Doctoral Thesis

Integrated Food Control Systems

Toward Food-Safety and Trade-Promotion in Myanmar

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ミャンマーにおける食の安全と貿易振興のための

統合的食料管理システム

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Abstract

In the realm of food safety,food control is a tool to achieve safety required for either hygienic-based or priced-based demand of food.Four case studies were utilized in this doctoral dissertation to scrutinize about food control in Myanmar.This dissertation was started with assessing the overall capacity of food control laboratories assigned with trade-related quality assurance task and the functional capacities of the supporting National Quality Infrastructure (NQI).Severity of supply-side constraints such as institutional capacity-based and compliance-based constraints to agricultural production systems showed the main drawback in export-led growth and that is a galvanizing issue for an agrarian country like Myanmar.

Secondly,street food sector was selected to investigate the authority's controlling aspects of street foods towards safety,to investigate the vendors' understanding of proper practices for safety and also to find out the constraints that prevent adoption of proper food handling practices.It is an important sector for developing countries where the numbers of informal businesses are majority especially in food sectors.Yangon City Development Council(YCDC) is mainly responsible for controlling food stalls in Myanmar.Interviews were conducted with the authority from the health department of the YCDC.A total of seventy two(n=72) street food vendors from the downtown area included.Demographic profiles of vendors,their food safety knowledge,constraints regarding proper handling practices etc.were assessed by using a semi-structured questionnaire.It was found that YCDC had already established five key components of food control system for controlling food stalls, however,street foods was not under control,if comparing with other stationary food stalls.That situation prevented the opportunity to educate vendors.Lack of availability of clean water sources and self-reported food safety knowledge weakness were two main constraints in practicing proper handling practices among other results.In addition, consumer's attitudes on this informal food sector from safety perspectives were conducted to explore street food consumers' attitude towards food handling practices and safety of street foods in Yangon,Myanmar.A total of one hundred and sixty seven (n=167) street foods consumers took part in this study.Among other findings,this study found that more than 75 % thought that street food stalls should be under the authority's control for safety. Most of them 65% had better impression on the sanitary condition of the stationary food shops if comparing with that of street food shops.Nearly 87% responded that they were not satisfied with the safety of street foods.Easy accessibility and saving time are the two main reasons for consumption of street foods.

Having the capacity of fulfilling lucrative markets requirements,Myanmar fishery-export sector was selected for a trade-related case study from food control aspects.This case study aimed at characterizing food control for the trans-boundary fishery trade specifically, from the points of view of both public food control provision and firm level adoption of food safety standards.The recognition

of Myanmar competent authority CA for fishery products export to EU was approved in 2009 resulting in 20 approved fishery processing plants in the EU publication list.This study showed that food control by the CA plays an essential role for the export success of firms.Regardless of how small or big the approved firms are and whether they possess private certificates or not. To comply with regulatory and customers' requirements and to get access to new markets are three major incentives towards the adoption of HACCP system.The need to retain trained production staffs and managerial staffs are two major challenges in the adoption of HACCP for the firms.Moreover, it was also found that more than 86% of fisheries processing firms of Myanmar were still inside the informality food control trap and only approximately 14% of the firms were eligible for export to EU markets.

When it comes to food control in transboundary food trade either export or import, it is vital to have sound NQI designed for supporting the implementation of food control measures aimed at quality assurance provision in export and protection of consumer against adulterated foods in import. Thus,this case study aimed at accessing the import food monitoring of Myanmar and Japan so as to conduct food control measures of trading countries in transboundary food trade.

With a number of food legislation, regulatory framework of Japanese import food monitoring supported and guided the responsibilities of food authority, quarantine stations, private inspection and testing agencies and importers.A strong negative correlation was found between consultation at quarantine stations and violations of import food with r value 0.78.Even though the number of delegated laboratories in 62 countries was 42 times higher than that of the domestic laboratories, they shared only 10% of total testing.Import food monitoring in third countries revealed less advantage in scope and food items, if comparing with EU.However,Japan chose not to rely on monitoring of export country solely rather than giving consultation to exporters and training to importers.The national standard formulation method is based on risk analysis in accordance with internationally accepted norms.Japan's import food monitoring was streamlined in accordance with global trend.The food authority of Japan took continuous restructuring with sound national quality infrastructure aimed at protection of consumer against adulterated imported food.

The characteristic of the food control system of Myanmar for import food monitoring is generally in accordance with GL 47/2003 CODEX,the international guideline other than uniformity in nationwide implementation.The link between the food authority and food control at quarantine stations is totally lost.Import food safety is, in fact,the concern of most Myanmar people including food importers,food exporters and inspectors.For preventing the adulterated food import, monitoring of import foods needs the integration of food control system in technical and managerial capacities so as to implement import food control effectively.

It is obvious that Myanmar quality infrastructure particularly in food sectors is on the brink or in the middle of quality assurance crisis due to insufficient capacity at institutional level and a widespread informality food control at business level.The investments in food control at farm level,

processing level and institutional level are urgently required that must support and reflect the need of domestic food sectors and the priority of the nation's economy strategically in Myanmar.

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Abbreviations

ASEAN	Association of South East Asian Nations
AQSIQ	General Administration of Quality Supervision, Inspection & Quarantine –China
ALOP	Appropriate Level of Protection
ARASFF	ASEAN Rapid Alert System for Foods and Feeds
CA	Competent Authority
CAC	CODEX Alimentarious Commission
CAC 52/2003	Code of Practices for Fish and Fishery Products
CAC 53/2003	Code of Practices for Fresh Fruit and Vegetables
CAC/RCP1-1969	General Principles for Food Hygiene
CCA	Central Competent Authority
CNCA	Certification and Accreditation Administration of the People's Republic of China
CODEX	International Code of Voluntary Standards published by CAC jointly sponsored by FAO and WHO
DOF	Department of Fishery
EC 882/2004	Official Control Performance for Verification of Compliance
EC 852/2004	Hygienic of Food Staffs (Food for Non-animal Origin FNAO)
EC 853/2004	Hygienic of Specific Food Staffs (Food for Animal Origin FAO)
EC 854/2004	Specific Rules for Official control (Competent Authority of the 3rd Country)
EC 211/2013	Certification Requirements for Seeds and Sprouts Products
EC2074/2005	Certain products under Regulation in connection with EC No.853/2004
EC96/23	Establishing residue monitoring plans, sampling frequency and range of substances
EC	European Union
FAINS	Food Automated import Notification and Inspection System
FBO	Food Business Operators
FDA	Food and Drug Administration
FIQCD	Fishery Inspection and Quality Control Division
FSMS	Food Safety Management System
FSO	Food Safety Objectives
FVO	Food and Veterinary Office of EU
GHP	Good Handling Practices
GLP	Good Laboratory Practice [ISO-17025]
GMP	Good Manufacturing Practices
GAP	Good Agriculture Practices
HACCP	Hazard Analysis Critical Control Points
HC	Health and Food Safety (DG-SANTE)

ICS	Inspection and Certification Section
IEC	Information, Education and Communication
ISO	International Standards organization
ISO 9000	ISO's Quality Management Standards for a company/an Organization
ISO14000	ISO's Environmental Management System for a company/ an Organization
ISO22000	ISO's Food Safety Management System for an organization in food-chain
MHLW	Ministry of Health, Law and Welfare
MITS	Myanmar Inspection and Testing Service
MLBF	Ministry of Livestock, Breeding and Fishery
MNQI	Myanmar's National Quality Infrastructure
MOC	Ministry of Commerce
MOH	Ministry of Health
MOI	Ministry of Industry
MSTRD	Myanmar Scientific and Technological Research Department
MRA	Mutual Recognition Agreement
NC	Non Compliance
NAFIQAD	National Agro Forestry Fisheries Quality Assurance Department
NQI	National Quality Infrastructure
NTM	Non-tariff Measures
PP	Processing Plant
PTS	Proficiency Testing Scheme
RASFF	Rapid Alert System for Foods and Feeds
SPS	Sanitary and Phyto-sanitary Measures
SSOP	Sanitation Standard Operation Procedures
TBT	Technical Barrier to Trade
TC	Third Country [Export country]
UNIDO	United Nations Industry Development Organization
US-FDA	U.S. Food and Drug Administration
WTO	World Trade Organization
YCDC	Yangon City Development Council

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[1] http://www.forth.go.jp/keneki/hiroshima/pr/2015/stock/12th.pdf

Chapter 1

Introduction

1.1.Introduction

Myanmar is principally an agricultural food production country, endowed with promising factor of productions and favorable weather condition. Situated in the main land South East Asia, it is the biggest country with the total area of 676,578 square kilo meters sharing lengthy border with Thailand, Laos,China, Bangladesh and India.It possesses about 1,900 km coastline along the Bay of Bengal and the Adman Sea.The estimated population of Myanmar is about 51,419,420 as of 2014 (MOIP,2014) and the population density per square kilometer is 82 in 2014 (World Bank,2014).

It can be divided into five broad regions based on physical-geographic characteristic such as (1) the Shan Plateau in the eastern part,(2) the northern and western folded hills,(3) the landlocked central belt, (4) the long coastal strips of Rakhine and Tanintharyi, and (5) the fertile delta area. Agricultural development has been mainly concentrated in the delta and extensive fertile alluvial plains of the central belt, which comprises the lower and middle basins of the Ayeyarwady River, the lower reaches of Chindwin River, the Sittaung River and the Bago River basins (GMS, 2009).

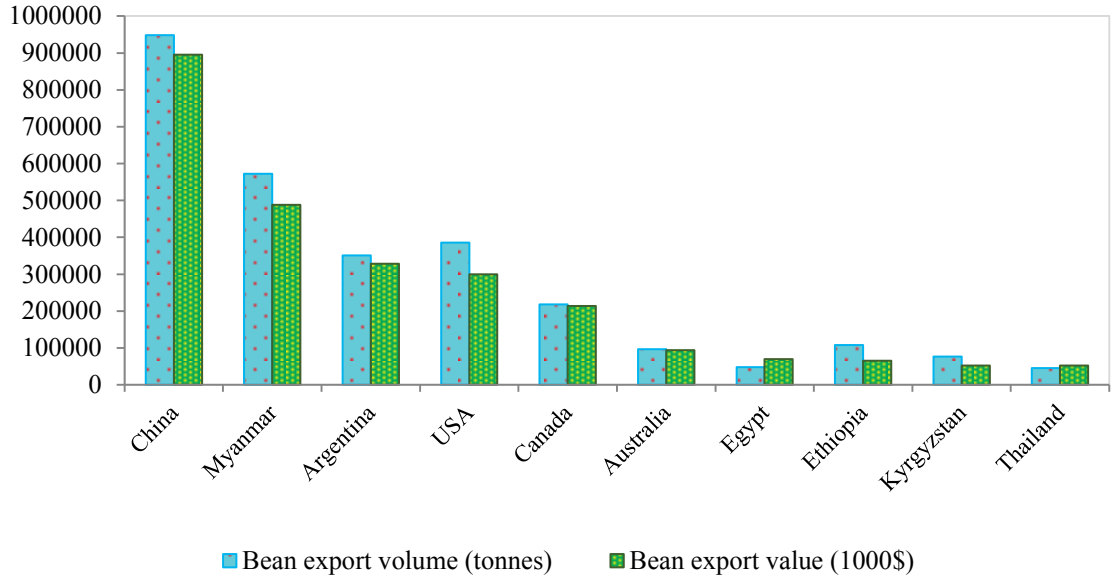
Figure 1.1. Map of Myanmar

Source: https://greatboatjourneys.files.wordpress.com/2013/11/myanmar_map.jpg

With the vast arable land and more than 63% of labor force engaged in agriculture sector, Myanmar has significant agricultural potential and a food surplus country indeed. In spite of its' richness in natural resources, Myanmar remains one of the poorest countries in Asia.Nearly 70% of population resides in rural areas and around one third (32.7%) of population is under poverty line (CIA,2007).

Myanmar exports a variety of primary produces and stands as the leading country in production and export of beans among ASEAN countries (Sein,2012) as the world second largest exporter of bean(dry) as shown in figure (1.2).

Figure 1.2.World top ten exporters of Bean (Dry)



Source: FAO (2011)

Even though one of the three main objectives of Myanmar agriculture sector is to increase foreign exchange earnings by export (MOAI), the trade-supported industries failed to collaborate with the agricultural export promotion effort (ITC,2015).The market for high quality and safe food products hardly existed in Myanmar due to various kind of market imperfection in credit, insurance, land and labor markets in the rural economy (Kudo and Yamada,2012).

