)

t   (50.04)*   (5.611)*

R^2 =0.612 R_a^2=0.592   Computed F value = 32.481*

*Significant at 1% level (p-value<0.01)

Estimated compound rate of growth = 4.71%

(5)Offshore Fishery Production Quantity (OFFFPQ)

Ln (OFFFPQ) = 4.046   +0.157 TIME

SE   (0.159)   (0.012)

t   (25.372)*   (12.898)*

R^2 =0.893 R_a^2=0.887   Computed F value = 166.355*

*Significant at 1% level (p-value<0.01)

Estimated compound rate of growth = 17.00%

(6)Total Fishery Production Quantity (TFPQ)

Ln (TFPQ) = 6.154   +0.089 TIME

SE   (0.085)   (0.006)

t   (72.631)*   (13.731)*

R^2 =0.904 R_a^2=0.899   Computed F value = 188.540*

*Significant at 1% level (p-value<0.01)

Estimated compound rate of growth = 9.31%

Appendix 11

Degree of Openness

Year	Export (Million US$)	Import (Million US$)	GDP (Million US$)	Degree of Openness
1989	424	507	4849	19.20
1990	473	874	5179	25.52
1991	464	846	5325	24.60
1992	599	880	5974	24.75
1993	651	852	6480	23.09
1994	783	1519	7112	32.24
1995	954	1817	7761	31.06
1996	993	1914	8418	34.53
1997	1007	2280	9043	36.35
1998	1069	2659	7742	48.15
1999	1129	2547	7575	48.53
2000	1647	2401	8275	48.91
2001	2382	2877	9644	53.42
2002	3046	2348	10369	52.02
2003	2484	2092	9999	45.76
2004	2379	2196	10253	44.61
2005	3813	1927	11930	48.11
2006	4585	2564	13738	52.04
2007	6313	3277	18443	51.90
2008	6950	4299	28663	39.25

Source: United Nations Statistical Yearbook

(Unstats.un.org/unsd/syb)

		Rohu		Rohu
		Ribbon Fish		Palathukae
		Hilsa		Hilsa
		Trash Fish		Sardine
		Big Eye Croaker		Ribbon Fish
		Palathukae		Palathu
		White Pomfret		Mrigal
		Mrigal		Katla
		Katla		Tilapia
		Tilapia		Carfu

		Pink		Pink
		Tiger		Tiger
		White		White
		Freshwater Prawn		Freshwater Prawn
		Flower		Flower

		Fish Meal		Fish Meal
		Live Crab		Live Crab
		Live Eel		Live Eel
		Dried Small Crab		Dried Small Fish
		Salted Fish		Dried Snake Skin Gourami
		Surimi		Surimi
		Dried Prawn		Dried Prawn
		Frozen Squid		Dried Squid
		Dried Snake Skin Gourami		Squid
		Dried Squid		Soft Shell Crab

Appendix 12

Based on the fish export (in metric tons) over the study period (1988-89 to 2009-10), semi-log trend (that is log-linear trend) equations and compound rates of growth are estimated. The regression results for each nature of catch are as follows.

(1) Fish Export Quantity (FEQ)

154

Ln (FEQ) 1.905   +   0.187 TIME

SE   (0.172)   (0.013)

t   (11.069)*   (14.275)*

R^2 =0.911 R_a^2=0.906   Computed F value = 203.764*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth =20.56%

(2) Prawn Export Quantity(PEQ)

Ln (PEQ) = 0.838   +0.13 TIME

SE   (0.212)   (0.061)

t   (3.947)*   (8.048)*

R^2 =0.764 R_a^2=0.752   Computed F value = 64.767*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth =13.88%

(3)Other Fishery Export Quantity (OFEQ)

Ln (OFEQ) = -0.944   +0.30 TIME

SE   (0.455)   (0.035)

t   (-2.075)*   (8.660)*

R^2 = 0.789 R_a^2=0.779   Computed F value = 75.003*

*Significant at 1% level (pvalue<0.01)

Estimated compound rate of growth = 34.99%

(4) Total Fishery Export Quantity (TFEQ)

