YANGON UNIVERSITY OF ECONOMICS
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THE INCIDENCE OF NON-TARIFF MEASURES
ON MARKET ACCESS FOR
MYANMMAR FISHERY EXPORTS

ZIN ZIN NAING
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The Incidence of Non-tariff Measures on Market Access for Myanmar Fishery Exports

Zin Zin Naing
4 Par Thu Ba-1

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CERTIFICATION

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

ZIN ZIN NAING

YANGON UNIVERSITY OF ECONOMICS

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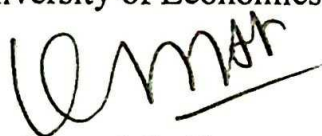Pro-Rector
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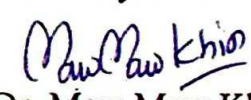Yangon University of Economics

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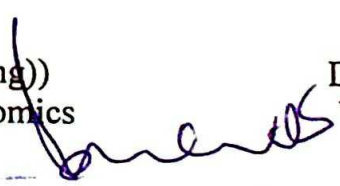Yangon University of Economics

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Abstract

Given the fact that non-tariff measures become one of the measures of market access condition, this thesis studies the incidence of non-tariff measures, which are standards on fish safety and quality that is originally regulated by trading partner countries and to be complied by exporting countries. The thesis identifies types of non-tariff measures in fishery products exports, and examines the effects of most frequently applied non-tariff measures on fishery exports and prices received by exporter of fishery products. The methods used for the research include descriptive and quantitative on secondary and primary data. The study is carried out using panel data estimation technique in an augmented gravity model. Random effects model with generalized least squares (GLS) regression fits in this study. All ASEAN member countries except Lao and Cambodia, East and Southeast Asian countries such as Japan, China, Thailand, Singapore and Malaysia, are the main destination for Myanmar's fishery and crustacean exports while a few fish species (Asian carp family) are exported to Middle East markets as well. Most of crustacean exports including shrimp were destined for a small group of Asian countries such as Japan, China, Malaysia and Hong Kong, and, recently, exports to USA. Sanitary and phyto-sanitary (SPS) measures are most regulated measures by all importing countries. The empirical study found that Myanmar fishery exports are determined by the GDP of importing countries in a sense that economically larger trading partner countries tend to demand more for Myanmar fishery products. It is also found that the more the countries are farther, the larger will be imported from partner countries. Total fish export value is not affected by any NTM including SPS measure, while EU-approval of SPS is important factor to determine the fish export to the world market. In addition, colonial ties between Myanmar and trading partners are also important. At firm level behaviour, adjacency is quite important. Prices of fish are determined by EU-approval and the number of SPS measures to be complied with by fish exporters. The sector needs to upgrade and diversify its fish exports primarily by meeting international food safety and sanitary standards.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

ADB	Asian Development bank
AEC	ASEAN Economic Community
AFTA	ASEAN Free Trade Area
ARTNeT	Asia_Pacific Research and Training Network on Trade
ASEAN	Association of South East Asian Nations
CBM	Central Bank of Myanmar
CMP	Cut-Making and Packaging
CSO	Central Statistical Organization
DOF	Department of Fishery
EU	European Union
ESCAP	The United Nations Economic and Social Commission for Asia and the Pacific
FDI	Foreign Direct Investment
GAP	Good Agricultural Practices
GATT	General Agreement on Trade and Tariff
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
HS	Harmonized System
JICA	Japan International Cooperation Agency
MACCS	Myanmar Automated Cargo Clearance System
MAST	Multi-Agency Support Team
MRA	Mutually Recognized Arrangement
MSTRD	Ministry of Science and Technological Research Department
NCA	National Competent Authority
NCDP	National Comprehensive Development Plan
NTB	Non-tariff Barrier
NTM	Non-tariff Measure

OLS	Ordinary Least Squares
OECD	Organization for Economic Cooperation and Development
PTA	Preferential Trade Agreement
SEZ	Special Economic Zone
SPS	Sanitary and Phyto-Sanitary
TBT	Technical Barriers to Trade
TPR	Trade Policy Review
UNIDO	The United Nations Industrial Development Organization
WIPO	World Intellectual PropertyOrganization
WITS	World Integrated Trade Solutions
WTO	World Trade Organization

Chapter I

Introduction

1.1 Rationale of the Study

Given the fact that sustainable economic growth through attracting significant trade and investment cannot be achieved without broader integration into the world economy. Within the frame of economic integration, common challenges to countries when traded is to comply with trade-regulations of the importing countries as sometimes it could reduce the competitiveness of their exports in the international market. Those trade-related regulations are recognized as non-tariff measures and sometimes interchangeably described as non-tariff barriers. The non-tariff measures (NTMs) are non -price instruments of trade policy measures that are used to regulate the flow of trade in trading countries. They are of particular concern to exporters and importers in developing countries. As tariffs tend to disrupt supply chains, especially when they are levied on raw materials and intermediate inputs, non-tariff measures can become as non-tariff barriers (NTBs) to trade once they are a major impediment to international trade and prevent market access.

In fact, exporting companies seeking access to foreign markets and companies importing products need to comply with a wide range of requirements including technical regulations, product standards and customs procedures. Based upon the analysis done by Cadot, Malouche and Saez (2012) regarding export structure of ASEAN countries, the non-tariff barriers that are of particular concern to ASEAN countries include Agreement on Textiles and Clothing, Rules of origin, Technical Barriers to Trade (TBT), and Sanitary and Phytosanitary (SPS) measures. In fact, by definition, non-tariff barriers to trade are trade barriers that restrict imports, but are unlike the usual form of a tariff. Some common examples of non-tariff barriers are anti-dumping measures and countervailing duties, which, although called non-tariff barriers, have the effect of tariffs once they are enacted. Non-tariff barriers to trade can be in many forms such as import quotas, special licenses, unreasonable standards for the quality of goods, bureaucratic delays at customs, export restrictions, limiting the activities of state trading, export subsidies, countervailing duties, technical barriers to trade, sanitary and phyto-sanitary measures, rules of origin, etc.

Being a founding member of the WTO, Myanmar believes that participation in the multilateral trading system can bring a wide range of opportunities for exports and help overcome its supply-side constraints. Myanmar's trade policy is also strongly influenced by its participation in ASEAN, and ASEAN's free-trade agreements with third countries. It is also looking beyond its Asian neighbors to develop trade and investment ties. Myanmar's product diversification is better than its contemporary new-comers in ASEAN, Cambodia and Lao PDR. Myanmar exports are distributed across four primary products groups, which include fuels, agricultural raw materials, textiles and clothing, and food items. Unlike Cambodia and Lao PDR, the exports of fuels from Myanmar had biggest share, which was 38% in 2012. The exports of agricultural raw materials is ranked second with 22 % and textiles and clothing ranked third, respectively. Since 2011, change of the government brings in the better investment climate through the Union of Myanmar Foreign Investment Law was enacted on 2nd November, 2012. In addition, after the reinstatement of generalized system of preferences in 2013, Myanmar exports are on track to gain to their potential share international markets.

As far as trade composition of Myanmar is concerned, Myanmar is an exporter of primary products and imports manufactured and investment goods at unfavorable terms of trade. Myanmar's foreign trade has been mainly with the Asian countries. More than 70% of Myanmar's total exports are destined for the Asian region. Also, more than 90% of its imports also come from China, Thailand, Singapore, India, Japan and South Korea. The Government's share of exports and imports dropped and international trade has been largely dominated by private sectors activities. Several steps have been taken to encourage the active participation of the private sector in international trade. In particular state trading monopolies were largely abolished in November 2011 so that private enterprises and individuals can now import and export almost all products.

Among the historic export items of Myanmar, fishery products has contributed relatively a large share next to timber, rice, pulses and precious stones, regardless of the changing importance of its share to total export value. Fishery is, in fact, one of the most important sectors for livelihoods, national income and international trade. However, it has been an underdeveloped sector that is dominated by small scale artisanal fisheries using traditional methods and rudimentary technology. Moreover, fish exporting firms rely heavily on the sales of only a limited number of spices. This

low standard of fishery sector suggests, at the same time, that there is considerable potential for it to grow and develop. The sector needs to upgrade and diversify its fish exports primarily by meeting international food safety and sanitary standards including public and private industrial level requirements. Fish producing firms naturally face a number of challenges in accessing the world's major markets, including weak infrastructure, ineffective trade facilitation procedures and difficult business environment. One of the main obstacles of fish exporters is to comply with the standards and regulations on fish safety and quality imposed by importers.

Kareem (2012) proved that tariffs are a measure of market access conditions, and it can be translated that an increase in the rate of preferential tariffs will lead to a rise in the level of importation of its trading partner country. Oppositely, if a government decided to raise revenue and/ or protect its economy through imposition of higher tariffs on imported products, it would lead to a reduction in imports. The non-tariff measures, NTMS, are another measure of market access condition. This means that whenever there is an increase in the incidence of NTMs in economies of trading partners, there will be reduction in imports from those trading partners due to the fact that most of these imported products may not be able to pass the test of these incidences of NTMs. Therefore, it is to be better able to understand the needs for export development and diversification to tap the potential of the fishery sector. Since fishery exports are subject to the quality management throughout the catching place to the mouth of consumers, it first involves the awareness and recognition in the investment in sanitary and phyto-sanitary (SPS) requirements, then application of good practices which is to be done by the application of suitable regulations called non-tariff measures. In this regard, well-defined structure of institutions plays important role to ensure the legal mandate for the export promotion of a certain export item, that is fishery exports in this study. It should therefore be examined carefully whether the compliance of standards on fish safety and quality that is originally regulated as non-tariff measures of trading partner countries turns to become the non-tariff trade barriers that have adverse effect on the international trade sector of Myanmar.

1.2 Objectives

The objective of the thesis is two-fold: to identify types of non-tariff measures in fishery products exports, and to analyse the effect of most frequently applied non-tariff measure on fishery in terms of total fish exports of Myanmar and prices received by exporters of fishery products.

1.3 Method of Study

The methods used for the research include descriptive and quantitative on secondary and primary data. The descriptive part include the discussions on trade policy measure, especially regarded as non-tariff measures regulated domestically and in trading partner countries. Non-tariff measures in different trading countries are essentially obtained from the secondary sources such as the departmental records of Department of Fishery, Ministry of Agriculture Livestock and Irrigation, Customs Department, Ministry of Planning and Finance, and the database of WTO information system and World Integrated Trade Solution (WITS). For the primary source of information, interviews with key informant persons and questionnaire surveys are carried out in control samples. The research is focused more on case qualitative analyses, although some quantitative analysis is conducted to back up qualitative findings. The objective is to turn the abstract model, i.e., gravity model, into a practical tool for the fish export sector of Myanmar.

1.4 Scope and Limitation of the Study

There are twelve classifications of non-tariff measures (NTMSs) grouped by UNCTAD which is a leading institution for harmonizing the classification of NTM. However, the non-tariff measure of which selected to study the incidence on fishery product is essentially the sanitary and phyto-sanitary measures (SPS). The emphasis only on the effects of a single measure on a particular item of export product is still in line with the theoretical ground. Since SPS is only concern in this study, it should have been covered almost all fishery exporting firms all over the country. This study however covers firm actually running in Yangon Region and the emphasis is on firms concentrated on safety and quality of products and care about SPS measures. That limitation in turn makes the bias of the study to become NTM-oriented, but not on

firm's contribution to export. The period of study is started from 2010-2011 where the significant changes alter the economy's potentials up to date.

1.5 Organization of the Study

This thesis is organized into six chapters. Chapter I is the introduction chapter. Chapter II is literature review on NTMs and trade facilitation, definition and classification of NTMs, the relation between Non-tariff Measures and Trade, the evidence of effects of NTMs, the quantification of NTMs, and conceptual framework of the research. Chapter III is the review on Myanmar international trade, pattern and direction of trade, trade policies largely emphasis non-tariff measures as well as trade remedy measures. Chapter IV provides in details of the incidence of Non-Tariff Measures on fishery and fishery Products with an overview of the fishery industry in Myanmar, Non-Tariff Measures imposed by Trading Partner Countries, SPS requirements of major importing countries of Myanmar fishery. Chapter V is the empirical study and Chapter VI concludes with findings and comments on the whole research of the thesis.

Chapter II
Literature Review

During the past decades, global tariff barriers in international trade have fallen significantly. There is a relation between the reduction of tariffs arising from WTO multilateral agreements and the numerous regional and bilateral level preferential trade agreements (PTAs) and the proliferation of Non-tariff Measures (NTMs). As tariff levels fell, non-tariff measures are increasingly important in market-access concerns (Mikic ,2010). With the growing number of trade policy measures under discussion globally, the existing WTO rules are not adequate to regulate a substantial flow of technical regulations, standards adapted internationally, nationally and privately, sanitary and phytosanitary regulations. The agreements on such regulations are not subject of negotiations in the ongoing Doha Development Round. Moreover, in spite of their importance, there is little understanding of the exact implications of NTMs on trade flows, export-led growth and social welfare in general. It has been a challenging effort to reach a common understanding on the relative importance of the different types of NTMs and their impact on the trading activities, especially those of developing countries.

2.1 Review on NTM and Trade Facilitation

Even though trade theorists viewed trade as engine of growth, in the last four decades, as Cho (2003) found, this view has been lost gradually due to the pressure especially on developing countries after the Uruguay round of negotiations and the establishment of the WTO to reduce protection and to liberalize their trade with promises of benefits from high international trade growth. They have been by and large disappointed as the world economy has gone into recession in the second half of 1990s, primary product prices has fallen drastically, and producers from developing countries face competition from heavily subsidized primary products of advanced countries. The Uruguay round of GATT (1986-94) led to the WTO creation, and agriculture was brought within the ambit of GATT for the first time as beginning of the liberalizing agriculture trade. Earlier GATT rounds provide agricultural protection through ordinary tariffs and non-tariff barriers, including quantitative

restrictions, discretionary licensing and variable levies. Cho (2013) also observed the key results reflected in the agreement on agriculture that, on market access, it was agree that all non-tariff import restrictions should be prohibited and that the trade should be regulated with ordinary tariff. In addition, the agreement on application of sanitary and phyto-sanitary measures and the agreement on technical barriers to trade were formulated to ensure that regulations that have a trade restrictive effect are applied only to the extent necessary to protect human, animals or plant life.

Again, with the incidence of the global financial crisis in 2008, many of observers feared an explosion of protectionism to protect jobs and "export unemployment" as had happened in the 1930s. As tariffs were constrained by WTO disciplines, the expectation was that non- tariff measures (NTMs) would be used for the same purposes. While the forces of protectionism are always present, inappropriate use of NTMs for protectionist purposes is therefore something to be watched on a continuous basis. However, there is more to NTMs than just hidden protectionism. As consumer wealth rises around the world, the demands on governments for safety and environmental protection rise as well. Governments need to respond to those demands by appropriate response which is NTMs, even if they make importers more difficult and ultimately raise consumer prices. The challenge is to design NTMs so as to maximize their effectiveness in responding to consumer concerns while minimizing the induced economic inefficiency and the interference from self-interested lobbies. This is a difficult balancing, for which governments, in particular the administrations involved in designing NTMs—regulatory agencies or agriculture, health and industry ministries—are often ill-equipped.

The result is sometimes measures that are poorly designed and unwittingly hurt key sectors of the economy, either because they are not targeted at the right problem, or because they are too broad ranging, or they involve unduly cumbersome compliance-verification mechanisms. In most countries, regulatory functions are scattered over a number of ministries and agencies that have no experience, and little incentive to work together on these issues. As a result, regulations are often adopted with narrow mandates domestically and also poorly coordinated across countries, even when their lack of harmonization hurts international and regional trade, fragments markets, and works at cross-purposes with regional integration plans. Because of their protectionist potential, NTMs are

viewed by Trade ministries as bargaining chips to be held for future trade negotiations. Their simplification or elimination is viewed as a concession to trading partners for which there is little motivation unless there is reciprocity, which is more complex to establish than in the case of tariffs. The cost of non-harmonization is often poorly understood by authorities in the country concerned, because the issues are complex.

The concept of the non-tariff measures (NTMs) and non-tariff barriers (NTBs) has been discussed in the trade literature for many years, but there has been no common decision on definitions. Not all non-tariff measures restrict trade in a discriminative way. It is to say that not all of them are non-tariff barriers to trade. Simply because at any moment NTM can be turned into NTB and thus to get a full impression of the possible impact of non-tariff protectionism one has to consider NTM. Basu and Kuwahara (2012) define NTMs as policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded or prices, or both. Often there is an argument that the use of non-tariff protection has been increasing to make up for the reduction of tariff levels which were targeted through successive multilateral rounds and Regional Trade Agreements.

Most NTMs allegedly protect human and animal health, and the environment from foreign threats. The rising public awareness of food safety and/or consumption externalities drives the emergence of these measures. Protectionist motives may also ride on this emergence and lead to unnecessary impediments in international trade. Delineating the complex impacts of these NTMs on trade and welfare is central to inform market participation by various stake-holders, as well as for sound policy design.

A survey conducted by Basu and Kuwahara for Brazil, Chile, India, Thailand and Philippines in 2010 shows that the majority of the NTMs cases were SPS and TBT measures entangled in exporting and importing. In the case of measures related to procedural obstacles, the survey results pointed out that about 85 % were exporting cases and the rest 15% are importing cases related to procedural obstacles. In Thailand, the largest number of cases involved rice, followed by crustaceans and fruits. The majority of cases of NTMs applied by Thailand are SPS and TBT measures. The European Union, the United States and

Japan account for half of the countries for which cases have been reported. Furthermore, it was found that the majority of the cases were due to inefficiency or obstructions related measures of procedural obstacles.

Measuring the level of non-tariff protections in terms of tariff-equivalents obviously is a problem as it is not clear which measures/policies to count in and, moreover, the choice would differ across countries. Ando and Ayako Obashi found that, among ASEAN Member States in 2010, only the Lao People's Democratic Republic does not adopt any core-NTMs, while other countries use almost the full arsenal of measures. In ASEAN as a whole, almost half of the tariff lines (49 per cent) are subject to some type of the NTMs; Cambodia and Thailand cover the fewest number of lines (6 and 11 per cent, respectively, in 2007). Three countries, Indonesia, Myanmar and the Philippines are found to cover all product lines with one or other type of NTMs. They also found that across ASEAN on average the exercise of non-core NTMs is more than core NTMs. As Ando Obashi (2010) described that some products attract more protection: non-core NTMs, particularly health and sanitary regulations and quality standards are widely applied mainly to the industries of animals, plants and food. Moreover, it seems that these products as well as chemicals and chemical products and machineries receive protection from various NTM simultaneously applied. ASEAN's evolution into the ASEAN Economic Community rests on reduction and complete elimination of the use of NTMs among the members which will also facilitate further development of international production and distribution networks which involve ASEAN members.

The issue raised by Ratna (2010) is difficulties in removal of NTMs that have been imposed by several developed countries. The only way, he suggests, for the developing countries to expand exports is to look at the markets of other developing countries. Michael Ferrantino (2006) pointed out the similarities between NTM and trade facilitation and says that removing NTM is equal to facilitating trade and therefore the economic analysis of NTM should be similar to the analysis of trade facilitation. He argues further that the economic distortion of NTM is potentially very large. This distortion can be measured as a price or a quantity gap, while price gaps are preferable in many applications. Another point is that the analysis of NTMs should aim at linking policy concerns with observed economic effects. He also gives a list of useful data sources for NTM

policies as well as trade data and points to the NTM network where analysts can discuss and post existing NTM research. An important conclusion of Ferrantino is that the best estimates of NTM effects are crafted with detailed knowledge of products and markets, one product and country at a time. However, policymakers often want to know about many products and countries at once.

The linkage between trade facilitation and non-tariff protection is also tackled by Ben Shepherd (2010) who undertakes an analysis to clarify the role of trade facilitation in lowering trade costs by decomposing them into tariff and non-tariff components in the cases of APEC and ASEAN. He shows that in both APEC and ASEAN, tariff reductions have played an important role in reducing overall trade costs. Progress on non-tariff trade costs has been much less impressive. This finding raises serious questions as to the effectiveness of trade facilitation efforts in the Asia-Pacific region, which should be clearly focused on non-tariff trade costs. Reducing trade costs and facilitating exports and imports must be about much more than just tariff cuts. This is the importance of trade facilitation, i.e. policies designed to reduce the transaction costs of international trade.

Ranjan and Lee (2007) used a gravity model to show that trade volumes were affected by the enforcement of contracts. Cuñat and Melitz (2007) focused on the impact of labor market flexibility on trade, while Anderson and Marcoulier (2002), Depken and Sonora (2005), and Levchenko (2007) all showed that institutional quality significantly affected trade patterns. Francois and Manchin (2007) also tested the importance of a regulatory quality indicator (measuring the incidence of market-unfriendly policies) along with five other governance indicators - constructed earlier by Kaufman, Kraay and Mastruzzi (2005) – finding all of them to have important positive impacts on both the value of exports and the probability of exporting. Helble (2007) focused on the effect of transparency in customs administration and trade policy on trade. The recent literature suggests that trade facilitation measures and the prevailing business environment in the trading countries have a significant effect on trade development.

Yann Duval and Chorthip Utoktham (2009) observed in their research on the impact of behind-the-border regulations and business environment on trade that import tariffs are found to have no significant effects on bilateral trade flows when behind-the-border trade cost and business facilitation performance are accounted

for. The overall business (investment) environment in both the importing and exporting country is important for bilateral trade development. From an exporter's point of view, this suggests the potential benefit of international agreements and conventions that encourage business regulatory reforms in partner countries, e.g., bilateral or plurilateral investment or services agreements. The efficiency of contract enforcement in the two trading partners is consistently found to be a significant factor for trade development. Regulations related to investment protection are found to be relatively less important, particularly for South-South and regional trade development. However, these regulations in the country of the exporter are found to have a potentially significant impact on exports. This can be explained by the fact that investment is a precondition to supply capacity, and hence of key importance to countries that want to develop exports. The analysis confirms that measures aimed at reducing the behind and at-the-border cost of exporting, such as reductions in customs and port fees and charges, and improvements in transport infrastructure and logistics services can be expected to have a significant impact on trade. However, it also reveals that improving the domestic business (investment) environment may have an impact on export competitiveness of a magnitude similar to the trade and transport facilitation measures.

As far as the incidence of NTMs is concerned, as Mikic (2010) stated, some scholars assumed that ASEAN's evolution into the ASEAN Economic Community rests on reduction and complete elimination of the use of NTMs among the members which will also facilitate further development of international production and distribution networks which involve ASEAN members. Cadot, Munadi and Ing (2013) found that the incidence of NTMs in ASEAN is moderate in comparison with other regions of the world. The econometrically-estimated ad valorem equivalents also seem comparable with other countries. The challenge is to design NTMs so as to maximize their effectiveness in responding to consumer concerns while minimizing the induced economic inefficiency and the interference from self-interested lobbies.

The research done by Cadot, Munadi and Ing (2013) observed the price-raising effect of NTMs in the ASEAN region tends to be substantial, in particular on foodstuffs and textile and clothing. However, the notify-negotiate-

eliminate approach does not seem to produce significant advances. Their report proposed an alternative route based on setting up country-level regulatory-oversight agencies with strong analytical capabilities to carry out NTM reviews in member countries. They even further discussed that NTBs restrict market access but do not necessarily improve the profitability of domestic producers. The reason is that poorly designed regulations create inefficiencies which are difficult to track down. Importers of intermediate products can be hurt by poorly designed or administered technical or sanitary standards. If those importers are also exporters as it is often the case, poor NTM design will hurt national competitiveness as much as market access. Thus, viewing the elimination of NTBs through mutual concessions is not the best approach. It might even be counterproductive if it induces governments to postpone reform out of a desire to keep "bargaining chips" for future negotiations. Instead, Cadot, Munadi and Ing (2013) suggested to start from a clear distinction between NTMs and NTBs at the country level. Only NTBs should be eliminated, while NTMs should be improved to minimize their costs for the private sector. Given an objective of improvement rather than elimination, the issues become different. NTMs are trade-relevant regulations, but the problems involved in making NTMs less trade-distorting are essentially "better-regulation" problems. Haddou (2011) points out in the World Bank (2011) that Mexico's experience suggesting that a key ingredient to make regulatory reform viable: Engagement of national administrations, in particular middle-level civil servants, in a regulatory impact assessment (RIA) process for new regulations and NTMs, taken seriously and used in conjunction with systematic exposure and consultation with stakeholders.

2.2. Definition and Classification

UNCTAD (2013) concludes that non-tariff measures (NTMs) are generally defined as policy measures other than ordinary customs tariffs that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both. These sections discuss the definition of NTMs in comparison with tariff and non-tariff barriers.

2.2.1 NTMs vs. Tariffs

The term "non-tariff measures" (NTMs) covers a wide array of disparate and complex regulations that can affect international trade, whether or not their primary objective is to regulate it. For instance, a ban on the sale of plastic bags—a measure taken by Rwanda to protect the environment—is not primarily a trade measure; however, it potentially affects trade and is thus an NTM. Regulations such as this, technical ones covering all sorts of product characteristics like the design of electric plugs, the chemicals used in children toys, maximum tolerance levels of pesticides in fruit and vegetables, and all the sanitary and technical measures put in place by governments to protect public health and the environment are all NTMs.

The frontier between NTMs and domestic regulations is not as clear cut. For instance, Cadot, Malouche and Saez (2012) stated that an environmental regulation prohibiting the discharge of polluting effluents in rivers as part of the production of a certain chemical is trade relevant if it raises the production costs of domestic producers and therefore reduces their ability to compete with foreign producers; however, it is not an NTM as the term is conventionally understood. If production standards were considered as NTMs, virtually all domestic regulations, including possibly labor regulations, would be NTMs, and the concept would become meaningless. Therefore, production standards are left out.

More traditional and commercially-motivated instruments like quantitative restrictions, obligations to use certain types of operators for cross-border operations, and so on are clear-cut cases of non-tariff measures, and they are sometimes called "core" measures. Contingent trade measures such as anti-dumping duties, countervailing duties, and the use of safeguard clauses are also considered by the WTO to be non-tariff measures, although they take the form of tariffs. The WTO's thinking on the issue is that they are not permanent tariffs and are not subject to binding. Although one could conceptually argue about where to draw the line between NTMs and other regulations, the conventional definition includes consumption standards and contingent protection, but excludes production standards.

2.2.2 NTMs vs. NTBs

A further distinction is drawn between NTMs with a protectionist intent, called non-tariff barriers (NTBs), and others. NTBs are a subset of NTMs that reduce trade intentionally. NTBs can be set up directly to reduce imports; this is the case of quantitative restrictions, voluntary export restrictions (VERs), or deliberately discriminatory standards. They can also be set up ostensibly for non-trade purposes, but affect trade disproportionately to the objective at hand—usually because the government really has two objectives in mind, one of which is to cut imports. For instance, an over-strict quality standard on steel beams for the construction sector could be ostensibly to ensure building safety, but have the effect of protecting a domestic steel producer.