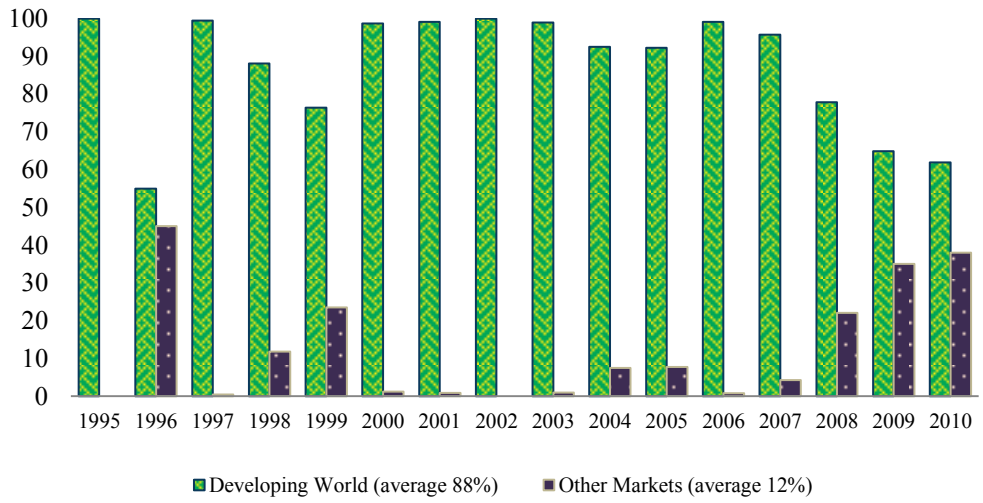
For achieving the export-led growth in poverty reduction, it is requisite to capitalize in food production system at primary level, processing level. Developing countries are generally concerned with food security. As food safety is part of achieving food security, developing countries have to contemplate food safety issues that have an important implication on export opportunity (Achterbosch and Tongeren, 2002).

1.2.Justification of the Study

Limited functional capacity and inadequate resources of government's food control are common constraints in export success of agricultural-resource-rich developing countries, thereby resulting to less competence in international food trade.The main sources of income for majority of the population depend on and directly relate with the success of primary food production and export. Thus,governments need to invest in food control system and other segments such as formation of commodity standards,consistent quantity provision,and reliable inspection and laboratory services for the trading system to be efficient.

To become a market-oriented agriculture production country, Myanmar needs to invest in food control[1] in production system to take part in global value chain effectively.During the last 30 years there has been little investment in quality infrastructure of Myanmar that acts as a constraint on trade and export led growth (UNIDO,2013).Figure (1.3) illustrates that majority (88%) of Myanmar fishery products' market destinations is developing countries, as shown below.

Figure1.3.Destined markets of Myanmar fishery products export



Source: Statistical Data of Department of Fishery in Myanmar (DOF,2012)

Control Authorities with the respective food control systems are in place, but without quality policy for export success (ITC,2015) and weak in sharing export success as a common goal among public agencies (Wai and Yamao,2014a).

The assessment of food control system in Myanmar found a number of challenges that includes insufficient food control that undermined the system's effectiveness and disrupted international trade, practicing traditional food control without separate food policy and so on (Wai and Yamao,2012b).A study stressed that there were many rooms left for development of the components

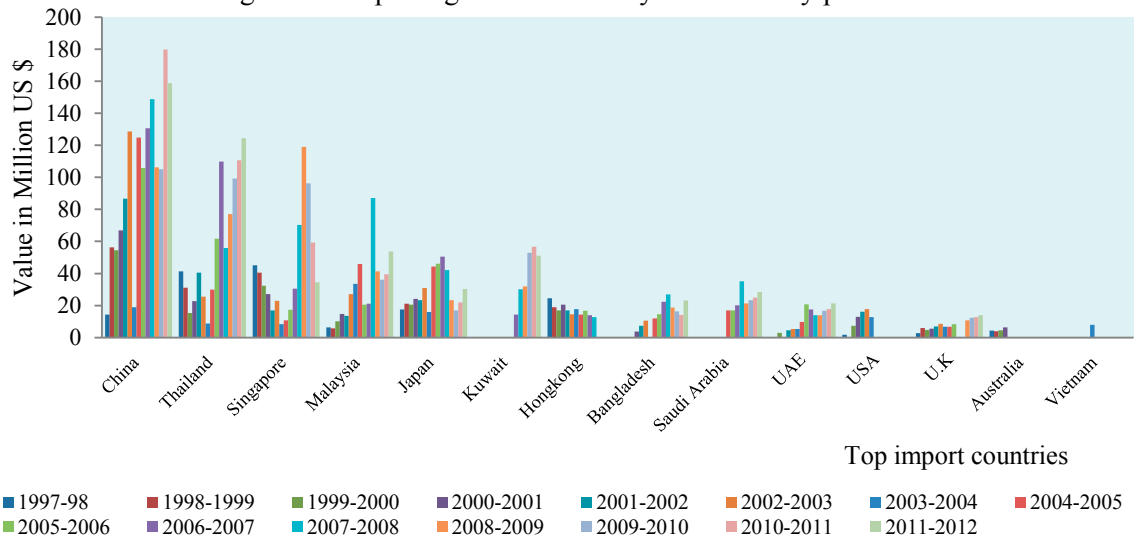
[1] Food control is the mandatory regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods during production, handling,storage,processing,packaging,transportation,distribution and sale are safe,wholesome and fit for human consumption;conform to safety and quality requirements;and are honestly and accurately labeled as prescribed by law (FAO/WHO,2003).

of the food control system for health and trade efficacy due to having a huge gap between food control governed by authority and food production industries (Wai and Yamao,2014a).Moreover, a case study on perception of food traders and inspectors showed the need of more operation among the responsible food control agencies for trade success.In this study,food inspector did not show strong confidence regarding the effectiveness of food control monitoring that they professionally involved (Wai and Yamao,2014b).

As regard with timeliness of food and drug administration-FDA's testing, some domestic food producers demanded quicker approval for their food products (Commerce,2011).Concerning with post-market surveillance, food and drug administration-FDA sometimes released the list of banned products (mostly targeting on traditional medicine and tea-leaves products) in state-owned newspapers, some local consumers started to raise questions about safety and quality of other food items sold in local markets that were still unchecked yet (Wai and Yamao,2012 and Kyaw,2011).

Regarding with the fulfilling of requirements in trade, only general export procedures for all exported goods existed in Myanmar (EU,2014).Thus, over 90% of Myanmar primary products were sold to the countries with less rigorous SPS regulation requirements (Wai and Yamao,2014a and Aye, 2005) due to lack of ability to overcome the non-tariff measures of lucrative markets.Figure 1.4 illustrates top importing countries of Myanmar fishery products as shown below.

Figure1.4. Importing countries of Myanmar fishery products



Source: Statistical Data of Department of Fishery in Myanmar (2012)

In terms of technical regulation, Ministry of Science and Technology MOST being responsible for standard setting admitted that there were technical regulation information gaps between National Standard Body-NSB and Trade Promotion Organization-TPO (MOST,2012). Wai and Yamao mentioned that agri-export success in Myanmar was facing with the challenge of quality assurance,as a result of lack of appreciation on commodity standards formation,insufficient resources in food control works, etc.(2014a).There was no strong brand image of Myanmar products, for

instance:sea food,in international market (CBI,2012)however,neighboring countries (China, Thailand, Bangladesh,etc.) are buyers and re-exporters of Myanmar (fishery) products (Wai et.al., 2015).

Weak food control at border is another issue that impacts on food safety. Food imported from border areas was not under strict control due to limited capacity as well as smuggling (Wai and Yamao,2012b).Smuggling of goods into and from Myanmar was pervasive (Kubo,2012). The entering of adulterated contraband goods was quite common especially from China and Thailand border routes (Thu et.al.,2012).

Two identified food safety challenges are (1) chemical hazards: Histamine in dried-anchovy, Antibiotic residues:Nitrofuran,Chloramphenicol in fish and raw meats,etc. and (2) microbiological hazards: *Escherichia coli* and fecal coliform in beans,*Vibrio cholera* in ice products,*Staphylococcus aureus* in milk and milk products and salads,etc.(Ilsijapan,2014).According to Food and Drug Administration,microbiological contamination is a major problem associated with street foods, reported during market assessments (Nwe,2011).

1.3.Research Questions

There are five main research questions for the dissertation.

(1) **Capacity of food control laboratories and NQI** What are the level of capacity of public food control laboratories involved in Myanmar quality infrastructure? Are they in place efficiently for trade promotion?

(2) **Food control in informal food sector: Street food** How is street food control system managed by the concerned authority Yangon City Development Council and how do they implement food control measures in reality? What are the demographic of food vendors, what are their opinions towards Control agency's food control for safety? And what are the challenges facing in vending? Who are street food consumers, what are their opinions on street foods and their attitudes towards Control agency's food control and producers for safety? What are the recommendations for this informal sector?

(3) **Food control in formal food sector: Fishery export** How did fishery competent authority develop the provision of food control to be able to cope in international market? How did firms achieve technical requirements and what are their food safety management systems FSMS at the firm level? What are the challenges for competent authority CA and firms in terms of food control system adoption at their level? What are the lessons learnt and implications from this sector?

(4) **Import food control monitoring system** How Myanmar and Japanese food control system works in import food control and domestic food production? What are the

characteristic of import food monitoring & inspection and what are the strength and weak points of the system? What are the main hurdles that export country needs to overcome?

(5) Integration of food control for trade-promotion and food-safety How integration of food control system obliged in export countries? What are the recommendations for policy makers toward food safety and trade success?

1.4.Purpose and Objectives of the Study

The main purpose of this study is to explore the necessity of integration of food control systems for trade and health efficacy in Myanmar. The five specific objectives are as follows:

(1) To access the deficiency of standard SPS diplomacy in trade and the capacity of food control laboratories involved in Myanmar quality infrastructure that impacted on food-safety and trade-promotion

(2) To explore domestic food safety by assessing food control regulatory principles managed in street food sector by the concerned authority and how they implement in reality, to investigate socio-economic condition of street food vendors,their understanding on proper practices and to know their opinion on control agency's food control,to examine socio-economics situation of street food consumers and their opinion on control agency's food control

(3) To investigate export food control in fishery sector achieved by the competent authority and firms and to examine the challenges firms faced for further trade-promotion

(4) To access import food control system particularly in monitoring & inspection of imported foods and to explore how Japan and Myanmar provided food control for consumer protection against the adulterated imported foods

(5) To provide recommendations in food control system integrations towards food-safety and trade-promotion

1.5.Organization of the Dissertation

It is organized with eight chapters.The first chapter mentions the introduction of the thesis including general introduction,the justification of the study, research questions, research objectives and the overview of the study.It will describe main exportable agriculture production and export of Myanmar, the brief expression of food control related issues in food sectors, the reasons for choosing the selected case studies,etc.

Chapter (2) presents the methodology of this study including study area, data collection, characteristic of the samples,data analysis and so on.Food control is the regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods along food chain be safe,wholesome and fit for human consumption;conform to safety and quality requirements; and are honestly and accurately labeled as prescribed by law. Therefore a number of government officials respondents from Food and drug administration-FDA,Yangon City Development Council-YCDC, Department of Fishery-DOF of Myanmar and Hiroshima Quarantine Station-HQS of Japan.Moreover, individual artisanal food producers-vendors,consumers,export-oriented fishery firms, and an import food inspection company were included in this study.

Chapter (3) presents the literature review of why regulated food control is needed for achieving socially optimal level of food safety, food control system for public health and trade, the role of standards, non-tariff measures and their application on trade,why investing in National Quality infrastructure is crucial for trade and business, the conceptual framework for achieving food safety in food sectors,food safety management system at firm level and the research framework for the dissertation.This chapter is divided into six main parts (1) market, government and socially optimal level of food safety,(2) food control system for public health and trade concerns,(3) national quality infrastructure NQI for trade and businesses,(4) food risk reduction in trade and business,(5) food safety management system FSMS at firm level and import food monitoring in trade and (6) research framework of this dissertation.

Chapter (4) is to explore the capacity of seven food control laboratories involved in national quality infrastructure of Myanmar and review the compliance-based assessment of two main exportable items.Having considered that the overall capacity of food control laboratories assigned with trade-related quality assurance task and the functional capacity of the supporting national quality infrastructure NQI are prime-movers in overcoming non-tariff measures in transboundary food trade, it is reasonable to examine the capacity of food control laboratories that assure safety for trade and businesses.For this reason,the functional areas of the NQI were accessed that need to be operated with compelling institutional capacity to fulfill the compliance-based demand.

It was found that the existing human capacity of Myanmar food control laboratories assigned with trade-related quality assurance task needed recruitment if their services are still considered crucial for trade.Likewise,other financial,structural and technical capacities were not compatible with the workload and outdated in service provision for trade and business that call for update restructurings from time to time.The NQI of Myanmar is facing with lacking of functional capacities in accreditation and conformity assessment for manifestation of the competency of food control laboratory.Severity of supply-side constraints such as institutional capacity-based and compliance-based constraints to agricultural production systems were found as the main drawback in export-led growth of agriculture sector.

Chapter (5) is the investigation on food control in informal food sector: street foods. It is to explore the authorized agency's food control system such as the legislation for street food, institutionalization of street food in urban place and provision of food safety management with inspection and testing services,the socio-economic condition of vendors and their opinion towards food control of agency and the opinion of the street food consumers towards the practices of vendors and the control of the authority.