Ln (TFEQ) = 2.252   +0.191 TIME

SE   (0.176)   (0.013)

t   (12.794)*   (14.261)*

R^2 =0.91 R_a^2=0.906   Computed F value = 203.365*

*Significant at 1% level (p-value<0.01)

Estimated compound rate of growth = 21.05%

Appendix 13

Fishery Export to Other Countries

(% Share of Total Fishery Exports)

Year	Saudi	UAE	Kuwait	Jordan	Quatar	UK	Netherland	Belgium	Germany	Sweden	France
1996-97	-	-	-	-	-	0.64	0.25	0.21	0.10	-	0.18
1997-98	-	-	-	-	-	1.04	0.58	0.05	0.11	-	0.01
1998-99	0.40	2.47	0.02	-	-	2.05	0.39	0.01	0.06	-	-
1999-00	0.40	2.08	0.13	-	-	1.75	0.16	0.03	0.08	-	-
2000-01	-	2.31	-	-	-	2.19	0.02	0.31	0.09	-	0.00
2001-02	-	2.31	-	-	-	2.20	0.24	0.06	0.01	0.16	0.00
2002-03	-	2.11	-	-	-	1.91	0.02	0.27	0.02	0.01	0.01
2003-04	-	2.52	-	-	-	2.11	0.01	0.25	0.05	0.00	0.00
2004-05	-	5.47	-	-	-	2.32	0.01	0.19	0.02	0.26	0.00
2005-06	5.60	6.55	1.36	0.55	0.12	2.05	0.00	0.19	0.11	0.03	0.00
2006-07	5.25	4.07	4.36	0.22	0.08	1.68	0.04	0.20	0.06	0.01	-
2007-08	5.35	2.69	7.93	0.05	0.07	1.77	0.00	0.04	0.01	0.02	-
2008-09	5.46	3.27	10.61	0.06	0.07	1.60	0.00	0.03	0.00	0.01	0.00
2009-10	5.45	3.60	15.66	0.12	0.13	1.68	0.02	0.00	0.00	0.01	0.00

Source : DoF, Fisheries Statistics, Various Issues

Appendix 14

Fishery Exports (Normal Trade and Border Trade)

Year	Normal Trade		Border Trade		Total Fishery Export
	Metric Ton	%	Metric Ton	%	
1997-98	59432	80.12	14747	19.88	74179
1998-99	63082	49.72	63787	50.28	126873
1999-00	48771	41.82	67838	58.18	116609
2000-01	68842	47.60	75781	52.40	144623
2001-02	112297	55.68	89369	44.32	201666
2002-03	103132	48.42	109867	51.58	212999
2003-04	91323	44.45	114140	55.55	205463
2004-05	91812	35.89	163967	64.10	255780
2005-06	102381	37.77	168689	62.23	271070
2006-07	124711	36.31	218715	63.69	343426
2007-08	143575	40.83	208077	59.17	351652
2008-09	163069	50.30	161144	49.70	324210
2009-10	191349	51.01	183743	48.99	375092

Source: DoF, Fishery Statistics, Various Issues

Appendix 15

EU approved factories in Myanmar

No	CompanyName Approval	Year
1.	United K.M.K Company Limited	2009
2.	Great International Fisheries Limited	2009
3.	Shwe Yamone Manufacturing Company Limited	2009
4.	May Yu Marine Products Co, Ltd	2009
5.	Twin Brothers Seafood Cold Storage	2009
6.	Myint Myat Hein Co, Ltd	2009
7.	Gharu Win International Modern Processing Plant and Cold Store	2009
8.	General Food Technology Industry Company Limited	2009
9.	Ayeyarwaddy Fisheries Cold Storage	2010
10.	Myanmar Sea Food Limited	2010
11.	Yuzana Fisheries Ltd	2010
12.	Shwe Myanmar Cold Store	2010
13.	Crabs World Industries Co, Ltd	2010

Appendix 16

Statistical Methodology for Impact of the Trade Liberalization Policy on Fishery Sector in Myanmar: Interrupted Time Series Analysis