As the above-suggested, the distinction between NTMs and NTB is not completely clear-cut, as different stakeholders may view the appropriate level of a safety standard differently. WTO disciplines contained in the SPS and TBT agreements provide some guidance on this. The spirit of WTO disciplines is in "necessity" and "proportionality" tests. The first consists of ascertaining whether a technical regulation is necessary to achieve the stated non-trade objective (say, protection of human health or the environment), while the second consists of choosing the least trade-distorting instrument to achieve the objective.

2.2.3 NTM Classifications of WTO-UNCTAD

The old NTMs classification identified by United Nations Conference for Trade and Development (UNCTAD) had six core categories according to the nature of the measure: (a) price control measures; (b) finance measures; (c) automatic licensing measures; (d) quantity control measures; (e) monopolistic measure; and (f) technical measures. These were further subcategorized in accordance with the types of measures under consideration. Measures were listed in accordance to the Harmonized Coding classification. NTMs classification was divided into Core-Measures and Non- Core Measures. Core measures included measures intended to protect local producers, and non-core measures included measures intended to protect local consumers. The core ones were interpreted as unambiguous trade barriers, while non-core measures are disguised measures with the potential to distort trade. It seems that the majority of NTMs fall in two categories: those that are technical barriers to trade and those that are sanitary/ phytosanitary

measures. Also, such measures may affect trade of only a group of exporters. Some exporters may observe certain SPS and/or TBT requirement considering too stringent procedure and act as a market access barriers. Some exporters may notice that it may provide those who can adopt the requirement with a competitive advantage.

The technical group, namely, Multi-Agency Support Team (MAST) meetings and consultations this technical group proposed the definition of NTMs as "Non-tariff measures (NTMs) are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both". MAST recognized that a precise and balanced definition of NTBs posed substantial difficulties, and that a distinction between NTBs and NTMs should not be attempted. At the same time, MAST agreed that NTMs cannot be simply qualified as NTBs on the basis of a single piece of regulation and can only be unambiguously identified as such following analysis of detailed data. Consequently, the group later agreed that a comprehensive database should be built to only collect data on NTMs. Mikic (2010) pointed that this would create an open judgment of whether a given measure constitutes a trade barrier and whether the measure has protectionist or discriminatory one.

One official source of the notification of NTMs by member states to the WTO is provided in Table 1. These notifications, which are mandatory for potentially trade-restricting regulations but are subject only to weak disciplines, are designed to provide other members with time and information to react to potential restrictions to market access. However, the process suffers from an incentive problem—by notifying, countries expose themselves to criticism—and coverage is incomplete.

Table 2.1 The New UNCTAD-WTO NTM Classification

Import Measures	Technical Measures	A	Sanitary and phytosanitary (SPS) measures
		B	Non-sanitary technical regulations (TBT)
		C	Customs formalities, including PSI
	Non-technical measures	D	Contingent protection (Anti-dumping, CD, safeguards)
		E	QR and non-automatic licensing Price-control measures, including additional taxes
		F	surcharges
		G	Finance measures
		H	Measures affecting competition
		I	Trade-related investment measures (TRIMs)
		J	Distribution restrictions
		K	Restrictions on post-sales services
		L	Subsides (excluding export subsidies)
		M	Government procurement restrictions
		N	Intellectual property
		O	Rules of origin
	Exports	P	Export-related measures

Source: Compilation from UNCTAD 2012.

Table 2.1 shows the new classification of NTMs in three branch structure: two branches on imports such as technical measures and non-technical measures, and exports measures. Each chapter represents an NTM with its own classification. For example, Chapter A is a subset of measures that are applied to protect human or animal life from risks arising from additives, contaminants, toxins or disease-causing organisms in their food; to protect human life from plant- or animal-carried diseases; to protect animal or plant life from pest, diseases, or disease-causing organism; to prevent

or limit other damages to the country from a entry, establishment or spread of pests; and to protect biodiversity. These include measures taken to protect the health of fish and wild fauna, as well as of forest and wild flora. Measures classified under chapter A are Sanitary and phytosanitary (SPS) measures, and denoted as A. Again, measures A's are categorized by sub-categories, that is, A1 through A6 are technical regulations while A8 are the conformity assessment procedures, and A9 are SPS measures which are not elsewhere specified.

Similarly, measures included in chapter B refer to technical regulations, and procedures for assessment of conformity with technical regulations and standards, excluding measures covered by the SPS Agreement. Chapter C includes measures for pre-shipment inspection and other formalities such as pre-shipment inspection, direct consignment requirement, requirement to pass through specific port of customs, import monitoring and surveillance requirements and other automatic licensing measures, and other formalities not elsewhere specified. Chapter D include contingent trade protective measures such as anti-dumping measure, countervailing measure and safeguard measures. Chapter E includes non-automatic licensing, quotas, prohibitions ans quantity-control measures other than for SPS and TBT reasons. Chapter F concerns about price-control measures, including additional taxes and charges. Chapter G includes finance measures such as advance payment requirement, multiple exchange rates, regulation on official foreign exchange allocation, regulation concerning terms of payment for imports, and other finance measure not elsewhere specified. Measures in chapter H, which are measures affecting competition, to grant exclusive or special preferences or privileges to one or more limited group of economic operators. Measures in chapter I are trade-related investment measures such as local content measures, trade balancing measures, and other trade-related investment measures not elsewhere specified. Distribution of goods inside the importing country may be restricted. Chapter J concerns about such distribution restrictions, and restriction on post-sale are expressed in chapter K. Chapter L is measures for subsidies but excluding export subsidy under measure P7. Measures controlling the purchase of goods by government agencies, generally by preferring national providers are denoted as measure M and listed in Chapter M. Measures related to intellectual property is denoted as N under chapter N; rules of origin are denoted as O under chapter O, Export-related measures such as export license, quota, prohibition and other quantitative restrictions, state-trading enterprises for exporting and other selective

export channels, export price-control measures, measures on re-export export taxes and charges, export technical measures, export subsidies, export credits and other export measures not elsewhere specifies are all denoted as P and listed under chapter P.

2.2.4 WTO disciplines: NTMs to NTBs

In Cadot, Malouche and Saez (2012), it is stated that WTO agreements include good-governance principles that provide a good start to the improvement of national regulatory environments. The WTO's approach on NTMs consists of disciplines which have progressively been put in place over time as NTMs were rising in prominence in world trade. The Uruguay Round set basic disciplines on trade-relevant regulations through the SPS and TBT agreement. These two agreements provide basic disciplines which are still highly relevant to prevent protectionism from creeping into legitimate regulations, transforming NTMs into NTBs.

The SPS agreement allows WTO members to set sanitary and phytosanitary regulations as needed for the protection of plant, animal and human health, but specifies that regulations should be based on science. When science is ambiguous, UNESCAP (2012) described that Article 5.7 allows countries to impose precautionary measures, but those should be imposed only on a temporary basis and the countries imposing them should make reasonable efforts to reduce the scientific uncertainty. If, after a reasonable delay, no scientific evidence of harmful effects has been uncovered—as was the case with GMOs—the importing country should phase out the precautionary measures.

The TBT agreement applies to trade-relevant regulations the fundamental principle of non-discrimination; that is, technical regulations should not favor domestic products over imported ones. Countries are encouraged to adopt international standards instead of national ones, and whenever feasible to apply mutual recognition. It also requires transparency in the imposition of technical measures, in particular through the notification system as well as good-governance principles in terms of advance notice of regulatory changes.

Other WTO rules apply to the many forms NTMs can take, including licensing, customs valuation, quantitative restrictions, and so on. The reduction of non-tariff barriers to trade features prominently in ASEAN efforts to promote

economic integration in the region, reflecting a widespread view that NTBs have superseded tariffs as relevant barriers to trade. In particular, the ASEAN Economic Community (AEC) blueprint has mainstreamed the reduction of NTBs in regional integration efforts, together with improvements in trade facilitation through single windows.

ASEAN countries focused on the removal of NTMs affecting largely traded products in intra-regional trade. The products identified were minerals, electrical appliances, and machineries. WTO rules stipulate maximum delays for agencies to issue licenses and encourage member countries to adopt simple rules. ERIA (2012) proved that the reduction of non-tariff barriers to trade presents prominently in ASEAN efforts. This reflects a widespread view that NTBs have superseded tariffs as relevant barriers to trade. In particular, the ASEAN Economic Community (AEC) blueprint has mainstreamed the reduction of NTBs in regional integration efforts, together with improvements in trade facilitation through single windows. ASEAN countries focused on the removal of NTMs affecting largely traded products in intra-regional trade. The products identified were minerals, electrical appliances, and machineries. The outcome of the analysis of NTMs so far was the identification of the main measures affecting intra-regional trade, namely, custom surcharges, technical measures, product characteristic requirements, and monopolistic measures.

ASEAN (2012) stated that the ASEAN Trade in Goods Agreement (ATIGA), adopted in 2008, set a schedule for the elimination of NTBs in three stages. The approach consisted of classifying NTBs into three categories: green for NTMs that were not NTBs, i.e. justified measures; amber for NTMs whose trade-restrictiveness could be discussed, or red for clear-cut NTBs.[1] ASEAN member countries were supposed to submit lists of NTMs which the ASEAN secretariat would then classify into green, amber or red. The Secretariat's classification would be reviewed by member countries, after which measures would be

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[1] First, non-tariff measures that are non-transparent, discriminatory, without scientific basis, and with the availability of better alternatives has to be eliminated immediately, classified as Red Box. Second, NTMs that are transparent but discriminatory and cannot be justified or identified as barrier is subject to negotiation and classified as Amber Box. Third, NTMs that are transparent, non-discriminatory, with scientific basis, and in the absence of better alternatives are acceptable and classified as Green Box.

examined and prioritized for elimination by a number of negotiating bodies including the Coordinating Committee on the implementation of the Common effective preferential tariff (CEPT) for AFTA (CCCA). ASEAN governments are committed to set up inter-ministerial coordinating mechanisms to centralize information on regulations issued by various agencies. Governments are expected to carry out a collective-action problem to provide market access as a public good for regional trading partners. In addition to a negotiated elimination of NTBs at the regional level, ERIA (2013) observeded that countries in the Asia-Pacific region have also adopted a sectoral approach to harmonization and mutual recognition which seems to be delivering results.

In agricultural products, with regard to sensitive products, ASEAN is currently developing a Mutually Recognized Agreement (MRA) for the acceptance or recognition of conformity assessment procedures among ASEAN members associated with food inspection and certification systems. The ASEAN is working on a Cosmetic Directive intended to guide national regulations in member countries, as the basis for mutual recognition, which is a model close to that in force in the E.U., ensuring that key provisions are sufficiently close to enable mutual recognition. In electrical and electronic equipment, an MRA for electrical and electronic equipment was endorsed by the ASEAN Economic Ministers. In preparation for its implementation, member countries have undertaken activities to favor the convergence of conformity-assessment procedures. In telecommunications equipment, an MRA initiated by the ASEAN Telecommunications Regulators' Council (ATRC) was finalized as early as 2000. Finally, a comparative study of ASEAN regulatory regimes for pharmaceuticals has been completed, with several areas identified for harmonization. An ASEAN Common Technical Dossier (CTD) is developed for the registration of pharmaceutical products, which is to serve as a basis for application of the MRA.

ASEAN has established a work programme on NTMs which is so called Work Programme on Streamlining ASEAN NTMs 2013-2014. Among others, ASEAN Member States aim to establish an NTM inventory using the WTO-consistent UNCTAD classification and put in place an NTM information portal at the country and ASEAN levels; review and streamline NTMs through agreed principles; and, establish an institutional mechanism to monitor and enforce agreed NTM streamlining objectives at the country and ASEAN levels.

Cadot (2012) stated that, while more NTBs were being identified, reflecting the political realities, they were pushed toward the less-urgent categories, and the identification of "quick wins", in the end, proved difficult. Ultimately, the lack of follow-up on complaints has led to some disaffection of the mechanism by the private sector. Even though some progress is being achieved in key sectors for the regional economy, both ASEAN's and East Africa's experiences highlight how difficult it is to make progress on the elimination of NTBs when they are approached from a trading-concessions angle.

The economic theory behind the impact of tariffs is very clear. Tariffs raise the price of an imported good and a higher price lowers trade. Cadot, Munadi and Ing (2013) supported that fact that tariffs are easily quantifiable, but NTMs are not and they are also more difficult to evaluate because they are multidimensional in nature, not all NTMs have the same effect and their effect is likely to be non-linear. NTMs have become more prominent in the regulation of international trade. It becomes increasingly important to get insight in the effects of NTMs on trade. This research would like to show the importance of improve transparency in NTMs as key dimension of market access by coordinating among trading partner countries so as to facilitate comparison, benchmarking, and access to information for the export sector, in general, and the fishery exporters in particular.

2.3   The relation between Non-tariff Measures and Trade

Non-tariff Measures have become a prominent part of the regulation of international trade (Ecorys, 2009; Fugazza, 2013). The reasons for having NTMs are diverse. NTMs are often used as a policy instrument to achieve public policy objectives, such as correcting for market failures and protection of public health. Bosse (2013) observed that NTMs can be used as consumer protection, but also as an instrument to protect domestic producers. The UNCTAD developed in 2009 a new coding system for the classification of NTMs, which distinguishes 16 categories. In terms of incidence, the categories A "Sanitary and Phytosanitary (SPS) measures" and B "Technical Barriers to Trade (TBTs)" are the most used NTMs. The SPS measures are measures to protect food safety and animal and plant health, while TBTs are all other regulations, standards, testing and certification procedures. WTO(2012) proved that, in 2010, TBTs were imposed on 30 percent of

products and trade for the average country and SPS measures were on average imposed on 15 percent of products and trade.

The use of NTMs will often have trade effects. These trade effects are less easy to define than for tariffs. There are NTMs who promote trade but in many other cases, they restrict it. Economic theory predicts that NTMs can have both positive and negative effects on the volume of trade. TBTs can be trade-impeding, because of increasing compliance costs for producers, but can also be demand-enhancing, because of decreasing information costs for consumers. In order to illustrate the impact of NTMs on trade, Bosse (2013) summarized that trade will increase or fall depending on whether the negative effect on supply is smaller than the positive effect on demand.

Disdier, Marette (2010) and Fugazza (2013) use a simplified framework for supply and demand for imports, which is a partial equilibrium framework. The market is assumed to be homogeneous except for a characteristic that is potentially dangerous to consumers. Both domestic and foreign goods can have this characteristic. When products are homogeneous, they are perfect substitutable. Demand and supply are derived from respectively quadratic preferences and a quadratic cost function (Disdier and Marette, 2010; Fugazza, 2013). Dependent on the nature of the NTM, the effect will be on the quantity, the demand-side and/or the supply-side.

2.4   The Evidence of Effects of NTMs

The effect of NTMs on market access and competition is typically assessed along two dimensions (WTO, 2012) called incidence and severity. Ando and Obashi (2010) and Cadot, Munadi and Ing (2013) suggested that NTMs incidence can be measured by either the frequency ratio (the proportion of product categories covered by one or more NTM) or the coverage ratio (the proportion of imports covered), and their severity can be measured by ad-valorem equivalents (AVEs).

2.4.1 Incidence of NTMs

The incidence of NTMs is widespread around the world. Ando and Obashi (2010) found that except Argentina, Latin American countries are moderate users of NTMs, and so are Cambodia and Indonesia in ASEAN countries. By contrast, a number of African countries and the EU appear as heavy users of NTMs.

Cadot, Munadi and Ing (2013) found that NTM coverage ratios worldwide seem to correlate negatively with income levels, a counter-intuitive situation. Although cultural attitudes vary, one would expect high-income consumers to be more concerned about health and the environment. Moreover, regulatory enforcement capabilities, which depend on the skills and resources of national administrations such as standards bureaus and their ability to draw on local scientific expertise, are also likely to go up with national income. Thus, one would expect NTM coverage (and frequency) ratios to correlate positively with GDP per capita. However, there is no such pattern of correlation between the incidence of NTMs and income levels; if anything, the relation is negative, as the regression line is downward-sloping, reflecting more parsimonious use of NTMs for middle-income countries than for low-income ones.

The unnatural pattern of NTM use worldwide suggests a strong need for technical assistance in order to help governments put in place regulatory systems adapted to local enforcement capabilities and societal preferences (in terms of a trade-off between the cost-raising effect of NTMs and their benefits in terms of public health).

2.4.2 Severity of NTMs

The "severity" of NTMs is their price-raising effect in the domestic market of the country imposing them. This is measured by so-called "ad-valorem equivalents" (AVEs) which can be estimated statistically using either price-based ones or quantity-based methods. The ad-valorem equivalent of an NTM is the rate of an ad-valorem tariff that would reduce imports by just as much as the NTM. That rate can be assessed using two broad families of approaches. Price-based approaches typically use variants of the so-called "price gaps" method, which compares the price of a good affected by an NTM in the affected import market with its price in a comparator market where no NTM is applied. Examples of price-

based methods include Andriamananjara (2008), Fontagné and Mitaritonna (2013), or Cadot and Gourdon (2011). Quantity-based methods use observed variations in trade flows, preferably at the product level, to infer how high are the barriers created by NTMs, once other trade barriers (tariffs and so on) are controlled for.

Both approaches use the cross-country variation in the dependent variable (prices or trade volumes) to identify the effect of NTMs. Therefore, by construction, the AVEs obtained are averages across countries and cannot give any indication on how a particular country administers NTMs. A country-specific flavor can be given to the estimates by interacting them with country characteristics such as factor endowments and income levels, and by using country-specific estimates of the elasticity of import demand, a crucial parameter.

Using price-based methods, one would expect AVEs to be mostly positive, as NTMs are likely to push up prices either by imposing compliance costs or by selecting high-quality suppliers. Using quantity-based methods, one can expect either positive or negative AVEs as well-designed regulations may act as trade facilitators by removing uncertainty about product quality. Empirically, most AVEs tend to be positive, suggesting that NTMs raise the cost of products and make trade more difficult rather than less.

Cadot concluded that some low-income countries having wide-ranging regulatory scope bearing little relation with enforcement capabilities on the ground. The cross-sectoral pattern of ad-valorem equivalents suggests heavily trade-restrictive use of NTMs in key sectors like chemicals where "regulatory prudence" would be expected, but also in sectors like textile and apparel where health and environmental issues are secondary while protectionism is widespread. Thus, NTM use worldwide seems to responds to both trade and non-trade concerns.

2.4.3 NTMs in ASEAN

Pasadilla (2013) stressed the products that are mostly affected by non-tariff measures in ASEAN are some agriculture products like coffee, tea, or sugar, edible and prepared fruits, and some manufactured goods range from vehicles and boats to plastics and textiles. In particular, technical regulations affect vechicles (auto) and electrical machinery and equipment in Indonesia; in Thailand,

effects across the board, particularly high in the case of footwear, textile and clothing, and leather. Technical regulations seem to have moderate price-raising effects, but other regulations again seem to affect heavily the automobile sector. With relatively high AVEs of SPS measures on foodstuffs, textile and clothing, and footwear, AVEs for TBT measures consistently above 10%, and high combined effects.

2.5   The Quantification of NTMs

It has been widely remarked that in a world where tariffs have been reduced by recent trade rounds and bilateral free trade agreements (FTAs), pressures for protection against imports are more likely to take the form of non-tariff measures (NTMs). This has led to an intensified interest both in monitoring such measures and in the quantification of their economic effects.

Basu and Kuwahara (2010) confirmed that NTMs are closely related to trade facilitation and the economic analysis of NTMs is similarly related to that of trade facilitation. NTMs make trade harder, and removing them makes trade easier. Trade facilitation makes trade easier, by removing problems that make trade harder. Thus, NTMs and trade facilitation are in fact mirror images of each other. Removal of NTMs can often be considered as trade facilitation by another name, and vice versa. In the study on negotiations and FTAs, NTMs and trade facilitation are often dealt with as separate subject matters. In particular, sanitary and phytosantary (SPS) and technical barriers to trade (TBT) measures are often dealt with under the heading of NTMs, for example, in the non-agricultural market access (NAMA) negotiations in the Doha Round, while customs matters are often considered under the heading of trade facilitation. In quantifying the effects either of trade facilitation measures or removing NTMs, similar issues arise. Basu and Kuwahara (2010) observed some of commonly measured issues such as trade flows, the direction of import prices, the effects of the change of policy, economic welfare, GDP, production, or employment.

There are relatively few quantitative analyses that compare the effects of NTMs and tariffs. Quantitative analysis of NTMs can be approached either from the policy side or from the data side. Sources of information about NTM policies

can be either official, or based on complaints and concerns of traders. The former tend to exclude less transparent measures, while the latter are often not specific about the measure involved.

The gravity model is widely used in econometric analysis of international trade data. For the foreign trade, the gravity model analyses the determinants of bilateral trade flows. Newton's gravitational equation measures the maximum force between two masses that are separated in space. Trade gravity equation follows the same principle, measuring trade that may exist between two countries, mainly depending on the distance between them and their level of development, plus a few specific factors.

Elena-Daniela Viorica (2012) observed that there are two times periods of intensive use of empirical gravity model of trade after the development of theoretical foundation of the model. The origin of the gravity model of trade lies in the work of Tinbergen (1962). He introduced the gravity model to explain international bilateral trade. The gravity equation predicts that the gravitational force between two countries is proportional to the product of the masses of the two countries and inversely proportional to the distance between them.

Since 1960, the first uses of gravity equations are in 1962 Tinbergen and, in 1963 Poyhonen applied the gravity model to explain the commercial trade between two partner countries using the classical equations, in which factors are the product of GDP's of the two countries and the geographical distance between the two partners. Then followed a time period of theoretical background for the gravity model, mainly through the scientific works of Anderson (1979), Helpman and Krugman (1985) and Deardoff (1988). After 2000, the papers are highly empirical, extending the model with a number of factors that show geographical, historical or economic relationships between the partner countries.

The standard gravity equation for international trade takes the form:

$$F_{ij} = C \frac{GDP_i \cdot GDP_j}{D_{ij}}, \text{ where}$$

$$T_{ij} = K \frac{M_i^{\beta 1} M_j^{\beta 2}}{D_{ij}^{\beta 3}}$$

F_{ij} represents the bilateral trade flow between countries i and j;

C is the constant of the equation;

GDP_i and GDP_j are the gross domestic products for the country i and country j;

D_{ij} is the bilateral distance between country i and j.

Gravity model of trade can be estimated in terms of natural logarithms (Ln). The equation becomes a linear equation when it is transformed into a logarithmic transformation. With the addition of a random disturbance term (ε), the equation becomes testable.

$$LnF_{ij} = \beta_0 + \beta_1 LnGDP_i + \beta_2 LnGDP_j - \beta_3 LnD_{ij} + \varepsilon$$

$\beta 1$ is the potential to generate trade flows, $\beta 2$ is the potential to attract trade flows, and $\beta 3$ is a resistance factor reflecting the distance decay in trade. The standard gravity equation can easily be extended with other variables, such as institutions, contiguity, common language, common border, free trade agreements, etc. Available studies tend to either include one or a very small set of specific trade facilitation, regulatory, or infrastructure indicators in their models.

The gravity equation was popular because of its high explanatory power. According to Bosse (2013), in log-linear structure, the coefficients of the gravity model can be interpreted as elasticities or ratios of percentage changes. The flow

of products, people and information can be predicted by gravity models, who are derived from Newton's law of gravity.

Table 2.2 Summary of Econometric Approaches to Gravity model

Econometric approach	Characteristics
Ordinary Least Squares (OLS)	• Log-linear least squares • Coefficients interpreted as elasticities / ratios of percentage changes • Logarithmic transformation dependent variable
Heckman Model (HM)	• Two equations: selection equation and trade equation • Have the same variables except one • Selection equation estimated by Probit Maximum Likelihood • Interpretation: probability that country i exports to country j • Trade equation estimated by OLS
Poisson Model (PM)	• Poisson distribution • Assumes that the conditional variance of the dependent variable is equal to its conditional
Negative Binomial Poisson Model (NBPM)	• Variance as a function of conditional mean and dispersion parameter • Dispersion parameter incorporates
Zero Inflated Negative Binomial Poisson Model (ZINBPM)	Two stages: probability of no bilateral trade and volume of trade. Probability of trade is estimated by Logit. Volume of trade is

Sources: 1) Xiong, Bo, Iowa State University (2012)

2) Ben Shepherd, ARTNeT, ESCAP (2013)

3) Yoto et, al , WTO (2016)

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2. 6   Conceptual Framework

This thesis adds to the fishery sector by providing more comprehensive empirical evidence on the effect of NTMs on fishery exporting firms of Myanmar by breaking down the incidence of into fishery product categories in terms of 6-digit HS-code.   The research first confirms the pattern and direction of Myanmar fishery exports first using the database from Myanmar Customs Department. Looking at the relative importance of trading partner countries for Myanmar fishery exports, non-tariff measures of the respective countries are then collected using the most recent data on NTMs provided by World International Trade Statistics (WITS) and the trade portals of the countries concerned. Since Myanmar exporting firms may face the export-related non-tariff measures due to domestically issued regulations, the existence of export-related NTMs in Myanmar will also be checked.   Based on the collected information on NTMs, interviews on fishery exporting firms is carried out using questionnaires. The most crucial part of the research is the assessment on the market access of Myanmar fishery exports in terms of the incidence of NTMs on Myanmar fishery exports and, possibly, the severity of those NTMs on the market access and the responsiveness of Myanmar fishery exports on changes in output, price and cost incurred in fishery products exporting firms.

The concept applied here is that the introduction of product safety regulations, namely, SPS measures, will increase the cost of production but can also signal and inform importers about the quality of product, then helping to promote the competitiveness of those products that meet standards. Product safety regulations also increase trust in the quality of foreign products. This can reduce transaction costs and fostering trade. However, whether or not these effects will facilitate the higher imports from trading partners or country's export depends on the effect of the measure on the relative costs of domestic and foreign products in importing country, and on the willingness of consumers to pay higher prices for safer products. When exploring the effects of SPS measures on trade, an empirical evidence is needed to distinguish among different types of measures as SPS measures affect trade through different channels.