It was found that the concerned food authority had developed the components of the food control system and the standardized practices for food establishments including street food stalls. However, the supply of street foods in Yangon is an unregulated food supply that is very dubious to socially optimal level of food safety.The politic of the acceptance of this informal sector is another important issue.That underlying institutionalization issue exacerbated the resource-poor food control measures in this informal sector.Vendors and consumers showed their concerned on food safety and appreciated control agency's food control management.A steady progress in the recognition of street food business was found however, there was no official recognition yet aiming at protection of the vendors' right whilst paving the way to safer food production.That situation prevents the implementation of food control measure in practice.It reveals that without enabling environment and infrastructure, application of food control practices is still not feasible.

Chapter (6) is to survey how food control provision is achieved in fishery export sectors, the recent trend in global food control restructuring, the need of vertical integration at government level and horizontal integration at firm level, the application of public and private standards in fishery firms and the assessment of the challenges faced by the approved fishery firms. In this study, it was found that fishery competent authority CA initiated integration of fishery control system successfully (among all other food sectors) and achieves mutual recognition agreements with EU, China, Vietnam, and ASEAN markets.It is in response to the requirements of markets; there were still some shortcomings though. Private firms play the role in fishery business**;**however they have to be controlled by the CA, regardless of how many private standards they possess. The more fishery firms

can invest in quality assurance of public standard by means of HACCP plans, the more they can export to several markets.Thus,dual integration both at government and firm level are required.That clearly showed the need of investment in quality infrastructure to facilitate transboundary food trade.

Chapter (7) is to examine the import food monitoring in Myanmar and Japan based on four main themes (1) regulatory framework for import food monitoring,(2) related organizations' import food monitoring,(3) monitoring of food authority at quarantine station and (4) National standards for technical references.The fragmented institutional capacity adversely affected the monitoring of imported food, for the case study of import food monitoring in Myanmar. Import food monitoring exists just in the form of reactive measure for conventional maritime trade that largely depends on document checking and testing the food samples taken by importers.It is ambiguous for ensuring food safety.Being a mainland country,Myanmar has less advantage in import food monitoring along the porous cross-border line. That type of non-uniformity in nationwide food control implementation should be averted by integration of food control measures.

It was found that Japanese import food monitoring system employs global risk-based inspection model with two tiers of checking: document checking and physical checking. Given the advantage of technological improvement in food production, it is still possible for Japanese import food controlling agency-Ministry of Health, Labor and Welfare to rely on document checking for ensuring food safety. In terms of food control coverage along food chain in export countries, Japan also restructured in consort with the 2009 reform of EU, as a new preventative approach covering 27 investigations in some export countries.It was found that Japan's import food control is streamlined in accordance with the global trend.

Finally chapter (8) states conclusion and recommendations of this study. It will include the findings from the assessment results of the cases studies so as to suggest how investment in food control system is necessary and integrated food control system governed by competent authority for trade and health efficacy with technical help to the policy makers in solving food-safety and trade-promotion issues in Myanmar.

Chapter 2

Methodology

2.1. Introduction

This research includes a number of approaches in order to conduct food control case studies comprehensively.As food control is one of the essential tasks supplied by government for protection of consumer against adulterated foods (Wai and Yamao,2012b),a number of government officials respondents from Food and drug administration-FDA,Yangon City Development Council(YCD), Department of Fishery(DOF) of Myanmar and Hiroshima Quarantine Station(HQS) of Japan contributed in this study.Moreover,individual artisanal food producers-vendors,consumers, export-oriented fishery firms,and an import food inspection company were included.Therefore,in this research the personals from State (Myanmar,Japan),firms (Myanmar,Japan) and individuals (Myanmar) were included for trans-boundary trade and domestic food safety concerns.

2.2. Case Studies

This dissertation is mainly made up of four case studies to explore the capacity of Myanmar food control and its supporting quality infrastructure for various food sectors: formal,informal and import food sectors.Due to the dearth of research, little was known in food control of Myanmar that impacts health and trade sectors directly.The summary of four case studies is mentioned in table (2.1).

Table 2.1. Summary of four case studies

	1st **Capacity of Food Control Laboratories** [N.Q.I.-Myanmar]	2nd **Street Food Food control** [Food Control in Domestic]	3rd **Fishery Products Food control** [Export Food Control]	4th **Japan / Myanmar Import Food Monitoring** [Import Food Control]
Place	Yangon	Yangon	Yangon	Kobe, Hiroshima
Year	2015 March	2013 Aug-Sep	2014 April-May	2014 September, 2015July
Population	1.Food Control Laboratories at National level and Standardization (Government)	1. Control Agency YCDC (Government) 2. Street-foods Vendors 3. Consumers	1. Control Agency (Government) 2. Approved Firms	1. Food Testing and Inspection Company (Private) 2. Prefecture monitoring (Government)Hiroshima 3. Related agencies
Sample Size	n-7 (86%)	N-1 (100%) n-72 (10-12%) n -167	N-1 (100%) n-17 (85%)	n-1 (20%) n- 1 (7.6%) n-6 (75%)

Questionnaires	Semi-structured	Semi-structured	Semi-structured	Semi-structured
Analysis	Descriptive Analysis	Descriptive Analysis Inferential Analysis	Descriptive Analysis	Descriptive Analysis Inferential Analysis
Theme	1. Capacity of labs involve in NQI 2. Direction of labs and their involvement in standard setting for SPS diplomacy of National quality infrastructure	1. Food Control system of street food 2. Vendors attitude on risk factors 3. Consumers attitude on street food safety Control agency' intervention on safety	1. Fishery food control system for international trade 2. Firm level adoption of FSMS Incentives and challenges for firms 3. Dual integration	1. Regulatory framework for Import Food Control 2. Related organization for Import food 3. Monitoring at Quarantine station 4. National Food standards for technical reference

2.2.1. Case study (1): Capacities of food control laboratories and National quality infrastructure in Myanmar

This study was conducted in Yangon where all food control laboratories existed.As lack of capacity to implement SPS agreements is the key challenges of developing countries (Padickakudi, 2006),this study explore National Quality Infrastructure that supports food(testing)control laboratories. It is important to take into account of prevailing local capacity of food control laboratories that performs SPS functions for maintain market access.

(1)Study area	Yangon
(2)Duration	2015 April
(3)Sample size	seven food control laboratories (n=87%)
(4)Characteristic of Respondents	Head of National level food control laboratories
(5)Primary and Secondary data	Primary data,Semi-structured questionnaires(annex1)
(6)Data collection and Analysis	Interviews,Descriptive analysis, Mapping Matrix

2.2.2. Case study (2): Food control in a domestic sector: Street foods control

This study was conducted in Downtown, Yangon.Three respondent groups (1) street food authority (N=1),(2) street foods vendors (n=72),(3) street food consumers (n=167) included in this research.Those three types of respondents are important primary stakeholders for achieving food safety to implement validating control measures.Their knowledge, their capacity for food control and the enabling infrastructure are the three keys factors to put the proper practices into the food production.For every stakeholder, the standardized practices/guidelines have been developed, so the questionnaires were structured in accordance with these guidelines.

(I) Street food Regulator: YCDC Official

By using a semi-structured questionnaire (Annex2),interviews with the authority from the health department of the Yangon City Development Council YCDC were conducted, after getting approval from one of the cabinet members of the YCDC Committee.To our knowledge,this was the first investigation of the food control system for food stalls to identify the governance administered by the YCDC.Food legislation,food control management, inspection service,laboratory service and information,education and communication-IEC activity are five key components of the system for controlling street food.

(1)Study area	Yangon (5^{th} floor 38 plaza ,38^{th} street ,Yangon)
(2)Duration	2013 August and September
(3)Sample size	N=1(100%)
(4)Characteristic of respondents	Regulator of street food
(5)Primary and Secondary data	In depth interviews,Available books of YCDC
(6)Data collection and Analysis	Interviews,Explanatory method

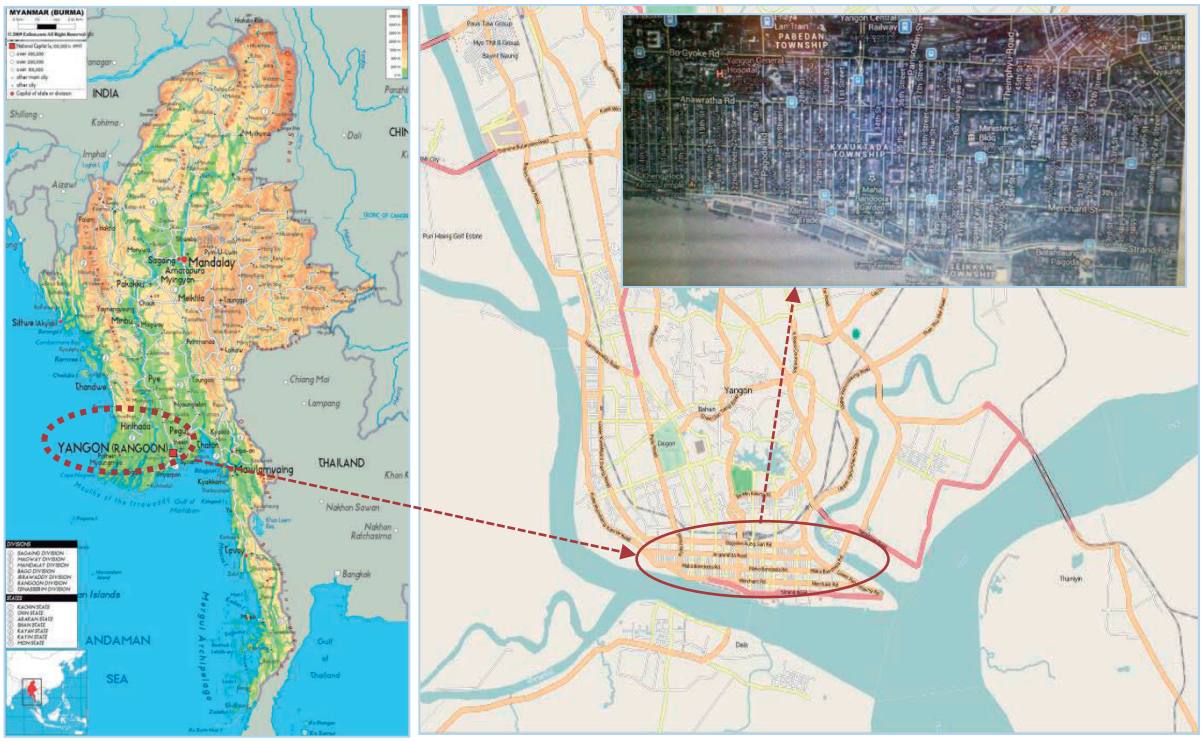
(II) Street foods Vendors

The study was conducted during August-September 2013,in downtown Yangon, Myanmar.A total of seventy two respondents (n=72) contributed towards the accomplishment of this study.The vendor respondents were requested to participate in surveys with the semi-structured questionnaires (Annex3).Revisions were made of the questionnaires until it could be answered and was clearly understandable.Pre-testing was performed randomly with some vendors.A simple random sampling technique was used to access three major themes: the demographic profiles of the vendors,their food safety knowledge and constraints on proper handling practices.The majority of the questions for vendors,with the exception of some demographic questions,were designed with a given set of options to save time during their busy business hours.

Information and secondary data were collected starting in April 2013 from various sources such as government offices and research organizations to review the governing regime.The collected data were examined during and after collection.Only fully answered questionnaires were used for analysis.The IBM SPSS Statistical software package was used to carry out the statistical analysis. Simple descriptive statistics were employed to analyze frequency,percentage and standard deviation.Face-to-face interviews were carried out to obtain in-depth knowledge.

(1) Study area	Yangon (Downtown)
(2) Duration	2013 August and September
(3) Sample size	n= 72 (10-12%)
(4) Characteristic of respondents	Street food vendors in Yangon
(5) Primary and Secondary data	Field survey,Available scholarly articles
(6) Data collection and Analysis	Interviews, Field survey,Descriptive Analysis and Inferential analysis using IBM SPSS software

Figure 2.1.Map of Myanmar and study area: downtown Yangon



Source: Google Map (2013)

(III) Consumers

A total of one hundred and sixty seven (n=167) street foods consumers took part in this study.The study was conducted during August-September,2013,in Yangon,Myanmar. Simple random sampling technique was employed and having the experience of street foods consumption is the only condition required in selection of respondents stayed in Yangon during the study period.Consumers' respondents were requested to take part in surveys with the semi-structured questionnaires.

For the sake of the respondents' convenience,majority of the questions were designed with a given set of options,with the exception of some demographic questions.No incentive was provided for being taken part in this survey.Revision of the questionnaires was made until it could be answered clearly.Pre-testing was performed randomly with some consumer

respondents. No previous study of this kind was found in the same study area and that limits in comparison with other study for further discussion.