In many cases, governments or public managers or policymakers introduce and implement a new project or a new policy or a new law to change a pattern of behavior of a system. This appendix provides an introduction to statistical methodology, called interrupted time series analysis that is useful in evaluating impact of changes in policies or programs on the pattern of behavior. Interrupted time series analysis assumes that a researcher has collected a time series of observations such as the following:

$$O_1 \quad O_2 \quad O_3 \quad O_4 \quad O_5 \quad X \quad O_6 \quad O_7 \quad O_8 \quad O_9 \quad O_{10}$$

where each O is an observation on an output variable Y of interest and X is the implementation of a new program or policy which is called interruption or intervention in literature of time series analysis. In many cases, researchers simply compare five observations before X with five observations after X, using a comparison of a mean or proportion test. Such a comparison might be misleading, because value of the output variable Yt obtained from observation Ot might have been in the trend of increasing or decreasing before the introduction of the new program, and observation O_6 might just be the continuation of a trend.
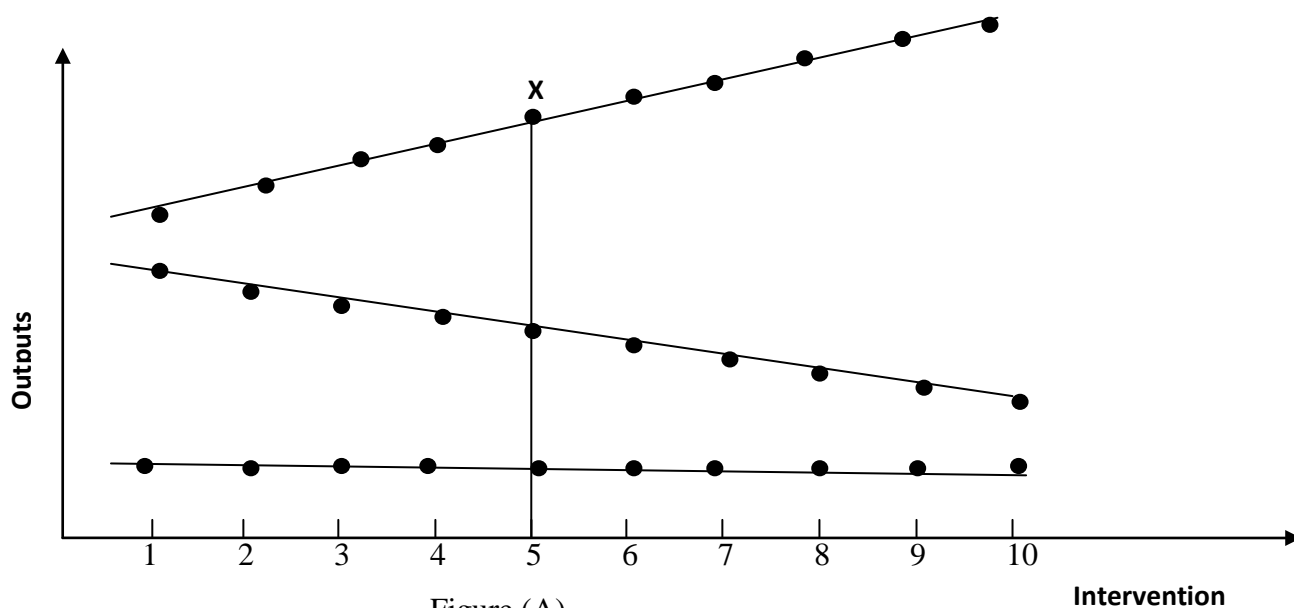

Figure (A)

In the above Figure (A), observation O_6 falls along a trend line that is simply the continuation of the line from observation O_1 to observation O_5. In this case, introduction of new program or policy made no difference that would not have occurred if past practices had simply continued. The pattern in Figure (A) represents

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the null hypothesis that there exists no impact of intervention in interrupted time series. This is not the only "no impact" pattern in Figure(A), however, each of the trend lines in Figure (A) is also trend consistent with the null hypothesis of no impact on output variable Y.