Figure 2.1 Conceptual Framework

Figure 2.1 Conceptual Framework
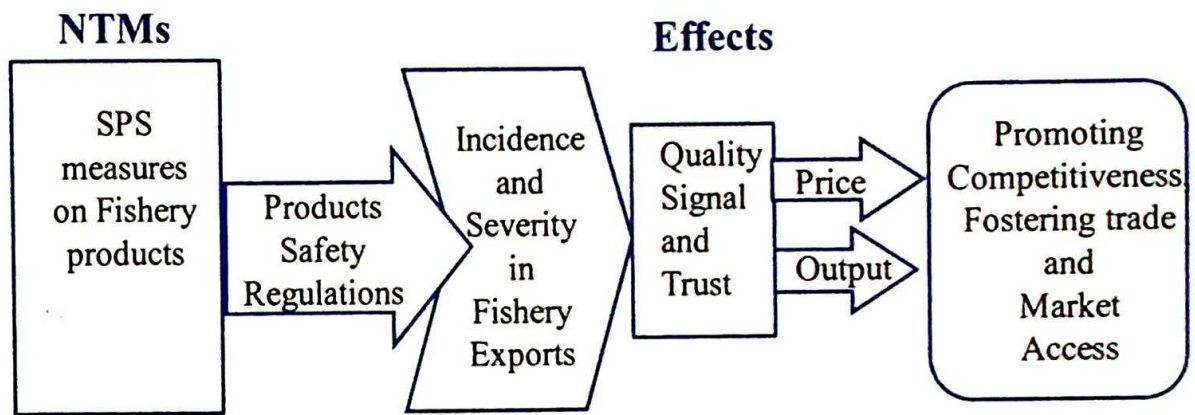
Source: Author

Chapter III

Review on Myanmar International Trade Sector

Liberalization of trade and foreign investment is an integral part of the economic reforms initiated since 2011. Myanmar has been exporting primary products with low price, and importing manufactured and investment goods. The government of Myanmar is actively encouraging export diversification and promoting downstream processing of primary commodities, improving support services in trade financing, market access and trade facilitation as well as removing barriers to inbound foreign direct investment. Increased economic integration into ASEAN does not much cause trade diversion. Thailand remains a main trading partner while China and India have been increasingly important through border trade. The major policy changes include reduction in export tax and income tax on income from CMP exports, exemption of commercial tax on exports of rice, pulses, maize, sesame, rubber, fishery products and animal products, the removal of state monopoly in international trade, and the elimination of licenses for commodities classified in over 1928 HS tariff lines, while licensing has been maintained on the commodities considered as sensitive. The government intends to prepare WTO compatible trade remedy laws and regulations.

3.1 Overview of Recent Macroeconomic performance

Myanmar initiated a series of gradual and radical changes of economic reforms since 2011 aimed at accelerating structural changes and comprehensive economic development. The first stage of reform, introduced in 2011, was the political reforms, for building up national reconciliation and inclusiveness. It is known as the first wave of reforms remarked by reconciliation with political parties and armed nationalities groups, endeavor for the rule of law, and peace-building process in conflict-affected areas. On 19 June, 2012, the government of Myanmar has

declared the second wave of reform that the government seeks for a high economic growth rate targeting 7.7 percent annual average GDP growth based on 2010-2011 in market price and 1.7 fold rise in per capita GDP after 5-Year Plan started from 2011-2012 to 2015-2016. (MCDV, 2013).

The reform strategy is based on four economic policies, namely, sustaining agricultural development towards industrialization and all round development, balanced and proportionate growth among regions and states, inclusive growth for entire population, and quality of statistics and statistical system. Liberalization of trade and foreign investment is an integral part of these economic reforms. Accordingly, Myanmar is increasingly looking outward and strongly supports the multilateral trading system (MTS). (WTO, TPR, 2014).

An open global trading system, including access to export markets and inward flows of FDI, is a key to Myanmar's economic development and thus poverty reduction. As a consequence of the membership of the Association of South East Asian Nations (ASEAN), and deepening economic relationship with China, Japan, Korea, India, Australia and New Zealand, Myanmar is becoming integrated economically with these regional trading partners. The third stage or third wave of reform focused on public administrative reforms through establishing of good governance and clean government.

Myanmar's wide-ranging political, social and economic reforms aimed at the re-integration of the country into the global economy following five decades of isolation and consequent economic stagnation. Myanmar experienced rapid economic growth in the last two decades, 7.9 percent on average in the 1990s and 11.5 percent in the last decade. Myanmar's nominal GDP per capita in terms of US dollar increased by 10.8 times during the last two decades, which is the second highest rate in ASEAN next to Vietnam. (MCDV, 2013).

The structure of economy has slightly changed. Between 2009/10 and 2012/13, agriculture's share of GDP fell from 38.1% to 30.5%. By contrast, the share of manufacturing increased from 18.1% to 19.9%. Services' share rose slightly from 37.4% to 37.5%. Real GDP growth has accelerated from 5.1 percent in fiscal year 2009-2010 and 5.9 percent in 2011-2012 to 7.3 percent in 2012-2013 and estimated 7.5 percent in 2013-2014, supported by higher domestic and foreign investment and

improved business confidence. Average annual rate of inflation during the reform period was stable at 2.7 and 2.8 percent in 2011-2012 and 2012-2013, respectively, mainly due to declining food prices and lower monetization of fiscal deficit. However, inflation quickened to an estimated 5.8 percent in 2013-2014, driven by higher food prices and the depreciation of the Myanmar kyat. In fact, following the adoption of a managed float in April 2012, the kyat has depreciated against the US dollar, falling by 11 percent from April 2013 to March 2014.

The balance of payment recorded an estimated surplus equal to 0.6 percent of GDP. The gross official reserves rose to an estimated 49 billion USD covering 3 months of imports. Market exchange rate has been remarkably stable, having a narrow gap between the Central Bank of Myanmar (CBM) reference rate and the market rate. Multiple currency practice has been largely reduced. Government spending on health, education and infrastructure will continue to increase with the support of higher natural gas revenue. Myanmar medium-term economic prospects are good. The economy is forecasted to post higher growth of 7.8 percent in both FY 2014 and FY 2015 (ADB, 2014). Average annual rate of inflation is expected to remain moderate. It is noted that realizing the full extent of growth potential requires macroeconomic stability, together with structural policies, including liberalization of trade and foreign investment.

Among the key macro-economic policies were foreign exchange and related monetary policy together with fiscal policy. The single most important economic reform so far has been the liberalization of the exchange rate regime starting in September 2011 and the subsequent replacement of the overvalued official exchange rate peg with a "managed float" in April 2012. This reform was motivated by commitments under the AEC Blueprint. The government of Myanmar has taken steps to unify the country's multiple exchange rates into a single rate by replacing the official peg in April 2012 with a "managed float" through the foreign exchange auction market under the supervision of the Central Bank of Myanmar. In August 2012 Parliament adopted a new Foreign Exchange Management Law, which is aimed to remove all the present restrictions on current payments and transfers abroad. Inflation has been remained moderate, averaging 2.8% during the period 2012/13. However, there are upward pressures due to the prices of real estate and wage

increases, and, as a result, inflation rose to around 5.6% in 2013/14, and upward trend thereafter.

As far as fiscal sector is concerned, fiscal policy is more transparent and accountable.   The policy is being oriented more towards supporting continued macroeconomic stability, while providing sufficient room for social and investment spending, including on poverty reduction programs and essential infrastructure, such as that involving electricity, transportation, telecommunications, water, educational and health facilities. Therefore, the government of Myanmar aims to keep the fiscal deficit during last five years and. The tax reforms is required to aim at broadening the tax base and improving compliance, so as to offset the loss in revenues from trade taxes as a consequence of the abolition the withholding tax on imports and the export tax on key agricultural exports. Furthermore, the Ministry of Finance has simplified the commercial tax on domestic sales, broadened the tax base by requiring public sector employees to pay income tax, and increased the progressivity of the income tax. Limiting tax incentives is also important to prevent further erosion of the tax base.

As regards international trade, Myanmar is an original member of the WTO. Myanmar considers that the multilateral trading system can bring a wide range of opportunities for exports and overcome its supply-side constraints. Myanmar's trade policy is strongly influenced by its participation in ASEAN, and ASEAN's free-trade agreements with third countries. Myanmar is also looking beyond its Asian neighbours to develop trade and investment ties. Myanmar expects to benefit from GSP schemes reinstated by the EU and Norway. Myanmar remains the exporter of primary products and importing manufactured and investment goods at unfavorable terms of trade. Myanmar's foreign trade has been mainly with the Asian countries. More than 70% of total export goes to Asian region, also more than 90% of total import comes from this region.   Major trading partners are China, Thailand, Singapore, India, Japan and South Korea. International trade has been largely dominated by private sectors activities. Several steps have been taken to encourage the active participation of the private sector in international trade. In particular, state trading monopolies were largely abolished in November 2011 so that private enterprises and individuals can now import and export almost all products.

Export Policy of Myanmar is to extend and explore the foreign markets by utilizing the natural and human resources effectively and efficiently and also to promote the export of traditional and value-added products. Import Policy of Myanmar is to import the commodity given priority as capital goods required by the State, raw materials for production, other important essential goods and the goods which support to the public health and export promotion. Trade Promotion Strategies of Myanmar can be outlined as follows. (Ministry of Commerce, 2012).

-To export all exportable surplus and diversify foreign markets by using natural and human resources.

-To increase and diversify exports and improve the quality of products

-Try to lower down the trade barriers and simplified export/import procedures

-To encourage the private sector participation in the foreign trade

-To establish the Export Processing Zones and Special Economic Zones at suitable places

-To organize the training, seminar, workshop, business matching, trade fairs

-To disseminate trade related information through the websites and Journals and bulletins

3.2 Pattern and Direction of Trade

Myanmar is very much an agrarian economy and this is reflected in its export composition, which is concentrated in few primary commodities. Table 3.1 shows recent trends in Myanmar's performance in international trade markets. During fiscal year 2010-2011, Myanmar's exports and imports accounted for about USD 8.8 billion and USD 6.4 billion, respectively, generating approximately USD 2.5 billion trade surplus for Myanmar. Over the most recent five years, both Myanmar's exports and imports have substantially increased. However, while Myanmar's exports increased by 41%, its imports increased about 160% during the five years. This transformed Myanmar into a trade deficit country with USD 4.1 billion in fiscal year 2014-2015.

Table 3.1 Trade Flow of Myanmar

Year	Value in million US$		
	Export	Import	Trade Balance
2010-2011	8861.0	6412.7	2448.3
2011-2012	9135.6	9035.1	100.5
2012-2013	8977.0	9068.14	91.9
2013-2014	11204.0	13759.5	-2555.5
2014-2015	12523.7	16633.2	-4109.5
2015-2016	11136.9	16577.9	-2555.5
2016-2017	11998.5	17211.1	-5212.6

Source: Customs Department, Myanmar.

Table 3.1 shows the recent trend of Myanmar's exports in terms of overseas exports and trans-border exports. Myanmar shipped 11.14 billion worth of goods and imported 16.5 billion worth of goods around the world in 2015-2016. Export of Myanmar can be seen as a gain compared to the situation in 2010-2011. However, it is a 13.4 % decrease compared to 2015. Total value of trade results a 38% gain compared to last five years, and 5% from 2015-2016 to 2016-2017.

There has been a shift in Myanmar's imports between the 2010-2011 and 2014-2015 fiscal years, during which a sharp increase in Myanmar's imports during the periods is observable. Imports increased from USD 6,412 million in the 2010-2011 fiscal year to USD 16,632 million in the 2014-2015 fiscal year. The dramatic increase of import was originated from the increase of import from overseas trade, not border trade.

Myanmar recently experienced sharp declines in its trade balance. In fiscal year 2010-2011, Myanmar had a trade surplus with USD 2,448 million. However, its trade balance slid into a trade deficit in fiscal year 2012-2013. Since then, the size of Myanmar's trade deficit continued to deteriorate. In fiscal year 2014-2015, Myanmar's trade deficit reached USD 4,109 million.

Table 3.2 Pattern of Export

Million USD

Product Type	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Agriculture	1800	2373	2636	2674.9	2923.5	2677.7
%	20.31	26	29.4	23.9	23.3	24.05
Animal	93.8	92.9	40.8	15.5	9.8	8.1
%	1.06	1	0.5	0.1	0.1	0.073
Marine	498.6	705.9	624.4	675.3	420.7	469.3
%	5.63	7.7	7	6	3.4	4.214
Metal	2274	897.1	393.6	1150.2	1469.5	960.8
%	25.66	9.8	4.4	10.3	11.7	8.63
Forestry	644.8	643.9	596.2	949.3	98.1	211.7
%	7.28	7	6.6	8.5	0.8	1.90
Manufacturing	2901.6	4001.2	4382.5	4246.8	6232.7	5554.9
%	32.75	43.8	48.8	37.9	49.8	49.88
Other	648.1	421.6	302.8	1491.9	1369.4	1254
%	7.31	4.6	3.4	13.3	10.9	11.26
Total	8861	9135.6	8977	11240	12523.7	11136.5
	100	100	100	100	100	100

Source: 2016 Statistical Yearbook.

Table 3.2 shows the trend of Myanmar's industrial exports between fiscal years 2010-2011and 2015-2016. One notable observation is that the manufacturing sector's performance in export markets overwhelmed that of other industries' and that sector's products constitute the main exports in Myanmar's export performance, accounting for almost half of Myanmar's total exports in the most recent statistics. Its export volume increased from about USD 2,902 million in fiscal year 2010-2011 to USD 5554.9 million in fiscal year 2015-2016. The export volume of the manufacturing sector more than doubled during the four years, which is notable when compared with the growth rates of other industries. The average export increase during the five years was about 40%. On the contrary, the importance of metal and forestry in Myanmar's export trade was sharply reduced. The metal industry's export volume decreased from USD 2,274 million to USD 960.8 million and the forestry industry's export shrunk from USD 645 million to USD 211.7 million during fiscal years 2011-2016. Regarding the increased share of manufacturing export, it is important to note that oil and natural gas export are categorized in the manufacturing export.

The comparison of the pattern of export of year 2010-2011 and 2015-2016 can be visualized with figures 3.1 and 3.2. Share of manufacturing exports has been larger, while shares of forestry exports and other exports including agricultural exports get shrink relatively.

In fiscal year 2011-2012, the manufacturing sector accounted for about 32.7% of total Myanmar exports, rising to about 49.8% in fiscal year 2015-2016. This signals a positive development for Myanmar's economy as it indicates that its manufacturing sector is beginning to play an important role. The second major export sector is the agricultural industry. Myanmar's agricultural product exports account for about one-fourth of Myanmar's total exports in fiscal year 2015-2016. The export ratios of the metal and other industries are 8.6%, and 11.3% in the most recent year, respectively. They reflect very similar percentages in total exports, but the patterns are quite different. The export volume and ratio of the metal industry dramatically decreased to 8.6 %. One interesting finding from the trade statistics is that the size and proportion of forestry exports dramatically contracted, from USD 648 million (7.3%) in fiscal year 2010-2011 to USD 98 million (2%) in fiscal year 2015-2016.

Table 3.3 Pattern of Import

Million USD

Product Type	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Capital Goods	2480.70	3063.7	3399.2	5237.8	6175.1	7039
%	38.68	33.91	37.48	38.07	37.13	42.46
Intermediate Goods	2629.00	3112.8	2674.4	3915.1	4488.3	4317.4
%	41.00	34.45	29.49	28.45	26.98	26.04
Consumer Goods	1303.10	2858.6	2995.3	4606.6	5969.2	5221.4
%	20.32	31.64	33.03	33.48	35.89	31.50
Total	6412.70	9035.1	9068.9	13759.5	16632.6	16577.8
%	100.00	100.00	100.00	100.00	100.00	100.00

Source: 2016 Myanmar Statistical Yearbook

Table 3.3 illustrates shifts in Myanmar's imports through three categories: capital goods, intermediate goods, and consumer goods. The total volume of import increased about 156% from 2010-2011 to 2015-2016 fiscal years. It illustrates the increasing importance of imported capital good compared with consumer goods imports which is in fact increasing important during 5 years period, but, in relative manner, share of capital goods obviously increases in the composition of export value.

More specifically, imports of capital goods and consumer goods increased about 270% and 400% respectively while imports of intermediate goods increased only by about 90%. Even though capital goods and consumer goods show similar percentages in terms of increase, the magnitudes of each increase are quite different. That is, while the increase in consumer goods imports was about USD 818 million, that of capital goods reached about USD 4658 million. This significant increase in both sectors generated the widening trade deficit in recent years.

Table 3.4. The trend of Myanmar's main export product

Million USD

	2010-2011 fiscal year			2014-2015 fiscal year		
	Products	Value	Share	Products	Value	Share
1	Natural gas	2,522.50	28.5	Natural gas	5,178.60	41.3
2	Jade	2,204.90	24.9	Garment	1,023.40	8.2
3	Matpe	458.2	5.2	Jade	1,018.00	8.2
4	Garment	379.1	4.3	Rice	523.7	4.2
5	Fish	306	3.5	Matpe	469.6	3.7
6	Natural Rubber	302	3.5	Metal & Raw	440.4	3.5
7	Teak Log	292.3	3.3	Maize	392.8	3.1
8	GreenMungBean	291.5	3.3	GreeMungBean	368.7	2.9
9	Hard Wood Log	282	3.2	Fish	226.5	1.7
10	Rice	194.3	2.2	Toor Whole	207.6	1.5
11	Toor Whole	121.8	1.4	Sesame Seed	182	1
12	Maize	116.1	1.3	Broken Rice	128.2	0.9
13	Sesame Seed	114.3	1.3	Natural Rubber	113	0.3
14	Prawn	73.1	0.8	Prawn	47	0.3
15	Metal & Raw	44.5	0.5	Hardwood	35.3	0.3
16	Teak Conversion	24.9	0.3	Cotton	34.5	0.3
17	Hardwood/Plywood	21.4	0.2	Pelun	34.2	0.3
18	Gems	10.5	0.1	Teak Conversion	29.2	0.2
19	Hard Wood	9.6	0.1	Sugar	18.6	0.1
20	Red Kidney	8.3	0.1	Butter Bean	14.1	0.1
	Others	1,083.70	12.2	Others	2,038.00	16.3
		8,861.00	100	Total	12,523.70	100

Source: 2016 Myanmar Statistical Yearbook

The composition and ratios of export products have changed over time. The importance of natural gas exports, a core Myanmar export product, increased. The

export value of natural gas generally expanded as follows: USD 2,523 million (2010), USD 3,502 million (2011), USD 3,666 million (2012), USD 3,299 million USD (2013), and USD 5,197 million (2014), reflecting an approximate 105% increase during the recent four years. In addition, there has been a huge increase in exports of textile/cloth and metal products among manufacturing goods. Textile and cloth exports increased from USD 379 million in 2010 to USD 1,023 million in 2014, reflecting a 170% increase during the four years. Exports of metal products increased from USD 44 million in 2010 to USD 440 million in 2014, a 10-fold increase during the four years. However, other manufacturing products apart from textiles, cloth and metal products, are not included in top 20 export products. Most of the top 20 export goods are agricultural products. The export of wood products, Myanmar's traditional main export product, decreased sharply from USD 630 million in 2010 to USD 64 million in 2014.

Recent pattern of trade can also be seen in terms of top-10 items exported and imported in 2015-2016. Top 10 exports of Myanmar accounted for over 80% of the overall value of her exports. Value of total exports therefore represents an estimated 3.4 % of GDP. The following export product groups represent the highest dollar value global shipments from Myanmar during 2016. Also shown is the percentage share each export category represents in terms of overall exports from Myanmar.

Table 3.5 Top 10 Export Items in 2015-16			Table 3.6 Top 10 Import Items in 2015-16		
		Million USD			Million USD
Sr. No	Items	% of Total Export	Sr. No	Items	% of Total Import
1	Natural gas	39.00	1	Vehicles and spare parts	11.06
2	Beans and pulses	9.70	2	Petroleum products	10.14
3	Garment	7.63	3	Machinery and equipment	9.52
4	Jade	5.11	4	Ship and ship spare parts	6.78
5	Rice and rice products	4.72	5	Iron and steel	5.00
6	Fish and prawn	2.78	6	Iron and steel construction materials	4.98
7	Corn	2.74	7	Broadcasting and telecommunication	3.67
8	Metal and ores	2.69	8	Plastic raw materials	3.07
9	Sugar	1.53	9	Palm oil	2.66
10	Sawn timber, sawn hardwood and plywood	1.44	10	Motor cycles	2.19
Total value of export (Million USD)		11136.88	Total value of import (Million USD)		16577.95
Source: Ministry of Commerce, Myanmar.			Source: Ministry of Commerce, Myanmar.		

Tables above convince that Myanmar is the exporter of primary products and importer of manufactured and investment goods, at unfavorable terms of trade, confirmed by the trade balance given in table 3.1. Myanmar's export diversification is distributed across four primary products groups, which include fuels, agricultural raw materials and fishery products, textiles and clothing, and food items including. The exports of fuels from Myanmar had biggest share, which was 39% in 2015-2016. The exports of agricultural raw materials and fishery products is altogether ranked second with 22 % and textiles and clothing ranked third with 8%, respectively, in same period. Import of Myanmar has also increased during last years. Myanmar is importing a diversified goods ranging from vehicles and spare parts, with a share of 11%, petroleum products (10.14%) and machinery and equipment (9.52%) to consumer goods like palm oil (2.66%). Top ten imports are capital and intermediate goods, contributing about 57 % of total value of import.

Myanmar's foreign trade has been mainly with the Asian countries. More than 70% of Myanmar's total exports are destined for the Asian region. Also, more

than 90% of its imports also come from this region. Myanmar's major trading partners are China, Thailand, Singapore, India, Japan and South Korea.

Table 3. 7. Top 10 Exporting countries of Myanmar

Million USD

Rank	2011/12		2013/14		2015/16	
	Country	Export Value	Country	Export Value	Country	Export Value
1	China	2786.84	China	4105.50	China	6395.43
2	Singapore	2516.13	Singapore	2910.20	Singapore	2970.9
3	Thailand	691.15	Thailand	1377.00	Thailand	1972.82
4	Japan	502.17	Japan	1296.20	Japan	1452.22
5	Korea	451.93	Korea	1218.00	India	807.35
6	Indonesia	431.82	Malaysia	839.70	Indonesia	601.96
7	India	325.38	India	493.50	Malaysia	588.72
8	Malaysia	303.41	Indonesia	438.80	Korea	396.6
9	USA	263.62	Vietnam	169.90	Vietnam	290.19
10	Germany	95.15	Italy	107.90	United Arab Republic	128.99
	Total	9035.06	Total	13759.5	Total	16577.83

Source: 2016 Myanmar Statistical Yearbook

There are several prominent features of Myanmar's export destinations. The major share of Myanmar's export products are destined for Asian markets (Table 3.6). In 2012, Germany was the only non-Asian country in Myanmar's top 10 export destinations and since 2012 no non-Asian country has been included in the top 10 export destination country list. China and Thailand have consistently constituted Myanmar's two largest export markets. In 2014, the value of exports to China and Thailand were USD 4,674 million and USD 4,029 million, respectively, which accounts for about 69.5% of Myanmar's total exports. The volume of export bound for Thailand is quite stable: USD 4,001 million USD (2012) and USD 4,029 million in 2014. In contrast, China-bound exports have increased sharply from USD 2,238 million in 2012 to USD 4,674 million in 2014 to assume first place. In addition, available statistics reveal that the concentration rate of the top 10 export destinations accounts for about 95.3% of exports in 2014. This implies that Myanmar has an

extremely high rate of concentration with its top 10 trading countries, all of which were Asian countries in 2014.

Table 3.8. Top 10 Importing countries of Myanmar

Million USD

Rank	2011/12		2013/14		2015/16	
	Country	Export Value	Country	Export Value	Country	Export Value
1	China	2786.84	China	4105.50	China	6395.43
2	Singapore	2516.13	Singapore	2910.20	Singapore	2970.9
3	Thailand	691.15	Thailand	1377.00	Thailand	1972.82
4	Japan	502.17	Japan	1296.20	Japan	1452.22
5	Korea	451.93	Korea	1218.00	India	807.35
6	Indonesia	431.82	Malaysia	839.70	Indonesia	601.96
7	India	325.38	India	493.50	Malaysia	588.72
8	Malaysia	303.41	Indonesia	438.80	Korea	396.6
9	USA	263.62	Vietnam	169.90	Vietnam	290.19
10	Germany	95.15	Italy	107.90	United Arab Republic	128.99
	Total	9035.06	Total	13759.5	Total	16577.83

Source: 2016 Myanmar Statistical Yearbook

As far as recent direction of trade is concerned, China has become the most import source of imports, rising from USD 2,720 million in 2012-13, accounting for about 30% of total imports, to USD 5,020 million in 2014-15, an increase of about 84.6%. One can see that Myanmar heavily depends on imports from Asian countries. The U.S. (in 2012, and 2014), Germany (2012) and Italy (2013) were included in top 10 importing country to Myanmar, but import volumes from these non-Asian countries were relatively small. That means, imports from the U.S. only accounted for about 3%, whereas imports from the other 9 Asian countries accounted for 91.4% in 2012. In particular, the four major countries, namely, China, Singapore, Japan, and Thailand, accounted for about 75.7% of total imports in 2012.

3.3 Trade Policies

Myanmar Trade policies can be observed during the recent decade in terms of changes towards liberalization, tariffs, tax incentives for export and customs administration and procedure.

3.3.1 Changes towards Liberalization

According to Ministry of Commerce (2014), since 2011, the government eased many regulations and procedures. The major policy changes the government initially made for trade sector are as follows.

- The export tax was reduced from 10% to 7% in September 2011.
- Exports of seven agriculture commodities (rice, pulses, maize, sesame, rubber, fishery products and animal products) are exempted from the commercial tax for six months up to 14 February 2012.
- These export items are required to pay only 2% income tax.
- Exports of value- added products based on timber, bamboo and rattan are exempted from the commercial tax for five and half months up to 14 February 2012. These export items are required to pay only 2% income tax.
- The income tax levied on CMP exports was reduced from 10% to 2% for a period of six months from 19 August 2011 to 18 February 2012.
- Import and export licenses are now issued in two or three days.
- The palm oil import monopoly has been terminated.
- Exporter, importers and foreign exchange earners from the service sector are now allowed to import automobiles.
- The property tax rate reduction, from 50% to 15% was extended for one year to 11 August 2012.
- The income tax levied on the foreign currency salaries of nationals in the country and abroad was reduced from 10% to 2%, for a period of six months from 19 August 2011 to 18 February 2012.
- The withholding tax (charged on local purchase) was reduced to 2% in September 2011.