Information and secondary data were gathered since April 2013. The collected data were examined during and after collection.Only fully answered questionnaire (Annex4) were entered for analysis.The SPSS Statistical package IBM software was used to carry out the analysis.Simple descriptive analysis was employed to analyze frequency,percentage and standard deviation.Face-to-face interviews were carried out to get in-depth knowledge.

(1) Study area	Yangon
(2) Duration	2013 August and September
(3) Sample size	n= 167
(4) Characteristic of respondents	Consumer
(5) Primary and Secondary data	Field survey, Available scholarly articles
(6) Data collection and Analysis	Interviews, Field survey, Descriptive Analysis and Inferential analysis using IBM SPSS software

2.2.3. Case study (3): Food control in export: Control of fishery products for international trade

The investigation was started in April and conducted in May and June 2014 in Yangon with two aims.The first aim is to examine the policy support and the food control system integration of the fishery competent authority CA for international markets.The second is to investigate incentives for and challenges to adoption of HACCP in the approved firms.

Interviews with the responsible personnel of the Fish Inspection Quality Control Division FIQCD: the delegated CA of EU,were conducted to get in depth knowledge by using semi-structured questionnaires(Annex5).The incentives to adopt the HACCP system and the accompanying challenges at firms were identified in Myanmar for the first time to assist policy makers.During the survey period, twenty fishery processing plants were approved in the national list of export to EU.Both primary and secondary data were used in this study.To investigate at the firm level, interviews with eight processing factories and two jetties were made initially.The consent letters were received during the interviews.Questionnaires(Annex6) were then sent to all the 20 factories on line again for accessing incentives and problems related in HACCP system application particularly focusing on the firms' exports to EU.The response rate of the questionnaire was 85%.FIQCD helped the research team especially for answering interviews, providing data and communication with firms.

(1)	Study area	Yangon
(2)	Duration	2015 April
(3)	Sample size	n=17 (85%)
(4)	Characteristic of respondents	Approved fishery processing plants
(5)	Primary and Secondary data	Field survey,Available scholarly articles
(6)	Data collection and Analysis	Interviews,Field Survey,Descriptive Analysis

2.2.4. Case study (4):Food control for transboundary trade:Import food monitoring of Myanmar and Japan

(I) **Import food monitoring in Japan**

Surveys were performed at a private inspection corporation and a public quarantine station respectively for this study.The first survey was conducted at Japan Frozen Food Inspection Corporation JFFIC being one of the five largest private inspection institutions of Japan in 2014 November.Short surveys were carried out with two times visits to JFFIC[2] situated in Kobe.The second survey was conducted in July 2015 at Hiroshima Quarantine Station, Ministry of Health,Labor and Welfare-MHLW using semi-structured questionnaires (Annex7).

Both Qualitative and Quantitative methods were used to assess food control system of Japan mainly focusing on import food monitoring for safety.This study employed desktop analysis,simple linear regression analysis and the surveys at two levels: public and private level. Desktop analysis was done using extensive literature review from available documents or reports of related institutions of food safety program of Japan.This method was applied to five key components of food control system of Japan.Simple linear regression analysis was used to examine inspection at port of arrival(dependent variable) compared to the number of declaration to predict the inspection in the future.

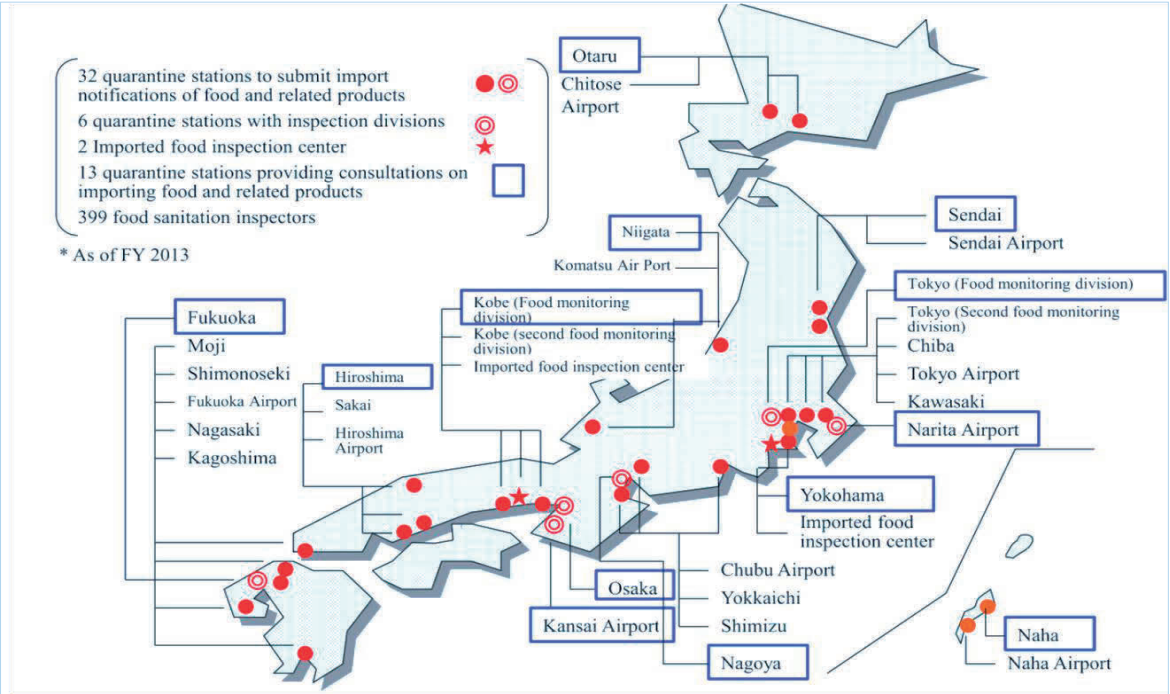
Table: 2.2.Import food control monitoring in Japan

	Public	**Private**
Study area	Hiroshima Quarantine Station	Japan frozen food inspection Corporation
Duration	July,2015	November,2014
Sample size	n=1 (7.6%)	n=1 (20%)
Respondents	Official of MHLW	Official of JFFIC
Primary Data Secondary data	Interviews Available scholarly articles	Interviews Available scholarly articles
Data collection Analysis	Field survey Descriptive & Inferential Analysis	Field survey Descriptive Analysis

Source : Survey

[2] The officials explained JFFIC's role and involvement in food inspection at the port of arrival, food safety administration of Japan and opinion on existing inspection and monitoring of food control system.

Figure 2.2.Quarantine Stations in Japan for Import food monitoring



Source: MHLW and Sumi (2014)

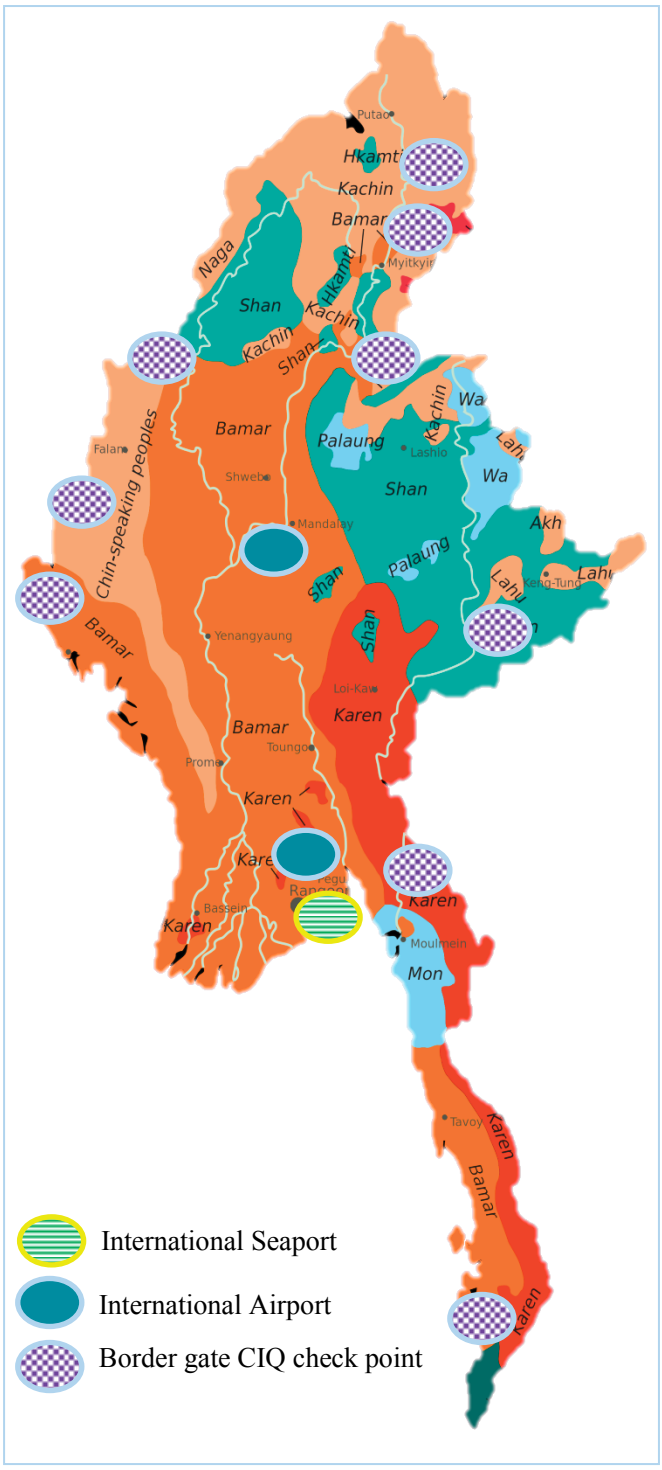
(II) **Import food monitoring in Myanmar**

This part of study is based on the interview result of case number 1 because the interviewees of the food control laboratories are responsible for import food monitoring for trade.

There are two types of import food monitoring in Myanmar: import food monitoring for conventional trade and for border trade.Figure (2.3) shows the point of import food monitoring for conventional trade and border trade.

(1)	Study area	Yangon
(2)	Duration	2015 April
(3)	Sample size	six food control laboratories (n=75%)
(4)	Characteristic of Respondents	Head of National level food control laboratories
(5)	Primary and Secondary data	Interviews,Available resources
(6)	Data collection and Analysis	Interviews,Descriptive analysis-frequency

Figure 2.3.Quarantine Stations in Myanmar for Import food monitoring



Source: Myanmar of Agriculture and Irrigation (2014)

To go over the main points of this chapter,this dissertation includes (1)a case study for assessing the capacity of food control testing laboratories and its supporting quality infrastructure in Myanmar,(2) a case study in a domestic sector- street foods food control,(3)a case study in fishery food control particularly for export market and (4) import food monitoring of Japan to explore how lucrative market formulates its SPS capacity in imported food monitoring in accordance with international norms-WTO and CODEX, etc. and Myanmar's food safety,animal health and plant health management capacity in prevention against adulterated imported foods.

Chapter 3

Literature Review and Conceptual Framework

3.1. Introduction

Nowadays, achieving food safety is driven by food security concerns at national level, changing agriculture practices,longer food millage in food trade with straighten technical requirements or non-tariff measures, greater consumer concern on food quality and safety,etc.Some of these are highly technical concern of food sector, while others are partly technological and partly food safety politic.The mutual goal should be to resolve these questions in a way that takes into account the needs of three primary stakeholders: governments, consumers and industry.

This chapter is divided into six main parts (1) role of government for socially optimal level of food safety,(2)food control system for public health and trade,(3) quality infrastructure for trade,(4) firm level food safety management system FSMS,(5) risk reduction in transboundary food trade and (6) conceptual research framework.

3.2.Role of Government for Achieving Socially Optimal Level of Food Safety

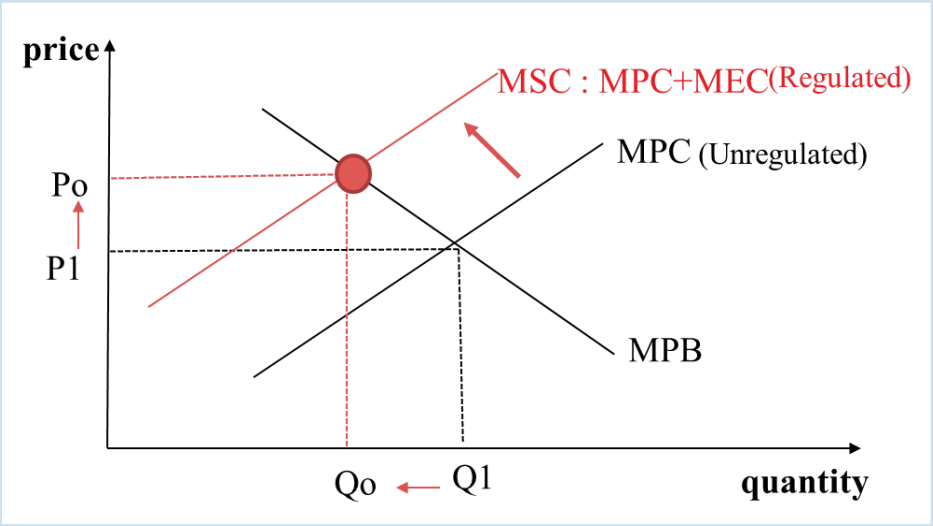
To be able to achieve the sustainable development in global scale, both producer and consumer are guided by globally accepted norms: sustainable production pattern and sustainable consumption pattern, through more sustainable, clean and efficient production, and food waste reduction by consuming better (UN,2015).