Regression Model for Short-term Impact of Trade Liberalization Measures on Fishery Sector in Myanmar

Using interrupted time series analysis is a matter of recognizing a few basic patterns, and then knowing how to use multiple linear regressions to provide a statistical test for the results obtained from the estimated regression models. One common pattern is *a short-term impact* (or what time series analysts call *a change in intercept*). As in Figure (B), short-term impact is one in which the output variable Y makes an immediate change (drop or rise), but the underlying trend of the data remains the same.

Figure (B) Short – Term Impact

Intervention
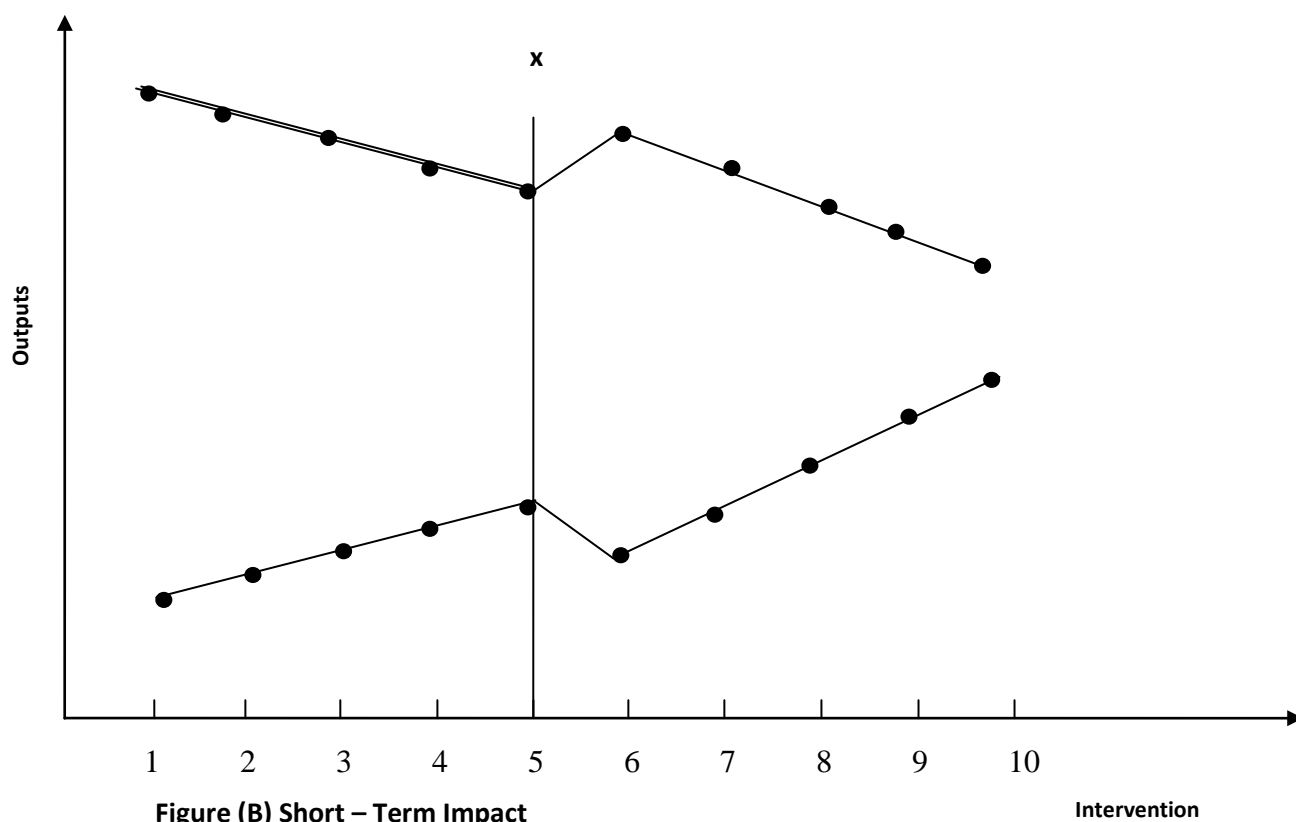
To determine whether a short-term impact of trade liberalization measures occurred, two new independent variables are created in the regression model. The independent variable (SHORT), called the program variable, is a dummy variable which is coded 0 if the introduction of new program or policy or law is promulgated and to be in effect. Treating output variable Y of interest as the dependent variable and program variable SHORT as a independent variable, a regression model is run to get the required result:

The regression model is given by $Y = \beta_0 + \beta_1 \, SHORT + \varepsilon$

Regression Model for Long-term Impact of Trade Liberalization Measures on Fishery Sector in Myanmar

Short-and long-term effects of trade liberalization measures apply to the rate of change. A short-term effect should not be interpreted as a temporary effect. It is a permanent effect, but its impact is immediate (in the short-term). A long-term effect is also permanent, but its impact takes place over a longer period of time. This pattern is called a long-term impact or a change in slope impact because the slope of the line changes after the program is implemented. Determining a long-term impact using interrupted time series is similar to assessing a short-term impact, but with a slightly different twist.
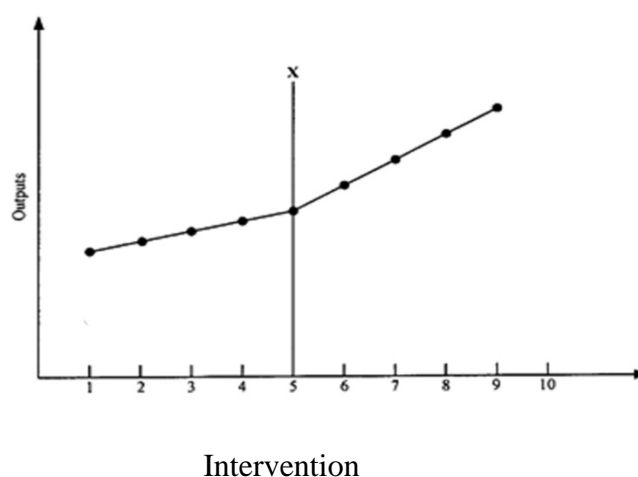

Intervention

Figure (C) Long-Term Impacts

An illustration of use of interrupted time series analysis for long-term impact of the trade liberalization measures on total fishery fish (TFPQ), based on time series

data over the period of 30 years from 1980/81 to 2009/2010 is presented using the variables as follows:

$$TFPQ = \beta_0 + \beta_1 LONG + \varepsilon$$

where TFPQ = Total fish production quantity (TFPQ) in thousand metric tons

LONG=Independent variable used to capture long-term impact

This variable (LONG) is coded 0 before the implementation of the trade liberalization measures, before 1988/89 and it is coded as a counter variable after the introduction of the program; that is, LONG=1 for 1988/89, LONG =2 for 1989/90, ... …….LONG = 22 for 2009/ 2010 in the above regression model.
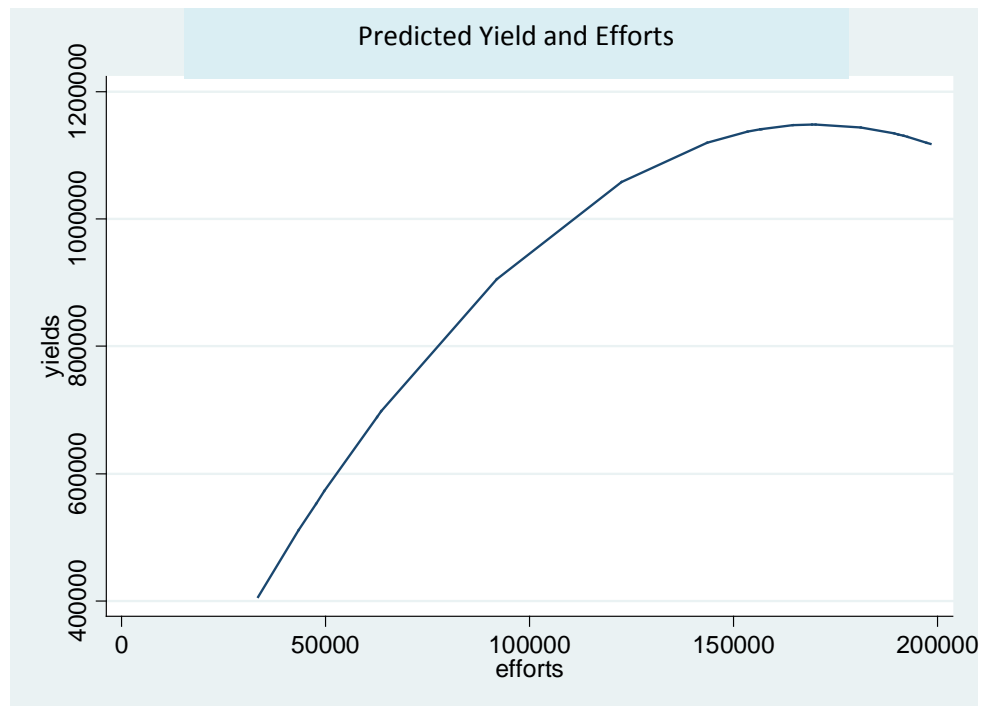
Appendix 17

```
reg  YbyE  and effort
  Source          SS          df          MS                Number of obs =      22
-------------+---------------------- ---------------------    F( 1,   20)    =  12.97
      Model | 114.583706   1       114.583706                 Prob > F       =  0.0018
   Residual | 176.648628   20         8.83243139              R-squared      =  0.3934
-------------+------------------------------- ----------      Adj R-squared =  0.3631
      Total | 291.232334   21       13.8682064                Root MSE       =  2.9719

-------------------------------------------------------------------------------------
       YbyE |    Coef.        Std. Err.                 t              P>|t
-------------+-----------------------------------------------------------------------
     effort | -.0000396          .000011              -3.60           0.002
       cons |  13.48339         1.612936               8.36           0.000
-------------------------------------------------------------------------------------
```