3.3.2 Tariffs

Tariff protection in Myanmar is relatively low by developing country and especially least developed country standards, much lower (and less dispersed) even most ASEAN countries. As tariffs tend to disrupt supply chains, especially when they are levied on raw materials and intermediate inputs, with an average applied most-favoured-nation (MFN) tariff rate of just 5.6% in 2012 and 2013. All applied MFN tariffs rates are *ad valorem*, thereby imparting a high degree of transparency to the tariff. While less than 20% of tariffs are bound and the average of bound rates greatly exceeds average applied MFN rates, thereby providing a great deal of scope for raising applied rates, this scope has never been used and so the average applied MFN tariff rate has hardly changed since 1996. Myanmar does not impose any tariff rate quotas (or quantitative restraints). The government is willing to consider binding more tariff lines in order to contribute to a successful conclusion of the current Doha Development Agenda (DDA) negotiations, provided mutually satisfactory results can be achieved in these negotiations. (WTO, TPR, 2014)

Taxes on most exports were removed in 2012-2013, so that they are now levied on only a few natural resource products, namely, gems, oil and gas, teak and other timber. Remaining export taxes are mainly designed to capture an appropriate share of natural resource rents for the budget. At the same time, however, they can also induce downstream processing of the products concerned. In the case of virgin teak, however, Myanmar has announced its intention of replacing the existing export tax with an export ban, as of 1 April 2014. The export ban is arguably more transparent than a prohibitive export tax, and is considered necessary to preserve Myanmar's remaining teak forests and to develop a sustainable hardwood timber export industry.

3.3.3 Tax incentives for exports

In order to promote export-based industrialization, profits of manufacturers derived from exports are eligible for income tax relief of up to 50%. As Myanmar is an economy in transition, such relief is justified on the grounds that some firms in the process of restructuring as well as those in "infant" industries need temporary

assistance to enable them to compete in export markets and thereby achieve cost reductions associated with economies of scale as well to learning-by-doing and technological progress, which are among the major determinants of productivity growth, and thus become viable in the longer term.

The government is simplifying the current internal tax system and making it more neutral with respect to trade. The previously multi-rate commercial turnover tax, the sole domestic indirect tax, has now been largely unified at a relatively low rate of 5%. Only Schedule 6 goods, including alcohol, tobacco, petroleum products, and vehicles, which would normally be subject to excise taxes elsewhere, are now subject to a range of higher rates. Moreover, the commercial tax on most exports was eliminated at the beginning of 2012-2013, thereby reducing the tax component in export prices and therefore making Myanmar exports more competitive on world markets.

Myanmar has also taken several important steps recently to streamline and modernize its direct tax system. In 2012, tax schedules were adjusted to the newly liberalized foreign exchange parity, tax rates for personal and corporate income tax were reduced, and some withholding taxes were eliminated. In the longer term, the government of Myanmar intends to improve the capacity of tax (including customs) administration; reduce further tax rates and broaden the tax base, by rationalizing tax incentives for investment, thus rendering the tax system more neutral, and gradually shift reliance from direct to indirect taxation.

3.4 Customs administration and procedures

In order to expedite customs clearance, the government of Myanmar has been implementing a National Single Window (NSW) in accordance with the principles of transparency, simplicity, efficiency and consistency with a view to its integration with the ASEAN Single Window (ASW) by 2015. The National Single Window Steering Committee was established and it is headed by the Customs Department of Ministry of Finance and it is composed of 24 other Government Agencies such as: Directorate of Trade and Department Commerce and Consumer Affairs of the Ministry of Commerce, Myanmar Port Authority, Forest Department, Livestock Breeding and

Veterinary Department, Department of Fisheries, Department of Historical Research, National Museum and Library, Department of ASEAN Affairs, Department of Agricultural, Central Bank of Myanmar, Myanmar Foreign Trade Bank, Myanmar Investment and Commercial Bank, Myanmar Economic Bank, National AFTA Unit, Myanmar Investment Commission, e-National Task Force, Department of Food and Drugs Administration, Department of Public Health and Laboratory, Department of telecommunication, Central Association of preventing and controlling from the risks of Narcotic Drugs and Myanmar Gems Enterprise. This Single Window will facilitate Myanmar's trade, not just with its ASEAN partners, but also globally, thereby enhancing Myanmar's role as a trade crossroads. The Customs Department is working on the establishment of the Single Window with technical assistance from Japan.

Although Myanmar Customs has not yet applied an automated system, since 2013 a risk management System has been introduced manually by using three channels, namely green, yellow and red. Daily throughputs of containers are 70% by the green channel is 70%, 20% by the yellow, 10% by the red. In order to implement the NSW, the Myanmar Automated Cargo Clearance System (MACCS) has been developed since July 2013, with technical assistance provided by JICA Grant Aid. Monthly discussions between Myanmar Customs and Japanese technicians have been conducted since June 2013. The Brief Design was finished at the end of the 2013 and the Detailed Design was introduced at the beginning of 2014. The MACCS System was expected to launch by 2015, then will also expedite customs clearance of cargo.

Trade-related Ministries were instructed to review their procedures affecting international trade with a view to minimize the administrative burden and transaction cost on trade operators. A manual risk management system has been established in March 2014 with technical assistance provided by the ADB. A Time Release Study will be conducted with a view to speeding up customs clearance. Regarding Customs Valuation, Myanmar has a plan to apply the WTO Customs Valuation Agreement. For the time being, we are using the Sea Customs Act 30 (a and b). The revised legislation is on the way to enactment subject to approval of Parliament. In April 2013, import licensing requirements were abolished for 166 import commodities, corresponding to more than 1,900 tariff lines, and the government plans to further liberalize the remaining restrictions. With respect to the import license regime, the Government

made a first significant change to the import license regime in June 2012 by replacing the former non-automatic import license regime by a new automatic regime covering all imports. In March 2013, the Government further eased licensing requirements by eliminating import license requirement for 166 commodities classified in over 1,900 HS tariff lines and representing about 35% of total import. A consultation process is underway involving the Ministry of Commerce, the Customs Department and representatives from the private sector to make recommendations about the identification of additional imported goods for which import license requirement will be removed. The Government intends to gradually phase out the license regime through a series of announcements in 2014 and 2015 that would each represent about 10 to 15% of total import. The license procedures are applied on a non-discriminatory basis and are available on the website in Myanmar language.

3.5 Non-tariff Measures

Many regulations related to NTMs in Myanmar are ratifications to the international conventions. A lenient regulatory environment with less bureaucracy and less cost of compliance is the desirable path in the political arena for Myanmar and for the world. However, consumers everywhere are increasingly demanding food safety; they consider it as the role of governments to ensure that food supply chains are safe. In a world of open trade, so many countries have resorted to heavy regulation of foodstuffs and agricultural products. These types of measures on such products ensure that food security and food safety are ensured, as in the case of Myanmar.

Myanmar has standards and technical regulations as well as SPS measures, they are based largely on international standards. For example, food standards are adopted from CODEX; fishery standards are based on EU regulations; pharmaceutical standards and regulations are based on British International Standards. The government of Myanmar has no intention of impeding imports of these products without science-based justification.

In order to develop a legal framework to implement its commitments under international agreements, a draft National Standards Law has been prepared with the assistance of foreign experts. In 2012 and 2013, the Ministry of Science and

Technological Research Department (MSTRD) held four national consultative meetings with concerned stakeholders to review the draft law. The draft law has been submitted to the President's office for consideration and subsequent transmission to Parliament. Meanwhile, the MSTRD has set up 19 standards technical committees involving all stakeholders. In addition, MSTRD has prepared a draft Legal Metrology Law as verification and re-verification of measuring equipment are currently not mandatory in Myanmar. The draft law was prepared by UNIDO for Cambodia and Laos, but modified according to Myanmar's specific circumstances and with the assistance of an expert from New Zealand. The draft law was also reviewed during the four national consultative meetings with stakeholders held in 2012 and 2013.

Moreover, as adherence to internationally-agreed SPS requirements is vital for the development of the agricultural and food processing sectors, the government of Myanmar is doing its best to ensure that they are upgraded in line with International Standards for Phytosanitary Measures, although its ability to do so is severely hampered by a lack of technical expertise and limited resources. Clearly, inward FDI together with technical assistance can enable Myanmar to implement internationally accepted standards, not only for the benefit of domestic consumers, but also for the benefit of Myanmar's enterprises, which can then satisfy such standards and therefore enter export markets.

The study of Ando and Obashi (2010) confirmed that Myanmar had 100 percent frequency ratio of by-type NTMs on account of quantitative restrictions. Some of these NTMs might have legitimate reasons. Some NTMs are policy measures concerning security, such as transport of firearms or explosives, or public health, such as trade in dangerous chemicals and radioactive materials. A number of NTMs are bans on trade, such as opium and drug narcotics.

Figure 3.5. Non-tariff Measures, by Type

% of each type of NTMs
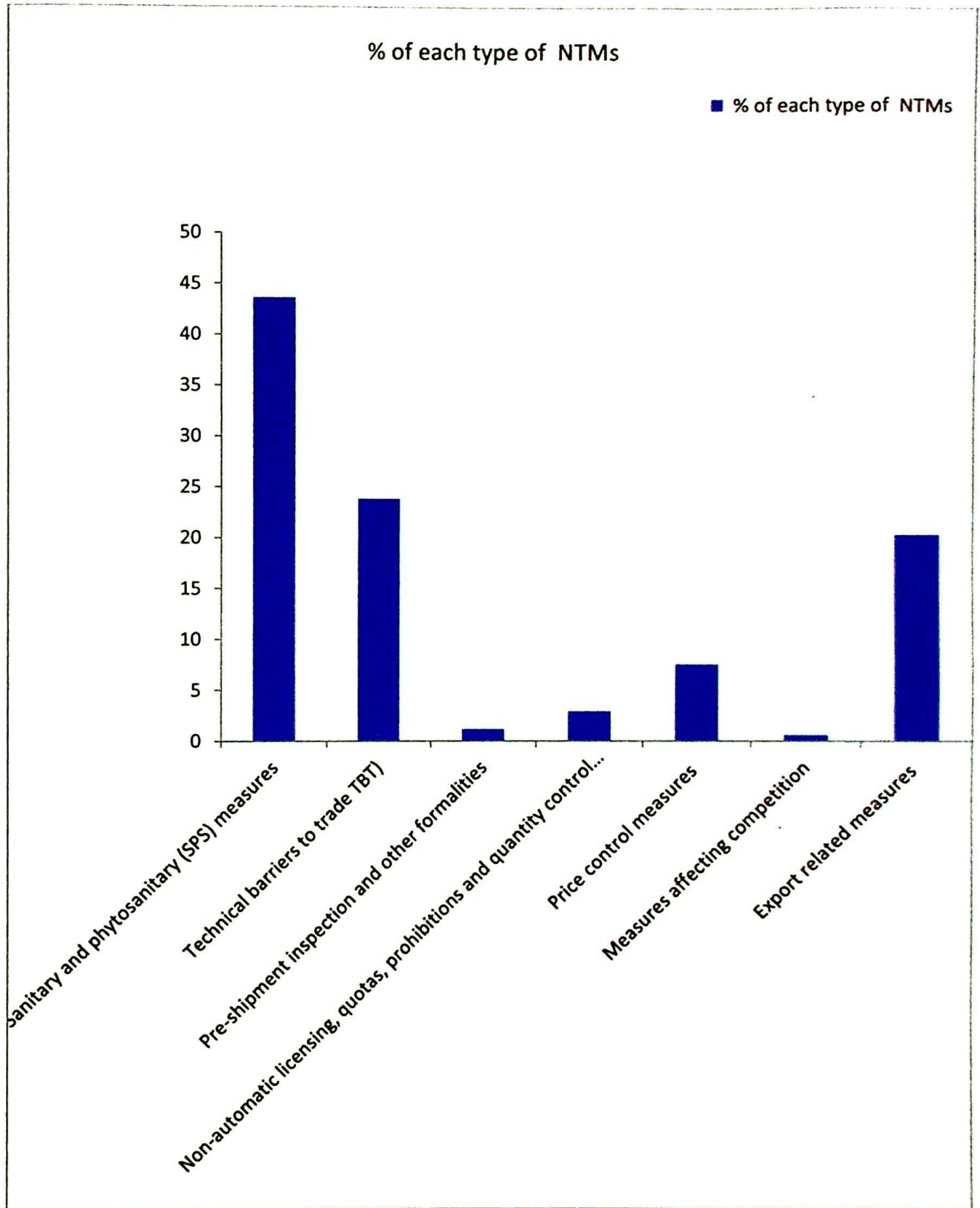
Source: Compiled from the available NTM data of Myanmar.

Usually TBT and SPS measures play a significant role in the incidence of NTMs in many countries. However, in Myanmar, the SPS measures and export-related measures have the greatest number of affective tariff lines. At the 10-digit HS

level, 15,120 products are subject to SPS and 13,829 products are subject to one or more of the export-related measures. The TBT measures are the third most widely used measure in Myanmar, covering 7,390 products.

Figure 3.6. Incidence of NTM by Product Group
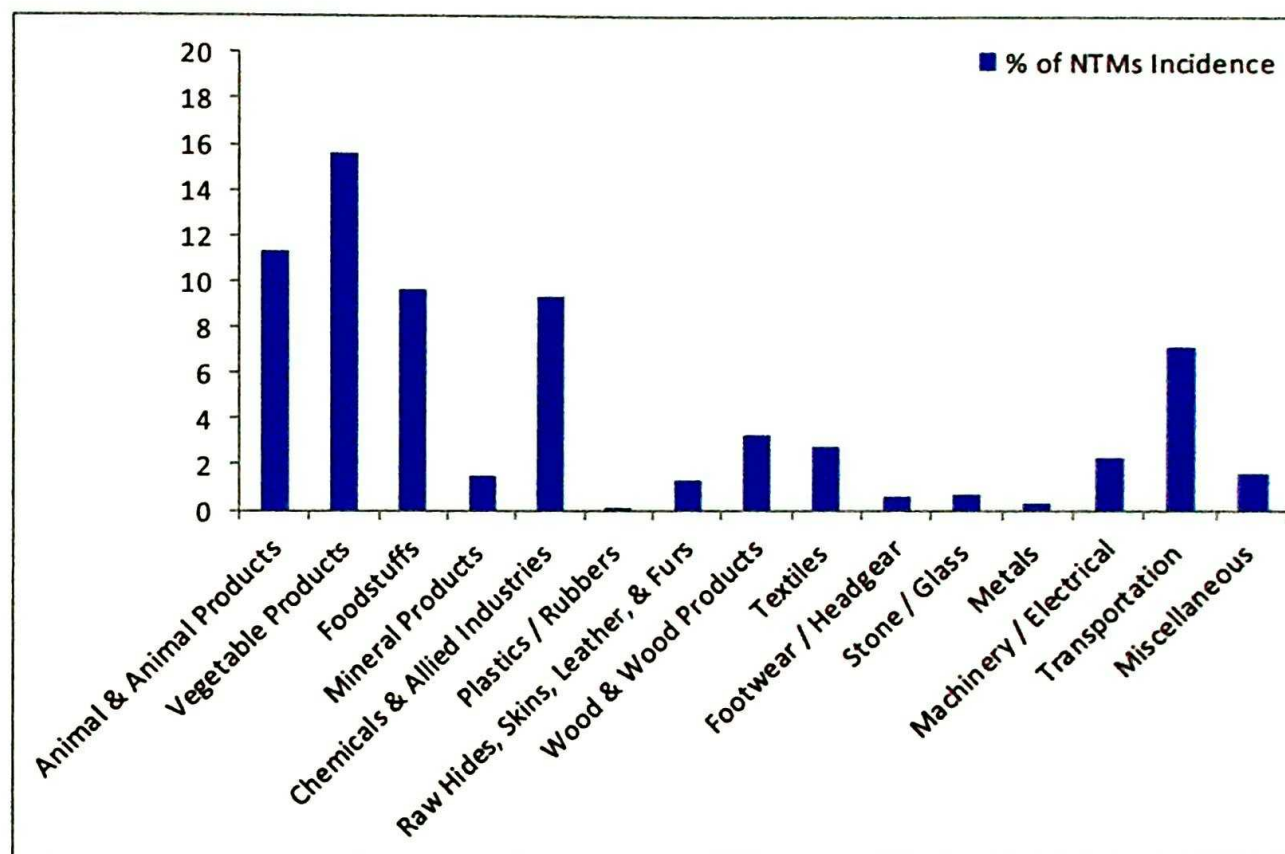
Source: Compiled from the available NTM data of Myanmar from UNCTAD I-TIP

The pattern prevails the relatively moderate use of NTMs, as no sector has more than a third of its tariff lines covered by measures according to the data. There are multiple NTMs on several products. Most of the product groups have total NTMs exceeding their total number of tariff lines. This indicates that some of the products within that group are subject to more than one NTM, compared or relative to the number of tariff lines in each product. As Ando and Obashi observed in 2010, Myanmar was found to cover all product lines with one or other types of NTMs. Compared to the previous study on Myanmar's NTMs (Ando and Obashi, 2010), it is observed from this study that finance control measures, such as multiple exchange rates and quantity control measures like quotas linked with export performance and quotas for sensitive product categories no longer exist in Myanmar's NTMs. Instead, technical measures such as marking, labelling, and packaging requirements have

become important in Myanmar's NTM composition. An examination on the frequency of NTMs by type in Myanmar suggests that TBT measures is the most frequent measures, followed by SPS and safeguard measures, according to the data in 2014 (Cadot and Ing, 2015).

Figure 3.7 Incidence of Multiple Non-tariff Measures, by Product Group
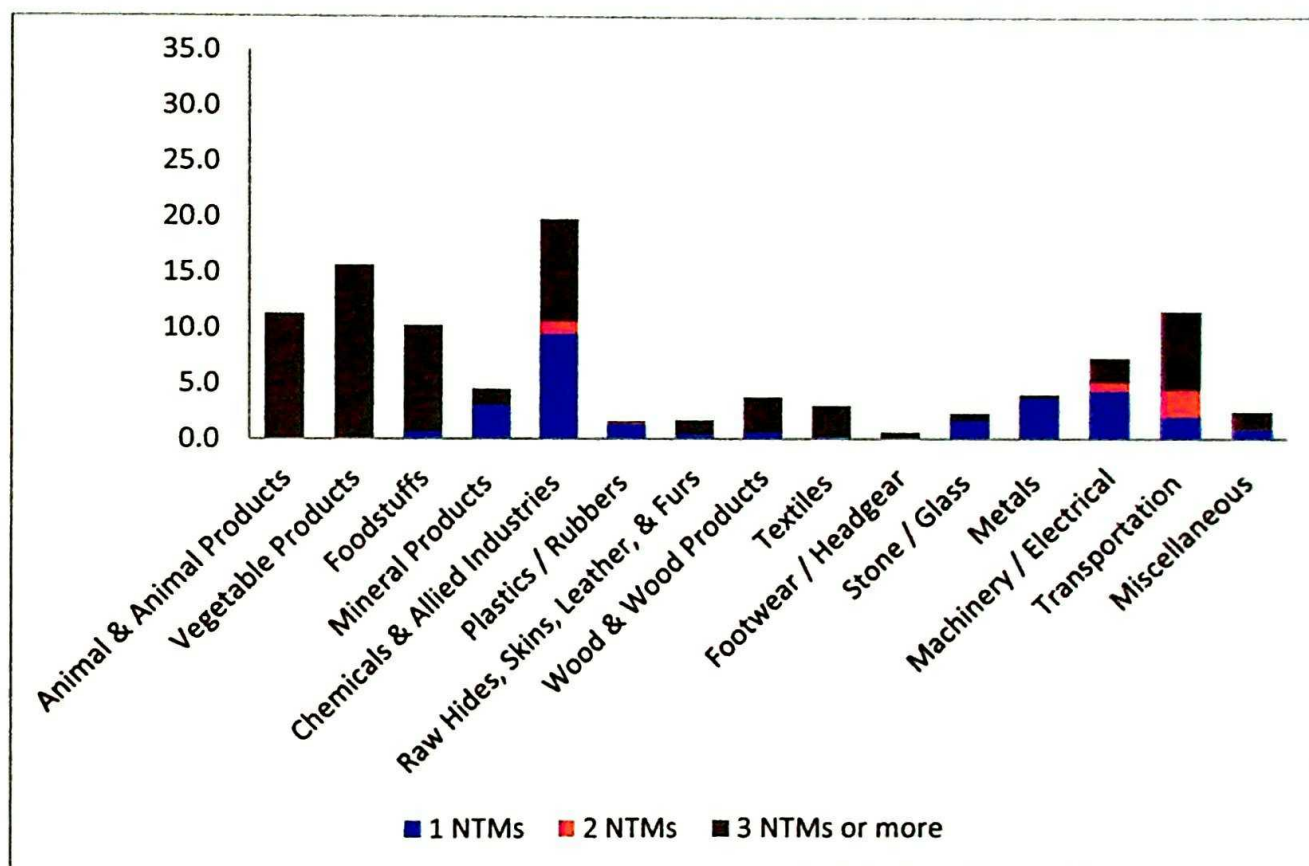
Source: Compiled from the available NTM data of Myanmar from UNCTAD I-TIP

Of the total NTM incidence, 14.2 percent are on vegetable products with three or more NTMs, while almost 11 percent, 10 percent, and 9 percent of NTMs are related to animal products, chemicals, and foodstuffs, respectively. It may be noted that animal and animal products, vegetable fat and oil, vegetable extract, and meat and fish are heavily covered by three or more NTMs. (Figure 3.1).

Most of the NTMs related to vegetables products are SPS TBT measures, but export-related measures such as certification required by the exporting country, export

technical measures and measures on re-export as well as licensing procedures with no specific ex-ante criteria are also included. Most of the NTMs related to animals and animal products and food stuffs are essentially the SPS measures such as labelling, marking and packaging requirements, conformity assessment related to SPS, storage and transport conditions, animal-raising or catching processes; export-related measures and licensing for economic reasons as well as customs inspections, - processing and servicing fees. Regulations related to chemicals and allied industries' products contains the TBT measures such as testing requirement and traceability information requirements, export technical measures as well as licensing for economic reasons. The NTMs related to textile products can be found in the export and import rules under CITES Convention and Operation System. Measures for textile products include much of TBT measures, export measures and licensing for economic reasons. For the transportation products, there are three NTMs regulated for such as licensing- or permit requirements, authorization requirement for TBT reasons and licensing for economic reasons.

3.6 Trade remedy measures and Other Trade-Related Measures

Myanmar does not have any legislation pertaining to anti-dumping, countervailing or safeguard measures. Consequently, no such measures are currently used. The Government intends to prepare WTO compatible trade remedy laws and regulations. Technical assistance in preparing the relevant legislation and regulations are needed. Ministry of Commerce is building up its understanding of trade remedy measures and it is currently receiving technical assistance notably from UNESCAP on the drafting of safeguard provisions, while anti-dumping and countervailing measures has so far not received high priority With limited human resources and significant work load in implementing autonomous liberalization measures and in following up on existing multilateral, regional and bilateral trade commitments, work on drafting WTO-consistent anti-dumping and countervailing measures has so far not received high priority. Recognizing our limited capacity, the drafting of trade remedy laws is an area where Myanmar would welcome additional international technical assistance.

Special economic zones (SEZs)

In order to overcome infrastructure bottlenecks, attract FDI and increase exports, the Myanmar Economic Zone Law was enacted in 2011. This Law provides additional tax incentives for investment in several strategic locations along Myanmar's 1,300 mile long coast. This is an integral part of a strategy to promote Myanmar as a low-cost production base for export destinations within the wider region. The government has been actively promoting greater public and private sector investments into the industrial zones to generate jobs and technological development, and to overcome infrastructure bottlenecks and promote foreign direct investment through Special Economic Zones (SEZs), which will emphasize Myanmar as a strategic location and a low-cost production base for exports to the region. There are three key SEZ projects have been announced in Myanmar, namely, Dawei Special Economic Zone in the southern Taninthayi region, with Thai investors, Kyaukphyu Economic and Technology Zone in the western Rakhine state, with investment from China, and Thilawa Special Economic Zone near Yangon, with assistance from Japan.

Intellectual property rights

Fully aware of the important role played by protection of intellectual property rights (IPRs) in attracting inward FDI, the government of Myanmar is taking steps to overhaul its outdated IPR laws and ensure that these laws are enforced. Accordingly, IPR laws in line with the TRIPs Agreement are being finalized subject to advice from the World Intellectual Property Organization (WIPO). These laws concern patents, industrial design, trademarks and copyright. The Ministry of Science and Technology is also preparing related enforcement provisions with WIPO assistance.

Chapter IV

Incidence of Non-Tariff Measures on Fishery and Fishery Products

Myanmar's fisheries sector plays an important role in generating both employment and exports. The sector is endowed with rich water resources and has been enjoying surplus production, which means it has great export potential. Nevertheless, production and export potential has not been fully realized due to various constraints and deficiencies in vessels, equipment, technologies, skilled labor, logistics, financing, etc.

4.1 Overview of the fishery industry in Myanmar

Fishery production in Myanmar

Fishery production in Myanmar has been steadily increasing. Since 2009, capture and aquaculture fishery showed around 8% and 5% increase, respectively, in production annually. About 80% of Myanmar's fishery production comes from capture and the rest from aquaculture. Small-scale inshore and offshore marine fisheries have contributed most to fishery capture production in Myanmar. Marine capture has been carried out only near the coast because most fishers lack sufficient capacity in terms of fishing vessels, equipment and technologies. Deep sea fishing that can catch high-valued tuna constitutes a very small share of production.

Most aquaculture fishery is in-land and freshwater farms, and marine aquaculture produces comparatively little. Shrimp is aquaculture's main product. Most shrimp farms are located in the northwest and central delta regions, and small-scale farmers mostly utilized a trap and hold system. Small-scale freshwater fish farmers serve local markets, leaving a small number of larger farmers engaged in export. Aquaculture farms has been increasing in production, but also suffering from various difficulties in terms of new sites development, disease control, quality

materials and hatcheries, under-developed technologies, skilled labor, etc., all of which deter introduction and expansion of more productive, intensive and eco-friendly farming.

Export performances and constraints in the fishery sector

Export levels and value in the fishery sector had steadily increased until 2012, subsequently decreasing afterward, according to Department of Fishery data. Inshore and inland capture contributed most to export growth in low-value fishery products. The recent decrease in fishery exports resulted from unsustainable management of fishery resources near coastal areas, decrease in production by in-land shrimp farms and increasing local demand for fishery products.

Table 4.2. Fishery Sector Exports

Tons, USD million

Year	Fish		Prawns		Other		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
2006-2007	235858	240.2	25370	120.9	82198	107.1	343427	468.2
2007-2008	245473	315.5	21061	109.7	85118	135.8	351652	561
2008-2009	234061	273.3	18382	88.9	72268	121.1	324711	483.2
2009-2010	277824	309.9	17439	56.3	79829	130.4	375092	496.6
2010-2011	273044	342.4	19143	68.7	81706	144.4	373893	555.5
2011-2012	283689	396.3	17995	86.2	85298	171.4	386981	653.9
2012-2013	266465	378.1	17268	89.3	93113	185.5	376846	652.8
2013-2014	237142	286.9	16509	62	91616	187.4	345267	536.3
2014-2015	225975	258.6	17527	56.9	94778	166.8	338291	482.3
2015-2016	246970	274.1	13674	49.6	108327	178.7	368970	502.6
2016-2017	290580	319.0	13082.0	58.2	135044.0	228.6	438707.0	605.8

Source: Department of Fishery of Myanmar

East and Southeast Asian countries such as Japan, China, Thailand, Singapore and Malaysia, has been the main destination for Myanmar's fishery and crustacean exports while a few fish species (Asian carp family) are exported to Middle East markets as well. Around 80% of crustacean exports including shrimp were destined for a small group of Asian countries such as Japan, China, Malaysia and Hong Kong and, recently, USA become an important buyer of live eel, crab and dried fish from Myanmar.