Government promulgates the enforceable standards of food safety that are convincing to both industry and consumers. In this regard, food control system is a tool to provide meaningful protection of consumers against real and important hazards. Food industry needs standards that permit flexibility and efficiency in producing and marketing foods that could enhance customers' confidence.

Government regulation is an attempt to increase the amount of food safety that market alone will usually not provide the socially desirable level of food safety.Most governments set minimum safety standards that food producing firms have to meet before they can sell their products (Mitchell, 2003).

Figure (3.1) illustrates market failure without government intervention and regulated food control for achieving socially optimal level of food safety.

Figure 3.1.Regulated food control for socially optimal level of food safety



Legend

MSC	Marginal Social Cost
MPC	Marginal Private Cost
MEC	Marginal External Cost
MPB	Marginal Private Benefit

Source: Mitchell (2002)

Without considering externalities, market produces quantity Q1 at imperfect information and over-production occurs. When we look at society as a whole noticing the output or the quality of food safety,we shift MPB up.So Q1 becomes Qo.Q1 is greater in quantity than Qo(Qo kyu-not) the socially optimal quantity of production with more information and the price also goes up. It is to demonstrate market failure and the need of government intervention for food safety and consumer protection by mean of controlling in food sector.Wanne suggested that unprecedented market conditions require new measures designed to protect the consuming public (2007).

Therefore,food control is the regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods during production,handling, storage,processing,packaging, transportation,distribution and sale are safe[3],wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labeled as prescribed by law(FAO,2003).Consumers expect the monitoring of safer food supply from official food control system (Whitehead,1995).Health risk is identified as an intolerable market failure (Achterbosch and Tongeren,2002).From a public policy perspective,if consumer has imperfect information about the quality of the product, markets fail to provide a socially optimal allocation of resources (Lusk et.al.,2006).Provision of food safety information has public goods characteristic for the benefit to society,unfortunately it is under supplied in the marketplace (Henson and Traill,1993).

[3] Despite there is no generally accepted definition safe food, one of the science based definitions described safe food as "the food that is wholesome and that does not exceed an acceptable levels of risk associated with pathogenic organisms or chemical and physical hazards" (Valeeva1 et.al.,2004).

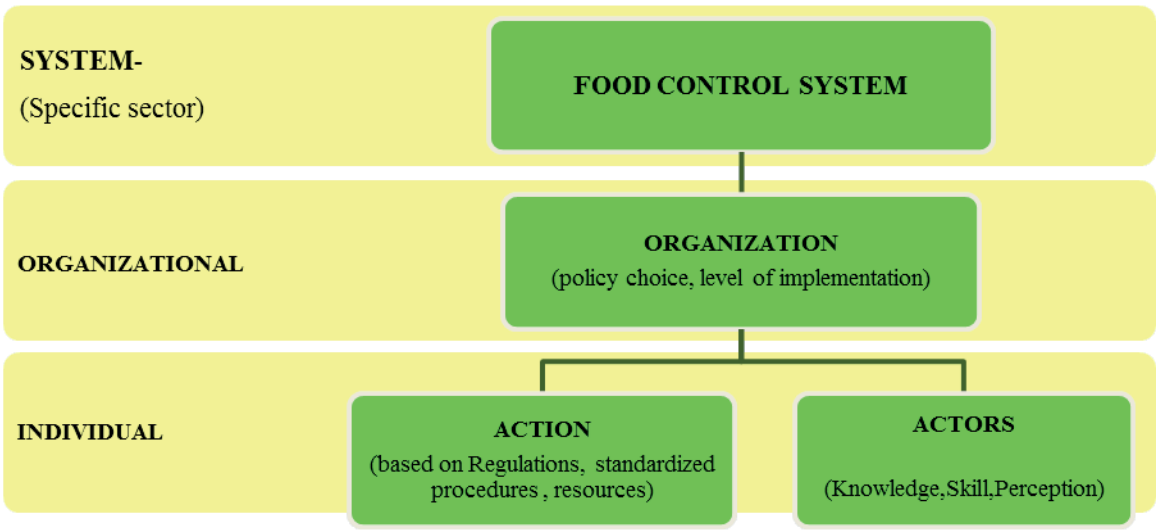
3.3.Food Control for Public Health and Food Trade Concerns

3.3.1. Implementation of food control system

Effective food control system is vital in enabling countries to assure safety and quality of food products for international trade and to verify that imported food products meet national requirements (FAO,2006).

Government agencies (at central and local levels) are responsible for establishing, managing and carrying out food control activities to protect consumers from risks arising from unsafe foods (FAO,2006).Public health goals are established to ensure continuous improvement in the health of the population and ideally should be based on an assessment of the risk to the population by a particular hazard (Walls and Buchanan,2005).Figure (3.2) demonstrates the implementation of food control works with the three tiers in food sectors for achieving food safety and export success.

Figure3.2. Implementation of Food control with 3 tiers



Source: elaborated from FAO (2008)

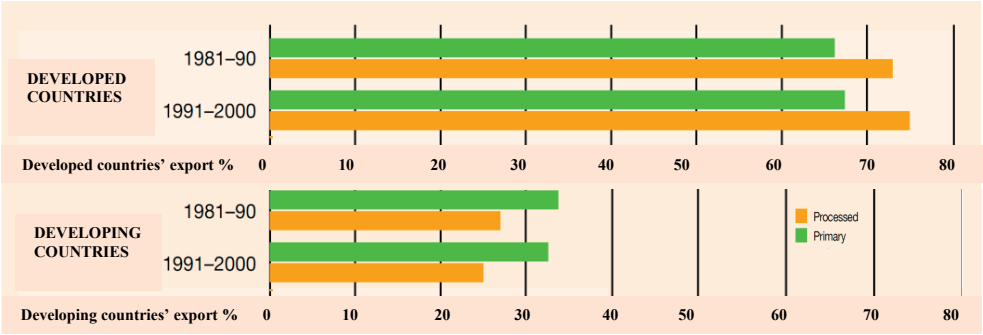
At the system level of the first tier of the figure(3.2), key elements include food legislation, institutions with clearly defined responsibilities for food control management,integrated management approach,scientific capacity,infrastructure and equipment for inspection and certification,laboratory service,and standard setting,public information,education and communication capacity for routine and emergency response.

Due to the high cost of implementation,policy choice at organization level varies in food sectors.For the case of imported foods,if food safety regulations imposed is straighten,import country regards these regulations as protection against adulterated food, meanwhile other argues as a technical barrier or non-tariff measureThe ability of a nation is the decisive factor in choosing goal for policy instrument (Josling,2009).

3.3.2. Straighten requirements in international food trade

In fact, food safety requirements in international food trade has been restructured accordingly with technological advancement in prevention of human, animal and plant health from new outbreak or diseases.Due to this reason, authorities in developing countries could not cope with increasing demand of farm level food control investment for exportable items to maintain export opportunities to countries with a low risk tolerance (Achterbosch and Tongeren,2002).Figure (3.3) states the export share comparison of developed and developing countries on primary and processed foods.For instance, developed countries' export share of primary food was about 68% and that of developing countries was only 32% during 1961-1990.Similar pattern was also found in processed food export.

Figure 3.3.Comparison of export shares between developed and developing countries



Source: FAO (2004)

It was stressed that the trend of access to export markets will continue to depend on their capacity to meet the regulatory requirements of importing countries (FAO/WHO,2003).The standards and their enforcement are new entry barriers to trade, public institutions are increasingly unable to defend the interest of small scale producers, farmers who would be completely cut-off from markets (Sanetra and Marbán,2007).Therefore,food export developing countries has no choice but to invest for export success,even though the costs of fulfilling the requirements are high.

3.3.3. Standards, NTMs and their application on trade

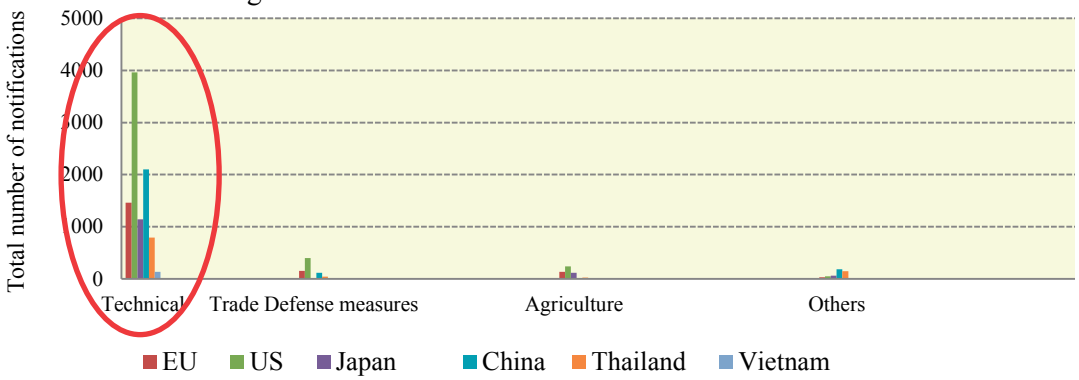
Recognizing the importance of developing international standards for the purposes of protecting public health and minimizing disruption of international food trade,Food and Agriculture Organization(FAO)and World Health Organization(WHO)jointly funded CODEX [4] to apply the standards of Codex as an important reference point for the dispute settlement mechanism of the WTO (WTO).

[4] Codex has developed over 200 standards covering processed,semi-processed or unprocessed foods intended for sale for the consumer or for intermediate processing;over 40 hygienic and technological codes of practice;evaluated over 1000 food additives and 54 veterinary drugs;set more than 3000 maximum levels for pesticide residues;and specified over 30 guidelines for contaminants(WTO).

When it comes to import food control,every country has its own national standards that may vary more or less higher than internationally accepted standards.In most cases developed countries are standard-makers in ensuring achieving acceptable level of protection(ALOP),whereas developing countries are standard-takers by adoption.Varying level of standards implementation being as internationally accepted norms in trade, as described in figure (3.6).

According to WTO, member countries are free to choose a high standard on the condition that these standards are required for the ALOP based on sciences.The ALOP was introduced by WTO under the Sanitary and Phytosanitary-SPS[5] agreement and encouraged nations to develop their own standards within the guidelines published by international agencies such as the Codex Alimenttarius Commission of the FAO/WHO for food safety (Mohammed et.al.2006).In 2010, approximately 80% of problems faced by exporters of developing countries were directly related with non-tariff measures-NTMs[6]a major impediment for trade (WTO,2012).Among four major groups, the technical NTMs are the highest measure imposed in trade shown in figure (3.4).

Figure 3.4. Non tariff measures used in international trade

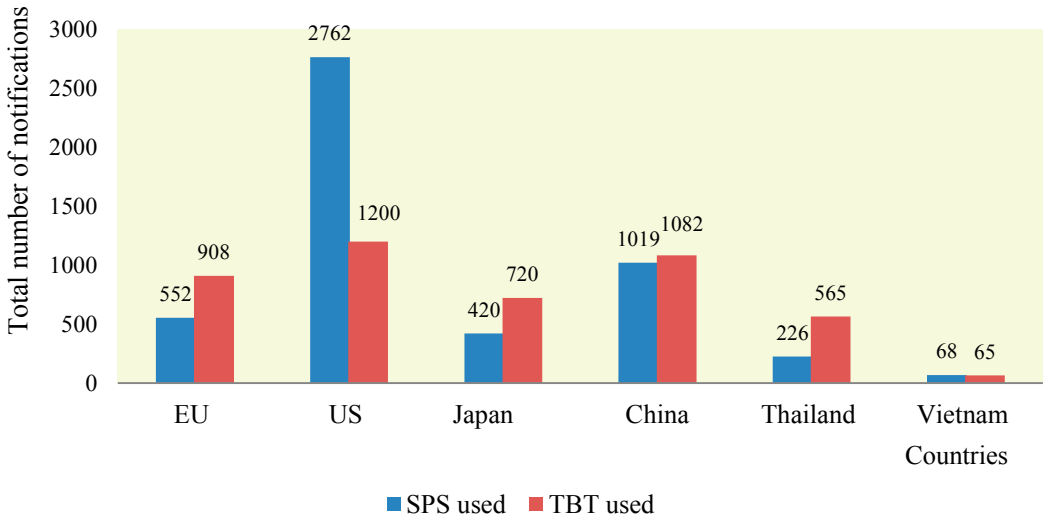


Source: WTO statistic

SPS and TBT[7] fall under the technical category among four categories[8] of NTMs.Figure (3.5) shows the number of SPS and TBT used in international trade by countries at which USA had imposed the highest number as of 30th June 2015.