Predicted Yield and Efforts

Appendix 18

The Numbers of Convicted Fishing Vessels and Cases

	1994/95	2001/02	2005/06	2009/10
Myanmar Marine Fisheries Law, Section(33)	4	4	9	31
Myanmar Marine Fisheries Law, Section(34)	-	13	31	187
Myanmar Marine Fisheries Law, Section(35)	12	25	28	31
Fishing Rights of Foreign Vessels Law	16	55	5	24
Freshwater Fisheries Law	5	12	17	38
Even though the fishing days are due the require amount of fisheries doesn't reach the target	-	354	425	288
Total	37	463	515	599

Source: DoF

Appendix 19

Types of Fishing Gears

Year	Trawl	Purse Seine	Driftnet	Long Line	Stick held falling net	Trap	Total
1996-97	726	59	792	4	28	-	1609
2001-02	939	84	820	103	6	47	1999
2005-06	798	106	1001	40	29	48	2022
2009-10	895	163	606	3	35	112	1814

Source DoF, Fishery Statistics, Various Issues.

REFERENCES

1. A Synthesis Report, (1999), *Trade Liberalization and the Environment*, United Nations.

2. Ahmed,M. (2007), "Fish to 2020 in changing global Markets: FAO, Italy.

3. Alessandriri,M., B. Fattouh and P. Scaranozzino, (2009), "Tariff Liberalization and Trade specialization in India", ADB Economic Working Paper ,Series No 17.

4. Anne, O. (2009), "Trade openness is now more important than ever", World Bank Institute, Special report.

5. Barbault,R.and S.D Sastraphadja(1995), *Generation, maintenanceand lossof biodiversity* .Global biodiversity assessment, Cambridge University Press,Cambridge .

6. Bojo, J.(1996)." Impact of Economic Policies on the Environment". Unpublished Invited Paper to the Workshop on Environmental Economics for Planners and Policy Makers, 11 - 13 March 1996, Windsor Lake Victoria Hotel, Entebbe.

7. Brown,N. (2007) "Free Trade Agreements: Implications for global seafood supply and demand", FAO, Rome.

8. Card,L.W. (2000)"Does Openness Promote Growth", Agenda, Vol. 7, No. 3.

9. Carlos Alfredo Rodrizuez, "on the Degree of openness of an open economy, Argentina Cathy A.Rohein, (2004), *Trade Liberalization in Fish Product,* The World Bank, Washington DC.