Table 4.3. Five most important export markets in 2016-2017

Value in USD million; Volume in tones

Shrimp			Fish			Other*		
Country	Value	Volume	Country	Value	Volume	Country	Value	Volume
Japan	18.9	4397.0	Thailand	144.2	168	China	120.1	65,568
China	12.0	3222.0	China	58.1	31,409	Thailand	47.2	40,900
Malaysia	7.4	1151.0	Saudi	23.3	20,756	Malaysia	24.1	7,961
Thailand	7.4	1771.0	UAE	14.4	15,657	USA	7.3	844
Hong Kong	4.6	760.0	UK	11.8	6,391	Vietnam	4.7	6,290

* Other includes live eel, crab and dried fish.
Source: Department of Fishery

FAO (2016) confirms that Myanmar is exporting 443 number of fishery products. Myanmar's fishery and crustacean exports had been increasing steadily during 2002-2013, however, export of existing products to existing markets constituted more than 90 of the export growth during the period. Diversification of export products, especially high-value-added ones, and development of new export markets will be critical for export promotion in Myanmar's fishery sector. The EU can be one of the important import markets for Myanmar's fishery products. In 2009, the European Union banned all Myanmar seafood imports. Imports of seafood were re-approved in 2010, while farmed products remain prohibited. Regardless of the small share of export to all EU countries, in 2016, Myanmar exports to the EU increased by 12 %, with fisheries products accounting for 8 percent of the total. It is

well known that the EU has been applying strict sanitary requirements to ensure the safety of fishery imports. Myanmar lacks the capacity to satisfy the strict sanitary standards required of exports. In the short-term, the Myanmar government needs to strengthen basic infrastructure, including expansion of facilities and test equipment to satisfy sanitary requirements, human capabilities to manage the sanitary system. In particular, to export fishery processed products to the EU market, the processing factories have to register as factories meeting EU sanitary standards. As many Myanmar fishery processing factories fall short of EU's standards, they are not eligible for registration for export to the EU market.

Myanmar's fishery sector has great production and export potential, however, the capture and aquaculture fisheries have suffered from various difficulties and challenges. The National Export Strategy succinctly identified and summarized supply-side, business environment, market entry and development challenges.

Table 4.4 Average Reference Prices (As of 1st February 2016)

Commodity	Size	Average Price (F.O.B USD/MT)
Rohu	1-2 kg to 5-8 kg	1084.00
MrigaL	1-2 kg to 5-8 kg	1866.50
Hilsa	300-500 gm to 1000-1200 gm	2970.50
Ribbon Fish	200-300 gm to 500-600 gm	2116.50
Long Tongue Sole	50-100 gm to 400-500 gm	2208.00
White Pomfret	100-200 gm to 400-500 gm	6362.25
Big Eye Croaker	100-200 gm to 400-500 gm	1473.50
Katla	2-3 kg to 5-8 kg	1417.67
Pangush	1-2 kg to 3-5 kg	975.00
Black Pomfret	700-800 gm to 2000 gm up	2060.75
Yellow Croaker	100-200 gm to 500-600 gm	2935.40
Thread Fin Bream	Size to 4/6 to 26/30	7485.71
Tiger (H.L)	Size to 4/6 to 26/30	11548.57
White (H.O)	Size to 6/8 to 41/50	6262.86
Pink (H.L)	Size 16/20 to 300/500	3636.67
Dried Prawn	Grade A, B,C, broken	5522.50
Dried Gourami	H.L/ H.O	1836.00
Live Crab	100 Gm up	3000.00
Soft Shell Crab	Grade A & B	5650.00
Fish Meal		660.00
Live Lobster	150 Gm up	22000.00
Live Slipper Lobster	120 Gm up	20000.00

Source: Department of Fish, Ministry of Livestock, Fisheries and Rural Development, Myanmar.

Table 4.4 is the average of reference prices of Myanmar export prices of crustacean, which varies with standards and quality of the products as well as the requirement of the buyer countries. Although the volume of fishery exports has steadily increased since Cyclone Nargis, FAO (2016) confirms that export prices have fallen following the global financial crisis.

Myanmar's Fishery Export Strategy

The NES report laid out a vision for export promotion in Myanmar's fishery sector as "an integrated and responsible fisheries sector, producing and exporting quality and value-added products for the sustainable socioeconomic development of Myanmar." In line with the vision, the strategy to resolve export constraints aims to (1) develop key markets in the short and medium terms for Myanmar's exporters and (2) facilitate structural changes in the value chain to increase its efficiency and value generation. Key structural changes to the value chain will include the following: add value through the introduction of organic aquaculture; rectify gaps in rural energy provision by introducing solar power; strengthen linkages with the tourism sector; strengthen linkages with the main agricultural sectors; implement waste reuse processes; protect ecosystems and trade with risk-based import systems.

The sector strategy and vision will be achieved through implementation of the Plan of Actions for the sector. This action plan aim at the following five strategic objectives that are concerned with challenges and opportunities in Myanmar's fishery sector:

Long-term Production and Productivity
- Increase the long-term production and productivity of the sector through modernization of infrastructure, adequate financial support, and improved production and processing techniques
- Improve production infrastructure; Ensure access to adequate financing; Ensure stable energy supply; Ensure sufficient supply of post-larvae and fingerlings from hatcheries; Increase the availability of feed and other inputs; Increase the availability of quality raw materials for processing plants.

Fishery Product Safety and Quality

- Improve the safety and quality of the sector's products through improved quality management capacities, as well as the implementation of a quality management system across the value chain
- Enhance farmer awareness of and adherence to Good Aquaculture Practice (GAqP); Promote adoption of Good manufacturing Practice (GMP) by processors; Strengthen quality management system to ensure food safety and quality.

Fishery Resource Management

- Enhance the organization of the sector through increased dialogue and partnerships as well as the implementation of effective policies for the management of fishery resources for sustainable growth
- Strengthen policy and legislative framework; Facilitate establishment of commercial linkages between value chain participants; Strengthen formal public–private dialogue geared at sector development;

Development and Innovation Capacity

- Improve sectoral development and innovation capacity through effective scientific research and data collection and investment in research and development (R&D)
- Build research capacity; Establish comprehensive data collection and management systems; Enhance R&D capacities for product development

Performance and Branding of Fishery Products

- Build performance and branding of fishery products to compete successfully in international markets
- Improve transportation efficiency; Establish sector-specific export finance scheme; Ensure provision of adequate trade information and market intelligence data; Establish sectoral branding and promotional effort.

Fishery is given fifth priority in NES. As an important source for of protein in the national level, and supporting an estimated 3.5 million jobs nation-wide, the fisheries sector has a significant impact on socioeconomic welfare and domestic food security. It is has great potential for export development as well. Adhere to modern assurance systems such as sanitary and phytosaniatary (SPS) measures, Harzard Analysis and critical control points (HACCP) and others is a key determinant in competing global markets. The strategy aims to enable compliance of goods with technical and voluntary standards, as well as ensuring food safety and animal and plant health.

4.2 Non-Tariff Measures imposed by Trading Partner Countries

There have been some efforts to conform to international standards and acquire certifications for fishery exports in Myanmar, while there are increasing number of non-tariff measures imposed in trading partner countries for the purpose of consumers' welfare in the form of technical regulations. With Tables 4.4 and 4.5, NTMs regulated by importing countries on the fishery product, coded as HS 03, are collected.

Table 4.5. NTMs imposed by ASEAN on HS 03 Products

Brunei	Price control measures	3
Brunei	Sanitary and Phytosanitary	10
Brunei	Technical Barriers to Trade	8
Cambodia	Price control measures	4
Cambodia	Quantity control measures	1
Cambodia	Sanitary and Phytosanitary	18
Cambodia	Technical Barriers to Trade	9
Indonesia	Pre-shipment inspection	9
Indonesia	Sanitary and Phytosanitary	46
Indonesia	Technical Barriers to Trade	3
Lao	Pre-shipment inspection	1
Lao	Price control measures	5
Lao	Sanitary and Phytosanitary	12
Lao	Technical Barriers to Trade	6
Malaysia	Price control measures	1
Malaysia	Sanitary and Phytosanitary	15
Malaysia	Technical Barriers to Trade	14
Myanmar	Quantity control measures	1
Myanmar	Sanitary and Phytosanitary	11
Myanmar	Technical Barriers to Trade	6
Philippines	Other measures	4
Philippines	Pre-shipment inspection	6
Philippines	Price control measures	9
Philippines	Quantity control measures	9
Philippines	Sanitary and Phytosanitary	46
Philippines	Technical Barriers to Trade	5
Singapore	Price control measures	5
Singapore	Sanitary and Phytosanitary	18
Singapore	Technical Barriers to Trade	12
Thailand	Price control measures	1
Thailand	Sanitary and Phytosanitary	34
Thailand	Technical Barriers to Trade	4
Viet Nam	Other measures	3
Viet Nam	Price control measures	1
Viet Nam	Sanitary and Phytosanitary	44
Viet Nam	Technical Barriers to Trade	12

Source: UNCTAD, TRAINS NTMs database through Integrated Trade
Intelligence Portal (I-TIP)

Sanitary and phyto-sanitary measures are most regulated measures in fishery
trade. Based on the varying importance in direction of fishery products trade, the
estimation on the effect of NTMs is mainly focused on ASEAN countries and SPS

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measures. Again, non-tariff measures regulated by all importing countries on fishery products are described as follows.

Table 4.6 NTM measures regulated by Importing Countries of Myanmar Fishery Products

	Countries	No. of Measures*							
		Export-related measures	Pre-shipment inspection	Price control measures	Quantity control measures	Sanitary and Phytosanitary	Technical Barriers to Trade	Contingent trade protective measures	Other measures
1	Argentina	6	1	1	1	30	9	0	1
2	Australia	47	1	5	0	30	27	0	0
3	Bahrain	16	5	10	2	25	6		
4	Brazil	3	1		3	25	28	1	
5	Brunei Darussalam	9		3		10	8		
6	Canada	2	1	2		22	15		
7	China				2	13	2		
8	Cuba				3	8			
9	European Union		1			37	11		
10	Hong Kong	8	2			15	11		
11	India			4	3	14		1	1
12	Indonesia					46	3		
13	Jamaica	17		2	1	1	6		
14	Japan	8	5		1	30	9		
15	Kuwait	1			5	11	2		
16	Malaysia	14		1		15	14		
17	Mexico	4	2		1	25	12		
18	Nicaragua	6		1		27	32		
19	Oman	6				8			1
20	Pakistan	2			1	11	1		
21	Philippines	34	6			46	5		4
22	Qatar	2				8	11		
23	Russian Federation	3		2		35	3		
24	Saudi Arabia	14	3	6	3	26	5		
25	Singapore	9		5		18	12		
26	Thailand	7		1		34	4		
27	United Arab Emirates	21	6	4		30	1		
28	United States of America	18	4	3		53	41		
29	Uruguay	2				8	6		
30	Venezuela	4	2		2	23	9	1	
31	Viet Nam	25		1		44	12	3	

Source: UNCTAD TRAINS NTM database at Integrated Intelligent Portal (I-TIP).

* Mesures for all WTO members.

Table 4.5 is a compilation of all non-tariff measures for the product HS 03 regulated by trading partner countries of Myanmar fishery products. Measures regulated in ASEAN member countries are also included in the table. In almost all importing countries, except Jamaica, sanitary and phyto-sanitary (SPS) measures are the most regulated and compose about 40% to 80 % of total NTMs on fishery products. Second most regulated measures are export-related measures, for which exporters of respected importing countries have to be complied with.

. The policy objective for Myanmar fishery sector is therefore laid down on secure export competitiveness by improving export/import regulation, sanitary quality and market information for fishery exports. As far as technical regulations for export and import of fishery products are concerned, sanitary and quality certifications in line with international standards such as CODEX and ISO 22000 play a critical role in promoting fishery exports to advanced country markets.

In order to cope up with the ever-increasing consumer demands and also to compete with the ever-changing international market requirements, countries are forced to develop suitable national regulations so as to ensure the quality and safety of food products as per the international requirements. Even though, such stringent national food safety regulations may be essential to protect the health and interest of the consumers of their country, it may naturally create trade barriers. In order to reduce trade barriers and to increase the international trade, SPS agreement has brought out the policy of 'Equivalence', which specifies that member countries shall recognize other countries SPS measures and regulations as equivalent to their own, if it is demonstrated that these measures can achieve the appropriate level of sanitary and phytosanitary protection. For this purpose, countries can harmonize their sanitary or phytosanitary measures as per the international standards/ guidelines or can develop their own SPS measures based on risk analysis. The principles of achieving harmonization of standards and equivalency in food control systems and the use of scientifically-based standards are the most important guidelines of WTO agreements. National food safety standards of any country, developed based on the international Codex standards, guidelines or recommendations, are deemed to be appropriate and not discriminatory.

The most important aspect in establishing the safety of fishery products is the holistic food chain approach, where the primary responsibility of maintaining the

quality and safety of the fish is bestowed on the stakeholders such as producers, processors, transport/storage operators and distributers. However, the implementation of the 'food chain approach' requires well developed regulatory standards and a properly defined regulatory control system, without which the 'farm to fork' concept cannot be achieved. In this regard, the technical regulations of Myanmar have been developed based on the national and international requirements for the smooth trade of Fish and Fishery Products. This document is addressed to the entire stakeholders of the food chain starting from primary producers to the processors and distributors (including feed manufacturers, hatcheries, farms, fishing vessels, auction centres, ice manufacturers, cold storage and processors) as well as the Competent Authority by providing norms and instructions necessary for the export and import of fishery products based on the requirements of Union of Myanmar. These regulations covers all the major SPS requirements for hygienic handling of fish and fishery products meant for import and export purpose. Even though, these regulations are prepared based mainly on the requirements of European Union (EU), the requirements of other major importing countries like USA, China, Japan, Russia etc are also taken into account. Since Myanmar is a member country of ASEAN, the requirements of ASEAN Economic Community are well taken into consideration.

Table 4.7 Total number of Processing Plants for Fish and Shrimp

(As of November 2016)

No	Region& State	Number of factory
1	Yangon Region	69
2	Tanintharyi Region	20
3	Ayeryarwady Region	8
4	Mon State	6
5	Rakhine State	9
6	Shan State	1
	Total	113

Source: Development and Research Division, Department of Fishery.

There are 113 cold-storage factories all over the country among which 39 factories are HACCP implemented processing plants including 18 EU approved factories. The word EU-approved does not necessarily mean to export the products to EU countries, but it is just a signal of the quality of product and facilitating the

competitiveness in overseas markets. Hazard Analysis Critical Control Point (HACCP) is a food safety system wherein a systematic approach has been developed for the identification, evaluation and control of food safety hazards.

4.3 SPS requirements of Major Importing Countries of Myanmar Fishery Products

Standards varies across importing countries as well as exporting countries, but all are recognized by FAO. In Myanmar, SPS requirements are categorized in five different standards requirements regulated by EU, People's Republic of China, United States of America, Japan, and other countries. (Details of SPS measures required by importing countries are presented in Appendix). There are 18 fishery firms and two jetties approved by European Union for their SPS standards. EU-approved firm does not mean that the firm must export its fishery products to EU countries. Rather, it is an approval of safety and quality of firm's export items. Despite the compliance costs, EU-approved firms are considered as most secure sources of fishery products by importing countries as the firm obtained EU-approval are examined on regular basis. Processing and allied activities of fishery exporting firms are to be in line with SPS requirements of the destination countries. Besides the SPS test, firms are required to be facilitated with proper infrastructure facilities. Establishments, freezer vessels and factory vessels, responsibilities of independent ice producers and cold storages are necessary infrastructure to comply with SPS requirements.

Establishments

Bushiness operator intending to process fish and fishery products for export shall get their establishment(s), including those producing semi processed materials, approved by FIQCD, the National Competent. Authority, for which establishments shall meet the minimum requirements specified in DOF Directive No 3/2009 dated 03.04.2009. However, if any additional requirement has been specified by the importing country, same shall also be complied with. Major infrastructure and hygiene requirements for approval are highlighted below.

The surroundings of the factory shall be free from objectionable odours, smokes, dust and other contaminants. It shall be maintained clean without stagnant water or garbage accumulation. The establishment shall be housed in a building of permanent nature affording sufficient protection from the environment and shall be of

sufficient size for the work to be carried out under hygienic conditions. The design and layout shall be such as to preclude contamination. Immediate surroundings of the building shall be tarred/ concreted to avoid pest/windblown dust.

All the fish handing areas should be separate from areas used for residential purpose. There shall be adequate lighting and ventilation and light fixtures shall be protected with proper covering. The layout should ensure sufficient space in different sections for machinery, equipment, personnel etc. without congestion. The building should provide sufficient protection against the entry and harbourage of rodent, insects, birds etc. Non-operative areas inside the establishment should be properly cordoned off to avoid possible cross contamination.

The floor of fish handing areas should be smooth, impermeable and easy to clean and disinfect. There shall be no water stagnation on the floor. The floor should have sufficient slope opposite to the flow of work or sideways. The walls should be durable, smooth, light coloured and easy to clean and disinfect. The ceiling shall be free from cracks and open joints and shall be smooth and easy to clean.

There should be adequate drainage facility and slope of the drainage shall be opposite to the flow of work/ material. The drains shall be of adequate size having sufficient slope for easy cleaning.

The doors shall be self closing and tight fitting to prevent the entry of files. All doors and windows shall be durable and made of corrosion resistant material and windowsills, if any, shall be sloped inwards. The windows/ ventilators shall be constructed at least two meters above the floor with fly proofing nets to prevent the entry of files. Mechanical ventilation/ exhaust fans shall be provided in areas of air stagnation.

All the entry points should have suitable arrangements to prevent the entry of flies/dust. Suitable washing and sanitizing facilities for feet and hands shall be provided at the entry points. Hand washing facilities such as non-hand operated wash basin, liquid soap, nail brush, disinfectants, hand dryers etc shall be provided.

All the entry points should have suitable arrangements to prevent the entry of flies/dust. Suitable washing and sanitizing facilities for feet and hands shall be provided at the entry points. Hand washing facilities such as non-hand operated wash basin, liquid soap, nail brush, disinfectants, hand dryers etc shall be provided.

All utensils and equipments shall be made of non-corrodible material and shall be smooth without cracks and crevices and easy to clean and disinfect. Separate

colour codes shall be given for utensils/crates/tubs using in the high risk areas to avoid cross contamination.

Adequate number of change rooms for workers of suitable size having smooth, washable walls and floors shall be provided depending upon the quantum of production and number of workers employed. Change room shall have all facilities for cleaning and changing the dress, including toilet facility. There shall be lockable cupboards and facility for keeping gumboots, shoes and uniforms inside the change room.

Chill rooms having adequate size with mechanical refrigeration system to maintain temperature at the required level (0 c° to 4 c°) or adequate number of insulated boxes may be provided for storing fishery products. Establishments processing frozen fishery products shall have cold storage having suitable refrigeration system to maintain the product temperature below-18C° which may be attached to the establishment or may be detached.

Solid wastes should collected in separately indentifiable containers/bags and shall be stored in waste rooms for disposal at the earliest. A suitable water purification and disinfection system should be implemented which shall include use of plumbing diagrams showing the entire reticulation of the water, indentifying each tap with consecutive numbers. Taps should be fitted with non-return valves to avoid back flow of water. Water storage tanks shall be cleaned on a laid down frequency. If the ice plants is not integrated to main establishment, it shall be approved by the Competent Authority separately.

There should be separate stores for wet and dry items and the chemicals/ disinfectants should be property labeled. Packing material stroe shall be of adequate size with proper fly and dust proofing system. Cartons shall be kept on cleanable pallets away from the walls and covered properly.

The establishment may have a well-equipped in house laboratory for testing microbiological and other chemical parameters or can test their products in government laboratories.

Freezer vessels/factory vessels

Freezer vessels/Factory vessels should equipped with freezing equipments which can achieve core temperature of fish not more than (-18 C°) rapidly and be equipped with a cold storage of sufficient capacity that can maintain a temperature of not more than – 18 C° and the store shall be fitted with a temperature recording device. If EU approved vessel, the device shall comply with EN 12830, EN 13485 and EN 13486 standards. The sensor of the device should be at the warmest area of the store.

When whole fishes intended for canning are frozen in brine, fish core temperature shall not be achieved more than -9 C°. The brine used should be free from contamination. rooms and hand washing facilities shall be provided at the convenient area.

Separate area for processing fishery products shall be available, which is sufficiently large for hygienic operation and easy to clean and disinfect. All the utensils and equipments should be made of non-corrodible material and should be smooth without cracks and crevices and easy to clean and disinfect.

In case of factory vessel a separate raw material receiving area should be identified on board to receive each fish catch separately, which shall be kept clean and well protected from environmental hazards and pests. Suitable hygienic system should be in place to transfer the fish from receiving area to fish processing area

The processing and storage areas of factory vessel should be sufficiently large for hygienic handing and storing fishery products. If a waste processing unit is operating on board, that should be well separated from processing areas to avoid cross contamination and the hold must be designed for the storage of such waste separately. Packing materials shall be stored separately in clean area. In case of factory vessels processing cooked products, processing of raw products or waste products is not permissible. Sufficient quantity of ice made up of potable water or clean sea water shall be made available for chilling fishery products. Proper hygiene and shall be maintained at all stages of production and the workers should implement strict personal hygiene practices to avoid contamination.

Independent ice producers

Independent ice plants intend to supply ice to approved primary producers and processors of fishery products meant for export shall be approved and monitored by

FIQCD. For this purpose the ice plant shall implement following minimum infrastructure and hygiene requirements.

Many of the infrastructure and hygiene requirements specified for establishments at Chapter-2. Clause No 2.2.1 is also applicable for independent ice plants, since the objective is to products good quality ice which is free from contamination. Utmost importance shall be given for cleaning and sanitation and personal hygiene. Business operator shall implement a written Sanitation Standard Operating Procedure (SSOP).

Proper water management system shall be implemented to ensure that the water used to produce ice shall comply with requirements specified at Clause. No 2.5.3 (a), (b) & (c) of Chapter-2 of this regulation, as applicable.

All records pertaining to cleaning and sanitation, personal, ice production, ice supply details, training, testing etc shall be maintained for verification by NCA.

Independent Cold Storages

In order to shore frozen and chilled fishery products meant for export, independent refrigerated stores should obtain necessary approval from FIQCD for which they shall comply with the following minimum requirements.

The surroundings should be reasonably free from objectionable colours, smoke, dust and other contaminants. The cold storages shold be housed in a building of permanent nature affording sufficient protection from the environment and shall be of sufficient size for the work to be carried out under hygienic conditions. The design and layout should be such as to preclude contamination. Hygiene and sanitation are to be strictly implemented.

In the case of frozen store, ante-room with suitable size having smooth walls, floor and roof should be provided, the door of which shall be made of non-absorbent material and fitted with air curtain / strip curtains. There should be suitable mechanism to prevent condensation of water inside ante room and suitable provisions for loading and unloading the cargo hygienically without causing temperature fluctuation shall be provided.

Frozen cold storage should have powerful refrigeration system to maintain the core temperature of the product at -18 C° or below. There shall be suitable defrosting system and suitable arrangement to remove melt water form the frost.

It should be ensured that during defrosting, variation in temperature is minimal and the period is short so as to avoid temperature abuse. The cold store shall have an automatic temperature recording device (thermograph), the temperature sensor of which be located at the warmest place the cold storage. In case of EU approved cold store, the automatic recording device (data logger) installed to monitor air temperature of cold store shall comply with EN 12830, EN 13485 and EN 13486 standards. Chill rooms for storing chilled fishery products shall have a refrigeration system to maintain the product temperature at 4 C° or below.

Records pertaining to cleaning and sanitation, details of loading, unloading and storage of products (frozen & chilled), core-temperatures of the product, store temperatures, calibration etc should be maintained.

HACCP Based Control System and SPS Requirements

Since the sole responsibility for maintaining the quality and safety of fishery products processed in the approved establishment/factory vessels/freezer vessels lies with the business operators, they are required to develop and implement HACCP based own check system set by Regional Draft Guidance on Criteria for GMP/ HACCP. All the pre-requisite programs have to be in place before implementing HACCP. All the seven principles of HACCP shall be properly implemented and records maintained. Any deviation in the process flow or, changes made in the CCP will be brought to the notice of the competent authority immediately. Documented control measures and sampling procedures must be established by the processor. HACCP has to be reviewed by the business operator of approved establishment/factory vessel/freezer vessel at least once in a year or in case of any change in the product/process/ source of raw material or in case of foreign complaint. The review records is maintained for verification.

Implementation of HACCP is monitored at all stages so as to ensure the quality and safety of the product. There have to be properly documented SOPs, SSOPs, GMPs recall procedures etc developed by the establishment. Approved processors conduct internal audits at least once in a year covering all areas of Sanitation Standard Operating Procedure (SSOP), Good Manufacturing Practices (GMP), Standard Operating Procedure (SOP), HACCP etc and records maintained. Validation of critical limits/ HACCP Plan shall be conducted on a laid down

frequency. Business operator maintains all the HACCP records including CCP monitoring, corrective action records, verification records, production records, testing records, cleaning and sanitation records, validation records, calibration records, temperature records etc. for verification by FIQCD.

HACCP system is control over raw material and final products. Business operators are required to take utmost care to ensure the quality and safety of raw material used for processing, for which following steps shall be taken. Traceability of raw material from source of procurement shall be established by the processor. Selection of suppliers/source shall also be done to identify the right area of procurement of raw material. Supplier/source audits shall be conducted at regular intervals to ensure the quality and safety of raw materials. Proper washing and chilling to 4 °C using good quality water and ice shall be ensured immediately after procurement of raw material. Transportation of raw material is done in clean vehicles in properly covered condition.

Before accepting the raw material for further processing, it shall be subjected to organoleptic evaluation by a qualified/ experienced employee of the factory. Only good quality materials are to be accepted for further processing. The sample size should be documented.

Raw fishery products procured by the unit as raw material may be tested (variety wise/ source wise) for microbiological factors like Standard Plate Count (SPC), Escherichiacoli, *Staphylococcus, salmonella, V. cholerae,* and *V.parahaemolyticus* in the in-house lab or in Government laboratory as per the laid down frequency. For Final product control, business operators requires to implement proper Standard Operating Procedures and verification procedures. Business operators have to develop their own sampling and testing plan based on the risk analysis to ensure the safety of fishery products. They have also to test the products as per the requirement of the importing country.