[5] SPS is also a technical measure of Non-tariff measures that concerns the application of food safety and animal and plant health regulations that entered into force with the establishment of World Trade Organization on 1 January 1995(WTO).
[6] NTMs are policy measures other than ordinary custom tariffs that have the potential to affect the international trade in goods.They affect the price or quantity of traded goods, or both.Although the use of NTMs is legitimate in many cases, they are also used sometimes as protectionist measures (UNCTAD).
[7] Technical Barriers to Trade-TBT aims to ensure that technical regulations,standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade.At the same time,it recognizes WTO members' right to implement measures to achieve legitimate policy objectives,such as the protection of human health and safety,or protection of the environment.TBT Agreement strongly encourages members to base their measures on international standards as a means to facilitate trade (WTO).
[8] According to WTO,other three categories of NTMs are(1)trade defense measures: anti-dumping,countervailing, safeguard, (2)measures used in agriculture:special safeguard,tariff rate quota,export subsidy,and(3)other measures: quantitative restriction,State trading enterprise and import license.

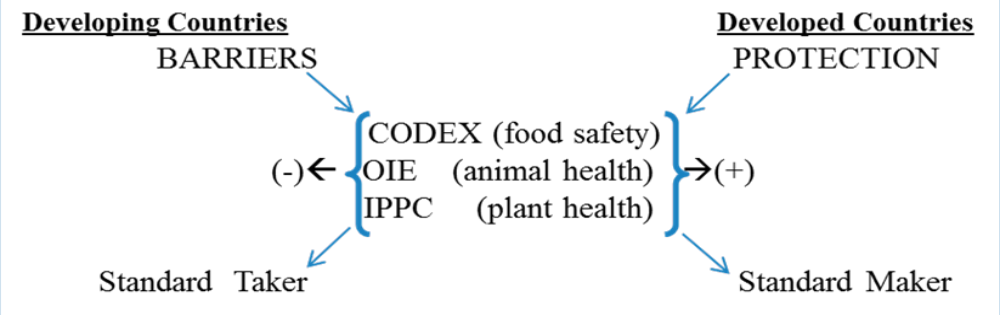
Figure 3.5. SPS and TBT measures imposed in international trade



Source: WTO Statistic

According to the data of WTO, the number of notifications used in SPS and TBT up to June 2015,were 14002 and 19497 respectively.These notified NTMs are just the variety of the SPS and the TBT.These every NTMs can be examined with the internationally accepted standardized guidelines or standards of CODEX(food safety),OIE(animal health),IPCC(plant health),to assess whether or not higher than the level of standardized guidelines/standards.That comparative examination is used in trade dispute.However as long as a country could proof the necessity of that (high) level for achieving ALOP with scientific evidence it can retain the level, according to WTO.

Figure 3.6. Varying level of standardized guidelines/standard used by countries



Source: Author

In this regard,it is important to comprehend the relationship between the level of NTMs or the intensity of regulations imposed in food trade and its effect on export and import.Swann et.al found that standard improved trade balance and market more open, promoted intra-industry trade and promoted export (1996).Table (3.1) mentions the effect of standard application and its effect on trade based on three underlying theories.

Table 3.1: Effect of standard on export and import

	Underlying Theory	Types of Standard	Effect of Standard	Effect on Export	Effect on Import
1	Competitive Advantage	International standard National standard	Enhance quality Reduce the cost	Positive (+)	Negative (-)
2	Competitive Disadvantage	Product standard	Reduce openness of market	Positive (+)	Negative (-)
		Process standard	Increase production cost	Positive (+)	Positive (+)
3	Intra-industry Trade	Minimum quality standard	Increase Openness of market	Positive (+)	Positive (+)
		Variety reduction standard	Reduce Variety	Negative (-)	Negative (-)

Note
1. Minimum quality means a certain level of quality
2. Variety reduction standard means it reduces a number of variants in a product range
Source: Swann et.al.(1996)

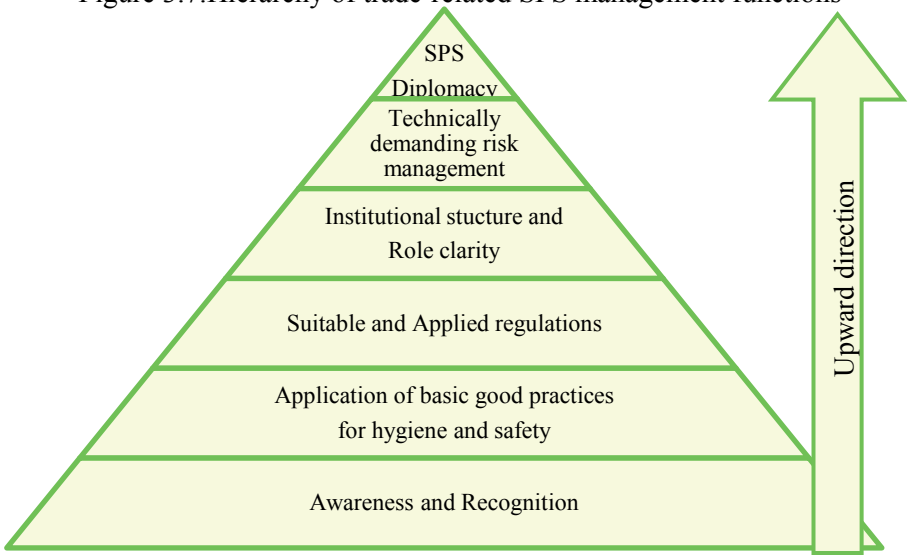
Standards can be classified into process and product standards.The enforcement of technical regulations is the most effective when the focus of the market is on process conformity rather than product conformity.The attention on product certification often involves imposing a long list of detailed technical product characteristics.Process conformity is less restrictive than product conformity but still can ensure that the desired requirements are met for health and safety standards (Tippmann,2013).Still, both are necessary for market differentiation at least.

Food safety standard can act both as a barrier to trade and as a basis of competitive positioning for developing countries in international markets (Henson and Jaffee,2006). Public and private food safety standards are fundamentally about establishing controls and conformance in production, transport and processing of food (Henson and Humphrey,2009).

Commodity Standard,consistent supply,proficient logistics,attested inspection and streamlined laboratory services are crucial in food trade to deliver goods safely, efficiently and cost-effectively.

3.4.National Quality Infrastructure for Trade and Business

Figure 3.7.Hierarchy of trade-related SPS management functions



Source: Henson (2007)

The trade related SPS management functions have six levels such as (1) the awareness and recognition on the needs of investment in SPS capacity,(2) the application of basic good practices for hygiene and safety,(3) the application of suitable regulations,(4) the clarifying of the institutional structure and role,(5) technical demanding risk management and (6) SPS diplomacy,as illustrated in figure (3.7).

The first fundamental tier,awareness and recognition,concerns with both the public and private sectors and from the level of decision makers to implementers and operatives,of the importance of effective SPS controls to export competitiveness and recognition by each party of their own role in this system (World Bank,2005).The final goal is to function with SPS diplomacy that relates to engagement with WTO and CODEX as well as bilateral relation with major trading countries fully.

Without specific food policy for safety and export success, the traditional food control was found in Myanmar (Wai and Yamao,2012b) that overlooked the need of investment in trade-related SPS management.As a result,the technical regulation information gap between national standard body and trade promotion organization was reported (Wai and Yamao,2014a).

The spokesman of the Ministry of Health-Myanmar pointed out that the current food control system was not functioning well due to the lack of demarcation of the responsibilities between the line ministries (Jim and Leo,2014).

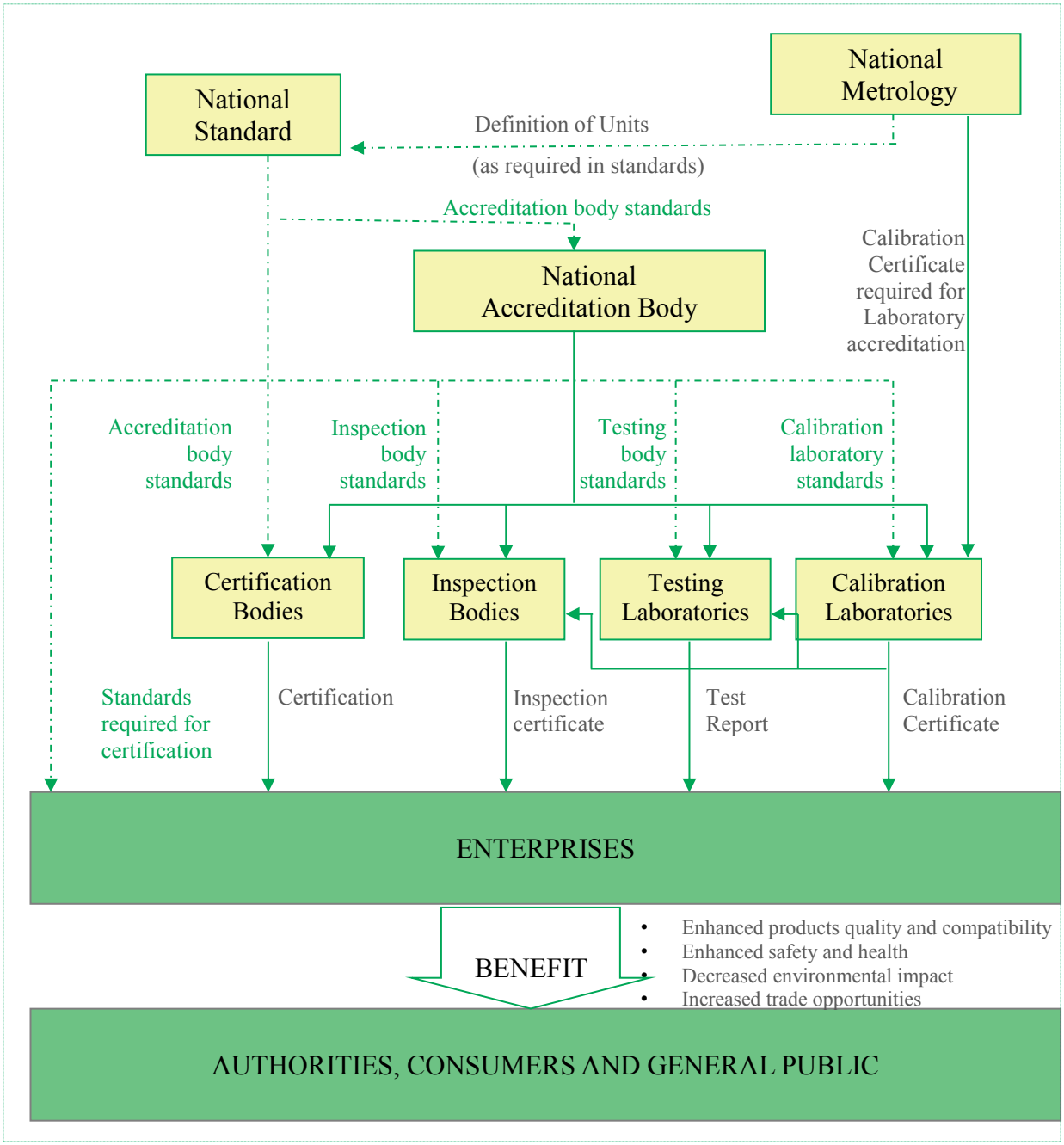
Most developing countries have a number of competing SPS capacity building needs linked to domestic policy objectives and agri-food export promotion (STDF,2013).Taking part in international trade demands government investments in quality infrastructure (Hochman et.al.,2013).Thus export

promoting policies will need to look well beyond tariffs and subsidies towards the establishment of standards (FAO,2012).

National Quality Infrastructure NQI an institutional framework that establishes and implements the practice of standardization,conformity assessment services,metrology and accreditation(Tippmann,2013).

The linkage between the National Quality Infrastructure and the food control system is illustrated in figure (3.8).

Figure 3.8.Linkage between National quality infrastructure and food control system



Source: World Bank (2007)

Henson recommended that the sources of information required to review for understanding the level of NQI[9] includes assessment on national food control system, review on trade policy for food trade, reviews on food safety capacity for agriculture,fishery,livestock, veterinary sectors,etc.(2007). Since the trend of international food trade keeps on increasing, access to export markets will continue to depend on their capacity to meet the regulatory requirements of importing countries (FAO/WHO, 2003).If National quality infrastructure is not in place or underdeveloped, the lack of acceptable proof can constitute a technical barrier to trade (PTB,2009).Most developing countries have a number of competing SPS capacity building needs linked to domestic policy objectives and agri-food export promotion (STDF,2013).

According to CODEX,food export countries should account for the efficiency of inspection service,laboratory service and certification for overcoming the technical barrier of the import country (CAC,2003).

The credibility of the quality signals is increasingly important to exporters; developing countries are prone to being excluded from the optimization process regarding food safety measures (Achterbosch and Tongeren,2002).Standards and their enforcement are new entry barriers to trade; public institutions are increasingly unable to defend the interest of small scale producers, farmers who would be completely cut-off from markets (Sanetra and Marbán,2007).The cost and time for developing the elements of NQI was estimated as shown in table (3.2).