10. Cho Cho Thein, Dr., (2003), Trade and Economic Development of Myanmar, Ph.D Dissertation submitted to Jawaharlal Nehru University, New Delhi, India.

11. Cho, Dong-Sung.(1994*)," A Dynamic Approach to International Competitiveness: The Case of Korea". *Journal of Far Eastern Business*.

12. Christine Gorman, We Love Fish, Newsweek, October, 2000.

13. Clark,C.W. (1985), *Bioeconomic Modelling and Fisheries Management*, John Wiley and Sons, New York.

14. Conrad, J.M. (1999), *Resource Economics*,Cambridge University Press, Cambridge,England.

15. Costanza,R.(2007) *An Introduction to Ecological Economic*, Lucie Press and International society for Ecological Economics.

16. CSO, Statistical Yearbook, Various Issues

17. DoF (2004), National Report of Myanmar on the Sustainable Management of the Bay of Bengal Large Marine Ecosystem.

18. DOF (2006), Status of and Threats of living Marine Resources in Myanmar, Ministry of Livestock and Fisheries, Myanmar.

19. DOF (2007/08), Fishery Statistics, Ministry of Livestock and Fisheries, Myanmar.

20. DoF(1994), Report of the Resources Survey, Yangon.

21. DoF, Fishery Statistics, Various Issues.

22. Dong – Sung Cho (1994), "Evolution of Competitiveness Theory", World Scientific Publishing Co. Pte.Ltd.

23. Dong-Sung Cho and Hwy-Chang Moon, (2000), *From Adam Smith to Michael Porter: Evaluation of Competitiveness Theory*, Asia-Pacific Business Series-Vol.2,World Scientific PublishingCo.Pte.Ltd.Singarpore.

24. FAO (2006), Status and Potentials of the Fisheries and aquaculture in Asia and the Pacific, APFIC.

25. FAO 2006: World Review of Fisheries and Aquaculture Part 1. Food and Agriculture Organization of the United Nations, Rome.

26. FAO, *Fishery Bioeconomics: Theory, Modelling and Management.*

27. FAO.1997.*The State of World Fisheries and Aquaculture 1998.FAO FisheriesDepartment, Rome.*

28. Gerber,J.(1999), *International Economics*, San Deigo State, University, Adison – Wesley Educational Publisher Inc.

29. Ghisu,P. (2009)" Trade, climate change and fisheries: Building resilience through trade-policy reform", International Centre for Trade and Sustainable Development, Vol. 8.

30. GLOBEFISH,(2008),Tilapia Market Report-April 2008.

31. Gorden, H.S. (1954). "*The economic theory of a common propT.erty"* „*Journal of Political Economics*

32. Gunst, R.F and R.L.Masson (1980). *Regression Analysis and Its Application*, New York: Marcel Dekker.

33. Gupta,S.D.,(2003), Comparative Advantage and Competitive Advantage: An Economic Perspective and a Synthesis, St Thomas University, Canada.

34. Hakin Ben Hammouda , (2004), "Trade Liberalization and Development: Lessons for Africa", Economic Commission for Africa.

35. Hamel,G.and Prahalad,C.K.(1994), Competing for the Future, Boston,Harvard Business School Press.

36. Hiller,E.C. (2005), *Openness, Country Size at Economic Growth*, University of Wien.

37. IMF Staff (2001) "Global Trade Liberalization and the Developing Countries", IMF Issues Brief.

38. Jimmy Wales,Trade Liberalization and Protectionism. http://wikipedia/trade liberal/

39. Jinghua Xie,(2008), "The effect of exchange rates on Export Prices of Farmed Salmon", *Marine Research Economics*, Volume 23.

40. Josupeit,H.L. and H.Lupin,(2001*), Aquaculture Products: Quality,Safety, Marketing and Trade*, NACA, Bangkok and FAO, Rome.