Parasite Check has to be done by business operators to ensure that fishery products have been subjected to visual examination for the purpose of detecting visible parasites before or during processing. Processors makes every effort to achieve parasite check through a nondestructive examination of fish and fishery products during processing by qualified personnel. The checking should be

performed under good light conditions, if necessary, by using candling. When processing conditions do not allow for the examination of each individual fish, the processor must develop a sampling plan for each batch of processed fish. The sampling plan for mechanically eviscerated fish must include a representative number of samples of not less than 10 fish per batch.

Additional requirements for European Union

In case of factory vessels/freezer vessels/ establishments, including those producing those producing semi processed materials intend to export fishery products to European Union, they shall also comply with following requirements in addition those specified above. A number of Non-EU countries like Russian Federation, Norway, Iceland etc are following EU requirements.

The frozen cold store and refrigerated transport vehicles shall have automatic temperature recording device (data logger) to monitor air temperature, which shall comply with EN 12830, EN 13485 and EN 13486 standards.

Water used for processing shall be of potable nature and should meet the requirements of EC Directives No. 98/83/EC dated 03.11.1998. There should be adequate quantity of ice made of potable water that meets the requirements of the Directive No.98/83 EC dated 03.11.1998.

Special requirements for export of aquaculture products

Establishments intending to process aquaculture products meant for export shall have a unique approval number given by the National Competent Authority based on their Good Hygienic Practices (GHP) and Animal Health Surveillance Scheme.

Approved establishments shall process aquaculture products procured only from farms approved and monitored by National Competent Authority, as specified in the Official Control System Manual for Inspection and Certification of Fish and Fishery Products issued by FIQCD. Department of Fisheries (DOF).

Establishments shall accept raw materials only after ensuring that the animals have not undergone illegal treatments and sufficient withdrawal time is given after treatment before harvest. Copy of the traceability record specified at Annexure-1 pertaining to each lot of raw material shall be maintained by the establishment.

Raw aquaculture products shall be tested by the approved establishments for antibiotic residue and pesticides as per the frequency specified in HACCP manual.

Business operators of approved establishments shall maintain all records pertaining to the procurement, processing and testing of aquaculture products for verification by the NCA

Business operators of approved establishments shall conduct regular audits of the farms from where they procure aquaculture products to ensure that the farms are following Good Aquaculture Practices (GAP) and are not doing any illegal treatments as specified in DOF Directive 3/2009 and EC Directive 96/23/EC. They shall maintain audit reports for verification by the NCA.

Business operators of approved establishments shall ensure that the approval number of the aquaculture pond/farm allotted by the competent authority shall be marked on all export packages of aqua cultured products meant for EU to establish traceability.

Residue Monitoring Plan

Business operators of approved establishments shall develop a residue monitoring plan based on risk analysis and also based on the national and international requirements to ensure that fishery products are free from residual contamination. (Ref: DOF Directive No 3/2009 and DOF Directive No 2/2014).

As a part of source selection procedure, business operator may test raw materials of aquaculture origin for banned chemical, including pharmacologically active substances, heavy metals, dyes etc on a laid down frequency.

Farm audits shall be conducted by the processing establishments on a laid down frequency to ensure that farms and hatcheries are following Good Aquaculture Practices and are not using banned chemicals.

Establishments shall test finished products for residual parameters based on the requirement of the importing country and on risk-basis (see a above).

2.4.5. Additives/ ingredients

Business operator shall use only permissible additive as per the recommended dosage as specified in DOF Directive No 3/2009 dated 03.04.2009. In case the exporter wants to use new additives or ingredients prior sanction shall be obtained from the National Competent Authority.

If salt is used during processing, it shall be ensured by the processor that all the batches of salt purchased shall be free from Staphylococcus and Sulphite reducing Clostridium.

Crustaceans shall be tested by the processor to ensure that residue of additives such as sulphites, phosphates etc., are within the permissible limits.

Histamine & Biotoxins

Histamine forming fishes meant for export to EU shall be tested by the establishment/factory vessel/freezer to ensure that the limits of histamine are not exceeded. For this purpose, 9 samples of 100 gm each shall be taken from each batch.

For the export of bivalve mollusks, business operator shall ensure that biotoxins are within the permissible limit.

Fishery products derived from poisonous fishes belonging to the families like Tetraodontidae, Molidae, Diodontidae, and Canthigasteridae may be processed in the approved establishment/factory vessel/freezer vessel only under the supervision of qualified persons, for which special sanction shall be obtained from the NCA. However, poisonous fishes belonging to the above metioned families shall not be permitted for export to European Union.

Process Control

Business operators of approved establishment/factory vessel/factory vessel/freezer vessel shall ensure proper hygiene and sanitation throughout the handling, transportation and storage of fish and fishery products to avoid introduction and multiplication of microbial contaminants.

For this purpose business operator shall develop a written cleaning and sanitation procedure for strict compliance on a laid down frequency, which may cover all areas of the establishment/factory vessl/freezer vessel including utensils and equipments.

Effectiveness of cleaning and sanitation shall be ensured by visual inspection and also by testing the swab samples taken from food contact surfaces and from workers hands for microbiological parameters on a laid down frequency.

Records of cleaning and sanitation and also the test results of swab samples shall be maintained for verification by the NCA.

Since employees are the major source of contamination, business operators shall develop proper control measures to ensure their personal hygiene, appropriate movements and behavior.

Sufficient number of facilities shall be provided at appropriate places to enable the workers to clean and sanitize their hands and feet and to wear clean dress before each entry to the fish handing areas.

Utmost care shall be taken by the workers to maintain hygiene and sanitation while handing cooked products to avoid microbial contamination and toxin formation.

Workers shall not eat, talk, cough, sneeze, spit etc inside fish handling areas. They shall trim their nails and remove their ornaments before entering the processing areas. They shall wear clean uniforms.

The movements of employees, utensils and equipments should be prevent cross contaminations. Works suffering from injury or disease should not be permitted to work inside the fish handling area. Each employee working in the processing areas shall have a health certificate issued by an authorized medical practitioner stating that he / she is fit to work in a fish processing establishment and the certificate shall be renewed every year. Employees shall conduct medical examination before joining for duty after taking leave on medical ground. Proper training should be given to the workers for strictly following personal hygiene and behavioural activities. Records of training should be maintained for verification.

Business operator should exercise proper control to ensure the quality and safety of water and ice used in their factory. They shall check the microbiological parameters such as coliform and E.coli of water and ice in their in-house lab/ government lab at teast once in a month.

Moreover, establishment/factory vessel/freezer vessel approved for export to EU / Russian Federation shall test water used for processing and ice production for all parameters as per EC Directive No. 98/83/EC in government lab at least once in three years or whenever the source of water is changed. However, establishment/factory vessel/ freezer vessel approved for export to countries other than EU and Russia shall test water used for processing and ice production as per the international Standards for Drinking water, WHO once in three years.

Pest control

Business operators shall take suitable measures to ensure a pest free environment inside the factory including the premises.

Methods for exclusion and eradication of pests shall be introduced wherever applicable. Elimination of shelters and attractants of pest shall be ensure pest free environment. Air curtains, fly catchers, rodent traps, nets, rodent grills etc may be provided, wherever applicable. Records of pest control activities shall be maintained for verification.

Time Temperature Control

As major tool to control microbial contamination and toxin formation, approved establishment/factory vessel/freezer vessel shall implement time-temperature control stating from the procurement of raw material till shipment of the consignment.

Reduction/elimination of pathogens/parasites is achieved through freezing, blanching, cooking, pasteurization, smoking etc.

Immediately after procurement, fish shall be chilled to 4 C° or bellow to maintain the freshness of the product and to avoid histamine formation. The core temperature of the product shall be recorded at all stages of handling to that the cumulative temperature does not exceed the desirable limits.

Special precaution shall be taken while procuring, transporting and processing histamine forming fishes to avoid temperature abuse. During procurement, it shall be ensured that the fish is caught without causing struggle, stress or injury to the animal. Bigger fishes, like tuna above 10 kg, shall be eviscerated before on-board chilling to 4 C or below. Moreover, ice should be filled inside the eviscerated portion to maintain uniform core temperature. Core temperature of the fish shall be maintained at 4 C or below at all stages of processing of histamine forming fishes till it is exported. Damaged or spoiled pieces shall not be processed for export.

All temperature recording devices shall be calibrated on a laid down frequency. Cooking devices shall be properly validated to ensure that the desired core temperature is achieved uniformly.

Control on Cross Contamination

Business operators shall establish proper control measures to prevent cross contamination of biological or chemical contaminants from unsanitary objects to food and / or food contact surfaces, which may include cleaning and sanitation, employees hygiene, employee movement and behavior, pest control, waste management, time and space separation etc.

Proper waste management system for the speedy collection and disposal of solid and liquid waste shall be in place to avoid cross contamination.

Establishments/ factory vessels/freezer vessels shall adopt GMP for storage/ handling of printed materials and marking materials/articles in order to ensure that printed surfaces or marking ink applied to non food contact surface will not come in contact with food or food contact surfaces, Regular training shall be imparted to the workers in this regard.

Traceability

Business operators shall develop proper methods to trace the source of raw materials, ingredients, packing materials, and other materials used for making food contact surfaces from its origin through all stages of production, processing and distribution. Lot identification is essential in product recall and in stock rotation.

Storage

Fresh fishery products, thawed/ unprocessed fishery products, and cooked and chilled products must be stored at a temperature approaching that of melting ice. If fishery products are kept under ice, melt water must not remain in constant contact with the products, for which the containers used for storing fishery products shall have proper drainage facility.

Frozen fishery products during storage shall be kept at a temperature of not more than - 18 C in all parts of the products; however, whole frozen fish in brine intended for the manufacture of canned food may be kept at a temperature of not more than – 9 C.

Storage of cleaning and sanitation chemicals etc shall be done separately under lockable condition with proper labels. Only food grade lubricants shall be used inside the factory, which shall be stored separately with in locked condition under the supervision of a responsible person.

Vehicles used for transporting fish and fishery products and ice shall have clean, smooth storage areas made up of non-corrosive material that will not contaminate the product. Cleaning and sanitation of vehicles shall be done before and after the use and records of cleaning shall be maintained. Frozen fishery products, with the exception of whole fish initially frozen in brine for the manufacture of canned food, must be maintained during transport at an even temperature of not more than − 18 C in all parts of the product, possibly with short upward fluctuation of not more than 3 C°. Vehicles used for the transportation of fishery products and ice meant for export shall be approved and monitored by the National Authority.

Refrigerated vehicles approved for transporting fishery products meant for export to EU shall have temperature recording device which shall comply with EN 12830, EN 13485 and EN 13486 standards.

Packaging

Fish and fishery products meant for export be packed in export worthy containers/packets that will not impart contamination or undesirable changes in the product but will give sufficient protection to the product till it reaches the customer.

Labelling

Proper information about the product shall be given to the consumer labeling, invoice, or other commercial documents accompanying the goods. However, in no circumstances, false, misleading or illusory information shall be given in the label as regards to the nature, identity, properties composition, quantity, durability, origin, production or processing methods of the product.

As for the general requirements, the outer packages of fishery products meant for export that has to undergo further processing at the destination shall have the following minimum information printed/stenciled/pasted in English or in the language of the importing country or both. Additional requirements of importing country, if any, should also be compiled with. These include approval No of the establishment, name of the country of origin, production date. In case of aquaculture products for EU approval number of the pond/farm and in case of export to China, the registration number allotted by China to be marked on carton.

As Specific requirements, in case of food stuff to be sold directly to the consumer, the information such as name under which the product is sold, list of

ingredients in descending order of proportion, quantity of certain ingredients or categories of ingredients expressed as percentage, net weight/drained weight, date of minimum durability or best before storage conditions or condition of use, name/business name of the manufacturer or packer should be given in the label.

Any ingredient known to cause hypersensitivity should always be declared. (Eg: Crustaceans) Any ingredient which has been treated with ionizing radiation should also be declared. In case of fishery products to be sold directly to the consumer, the following additional labeling requirements shall also be complied with.

Chapter V
Empirical Study on the Trade Effects of Non-tariff Measures

It must be restated the fact that the evidence of the effect of NTMs on market access and competition is typically assessed along two dimensions: their *incidence* measured by either the frequency ratio (the proportion of product categories covered by one or more NTM) or the coverage ratio (the proportion of imports covered), and their *severity* measured by ad-valorem equivalents (AVEs).

When the impact of NTMs on international trade is assessed, a gravity estimation approach is often followed, even though the substitutability of tariffs with NTMs and other trade policy instruments is sometimes analysed (Moore and Zanardi, 2011; Aisbett and Pearson, 2013; and Ghodsi, 2016). However, NTMs are complex in nature cannot be easily compared with tariffs. Unlike tariffs, NTMs often vary across countries and sectors, so "ad valorem" equivalents are calculated for NTMs in order to make this comparison. Evidence is then presented on the trade effects of technical barriers to trade (TBT) and sanitary and phytosanitary (SPS) measures in goods and of equivalent domestic regulation measures in services.

The rationale for focusing on these measures is that, independent of their policy objectives, economic theory offers a mixed picture - both negative and positive - of how these measures affect the volume and direction of trade. For example, standards and technical regulations can raise producer costs -because compliance is more expensive - but reduce consumer costs - because product quality information is more readily available. Trade will increase or fall depending on whether the positive effect on demand is greater than the negative effect on supply.

In order to highlight the differences between non-tariff measures and tariffs, stylized analyses also attempts to disentangle the trade effects of these measures by focusing on: (a) the specific channel through which trade is affected (the volume of trade or the decision to export); (b) their specific impact across countries, sectors and firms; and (c) whether the measure itself, or the way it is applied, constitutes the main restriction to trade. This section also considers the degree to which the harmonization or mutual recognition of TBT/SPS measures and domestic regulation in services helps to reduce any trade-inhibiting effects.

5.1 Methods of Estimating the trade effects of NTMs

A number of studies attempt to quantify the effect of non-tariff measures on international trade. Averaging across countries, they find that NTMs are almost twice as trade restrictive as tariffs. They also find that, in several countries, NTMs actually contribute much more than tariffs to the overall level of trade restrictiveness. These results, however, are based on NTMs data which have not been updated for about ten years. Given the decline in tariff rates since then, the relative contribution of NTMs to overall trade restrictiveness is likely to have increased, perhaps making them even more important than tariffs in most countries.

Furthermore, evidence suggests that the relative contribution of non-tariff measures to the overall level of protection increases with the level of GDP per capita. The trade literature also finds that NTMs in agriculture appear to be more restrictive and widespread than those in the manufacturing sector. In the case of services, while restrictions to trade are generally higher in developing countries than in OECD countries, they do not appear to be systematically associated with a country's level of development. The cross-country pattern of restrictiveness of services measures varies across services sectors. It is worth noting that the methods developed in the literature to estimate these trade effects suffer from a number of limitations which can be traced, in part, to a lack of transparency in the use of NTMs. In addition, they do not address the potential impact of global supply chains.

According to the literature, magnitude of NTMs as restrictions to international trade is measured by estimating an "ad-valorem tariff equivalent (AVE)", i.e. the level of an ad-valorem tariff that would have an equally trade-restricting effect as the NTM in question. This enables a comparison to be made with tariffs, and is important for any analysis of the welfare implications of various trade policy measures. The importance of NTMs is reinforced by available firm survey evidence. A recent survey done by Hoekman and Zarrouk (2009) on non-tariff trade costs between Arab countries confirms that estimates of the trade impact of non-tariff measures are largely consistent with the AVEs computed. In the trade literature, the AVE of different NTMs is computed using one of two approaches – the price gap method or the econometrics-based method.

In estimating AVE, methodological limitations occurs due to the problem of transparency. The use of AVEs and the choice to model the effects of NTMs as a

negative tax for subsidies, and as a tariff for trade-restricting NTMs can be misleading. For example, the equivalence between tariffs and quotas breaks down in the presence of market uncertainty. Furthermore, the AVE of NTMs does not capture any relevant fixed costs, such as those associated with meeting certain technical regulations. Beyond these limitations, quantifcation is a challenging task. The methods developed in the literature involve a number of limitations.

Price gap method

Non-tariff measures increase the price paid by consumers. The basic strategy of the "price gap" method involves a comparison of prices before and after the NTM mark-up, where this difference is expressed as a tariff equivalent. Making this comparison, however, is not straightforward. Many factors unrelated to NTMs also affect costs and prices at different points in the supply chain. For instance, the "free-on-board" (f.o.b.) price at the point of export includes the cost of transport to the point of export as well as the costs of loading the goods, while the "cost-insurance-freight" (c.i.f.) price also includes the cost of international transport and insurance. Furthermore, the price after border procedures includes any tariffs charged on the product. Finally, wholesale and retail prices include internal transport costs and distribution margins. These factors must be removed from the observed price difference before the mark-up can be attributed to non-tariff measures (Ferrantino, 2006). However, different NTMs occur at different points in the supply chain, which means that the price impact of a particular NTM can only be identified by comparing two prices at the relevant stages in the production and distribution process. For example, customs procedures affect the difference between the c.i.f. price and the landed duty-paid price. In sum, it is possible but not straightforward to measure and compare the restrictiveness of different types of NTMs (Ferrantino, 2012).

A comparison of two prices to infer the trade effect of a non-tariff measure is indicative of the lack of transparency associated with the use of NTMs. Due to then insufficient data on different prices, even the estimation of a price gap is not that straightforward. The appropriate prices to compare when measuring the price gap attributable to most non-tariff measures are the invoice (c.i.f.) price of the imported good and the price of the domestic alternative (Deardorff and Stern, 1998). However, in reality, the observable domestic price of a good typically does not distinguish between domestic products and imports. It means that the actual comparison is

between the invoice (c.i.f.) price and the price of the good in the domestic market, whether produced at home or imported. This is problematic for two reasons.

First, at a certain level of aggregation, goods that are imported into a country are seldom identical to "like" goods produced domestically. The two may be poor substitutes for each other - for example, because of quality differences. Secondly, even if the domestic and imported good are perfect substitutes, the price gap may be suppressed to the extent that the imports of the same good from other countries are subject to a non-tariff measure.

An additional issue relates to the choice of domestic prices to use in computing the price gap. Many studies use retail price data simply because they are easier to observe than prices at other stages of the supply chain. Retail price data contain transport, wholesale and retail margins. Although these can potentially be separated out, they introduce considerable uncertainty in the identifcation of the NTM mark-up. It is also difficult to separate the portion of price increase due to consumers' willingness to pay for higher quality.

In addition, once a price gap is calculated for a particular good in a particular market, it provides a single measure of the trade effect of non-tariff measures. So when there is a single, transparent NTM, the tariff equivalent reflects the effect of that policy. However, in the case of multiple NTMs, the single price gap or tariff equivalent reflects the cumulative effects of all NTMs that are present in the market. This makes it difficult to ascertain the percentage of the price increase that is attributable to each of the separate NTMs. It may be that there is one NTM which, when removed, eliminates most of the distortion. If so, the price gap would largely reflect the effect of this particular NTM.

Conversely, it may also be true that the removal of a non-tariff measure does not permit market access. In this case, the "true" tariff equivalent of a single policy change may in fact be zero even when the measured tariff equivalent of all NTMs jointly may be quite large (Ferrantino, 2012). Finally, the price gap method is only suitable for analysing NTMs of a single importing country for a few products of particular interest. The data requirements to address NTMs across multiple countries and products can be unmanageable.

Econometrics-based method

A notable advantage of econometric analysis, relative to the "price gap" method, is that it can be used to study the trade effects of multiple non-tariff measures

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across multiple industries and countries simultaneously. In addition, the relative abundance of data on trade flows makes it particularly attractive for analytical purposes. However, the econometrics-based methods have certain shortcomings as well.

First, given the lack of transparency, observing non-tariff measures precisely is diffcult. Hence, a dummy variable which equals one if the measure is present is unlikely to capture several NTMs. Using the difference between actual and predicted imports as a measure of NTMs is also problematic because it may capture factors other than trade policies. Secondly, like the "price gap" method, this approach cannot disentangle the individual effects of a single non-tariff measure when multiple NTMs are present in a market. In many cases, however, only one NTM - or a small number of NTMs - is applied to any given good. Cross-country variation in the application of NTMs can then potentially be used to disentangle their trade effects (Carrère and De Melo, 2009). Thirdly, the results obtained are likely to be sensitive to the details of the econometric techniques used.

In econometrics method, the impact of non-tariff measures is estimated on either price or quantity (trade flows) using econometric models. Estimating the "quantity impact" is particularly useful because data on trade flows are more easily available at a disaggregated level. Moreover, when the NTM is absolutely prohibitive, no prices are observed, or when the product is highly differentiated, prices are not particularly informative (Ferrantino, 2012).

In much of the trade literature, the AVEs of non-tariff measures are estimated through "gravity equations". These are econometric models of trade which acquire their name from the similarities to Newton's theory of gravitation. They predict that the value of trade between any two countries will be positively related to the size of their economies and inversely related to the distance (and other measures of trade costs) between them. In order to estimate the effect of poicies such as tariffs and N TMs on trade, gravity equations include measures, which capture these policy factors, as explanatory variables.

$$ln(VALUEOFIMPORTS) = a + b_1 \ln (1 + TARIFF) + b_2 NTM + cX$$

where "X" is a se t of variables that may also affect trade flows. It typically includes G DP, distance and other trade costs. When precise data are lacking, the presence of NTMs is captured by a dummy variable, which assumes a value of one when the

NTM in question applies and zero otherwise.

The gravity model of trade enables an estimation of the predicted value of trade between a country pair with and without the non-tariff measures. The effect of the NTM on trade is estimated as the difference between the two values. A similar calculation can be made for the effect of a tariff compared with no tariff. The AVE of the NTM can then be derived by comparing these two predicted differences. More specifically, the AVE of the NTM is a tariff that has the same effect on the value of trade.

The trade literature refers to the above as the "direct approach". There is also an "indirect approach" which compares actual trade flows to the trade flows predicted by a hypothetical frictionless benchmark scenario. The deviation of actual from predicted trade flows is taken to be indicative of the impact of NTMs because specifc explanatory variables measuring NTMs are not included in the estimated equation. This "indirect approach" is particularly useful if direct measures of trade restrictions are sparse or imprecise, as is often the case for NTMs (Chen and Novy, 2012).

Focusing on SPS measures, Fontagné et al. (2005) find that for trade in fresh and processed food, these measures tend to restrict trade from developing countries and least-developed countries (LDCs). Drawing on French firms' custom data from 1995 to 2005, the study uses a gravity model of trade to evaluate the effect of SPS and TBT measures raised as specific trade concerns on export performance by firms. The firms' exports are assumed to be determined by demand-side factors (such as income), supply factors (such as sectoral productivity), trade costs (such as distance) and by an additional variable indicating the stringency of SPS and TBT measures.

Cost of Compliance of SPS requirements

Conformity assessment refers to testing, inspection and certifcation, as well as to a supplier's declaration of conformity. Conformity assessment procedures are necessary for achieving important policy objectives, such as the protection of consumers' health and safety. They can, however, also be unnecessary obstacles to trade when they are duplicative, inefficient or applied in a discriminatory manner.

Testing, inspection and certifying compliance with a certain SPS measure entails costs. These costs are necessary because they assure compliance with the required standard. Yet, they can also be an unnecessary obstacle to trade, when

foreign providers are competent to provide the required level of assurance in a cost-effective manner, but this competence is not recognized by the importing country. Ideally, attestation of conformity would be carried out just once in a cost-effective manner and then recognized everywhere. Yet, even the existence of a well-functioning technical infrastructure in many countries does not automatically lead to single conformity assessment, thus unnecessarily increasing transaction costs (see Section B.1). There are several dimensions of conformity assessment costs. It is not just that the fees for testing, inspection or certifcation may be unnecessarily high. Unnecessary costs also arise because exporters need to comply with testing and certifcation requirements in each of the countries to which they are exporting. Even if importing countries rely on internationally harmonized product standards -or accept another country's standards as equivalent -they may still have a separate conformity assessment requirement. For Myanmar fishery exporting firms, there are five different sets of requirement for EU, China, America, Japan and other countries including ASEAN. This can substantially increase the costs of exporting, not least because exporters face the risk that goods are rejected by the importing country after shipment.

5.2 Model Specification

Chen and Novy (2012) described two approaches to quantifying NTMs. Direct approach requires collecting observable data on the incidence of NTMs (inventory-based frequency measures), for example, frequency or coverage ratios. Indirect approach is estimating the existence of NTMs from market anomalies (e.g. unexplained price gaps or smaller than expected trade flows). Indirect approach usually requires to calculate an ad valorem equivalent of an NTM.

From the recent literature, the specification usually adopts as follows. Demand elasticity can be estimated simply estimated by the equation below by using ad valorem tariff rate imposed by the importing country.

$$Ln(m_{ijnt}) = \beta_0 + \beta_{1n} Ln(1 + t_{i,j,n,t}) + \sum_{n=1}^{N-1} \beta_{2n} NTM_{ij} + \beta_{3n} C_{ijt-1} + \mu_{ijnt}$$

where m_{ijnt} denotes the import quantities of product n to country i from partner country; at time t. Therefore, β_{0n} represents product-specific fixed effects. $t_{i,n,t}$ is the

ad valorem tariff rate imposed by the importing country i against the import of product h from partner country;. The equation incorporates the coefficients capturing the impacts of tariffs (β_{1n}) and non-tariff measures (β_{2n}) on imports. C_{ijt-1} captures time-varying countries' characteristics and consists of classical gravity variables and factor endowments. Gravity variables that enter in regressions are dummy variables indicating whether they (i) are both EU members, (ii) are both members of the WTO, or (iii) are both members of a Preferential Trade Agreement (PTA). Most of the variables are expressed in natural logarithms, so coefficients obtained from linear estimation can be read directly as elasticities.

A gravity model is also used to estimate the impact of NTMs on import quantities. Considering NTMs as factors in the trade cost, the gravity method estimates the impact of a specific measure on trade flow (e.g. positive, negative, or neutral).

The estimation of the gravity regression is

$$Ln(Trade_{ij}) = \alpha + \beta_1 Ln(GDP) + \beta_2 Ln(GDP_j) + \beta_3 Ln(dist_{ij}) + \varepsilon_{ij}$$

However this version can lead to very biased results serious omitted variable bias: any i- or j- characteristic that correlates both with trade and GDP ends up in the error term. The basic OLS assumption of orthogonality between the error term and the explanatory variables is violated.

5.3 Estimation of Gravity model for Fish Export of Myanmar

This section attempts to find out the major determining factors of Myanmar fishery trade using panel data estimation technique in a generalized gravity model. In fact, the gravity model is a tool of the applied international trade literature, for example, of Anderson and Van Wincoop (2003), Chaney (2008) and Helpman et al. (2008).