Table 3.2. Estimated costs and time involved in developing NQI

Components	Investment cost (US $ millions)	Development time for harmonizing (Years)
National Metrology Institute	5-200	15
Legal metrology	0.5-5	5
Secondary calibration and testing laboratories	2-500	2-15
National accreditation body	0.5-2	5
National standard body	0.5-2	5

Source: World Bank (2013)

To establish a National standard body, it will take about 5 years and cost approximately 0.5 to 2 million US dollars. Export loss is an incentive to address food safety issues in tradable sectors (Achterbosch and Tongeren,2002).Arthukorala and Jayasuriya stressed that many developed countries see the much lesser SPS standards that often prevail in developing countries as a threat precipitating "a race to bottom"(2003).Tabakis recommended that higher infrastructure investments driven by international trade make firms more productive and better competent internationally (2013).

[9] World class technical regulation framework for National Quality Infrastructure must be (1) compliance with WTO/TBT Agreement,(2)effective and efficient,(3)acceptable to main trading partners,(4)supports consumer protection, authorities with technical regulations,industry with quality products and export,(5)connection with international organizations and (6) setting aside the confusion between regulatory and voluntary activities (PTB,2007).

For protecting the consuming public,the government needs a sound policy and operational coordination between government to government at the national level (Sarter,et.al,2010).During the last decade,the integration of food control system in major food importing countries can be seen in the form of a closer collaboration vertically between CAs of export and import countries.The cost of compliance could be burdensome particularly for food businesses in developing countries.In this regard public food safety program at the national level could contribute towards overcoming that barrier (FAO,2010).

3.5.Food Risk Reduction in Trade and Business

It is too ambitious to expect the zero level of risk in food. Even if possible,it involves substantial costs and would not be economically efficient (Henson and Trail,1993).The aim of food safety is to keep the hazard within the acceptable level at the time of consumption(Walls and Buchanan,2005).

So it is needed to clarify what level of food safety objective consumer should expect. In 2002, the international commission on microbiological specification for foods (ICMSF) proposed the establishment of food safety objectives FSO at the time of consumption to provide a link between public health objectives and target points earlier on the supply chain,as described below.

$$\mathbf{Ho - \sum R + \sum I \leq FSO}$$

Where Ho is initial level of the hazard; $\sum$R = total (cumulative) reduction of the hazard; $\sum$I = total (cumulative) increase of the hazard; FSO = food safety objective. FSO,Ho, R and I are expressed in log10 units and, by definition, R is negative (reduction) and I positive (i.e.,an increase) (Walls and Buchanan,2005).For example-Japan's food safety objective for peanuts in terms of Aflatoxin B1 is 10 parts per billion. If Aflatoxin B1 in peanuts is higher than that level,then it is a violation according to Food Sanitation Law of Japan 2003.Therefore, food business operators including exporters to Japan need to keep peanuts under that range in terms of storing at proper temperature, adoption of farm level good agriculture practice GAP,processor level good handling practices, etc.

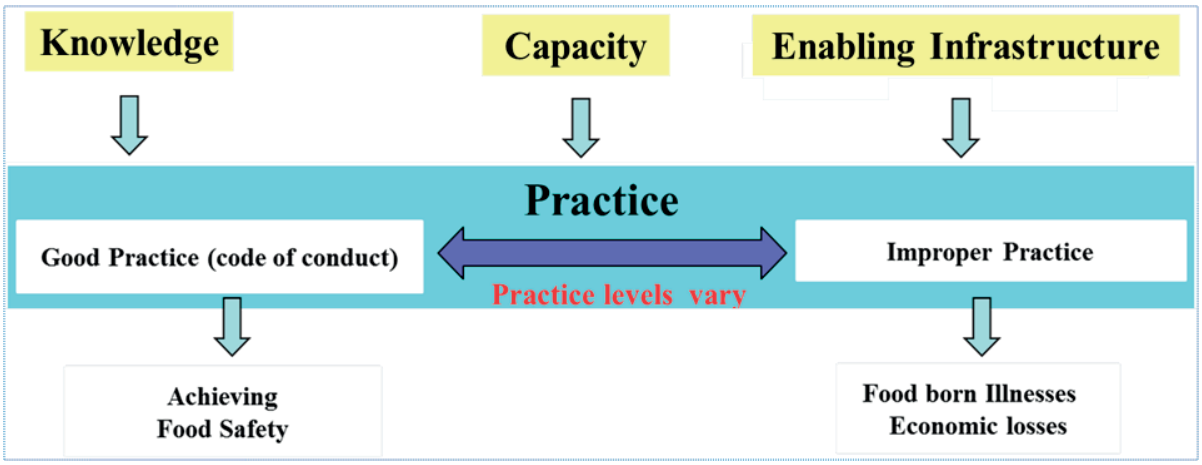
Food Safety Objective FSO can be used to assign the responsibilities over the various parts of the food chain, and within one part of the chain over the various process stages; linking finally the limits of the Critical control points CCPs in HACCP to the overall public health objective (Zwietering, 2005).It is also regarded as a tool to develop food standards,guidelines and related texts (Schothorst and Gram,2002).

There is no doubt that the control of food-borne risk is highly complex.Fortunately,all levels of food chain from agriculture and its input industries to consumer have been guided with a complex system of policy intervention (Henson and Traill,1993).Unnevehr expressed that food safety is addressed as a global public good through private sector efforts, institutional innovations such as the SPS agreement under the WTO,and trade capacity building efforts to improve food safety management for developing country exports(2006).

3.6. Conceptual Framework for Achieving Food Safety in Food Sectors

Producers or food business operators FBO[10] plays the central role with ultimate responsibility in safe food production. Still, their ability to fulfill their role adequately also depends on their ability to understand and follow the practices.For most cases of developing countries,producers are not incorporated in the trade-off between health risks and the costs of maintaining the low level of risk (Achterbosch and Tongeren,2002). Figure (3.9) illustrates the conceptual framework for achieving food safety with the use of proper (good) practice supported by Knowledge,Capacity:human, financial,technological,structural, and other enabling supportive infrastructures.

Figure 3.9.Conceptural framework of food control



Source: Author

There are two possible outcomes depending on the level of application of good (production) practices in food sectors.These practices are in turn based on enabling environment and supportive infrastructure of the specific food production in terms of knowledge and capacity used by individual and organization levels and government's food safety policy choice aimed at destined markets.

Knowledge and capacity can be enhanced with intervention by means of training (ex: effective utilization of IEC materials in food control system) and capacity building program.Capacity building at the institutional level means encouraging the ability of people, by means of finance, technology,expertise, etc.to be able to accomplish their job effectively.OECD defined that "Capacity is the ability of people, organizations and society as a whole to manage their affairs successfully" (2006).UNDP defines capacity building as a long-term continual process of development that involves all stakeholders; including ministries, local authorities, non-governmental organizations, professionals, community members, academics and more.

[10] Food business operator means the natural or legal persons responsible for ensuring that the requirements of food law are met within the food business under their control,according to EU (FSA,2007).It is a common word to describe the person who involves in food chain commercially.

3.6.1. Food safety management system FSMS at firm level

To be able to practice standardized good practices i.e. code of conduct[11] sufficient infrastructure with enabling environment is needed for the desired outcome:food safety.In fact, a number of guidelines have been established for almost all food sectors starting from informal food sector (the artisanal street food) to formal food sector (for lucrative market).

(1) **Standardized practices for informal food sector** With the purpose of controlling the food borne risk in food establishments including street foods shops,Yangon City Development Council YCDC classified eight types of main risk factors such as foods, utensil, food handling and food handlers, water usage, drainage system & toilet, waste disposal, stall (location/sanitary condition, ventilations, lightning, labor management) and others.

The practice of food handlers is influenced by a range of personal and environmental factors that need to be addressed in order to improve (Gul,2012).Hazards and violations of good practices can occur easily at every stage of street foods productions (Barro et.al,2007). The place of preparation, utensils for cooking and serving,raw materials,time and temperature abuse of cooked foods and the personal hygiene of vendors are major sources contributing to contamination(Rane,2011).

It is necessary to reduce food contamination through education and provision of sanitary facilities at vending,as vendors do not put their awareness in practice (Ackah et.al., 2011).In this regard, twelve health codes of practices for food establishment are regulated by the YCDC for street food safety in Yangon (Annex8,9).For the case of Thailand,Department of Health guided Bangkok Metropolitan Administration BMA in controlling street food safety with ten sanitary requirements for street foods stalls (1996)(Annex10).

CODEX[12] has adopted two regional guidance documents on street foods based on regional code of practices to be adopted by each country and enforced by local authority.

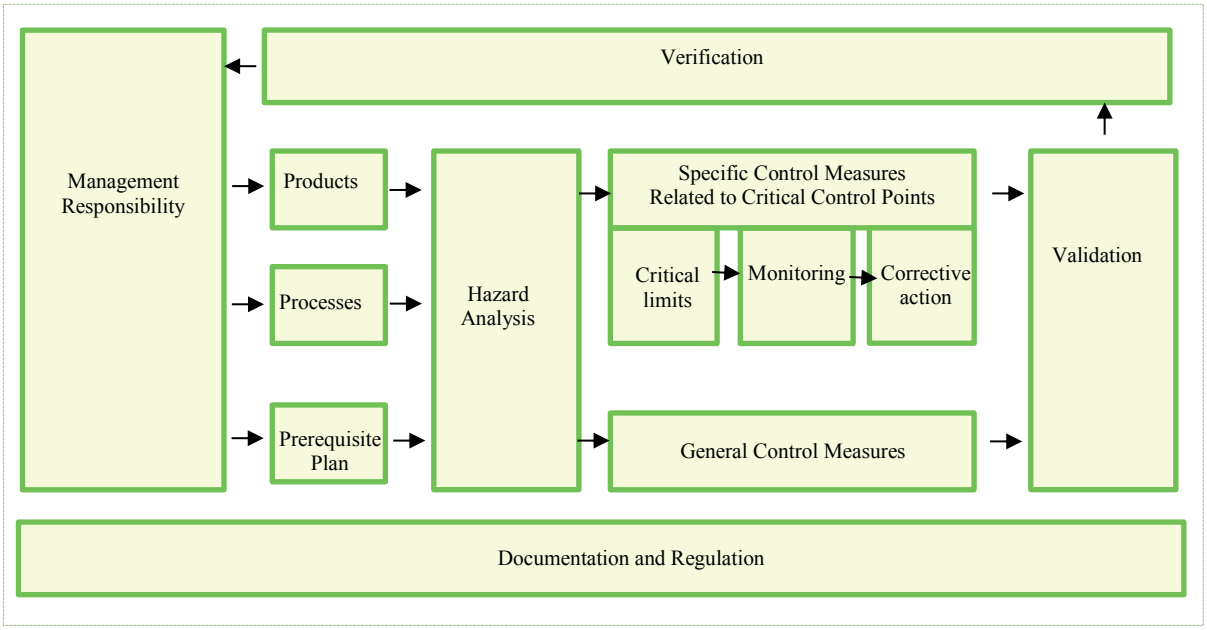
(2) **Standardized practices for formal food sector (Approved fishery processing plants)** The requirements in the food production process were established in reduction of food borne risk, for example, the use of standardized practices such as Good Agriculture Practices GAP, Good Manufacturing Practices-GMP,Good Handling Practices-GHP,and Hazard Analysis Critical Control Points-HACCP along food chain.

Figure (3.10) shows the generic structure of a HACCP based food safety system drawn by the Netherlands's National Board of Experts in 2006.

[11] A code of conduct is a set of rules outlining the responsibilities of or proper practices for an individual, party or organization.It also means principles, values, standards, or rules of behavior that guide the decisions,procedures and systems of an organization in a way that (a) contributes to the welfare of its key stakeholders, and(b) respects the rights of all constituents affected by its operations (International Good Practice Guidance,2007).

[12] http://www.codexalimentarius.org/standards/list-of-standards/en/?provide=standards&orderField=fullReference&sort=asc&num1=CAC/GL

Figure: 3.10. Structure of a HACCP-based food safety management system



Source: National Board of Expert (2006)

All the approved fishery processing plants and their products have been regularly monitored and controlled by the CA.

(3) **Need of integration at government level and firm level** Achieving food safety specifically in international trade is regarded as public goods that must be shared by global consumers without rivalry.As export success and lucrative market access are the interests of government and firms of export countries, they have to invest in food control.

The restructuring of requirements in food control in major food importing countries is observed in the form of a closer collaboration between competent authority CAs of export and import countries(Wai et.al.,2015).Competent authority of food export countries integrates overall capacity of its food control system vertically by adoption of the import countries' food safety regulatory requirements.It is called vertical integration of food control system by line ministry for export success of the specific food sector.In this case,CA is responsible for controlling safety along the food chain with precautionary approach,on behalf of the CA of the import country.