41. Khatum.F (2004), "Fish Trade Liberalization in Bangladesh" FAO, Rome.

42. Khin Maung Soe (2008*), Trends of Development of Myanmar Fisheries: With References to Japanese Experiences*, Institute of Developing Economies, Japan External Organization

43. Khin San May, (1981), "The Australian Rice Industry in Relation to the International Rice Trade and its Implications for Southeast Asian Rice Exporting Countries", Unpublished Master of Agricultural Development Economics, Thesis, Canberra, The Australian National University .

44. Khin,U.,(1948), Fisheries in Burma,

45. Khutun.F. (2002),Environmental Impact of Trade Liberalization and Trade-Releated Policies on the Marine Fishery sector in Bangladesh,Centre for Policy Dialogue, Dhaka.

46. Koichi Fujita, Fumiharu Mieno and Ikuko Okannoto, ed. "The Economic Transition in Myanmar after 1988".

47. Krueger,A.S. *Differential Effects of Trade Liberalization on Economic Growth: Role of Human Capital Accumulation* ,TEL Classification.

48. Kurien,J. (2005), Responsible Fish Trade and Food Security, FAO Rome.

49. Lacramioara Dominte "Determinants and Effects of Economic Openness".

50. Megee,J. (2009) "10 Advantages of Free Trade".

51. Ministry of Commerce "Pocket Note".

52. Ministry of Information, (2005), Sustainable Development in Livestock Breeding Sector.

53. Ministry of Livestock and Fisheries, (2011), Statistics of Exported Fish and Fishery Products from Myanmar, DoF, Myanmar.

54. Munasinghe, M.and W. Cruz, (1995). "Economy-Wide Policies and the Environment. Lessons from Experience". World Bank Environment Paper No. 10. The World Bank, Washington DC.

55. Muramira,T.E.,(2002),*The Impact of Market Liberalization on the Lake Victoria Fishery*, NURRU Publications, Working Paper.

56. Mya Than Tun, (2008), Review of Recent Events and Activities in Myanmar that are Relevant to the BOBLME Project.

57. Myat Thein,(2004), *Economic Development of Myanmar*, Institute of Southeast Asia Studies Singapore.

58. Paulino,A.S.and A.P. Thirbwall (2004), "The Impact of Trade Liberalization on Exports, Imports and the Balance of Payments of Developing Countries", *The Economic Journal*, Blackwell Publishing, Oxford.

59. Pawiro,S., (2009)," FTA and Fish Trade Liberalization", Bulletins, Issue 14.

60. Rodrik,D. and Rodriguez (1999), "Trade Policy and Economic Growth", Working paper, National Bureau of Economic Research.

61. Sampson,G.P.(2005), *The WTO and Sustainable Development*, United Nations University Press,2nd edition.

62. Schaefer, M. (1957). "Some Considerations of Population Dynamics and Economics in Relation to the Management of Commercial Marine Fisheries", Journal of Fisheries Research, Board of Canada.

63. SEAFDEC (2001) Fish for the People, FAO, Thailand.

64. Sen.A, (1981), *Poverty and Famines: An essay on Entitlement and Deprivation*, Oxford, Clarendon.

65. Shafaeddim, S.M. Trade Liberalization and Economic Reform in Developing Countries: Structural Change or De-industrlization?, United Nations Conference on Trade and Development.

66. Stiglitz,J.E. and A. Charlton (2005), *Fair Trade For All*, Oxford University Press.

67. Tung,N.T., N.V.Thanh and M. Phillips (2004), "Implications of Liberalization of Fish Trade for Developing Contries", FAO, Rome.

68. UNCTAD (1983) Shrimps: a survey of the world market, International Trade Center UNCTAD/GATT, Geneva.

69. Wignaraja,G.(2003), Competitiveness Strategy in Developing Countries, Commonwealth Secerariat.

70. Wik,I. (2007), *Trade liberalization: The right engine of growth?,* University of Bergen.

71. Yip,G.(1992), *Total Global Strategy*, New Jersey: Prentice Hall

Internet Sources:

http://en.wikipedia.org/wiki/competitive -advantage

http://en.wikipedia.org/wiki/liberalization

http://mapsofworld.com

http://www.comtrade.gov/directorate of trade

http://www.fishtrade.com/Fmis,Inti Prices/admin/Bulletins.doc

http:www.globefish.org/trade/ index .