Regarding NTMs, there is a multiplicity of efforts to gather information according to needs. Broadly, there are two families of databases: Private-sector surveys and official data. Private-sector surveys provide subjective measurement of the effect of NTMs on market access and the cost of doing business as perceived by exporters or importers. Their value is that they reflect what is happening on

the ground, including not just the regulations on the books, but how they are administered. However, surveys should be interpreted carefully. They do not always have rigorous sampling frames and thus may not be representative. This can be a problem when some segments of the private sector—say, large firms or particular industries—have strategic reasons to portray regulations either favorably or unfavorably. Respondents can also be imperfectly informed; for instance, producers are sometimes told by intermediaries that their products fail to comply with some new regulation just to convince them to accept lower prices.

Intuitive Gravity Model

In estimation, the gravity model takes the log-form as follows.

$$\text{Ln } X_{ij,t} = \beta_0 + \beta_1 \ln (Y_i) + \beta_2 \ln(Y_j) + \beta_3 \ln(t_{ij}) + e_{ij}.$$

Apart from the GDPs of countries, proxies for trade costs (t_{ij}) can be Distance between capital of home and trading each partner, Adjacency and Colonial links between the home country and trading partner countries.

5.3.1 Empirical equation for the gravity model in the study

$$\ln Xfob_{ij,t} = \beta_0 + \beta_1 \ln (gdpimporter_{i,t}) + \beta_2 \ln (gdphome_{j,t}) + \beta_3 \ln (produce_{j,t}) + \beta_4 \ln(distance_{ij}) + \beta_5 contig_{ij} + \beta_5 comcol_{ij} + e_{ij,t}$$

Variables	Description of Variables
ln $Xfob_{ij,t}$	The logrithm of nominal bilateral fishery export flows from exporter (home country) i to importer j at time t, where the value of fishery export is in US$ at f.o.b price.
β_0	A constant term, whose structural interpretation is as world output
ln ($gdpimporter_{i,t}$)	The logarithm of GDP of importing country at time t
ln ($gdphome_{j,t}$)	The logarithm of total production of exporting country (Myanmar) at time t
ln ($produce_{j,t}$)	The logarithm of GDP of exporting country (Myanmar) at time t
ln($distance_{ij}$)	The logarithm of bilateral distance between trading partners i and j
$contig_{ij}$	An indicator variable capturing the presence of contiguous borders between trading partners i and j, yes=1
$comcol_{ij}$	An indicator for the presence of colonial ties between countries i and j, yes = 1

Source of Data

Variables	Source of data	Measure
$Xfob_{ij,t}$	Customs Department and Central Statistical Organization	US dollar
$produce_{j,t}$	Department of Fishery, MoALI	US dollar
$gdpimporter_{i,t}$		US dollar
$gdphome_{j,t}$		US dollar
$distance_{ij}$	WITS of World Trade Organization	Miles between capital cities
$contig_{ij}$		If *yes* = 1, otherwise, 0.
$comcol_{ij}$		If *yes* = 1, otherwise, 0.

Hypothesis and Expectations of Variables

Dependent Variable ln $Xfob_{ij,t}$	Expected sign of coefficient
β_0	Positive
ln ($gdpimporter_{i,t}$)	Both positive and negative can be expected.
ln ($gdphome_{j,t}$)	Positive if the GDP in the importing country increases, imports increase as well, showing the tendency of trade with larger economies. Negative if the country is at the self-sufficiency. More GDP supports more for domestic production, leading to a decrease in imports.
ln ($produce_{j,t}$)	Positive, assuming that consumption of types of the fishery products exported remains unchanged.
ln($distance_{ij}$)	Negative sign
$contig_{ij}$	Positive
$comcol_{ij}$	Both positive and negative can be expected. Positive if being a colony of same country, or common colony, influences on bilateral trade relations. Negative if the situation of common colony is no longer affective.

Descriptive Statistics

Variable	No. of Observations	Mean	Minimum	maximum
Xfob	324	7094950	0	2.20e+08
distcap	324	7361.46	288	16807.73
gdpimporter	324	1.25e+12	9.77e+9	1.86e+13
gdphome	324	6.14e+10	5,97e+10	6.54e+10

Methodology

Techniques used to analyse panel data are fixed effects and random effects. *Fixed Effects model* is known as covariance model, within estimator, individual dummy variable model, and least squares dummy variable model. Fixed effects model is a model in which parameters are fixed or non-random quantities. According to Wooldridge (2013), in econometrics, a fixed effects model refers to a regression model in which the group means are fixed (no-random). Generally, data can be grouped according to several observed factors. Group means can be modeled as either fixed or random effects for each grouping. In a fixed effects model each group mean is a grop-specific fixed quantity. *Random Effects model* is random intercept, partial pooling model, and in statistics, it is also called a variance components model. In a random model, parameters are random variables. In econometrics, random effects models are used in the analysis of hierarchical or panel data when there is no fixed effects. It allows for individual effects. The random model is assumed as a special case of the fixed effects model.

Before estimating fixed effects and random effect model, the estimation starts with Ordinary Least Square method. The panel data of 54 importing countries for years between 2011/2012 and 2016/2017 are used. When observations are repeated per individual, there can be a problem that the observations are not independent, but, on the other hand, there can be an advantage that the repetition gets better parameter estimates. When the observations are pooled and used OLS, the estimates can be biased. The study employs a fixed and random effects model to verify the estimation of gravity equation

Fixed Effects model estimation with OLS method

Variable	Coef.	Std.Err	t	P>|t|	[95% Conf. Interval]	
ln(gdpimporter)	-0.1108672	0.2172819	-0.51	0.610	-0.5394475	0.3177131
ln(gdphome)	-6.293543	11.87264	-0.53	0.597	-29.71188	17.12479
lndistcap	-1.372238	.3162739	-4.34	0.000	-1.996076	-.7483994
contig	-1.399784	.6500755	-2.15	0.033	-2.682034	-.1175353
comcol	2.463912	.6340124	3.89	0.000	1.213347	3.714477
_cons	183.6232	294.6676	0.62	0.534	-397.5975	764.8439
Number of obs	252					
Prob > F	18.14					
R-squared	0.8507					
Adj R-squared	0.8038					

All OLS estimates other than *lndistcap* and *comcol* are not statistically significant, Then, for the better estimation, fixed effect model is repeated using generalized least squares (GLS) regression.

Fixed-effects (within) regression

Variable	Coef.	Std.Err	t	P>|t|	[95% Conf. Interval]	
Ln(gdpimporter)	-0.1108672	0.2172819	-0.51	0.610	-0.5395	0.3177
Ln(gdphome)	-6.293543	11.87264	-0.53	0.597	-29.712	17.1248
lndistcap	0 (omitted)					
contig	0 (omitted)					
comcol	0 (omitted)					
_cons	173.0553	294.6628	0.59	0.558	-408.16	754.2664
sigma_u	2.1504534					
sigma_e	0.95495553					
rho	0.83528255	(fraction of variance due to u_i)				
Number of obs	252					
Number of groups	54					
F(7,191)	1.27					
Prob > F	0.2697					
R-sq: within	0.0443					
Between	0.0482					
overall	0.0265					

Source: stimation result.

Heteroscedeasticity test confirms as follows: -

F test that all $\mu_i = 0$; F(53, 191) = 17.06   Prob > F = 0.0000

Then, the variation across trading partners is assumed to be random and uncorrelated with dependent variable (Xfob) or independent variables (gdpimporter, gdphome, distance) included in the model.

$$Xfob_{it} = \beta X_{it} + \alpha + U_{it} + \varepsilon_{it},$$

where U_{it} = between-countries error; ε_{it} = within-countries error

Random-effects Model Estimation using a panel data

Random-effects GLS regression Number of obs = 252
Group variable: pairid Number of groups = 54
R-sq: within = 0.0265 Obs per group: min = 1
  between = 0.4099 avg = 4.7
  overall = 0.2916 max = 6

 Wald chi2(10) = 3.28e+08

corr(u_i, X) = 0 (assumed) Prob > chi2 = 0.0000

(Std. Err. adjusted for 54 clusters in pairid)

lXfob	Coef	Robust Std. Err	z	P>|z|	[95% Conf. Interval]	
lgdpimporter	0.3803646	0.1392842	2.73	0.006	0.1073726	0.6533566
lgdphome	-6.481532	1.669257	-3.88	0.000	-9.753217	-3.209848
ldistcap	-0.9900287	0.366634	-2.70	0.007	-1.708618	-0.2714393
contig	-0.2040099	1.1355	-0.18	0.857	-2.429549	2.021529
comcol	0.8106135	0.6511278	1.24	0.213	-0.4655735	2.086801
_cons	173.0073	43.11273	4.01	0.000	88.50795	257.5067
sigma_u	1.4066414					
sigma_e	0.95495553					
rho	0.68451312	(fraction of variance due to u_i)				

Source: Estimation result.

Testing for random effects: Breusch-Pagan Lagrange multiplier (LM)

Breusch and Pagan Lagrangian multiplier test for random effects is carried out and resulted as follows.

Estimated results:

	Variable	sd = sqrt(Var)
lnXfob	4.647893	2.155897
e	0.9119401	0.9549555
u	1.97864	1.406641

Test: $Var(u) = 0$

$$\bar{\chi}^2_{(01)} = 259.24$$

$$Prob > \bar{\chi}^2 = 0.0000$$

Here, the null hypothesis that variances across countries equals zero is rejected. That is evidence of significance differences across countries (i.e panel effects exist.). The random effects model is appropriate and random effects estimation is suggested.

Since serial correlation tests are supposed to apply to macro panels with long time series over 20-30 years, it is not a problem in this micro panels with 6 years.

5.3.2   Augmented Gravity Model estimation with NTM variable

The OLS estimation confirms the gravity model with panel effects, i.e, random effects and fixed effects, and , particularly random effects existed. Then, the estimation process is proceed with different estimating methods applied in the gravity model.

Total NTM counts and SPS counts of each importing countries are also included in the random effects estimation and check the significance of NTM variables on fishery exports. Total fish production is also included in the estimation.

Table 5.1 Results of Random Effects and Fixed Effects

IXfob	Random effects	Fixed effects
	GLS regression	
ln(gdpimporter)	0.226	0.183
	(0.000)	(0.008)
ln(gdphome)	-19.176	-19.781
	(0.000)	(0.414)
lndiscap	-0.606	-0.459
	(0.021)	(0.266)
lnSPS	0.281	0.387
	(0.053)	-0.266
lnNTM	0.438	omitted
	(0.027)	
lproduce	-1.590	-1.59086
	(0.010)	(0.111)
comcol	1.827	2.298
	(0.000)	(0.023)
contig	-0.2092021	-0.232
	(0.613)	(0.693)
Number of obs	256	256
R-sq: within	0.1106	0.1137
between	0.3896	0.2884
overall	0.266	0.2187
Wald chi^2(13)	1610.48	
Prob> chi^2	0.000	
F (12,214)		2.29
Prob>F		0.0093

Source: Estimation Results.
 In random effects estimation using GLS regression, standard   errors are adjusted for 30 clusters in the group variable. Random effects estimators give better results. Then Breusch and Pagan Lagrangian multiplier test for random effects against fixed effects is carried out.

Breusch and Pagan Lagrangian multiplier test for random effects

lXfob[AvgNTM,t] = Xb + u[AvgNTM] + e[AvgNTM,t]

```
   Estimated results:
                   |    Var     sd = sqrt(Var)
         ----------+----------------------------
           lXfob | 4.840858     2.200195
               e | 1.528289     1.23624
               u | 2.718583     1.648813

   Test:  Var(u) = 0
                     chibar2(01) =   30.32
                     Prob > chibar2 =  0.0000
```

Random effect model is significant. Total NTM counts and SPS counts are not significant to determine the fish export at the country level. Firms with EU-approved certificates are also used as a proxy for the SPS compliance of exporting fishery firms.

Manual version Ramsey RESET test for re estimates (Omitted Variable, OV,test)

```
Test yhat2=yhat3=yhat4=0
( 1)  yhat2 - yhat3 = 0
( 2)  yhat2 - yhat4 = 0
( 3)  yhat2 = 0

    F( 2, 239) =   6.04
       Prob > F =   0.0028
```

The estimation by random effects models passed the misspecification test. Random effects estimators can then explain the incidence of non-tariff measures on fishery exports.

Again, firm level estimation using the data collected from fishery processing and exporting firms is proceeded to verify the result.

5.3.3 Gravity Model Estimation at Firm-level

The panel data of 21 importing countries for year 2014-2015 and 2015-2016 are used. The study employs a fixed and random effects model to verify the estimation of gravity equation. The estimation at firm level applies the firm specific variables such as the dummy variable for firms which hold EU-approval and the variable for the number of SPS measures regulated on the firms' fishery products by respected importing countries. The estimation results are presented in table 5.2.

Table 5.2 Results of Random Effects and Fixed Effects at Firm-level

Table 5.2 Results of Random Effects and Fixed Effects		
lfirmX	Random effects	Fixed effects
	GLS regression	
lgdpimporter	0.242	1.137
	(0.077)	(0.495)
lgdphome	7.780	8.490
	(0.088)	(0.195)
ldiscap	0.245	Omitted
	(0.496)	
lSPS	0.015	Omitted
	(0.960)	
EU-approved	-1.519	Omitted
	(0.001)	
comcol	0.077	Omitted
	(0.874)	
contig	-1.343	Omitted
	(0.027)	
Number of obs	101	101
R-sq: within	0.167	0.175
between	0.216	0.017
overall	0.233	0.2187
Wald chi^2(8)	30.72	
Prob> chi^2	0.000	
F (3,38)		2.29
Prob>F		0.061

Source: Estimation Results.

Signs of estimates of the random effects models are as expected. The coefficient of the GDP of importing countries, the distance between two countries, colonial ties and the count of SPS are not significant to determine the export value of fishery products, while contingency with trading partner seems to be significant at any significant level larger than conventional levels. Interestingly, dummy variable for EU approval is significant and it has negative effects on the export value of firms.

The model specification is confirmed between random effects and fixed effects by Hausman test as follows.

```
. hausman fixed1 random1
                          ---- Coefficients ----
                  |    (b)        (B)              (b-B)     sqrt(diag(V_b-V_B))
                  |  fixed1     random1         Difference       S.E.
------------------+----------------------------------------------------------------
      lgdphome |  8.490433   7.279641          1.210792      2.199782
   lgdpimporter |  1.137042    .2418283          .8952133      1.638066
        year_1 | -1.080481  -1.011351         -.0691298      .2082363
------------------+----------------------------------------------------------------
```

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\text{chi2}(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$$
$$= 2.56$$
$$\text{Prob>chi2} = 0.4645$$

If this is < 0.05 (i.e. significant at 5 % level) use fixed effects. Since this is not < 0.05, fixed effects cannot be used.

5.3.4 Effect of NTM on Price of Fishery Exports

The effect of NTM can be estimated with the responsiveness of a variable under consideration with respect to the incidence of particular NTM. OLS estimators of the log-log function gives such responsiveness.

Table 5.3 Estimation of NTM on Price of Fishery Export

OLS estimates	lP
-0.050	lX
(0.010)	
0.180	lSPS
(0.003)	
-0.478	lEu-dummy
(0.000)	
-0.216	contig
(0.507)	
0.056	comcol
(0.303)	
1352	No. of observations
0.767	R-squared

In OLS estimation, X denotes the fish export, which has the negative sign, expressing the fact that the more can be exported, the less will be the prices received by the exporters of fishery products. Coefficient of the log of value of fish export represent "the responsiveness of fishery products' price" with respect to the world demand for Myanmar fishery products . Negative coefficient means that, with same volume of export, percentage change in prices of fishery products will move in the opposite direction with the percentage change in the export level. The variables SPS and EU-dummy are significant at any level, saying that number of SPS measures on fishery products regulated by importing countries and being an EU-approved firm is significant in pricing of fishery exports.

5.4 Interpretation of results

It is to draw from this study that random effects model with Generalize Least Squares method is suggested in forcasting the export of fishery products. As variables are expressed in natural logarithms, coefficients obtained from linear estimation can be read directly as elasticities. Size of importing countries measured by GDP is statistically significant at any level to determine the export value of fish firms, and positively affected. Size of Myanmar economy is also statistically significant at any level, with negative sign, showing Myanmar economy is relatively small in fish trade. Negative value of elasticity in the variable distance shows the inverse relationship between the distance and export values, describing more fish trade with farther countries, with a significant level larger than 20%. The dummy variable for contingency supports this finding. Total number of NTM is not statistically siginificant at all while the number of SPS on fishery products are also not significant at any conventional level of significant. For the fishery export sector as a whole or at the country level, colonial ties with trading partner for fishery products is statistically significant, while contingency or adjacency with trading partner countries is not statistically significant at all. Given the existence of SPS requirement and particularly the compliance with EU-standards of sanitary and phyto-saintary requirements. The estimation for the country as a whole implies Myanmar would do better if the trading countries which have ever been sharing the same historic ties such as India, Malaysia, and EU countries as well as Japan. At firm level, however, colonial ties is not statistically significant, but nearness with trading partners is quite significant at the

significant level greater than any conventional level, i.e. greater than 20%. Myanmar fishery products trading companies would do more with neighbours of the countries such as China and Thailand. In addition, firm level estimation suggests the statistical significance of holding EU-approval by fishery cold-storage and exporting firms, apart from the insignificance of other varaibles. Again, the importance of EU-approval and the number of SPS on fishery firms are supported by the estimation results of pricing in which log of SPS and EU-dummy variable is statistically significant.

Chapter VI

Conclusion

Myanmar is importing many types of fish for consuming purpose, for consuming non-native varieties like Tuna, for home and hobby like raising Goldfishes, and for feeding in aquaculture farms. Fish is also imported for contract manufacturing process (CMP) to export value-added products and to be exported better quality products. Myanmar's fishery and crustacean exports had been increasing steadily. However, export of existing products to existing markets constituted more than 90 of the export growth during the period. Diversification of export products, especially high-value-added ones, and development of new export markets will be critical for export promotion in Myanmar's fishery sector.

6.1 Findings

The empirical study found that Myanmar fishery exports are determined by the GDP of importing countries in a way that larger trading partner countries more demand for Myanmar fishery products. It is also found that the more the countries are farther, the larger will be imported. Total fish export value is not affected by any NTM including SPS measure, while EU-approval of SPS is important factor to determine the fish export to the world market. In addition, colonial ties between Myanmar and trading partners are still important, whereas the adjacency factor is valid for the individual firms to some extent. Prices of fish are determined by EU-approval as well as the number of SPS measures to be complied by fish exporters are important determinants for fisher exporters. Myanmar has captured the fish market of the world most-demanding countries like Kuwait, Saudi Arabia and UAE, and regained markets in the United States of America and United Kingdom. Even though the volume of fishery exports has steadily increased since Cyclone Nargis, export prices for fishery products have fallen following the global financial crisis. Regardless of the small share of export to all EU countries, in 2016, Myanmar exports to the EU increased.

As for the direction of fishery exports, Japan is the largest importer of Myanmar's shrimp, while Thailand and China are largest buyers of fish and other types of crustacean. Some raw materials such as feed for fish are purchased by China and Japan for processing into value-added fisheries products. The EU can be one of the important import markets for Myanmar's fishery products. In 2009, the European Union banned all Myanmar seafood imports. Imports of seafood were re-approved in 2010, while farmed products remain prohibited.

It is well known that the EU has been applying strict sanitary requirements to ensure the safety of fishery imports. Myanmar lacks the capacity to satisfy the strict sanitary standards required of exports. In the short-term, there are needs to strengthen basic infrastructure, including expansion of facilities and test equipment to satisfy sanitary requirements, human capabilities to manage the sanitary system. In particular, to export fishery processed products to the EU market, the processing factories have to register as factories meeting EU sanitary standards. As many Myanmar fishery processing factories fall short of EU's standards, they are not eligible for registration for export to the EU market.

As far as the direction of fishery export is concerned, Myanmar has exported fishery exports to 43 countries around the world, including all ASEAN member countries except Lao and Cambodia, East and Southeast Asian countries such as Japan, China, Thailand, Singapore and Malaysia, are the main destination for Myanmar's fishery and crustacean exports while a few fish species (Asian carp family) are exported to Middle East markets as well. Most of crustacean exports including shrimp were destined for a small group of Asian countries such as Japan, China, Malaysia and Hong Kong and, recently, exports to USA.

6.2 Recommendations

Fishery production in Myanmar has been steadily increasing in both capture and aquaculture. Fish exporting sector has been an underdeveloped sector that is dominated by small scale artisanal fisheries using traditional methods and rudimentary technology. Moreover, fish exporting firms rely heavily on the sales of only a limited number of spices. This low standard of fishery sector suggests, at the same time, that there is considerable potential for it to grow and develop. The sector needs to upgrade and diversify its fish exports primarily by meeting international food safety and sanitary standards including public and private industrial level

requirements.   Fish producing firms naturally face a number of challenges in accessing the world's major markets, including weak infrastructure, ineffective trade facilitation procedures and difficult business environment. One of the main obstacles of fish exporters is to comply with the standards and regulations on fish safety and quality imposed by importers. Regardless of total population, China and Singapore can be ranked top in Myanmar fishery export destination due to its role in re-exporting Myanmar exports since the time of economic sanction of the United States and EU. Apart from Singapore, Malaysia is also listed as top market for Myanmar fishery products. As China is important market for Myanmar exports, so do in fishery exports. East Asian countries like Japan and Korea are also among the top 10 markets for Myanmar fishery products as they has been most important trading partners for Myanmar.

Myanmar's fishery sector has great production and export potential, while the capture and aquaculture fisheries have suffered from various difficulties and challenges. The National Export Strategy concisely highlights the supply-side, business environment, market entry and development challenges of the fishery sector as one of the sectors given the top priority of the economy. Fishery products has contributed relatively a large share next to timber, rice, pulses and precious stones, regardless of the changing importance of its share to total export value. Fishery is, in fact, one of the most important sectors for livelihoods, national income and international trade. However, it has been an underdeveloped sector that is dominated by small scale artisanal fisheries using traditional methods and rudimentary technology. Moreover, fish exporting firms rely heavily on the sales of only a limited number of spices. This low standard of fishery sector suggests, at the same time, that there is considerable potential for it to grow and develop.

The sector needs to upgrade and diversify its fish exports primarily by meeting international food safety and sanitary standards including public and private industrial level requirements. Fish producing firms naturally face a number of challenges in accessing the world's major markets, including weak infrastructure, ineffective trade facilitation procedures and difficult business environment. One of the main obstacles of fish exporters is to comply with the standards and regulations on fish safety and quality imposed by importers.

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Appendix-1

Gravity Model Regression Results

Random effects

Random-effects GLS regression				Number of obs	=	256
Group variable: AvgNTM				Number of groups	=	30
R-sq: within = 0.1106				Obs per group: min =		1
between = 0.3896				avg =		8.5
overall = 0.2660				max =		79
				Wald chi2(13)	=	1610.48

corr(u_i, X) = 0 (assumed)

(Std. Err. adjusted for 30 clusters in AvgNTM)

lXfob	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
lgdpimporter	.2260323	.0361261	6.26	0.000	.1552265	.2968382
lgdphome	-19.17645	2.637965	-7.27	0.000	-24.34677	-14.00614
ldiscap	-.6058899	.2630313	-2.30	0.021	-1.121422	-.0903581
lSPS	.2814833	.1452571	1.94	0.053	-.0032153	.5661819
lNTM	.4379822	.3943493	1.11	0.267	-.3349283	1.210893
lProduce	-1.595385	.6214373	-2.57	0.010	-2.81338	-.3773903
comcol	1.826887	.505867	3.61	0.000	.8354059	2.818368
contig	-.2092021	.4135791	-0.51	0.613	-1.019802	.6013981
year_1	-1.297874	.213953	-6.07	0.000	-1.717214	-.8785338
year_2	-.9447738	.3301534	-2.86	0.004	-1.591863	-.2976851
year_3	-1.187676	.2732176	-4.35	0.000	-1.723173	-.6521798
year_4	.0177752	.1390759	0.13	0.898	-.2548085	.2903589
year_5	-1.210177	.1446467	-8.37	0.000	-1.493679	-.9266749
year_6	0 (omitted)					
_cons	501.2352	67.72952	7.40	0.000	368.4878	633.9826
sigma_u	1.6488127					
sigma_e	1.2362399					
rho	.64013774	(fraction of variance due to u_i)				

Fixed Effects

Group variable: AvgNTM			Number of groups	=	30
R-sq: within = 0.1137			Obs per group: min =		1
between = 0.2884			avg =		8.5
overall = 0.2187			max =		79
			F(12,214)	=	2.29
corr(u_i, Xb) = -0.0279			Prob > F	=	0.0093

lXfob	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lgdpimporter	.1834111	.0687995	2.67	0.008	.0477997	.3190226

lgdphome	-19.78008	24.17276	-0.82	0.414	-67.42728	27.86713
ldiscap	-.4586367	.4108402	-1.12	0.266	-1.268449	.3511751
lSPS	.3872506	.3473048	1.12	0.266	-.2973258	1.071827
lNTM	0 (omitted)					
lProduce	-1.59086	.9954773	-1.60	0.111	-3.553057	.3713366
comcol	2.298098	1.004083	2.29	0.023	.3189383	4.277258
contig	-.2321814	.5878972	-0.39	0.693	-1.390992	.9266294
year_1	-.363927	.2983005	-1.22	0.224	-.9519104	.2240565

Breusch and Pagan Lagrangian multiplier test for random effects

lXfob[AvgNTM,t] = Xb + u[AvgNTM] + e[AvgNTM,t]

Estimated results:

	Var	sd = sqrt(Var)
lXfob	4.840858	2.200195
e	1.528289	1.23624
u	2.718583	1.648813

Test: Var(u) = 0

$$chibar2(01) = 30.32$$
$$Prob > chibar2 = 0.0000$$

Firm level Estimations

Random-effects GLS regression	Number of obs = 101
Group variable: pairid	Number of groups = 60
R-sq: within = 0.1671	Obs per group: min = 1
between = 0.2163	avg = 1.7
overall = 0.2330	max = 2
	Wald chi2(8) = 30.72
corr(u_i, X) = 0 (assumed)	Prob > chi2 = 0.0002

(Std. Err. adjusted for 60 clusters in pairid)

lfirmX	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
lgdphome	7.279641	4.271424	1.70	0.088	-1.092197	15.65148
lgdpimporter	.2418283	.1791172	1.35	0.077	-.109235	.5928916
ldistcap	-.2454899	.3604316	-0.68	0.496	-.9519229	.4609431
lSPS	.015024	.3021728	0.05	0.960	-.5772238	.6072718
euapproved	-1.518875	.4646902	-3.27	0.001	-2.429651	-.6080988
contig	-1.343498	.6086999	-2.21	0.027	-2.536528	-.150468
comcol	.07702	.485228	0.16	0.874	-.8740095	1.028049
year_1	-1.011351	.2902368	-3.48	0.000	-1.580205	-.4424975
year_2	0 (omitted)					
_cons	-171.7259	105.7882	-1.62	0.105	-379.067	35.61521

sigma_u	1.2420247
sigma_e	.81165955
rho	.70074215 (fraction of variance due to u_i)

Fixed-effects (within) regression	Number of obs = 101
Group variable: pairid	Number of groups = 60

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```
R-sq:  within  = 0.1747                                Obs per group: min =      1
       between = 0.0174                                                avg =    1.7
       overall = 0.0203                                                max =      2
                                                       F(3,38)         =    2.68
corr(u_i, Xb) = -0.7292                                Prob > F        =  0.0605

------------------------------------------------------------------------------
       lfirmX |    Coef.    Std. Err.     t    P>|t|    [95% Conf. Interval]
--------------+---------------------------------------------------------------
     lgdphome |  8.490433  6.437016    1.32   0.195   -4.540624   21.52149
   lgdpimporter| 1.137042  1.650999    0.69   0.495   -2.205231   4.479314
      ldistcap |        0 (omitted)
         lSPS |        0 (omitted)
    euapproved |        0 (omitted)
        contig |        0 (omitted)
        comcol |        0 (omitted)
        year_1 | -1.080481  .4969352   -2.17   0.036   -2.086474  -.0744882
        year_2 |        0 (omitted)
         _cons | -229.9091  174.3408   -1.32   0.195   -582.8435   123.0254
--------------+---------------------------------------------------------------
      sigma_u |  2.1978651
      sigma_e |  .81165955
          rho |  .87998853   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:   F(59, 38) =   5.72         Prob > F = 0.0000
```

Estimation results for the Effect of NTM on Price of Fishery Exports

```
reg lP lX lSPS eudummy contig comcol firm_* importer_*, robust
Linear regression                              Number of obs =   1352
                                               R-squared     = 0.7679
                                               Root MSE      = .44255

------------------------------------------------------------------------------
             |            Robust
         IP  |    Coef.  Std. Err.     t    P>|t|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lX | -.0501141  .0192982   -2.60   0.010   -.0879739  -.0122543
        lSPS |  .1799782  .0607384    2.96   0.003    .0608195   .2991368
     eudummy | -.4780895  .0848245   -5.64   0.000    -.644501   -.311678
      contig | -.2167238  .3263688   -0.66   0.507   -.8570051   .4235575
      comcol |  .0556376  .0540452    1.03   0.303   -.0503902   .1616653
       _cons |  7.302776  .2302202   31.72   0.000    6.851122    7.75443
------------------------------------------------------------------------------
```

Appendix-2

SPS Requirements

SPS Requirements of European Union

Chemical Requirements for Fish & Fishery Products

List of Analysis		Fish & Fishery Products
Antibiotic, Drug and Chemical Residue	Chloramphenicol	1. Aquaculture Fish, Aquaculture Shrimp, Crab
		2. Dried fish (except dried anchovy and dried tuna) and Dried shrimp 3. Fermented fish
	Malachite Green and Leuco-Malachite Green	1. Aquaculture Fish and Aquaculture Shrimp
		2. Dried fish (except dried anchovy and dried tuna) 3. Fermented fish
	Oxolinic acid	Aquaculture Fish (Muscle and skin in natural proportions)
	Fluroquinolone	Aquaculture Fish, Aquaculture Shrimp
Heavy Metal	Cadmium	1. Muscle meat of Fish (except those in 2) and Surimi Based
		2. Muscle meat of 2.1 Anchovy (Engraulis species) 2.2 Bonito (Sarda sarda) 2.3 Common two-banded Seabream (Diplodus vulgaris)

Heavy Metal (continued)	Cadmium	2.4 Eel (Anguilla Anguilla) 2.5 Grey Mullet (Mugil labrousus labrosus 2.6 Horse Mackerel or Scad (Trachurus species) 2.7 Louvar or luvar 2.8 Sardine (Sardinops species) 2.9 Sardinops (Sardinops species) 2.10 Tuna (Thunnus Species, Euthynnus species, Katsuwonus pelamis) 2.11 Wedge sole (Dicologoglossa cuneata)
		3. Swordfish (Xiphias gladius)
		4. Crustaceans: muscle meat from appendages and abdomen (excluding crab and crab-like)

		5. Crabs and crab-like crustaceans (brachyuran and Anomura): muscle meat from appendages
		6. Bivalve Moliuscs, Cephalopods (without viscera), Seafood mix and Based mix with Seafood
		7. Dried Cephalopod
Heavy Metal	Lead	1. Muscle meat of Fish
		2. Crustraceans: muscle meat from appendages and abdomen (excluding crab and crab-like) 3. Crabs and crab-like crustaceans (brachyuran and Anomura): muscle meat from appendages
		4. Bivalve Molluscs
		5. Cephalopods (without viscera)
	Mercury	1. Fishery products (except those in 2) 2. Dried Anchovy, Dried Fish 3. Salted mackerel 4. **Fish** 4.1 Angler Fish *(Lophius spp.)* 4.2 Atlantic Catfish *(Anarhicha lupus)* 4.3 Bonito *(Sarda sarda)* 4.4 Eel *(Anguilla species)* 4.5 Emperor, Orange roughy, Rosy soldierfish *(Hoplostehus species)* 4.6 Grenadier *(Coryphaenoides ruperstris)* 4.7 Halibut *(Hippoglossus hippoglossus)* 4.8 Marlin *(IMakaira species)* 4.9 Megrim *(Lepidorhombus species)*

	Mercury	4.10 Mullet (Mullus species) 4.11 Pike (Esox lucius) 4.12 Plain bonito (Orcynopsis unicolor) 4.13 Poor Cod (Tricopterus minutes) 4.14 Portuguese dogfish (Centroscymnus coelolepis) 4.15 Rays (Raja species) 4.16 Red fish (Sebastes marinus, S.mentella, S.vivp-arous) 4.17 Sail fish (Istiophours platypterus) 4.18 Scabbard fish (Lepidopus Caudatus, Aphanou pus carbo) 4.19 Seabream, Pandora (Pagellus species) 4.20 Shark (all species) 4.21 Snake mackerel or Butter fish (Lepidocybium flavobrunneum, Ruvetltus pretiosus, Gempylus serpens) 4.22 Stugeon (Acipenser species) 4.23 Sword fish (Xiphlas gladius)

		4.24 Tuna (Thunnus species, Euthynnus species, Katsuwonus pelanis) 5. Crustaceans ; muscle meat from appendages and abdomen (excluding crab and crab-like) 6. Crabs and crab-like crustaceans (Brachyuran and Anomura): muscle meat from appendages 7. Dried anchovy and cried tuna 8. Dried fish (except dried anchovy and dried tuna) 9. Salted mackerel
Food Additive	Benzoic and Sorbic acid	Cooked Shrimps
	EDTA	Canned Crustaceans, Molluscs and Cephalopos
	Phosphate	Frozen Fish fillets, Molluscs, Crustaceans, Fish paste, Crustean paste and Suemi Based
		Surimi and Canned Crustances
	Sulferdioxide	Frozen Crustaceans
		Canned / Cooked Shrimps and Crabs
Quality Index	Histamine	1. Histamine poisoning fish: Tuna, Mackerel, Sardine, Saba, etc. 2. Dried Anchovy & Dried Tuna 3. Fish Sauce 4. Salted Mackeret

Biotoxin	ASP	Bivalve Molluscs
	AZA	Bivalve Molluscs
(Analyzed)	DSP & PTX	Bivalve Molluscs
from Raw	PSP	Bivalve Molluscs
Material)	YTX	Bivalve Molluscs

Note :

MRPL=Minimum Requiered Performance Limit follow by EU Direcitve Histamine analysis

n = number of units comprising the sample

c = number of sample units giving values over m or between m and M

Microbiological requirements for Fish & Fishery Products-EU

Product	TPC CFU/g	E.coli	S. aureus CFU/g	V. cholera /25g	V. parahaem olyticus MPN/g	Salmonella spp. /25g	L monocyt ogens /25g
Raw fish: (Cooked before consumption)	n=5,c=2 m=5x10^6 M=5x10^7	n=5,c=2 m=11 M=500 MPN/g	n=5, c=2 m=10^3 M=10^4	n=5, c=0 m=0	NT	n=5 c=0 m=0	NT
Raw	n=5,c=2	n=5,c=2	n=5,	n=5,	NT	n=5	NT

crustaceans: (Cooked before consumption)	m=5x10^6 M=5x10^7	m=11 M=500 MPN/g	c=2 m=10^3 M=10^4	c=0 m=0		c=0 m=0	
Cooked fish: (Ready to eat: consumption without further cooking)	n=5,c=2 m=1x10^5 M=1x10^6	n=5,c=2 m=1 M=10 MPN/g	n=5, c=2 m=10^2 M=10^3	n=5, c=0 m=0	n=5 c=0 m=<3	n=5 c=0 m=0	n=5 c=0 m=0
Cooked crustaceans: (Ready to eat: consumption without further cooking(	n=5,c=2 m=1x10^5 M=1x10^6	n=5,c=2 m=1 M=10 MPN/g	n=5, c=2 m=10^2 M=10^3	n=5, c=0 m=0	n=5 c=0 m=<3	n=5 c=0 m=0	n=5 c=0 m=0

Requirements of People's Republic of China

Chemical Requirements for Fish & Fishery Products

List of Analysis		Fish & Fishery Products
Biotoxin (Analyzed from Raw Materials)	DSP	Bivalve Molluscs
	PSP	Bivalve Molluscs
Antibiotic and Drug Residue	Oxolinic acd	
	Oxytetracycline	
Food Additive	Benzonic acid and Sobic acid	
Heavy Hetal	Cadmium	Fishery Products (Excluding canned fish)
		Canned Fish
		Frozen/Canned Crustaceans
		Frozen/Canned Molluscs & Cephalopods
	Lead	Fishery and Crustaceans
		Frozen/Canned Molluscs, Cephalopods, Other fish products
	Mercury	Fishery Products (excluding predatory fish)
		Predatory Fish; Tunny, Shark and others
Quality Index	Histamine	Histamine Poisoning Fish: Tuna, Mackerel, Sardine, Saba, etc.
	TVB-N	Frozen Uncooked Marine Fish, Marine Curstaceans, and Marine Cephalopods
		Frozen Uncooked Freshwater Fish and Freshwater Crustaceans
		Frozen Uncooked Crab

Microbiological requirements for Fish & Fishery Products

Microbiological requirements for Fish & Fishery Products-China

Product	TPC CFU/g	Coliforms MPN/100g	E.Coli MPN/ 100g	S.aureus MPN/g	V. cholera /25g	Salmonella spp. /25g	l.mono- * /25g	v.para** MPN/g
All Fishery Products: (Cooked before consumption	1×10^6	NT	< 30	NT	n=5 c=0 m=0	n=5, c=0 m=0	n=5,c=0 m=0	Negative
Ready to cook: (Prepared fishery products for cooking)	5×10^4	NT	< 30	Negative	n=5 c=0 m=0	n=5, c=0 m=0	n=5,c=0 m=0	Negative
Ready to cook: (Prepared fishery products for cooking)	5×10^3	NT	< 30	Negative	n=5 c=0 m=0	n=5, c=0 m=0	n=5,c=0 m=0	Negative

Requirements of Japan

Chemical Requirements for Fish & Fishery Products

List of Analysis		Fish & Fishery Products
Biotoxin (Analyzed from Raw Materials)	DSP	Bivalve Molluscs
		Bivalve Molluscs
Antibiotic, Drug and Chemical Residue	Oxytetracycline	Aquaculture Fish, Aquaculture Shrimp and Raw consumption Oysters
	Chloramphenicol*	Aquaculture Fish, Aquaculture Shrimp
	Nitrofuran metabolites*	Aquaculture Fish, Aquaculture Shrimp
	Oxolinic acid	Aquaculture Crustaceans
		Aquaculture Fish
		Salmon and Trout
	Malachite Green and * Leuco-malachite green	Aquaculture Fish, Aquaculture Shrimp and Snapping tutie
	Fluoroquinolone*	Aquaculture Fish, Aquaculture Shrimp
Heavy Metal	Mercury	Fishery Products
Food Additive	EDTA	Canned Fishery Products (Excluding Canned Fish)
	Sorbic acid	Fish past products (excluding surimi)
	Sulferdoxide	Crustaceans

Note: In case of seafood mix and surimi based mix with seafood analyse only in aquaculture shrimp/fish parts. If products contain Malachite Green Leuco-Malachite Green > 0.5 ppb to < 1.00 ppb, gathering of information will be required to determine deliberate use in Canada.

Microbiological requirements for Fish & Fishery Products-Japan

Product	TPC CFU /g	Coliforms MPN/g	E.coli MPN/ g	S.aureus MPN/g	V.cholerae /25g	Salmonella spp. /25g	L.monocytogens /25g
Raw fish (Cooked before consumption	$<1.0 \times 10^7$	NT	500	1.0×10^3	n=5,c=0 m=0	n=5,c=0 m=0	NT
Raw crustaceans: (Cooked before consumption)	$<1.0 \times 10^7$	NT	500	1.0×10^3	n=5,c=0 m=0	n=5,c=0 m=0	NT
Raw seafood mix: (Cooked before consumption	$<1.0 \times 10^7$	NT	500	1.0×10^3	n=5,c=0 m=0	n=5,c=0 m=0	NT
Ready to cook: (Prepared fish and fishery products for further cooking)	$<1.0 \times 10^5$	Negative	NT	Negative	n=5,c=0 m=0	n=5,c=0 m=0	NT
Ready to eat: (Cooked fish and fishery products)	$< 5.0 \times 10^4$	Negative	NT	Negative	n=5,c=0 m=0	n=5,c=0 m=0	n=5,c=0 m=0

Note : NT = Not tested, n = number of sample units, m = minimum amount of bacteria for good quality product. M = maximum recommended bacteria for products of marginal quality, c = Number of sample units giving values between m and M.

Requirement of United States of America

Chemical Requirements for Fish & Fishery Products

List Analysis		Fish & Fishery Products
Biotoxin	DSP	Shell Fish
	PSP	All Fish
	NSP	Shell Fish
	ASP	All Fish
	Ciguatera	All Fish
Antibiotic and Drug Residue	Sulfadimethoxine/ ormetoprim combination	Salmonids and Cat fish
	Oxytetracycline	Finfish & lobster
	Florfeicol	Sammonids and Cat fish
	Chloramphenicol; Dimetridazole, Nitroimidazoles; Furazolidone, Nitrodurazone, and other nitrofurans;	All Fish
Heavy Metal	Cadmium	Crustacean
	Lead	Crustaceans
	Methyl Mercury	All Fishes
	Chromium	Crustacean
	Nickel	Crustacean
Quality Index	Histamine	Histamine forming fishes
Pesticide residues	Aldrin/Dieldrin	All Fishes
	Benzene hexachloride	Frog legs
	Chlordane	All Fishes
	Chlordecone	All Fishes
	DDT, TDE, DDE	All Fishes
	Fluridone	Finfish & Crayfish

Microbiological requirements for Fish & Fishery Products

Contaminants	Levels	Food commodity
Salomonella	Absence /25 g	All fishes
Staphylococcus aureus	10^4/ 1g (MPN)	All fishes
Clostridium botullnum	Absence of viable spore & toxin	All fishes
E.Coli	1×10^3/ 1g	Ready to eat fishery products
Listeria moncytogenes	Absent	-do-
Vibrio cholera	Absent	-do-
Vibrio parahaemolyticus	1×10^4/ 1g	-do-

Requirements of Other Countries

Chemical Requirements for Fish & Fishery Products

List Analysis		Fish & Fishery Products
Antibiotic, Drug and Chemical Residue	Chloramphericol	Aquaculture Fish, Aquaculture Shrimps, Crab
	Nitrofuran metabolites	Aquaculture Fish, Aquaculture Shrimps, Crab
	Malachite Green and Leuco-Malachite Green	Aquaculture Fish and Aquaculture Shrimps
	Oxolinic acid	Aquaculture Fish and Shrimps
	Oxytetracycline	Aquaculture Fish and Aquaculture Shimps
Food Additive	EDTA	Canned Crustaceans, Molluscs and Cephalopots
	Sulifurdioxide	Frozen Uncoked Curstaceans
		Frozen Cooked/Canned Crustaceans
Heavy Metal	Cadmium	Moliuscs, Cephalopods, Seafood mix and Surimi Based mix with Seafood
	Lead	Fish, Crustaaceans, Molluscs, Cephalopods, Seafood mix and Surimi Based mix with Seafood
	Mercury	Fish, Crusteans, Molluscs, Cephalopods, Seafood mix and Surimi Based mix with Seafood
Quality Index	Histamine	Histamine poisoning fish; Tuna, Mackerel, Sardine, Saba, ect.

Microbiological requirements for Fish & Fishery Products

Product	TPC CFU/g	E coli MPN/g	S. aureus MPN/g	V.chlorae /25g	V.para* MPN/g	Salmonella spp. /25g	L.mono ** /25g	Shigella*** /25g
Raw Fish (Cooked before consumption)	NT	10	100	NT	NT	n=5,c=0 m=0	NT	n=5, c=0 m=0
Raw Crustaceans: (Cooked before consumption)	NT	10	100	NT	NT	n=5,c=0 m=0	NT	n=5, c=0 m=0
Ready to cook: (Prepared	5x 10^5	10	100	NT	NT	n=5,c=0 m=0	NT	n=5, c=0 m=0

fish and fishery products)								
Ready to eat: (Cooked fish and fishery products)	5×10^5	<3	<100	n=5,c=0 m=0	<100	n=5,c=0 m=0	n=5,c=0 m=0	n=5, c=0 m=0

Note: V.para*** = Vibrio parahaemolyticus

L.mono-**= L monocytogents

Shigella *** only for FCC.

II. Microbiological Requirement of Traditional Fishery Products for all Countries

Product	TPC CFU/g	Yeast & Mould CFU/g	S.aureus MPN/g	V.cholerae /25g	C.Perfringen /0.1g	Salmonella spp./25g
Fermented shrimp paste	NT	<1.000	<3	n=5 c=0 m=0	10	n=5 c=0 m=0
Dried cephalopods	NT	<1.000	<100	NT	ND	n=5 c=0 m=0
Dried fish	NT	<1.000	<100	NT	ND	n=5 c=0 m=0
Dried other fisheries product	NT	<200	<100	NT	NT	n=5 c=0 m=0
Dried other fisheries product (Ready to eat)	<50.000	<200	<100	n=5 c=0 m=0	NT	n=5 c=0 m=0
Fermented fish (Ready to eat)	<50.000	<200	<100	n=5 c=0 m=0	ND	n=5 c=0 m=0
Salted fish (Fresh)	NT	<1.000	<100	NT	ND	n=5 c=0 m=0
Traditional other fisheries product (Ready to eat)	<50.000	<200	<100	n=5 c=0 m=0	ND	n=5 c=0 m=0

Appendix C   Distance and GDP statistic of Trading Partner Countries of Fishery Trade with Myanmar

	Country	Distance from Myanmar (km.)	Distance from Capital City(km.)	GDP 2011	GDP 2012	GDP 2013	GDP 2014	GDP 2015	GDP 2016
1	United Arab Emirates	4415	4415	350908390034.0	374817974104.8	390427289203.5	403197682886.3	357949199754.9	348743265704.6
2	Argentina	16824	16824	530163281574.7	545982375701.1	552025140252.2	526319673731.6	584711485367.3	545476103427.2
3	Austria	8108	8049	1390557034408.0	1538194473087.2	1567178619062.3	1459597906912.7	1345383143356.4	1204616439828.4
4	Australia	7884	7884	431120310088.8	409425234155.3	430068712971.9	441885415805.8	382065930308.0	390799991147.5
5	Belgium	8702	8702	527008453886.9	497884216568.9	520925468952.9	531075861047.3	455200045095.6	467955709817.5
6	Bangladesh	979	979	128637393871.4	133355749482.5	149990451022.3	172885454931.5	195078665827.6	221415162445.6
7	Bulgaria	7371	7371	57418391041.6	53903028252.3	55758744571.1	56732006512.0	50199117547.0	53237882472.7
8	Brunei Darussalam	2438	2438	18525319977.7	19048495518.6	18093829923.3	17098342541.4	12930394937.8	11400653732.0
9	Bahrain	4806	4806	28776595744.7	30749308510.6	32539547872.3	33387712766.0	31125851063.8	1796186586414.5
10	Brazil	16086	16200	2616201578192.3	2465188674415.0	2472806919901.7	2455993200170.0	1803652649613.8	1796186586414.5
11	Canada	13292	13062	1788647906047.8	1824288757447.6	1842628005830.2	1792833225804.4	1552807652015.4	1529760492201.4
12	Switzerland	8567	8567	699579638638.2	668043614122.9	688504173431.5	709182559935.3	679289166858.2	668851296244.2
13	China	0	3234	7572553836875.3	8560547314679.3	9607224481532.7	10482372109961.9	11064666282625.5	11199145157649.2
14	Cuba	15590	15590	68990000000.0	73141000000.0	77148000000.0	80656100000.0	87132800000.0	⋮
15	Germany	8508	8056	3757698281117.6	3543983909148.0	3752513503278.4	3890606893346.7	3375611100742.2	3477796274496.8
16	Denmark	8082	8082	344003209695.6	327148899962.1	343584385594.1	352993633221.3	3012984464861.4	306899653409.6
17	Finland	7363	7363	273674236772.8	2567706466091.1	269980111642.9	272609288689.6	232439324529.6	238502900311.9
18	France	8893	8893	2862680142625.1	2681416108537.4	2808511203185.4	2849305322684.8	2433562015516.2	2465453975282.2
19	United Kingdom	8991	8991	2619700404733.4	2662085168498.9	2739818680930.2	3022827781881.4	2885570309160.9	2647898654635.2
20	Giorgia	5601	5601	14434619982.2	15846474595.8	16140047012.1	16509305827.7	13993546732.5	14378016729.2
21	Hong Kong	1981	1981	248513617677.3	262629441493.5	275696879835.0	291459356985.3	309403880389.1	320914302646.2
22	Hungary	7688	7688	140782064609.2	127856647107.8	135215704419.0	140118140454.7	122879042001.9	125816640420.6
23	Indonesia	2804	2804	892969107923.1	917869910105.7	912524136718.0	890814755233.2	861256351277.4	932259177765.3
24	India	2344	2344	1823049927771.5	1827637859135.7	1856672121394.5	2035393459979.5	2089865410867.8	2263792499341.0
25	Ireland	9322	9322	239018540057.0	225571857948.3	239389337002.8	258099015103.5	290617006704.0	304819020500.6
26	Italy	8264	8264	2276292404600.5	2072828231559.8	2130491320658.7	2151732868243.2	1832347450961.5	1858913163927.7
27	Jamaica	16090	16090	14439910353.1	14800165406.8	14274983015.9	13897723431.4	14186886642.7	14056908749.4
28	Japan	4782	4782	6157459594823.7	6203213121334.1	5155717056270.8	4848733415523.5	4383076298081.9	4940158776617.2
29	Kenya	6812	6812	41953433591.4	50412754822.0	55097343447.6	61445345999.1	63767539356.6	70529014778.3
30	Korea, Republic of	3796	3796	1202463682633.9	1222807284485.3	1305604981271.9	1411333926201.2	1382764027113.8	1411245558976.6

#	Country	Distance from Myanmar (km.)	Distance from Capital City(km.)	GDP 2011	GDP 2012	GDP 2013	GDP 2014	GDP 2015	GDP 2016
31	Kuwait	5089	5089	154027536231.9	174070025008.9	174161495063.5	162631763879.1	114567298105.7	110875579086.7
32	Mexico	15670	15670	1171187519660.6	1186598324461.8	1261981728468.5	1298461494903.1	1152263780657.9	1046922702460.9
33	Malaysia	1635	1635	297951960784.3	314443149443.1	323277158907.0	338061963396.4	296434003328.6	296535930381.1
34	Nicaragua	16808	16808	9774316692.2	10532001129.7	10982972256.4	11880438824.4	12747741539.7	13230844686.9
35	Norway	8153	8153	498831558925.9	510229136226.9	523502127659.6	499385334779.2	386663139402.7	371076190476.2
36	Oman	3982	3982	67937307412.2	76689583355.0	78938585175.6	81034395058.5	69831770871.3	66293368010.4
37	Pakistan	2972	2972	213587413184.0	224383620829.6	231218567179.0	244360888750.8	270556126820.1	278913371202.1
38	Philippines	2666	2666	224143083706.8	250092093547.5	271836123723.7	284584522898.9	292774099013.7	304905406845.3
39	Poland	7542	7542	528725113045.8	500284003684.4	524201151607.2	545075908846.0	477279647754.7	471364408714.0
40	Qater	4710	4710	167775274725.3	186833516483.5	198727747252.7	206224725274.7	164641483516.5	152451923076.9
41	Russian Federation	6526	6526	2051661732059.8	2210256976945.4	2297128039058.2	2063662665171.9	1365864126832.8	1283162985989.3
42	Saudi Arabia	5190	5190	671238840106.7	735974843360.0	746647127413.3	756350347333.3	651757333333.3	646438380560.0
43	Singapore	1920	1920	275599459373.5	289162118908.5	302510668904.3	308142766948.1	296840704102.4	296975678610.2
44	Sweden	7742	7742	563109663291.2	543880647757.4	578742001487.6	573817719109.4	497918109302.4	514459972806.2
45	Thailand	576	576	370818747396.8	397559992407.5	420528737876.7	406521561093.4	399234547137.5	407026127310.4
46	Turkey	6902	6567	832546270783.8	873981786532.1	950595270314.3	934167809301.7	859794177118.1	863711710426.5
47	Taiwan	2788	2788	485670000000.0	495920000000.0	511590000000.0	530038000000000.0	523006000000.0	..
48	Ukrain	6868	6868	163159671670.3	175781379051.4	183310146378.1	133503411375.7	91030959454.7	93270479388.5
49	Uruguay	16626	16626	47962439293.4	51264390121.4	57531233350.9	57236013077.5	53274304214.8	52419720713.7
50	United States	13550	13799	15517926000000.0	16155255000000.0	16691517000000.0	17393103000000000.0	18120714000000000.0	18624475000000000.0
51	Venezuela	16465	16465	316482190800.4	381286237847.7	371006299120.2	482359318767.7	..	..
52	Viet nam	1124	1124	135539438559.7	155820001920.5	171222025117.4	186204652922.3	193241108709.5	205276172134.9
53	Yemen	5540	5540	32726417878.4	35393148127.3	40415233436.2	43228583935.0	37733919936.2	27317605346.1
54	South Africa	9966	8743	416878162440.9	396332598448.2	366810014300.2	351119102947.1	317610719411.5	295456189492.0

Source: 1) World Development Indicators database, wdi.worldbanl.org/tables