At the firm level,the firms need to be controlled by the CA of the line ministry delegated by import country.They must integrate its food safety management system by acquiring the approval of the CA.

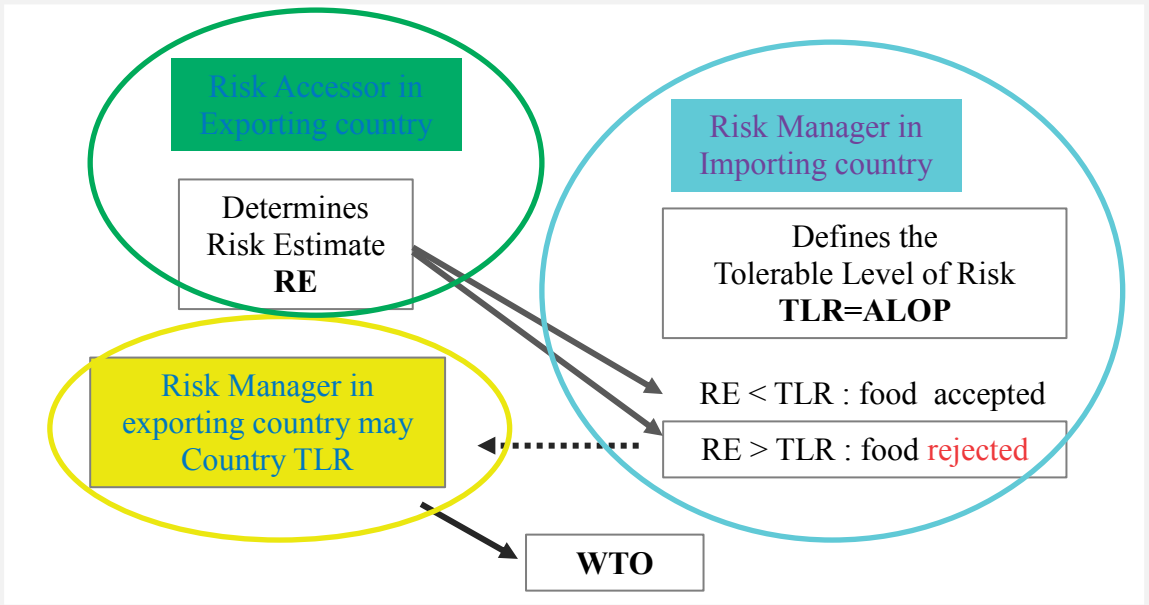
It is called horizontal integration at firm level.As initiated by EU in 2009,these two types of integration:vertical integration at government level and horizontal integration become necessary to fulfill by export country nowadays.

3.6.2. Import food monitoring in transboundary food trade

When one country monitors import food,tolerable level of risk-TLR or acceptable level of protection-ALOP[13] of particular food item may not be the same as the other country.For instance, for the case of Japan if the food is detected to contain Aflatoxin B1(equal to or more than 10 parts per billion-ppb),it is a violation of Article 6 of Japanese food sanitation law(Watanabe,2011).The standard for Aflatoxins B1 for raw peanuts in US is 20 ppb for human food and animal feeds and 4 ppb is a standard set for raw peanuts in European countries (Dohlman,2004).If the test result is less than the tolerable level,then the food is accepted, or else it will be rejected.This is the generic judgement based on the concept of TLR or ALOP in trade.

According to World Trade Organization's rules, countries are allowed to choose if they can make decision based on science.Martinet.al. suggested that the most efficient way for demonstrating food control measures is not necessarily restrictive to trade but rather ensures that developed food safety standards are based on sound scientific evidence and, where possible,they are consistent with the international standards(2003).If authorized agency finds that the import food is safe, they describe that food is in compliance with the importing country's standards.Those standards are used by risk assessors of export country to keep the risk within the tolerable level of risk TLR or ALOP as shown in figure (3.11).

Figure:3.11.Use of TLR or ALOP in transboundary food trade



Legend
ALOP Appropriate Level of Protection
RE Risk Estimate
TLR Tolerable Level of Risk
WTO World Trade Organization
Source: Schothorst and Gram (2002)

[13] FSO and ALOP are useful for transparent and quantifiable in judgment of import monitoring, suggested by international governmental bodies and can be used as tools to develop food standards,guidelines and related texts(Schothorst et.al.,2002).Defined by WTO/SPS, the ALOP is deemed appropriate by the member country establishing SPS measure within a territory (WTO).

3.7. Research Framework for Dissertation

The research framework is an abstract form of this dissertation composed of eight chapters. The framework has three main phases such as(1) issues of food safety in Myanmar,(2) the assessments phase with four case studies and (3) the conclusion and recommendation phase.

(1) Based on the identified food safety issues, uncertain food safety was the problem statement for the dissertation, as shown in the first phase of the figure (3.12).

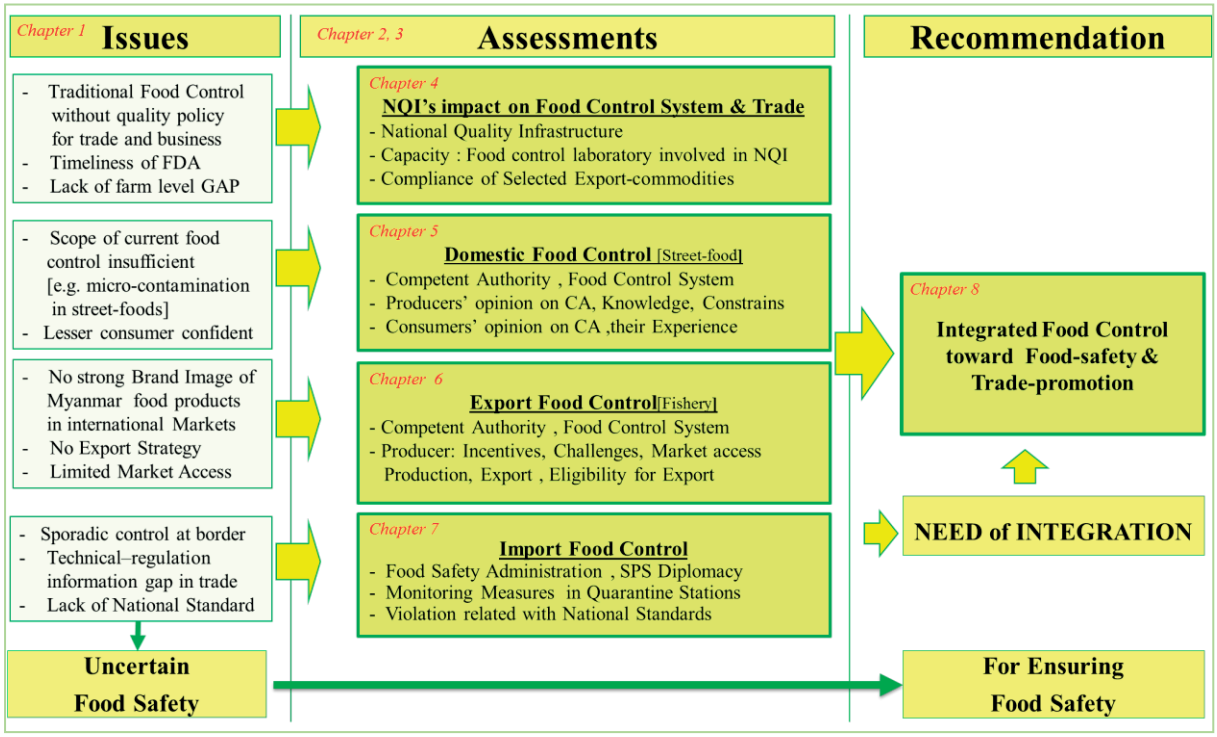
(2) In the realm of food safety, food control is a tool to ensure safe food production. Thus, the first assessment in the second phase begins with assessing the functional-capacity of food control laboratories involved in national quality infrastructure NQI, as food control is the mandatory regulatory activity of enforcement by national or local authorities. It includes the compliance-based assessments of two main exportable items based on the detailed criterions of the related food control system and SPS capacity so as to thoroughly identify institutional supply-side constraints of food control agencies.

After recognizing the severity of NQI capacity,the investigations on food control in informal food sector was performed.The informal sector has a complete set of three primary stakeholders; the regulator, the producers:vendors, and the street food consumers.That situation allowed the study to investigate the respondents' opinions on food control in a specific food sector.The study on fishery (formal) sector focuses mainly on how successfully food control was accomplished at government level and firm level and what challenges public and private sectors were facing in meeting the requirements in export markets.

The assessment on import food monitoring conducted in Japan was a great opportunity,as country like Japan with significant imports of food and agricultural products needs effective SPS-capacity supported by sound NQI.Myanmar's import food monitoring was accessed as well.All case studies show the need of integration in food control and SPS capacity that is the last part of the assessment phase.

(3) The third phase is conclusion and recommendation for this dissertation by ensuring food safety for promotion of trade and health interests.

Figure: 3.12. Research Framework



Source: Author

Chapter 4

Assessing the Capacity of Food Control Laboratories involved in Myanmar Quality Infrastructure

4.1. Introduction

At national level, the credibility of food control laboratory's services is vital to support enforcement activities with analytical results used in health and trade sectors.Adequate laboratory infrastructure such as well-equipped food control laboratories, trained analysts is required in provision of laboratory services in accordance with internationally accepted norms (Othman,2007).Weak in capacity building of government institution is,in fact,a widespread phenomenon especially in developing countries.But when it comes to food safety, government investment in food control is essential for food export country to assure safety of food, to maintain market access, to gain new international markets, etc.Wai and Yamao mentioned that the achievement of food control measures in Myanmar was limited due to insufficient technical capacity that was needed to upgrade staffs, laboratory equipment and technical assistance in various food sectors (2012b).

This chapter is divided into three main parts such as (1) the National Quality Infrastructure of Myanmar MNQI (2) Capacity-based assessment of food control laboratories involved in MNQI and (3) Compliance-based assessments of two commodities (a) bean export to EU and (b) fishery products export to EU for identification the existing quality assurance in the specific food sectors.The aims of this chapter are -

(i) To observe the relationship between main food control laboratories and the support of the National Quality Infrastructure to these laboratories

(ii) To assess the capacity and the direction of food control laboratories for identifying more about a detailed account of barriers to provide quality assurance in trade and

(iii) To re-examine the compliance status of two important export commodities for EU markets, as compliance-based assessment is a true test if Myanmar has comprehensive food control with quality policy for food trade promotion.

The very first survey for the national level food control system from food safety perspective was conducted in 2012 and published by author.Many positive changes occurred since 2012 especially in the infrastructure and the food control system. Therefore, during April, 2015 this survey was conducted to access more detail and recent development of the food control system and the support of the NQI to the food control systems.According to Standards and Trade Development Facility (STDF),there are 3 types of assessments for SPS capacity of NQI such as capacity-based, compliance-based and trade-based.This study is based on the capacity-based and the compliance-based in food trade.

The main targets are food control laboratories including the food laboratory of FDA- the food authority of Myanmar.The interviews were made with responsible agencies involved in Myanmar Quality Infrastructure including FDA.Very little information was available regarding the functional areas of the NQI of Myanmar for quality management needed for society and business concerns.

4.2. National Quality Infrastructure NQI for Trade and Business

4.2.1. Linkage between National quality infrastructure and food control system

National Quality Infrastructure NQI is an institutional framework that establishes and implements the practice of standardization, conformity assessment services, metrology, and accreditation (Tippmann,2013).The investment in National Quality Infrastructure is costly, however opportunity cost of failing to invest in quality is more costly [for example in 2010,Tanzania lost one million US dollars in meat export because of the failure to control foot and mouth disease, when Botswana enjoyed $159 million from meat export (Day,2013)].Thus,NQI is required for providing acceptable evidences demanded by authorities in term of technical regulation requirements or demanded by markets (Kellermann,2013).

Food control is a mandatory regulatory activity of enforcement by national or local authorities for provision of consumer protection and ensuring food safety along the food production chains thereby it promotes trade.When it comes to food control, public agency plays a central role by governing with standardized guidelines or regulations developed by respective expert committees in accordance with (quality) policy designed for national (industry) competitiveness.The capacity of public agency and their policy objectives are crucial in adoption of standards or good practices in food sectors.That institutional framework is recognized as National Quality Infrastructure.To become an efficient food control system, the key operational components of the system (for example; inspection service,testing service) must be supported and guided by the components of the NQI such as standards, regulations, guidelines, etc.In this regard, it is needed to examine the functional areas of NQI and they are as follows:

(i) Conformity Assessment (Sampling,Inspection,Testing,Certification)

(ii) Accreditation (Demonstration of competence of testing and calibration laboratories, Certification Bodies,Inspection Bodies)

(iii) Standardization (Standards for trade facilitation, for providing basis for technical regulation based on and developed by international, regional or national standard bodies)

(iv) Metrology (Establishment of accurate, reliable, traceable measurements that is basis for performance requirements in standards)

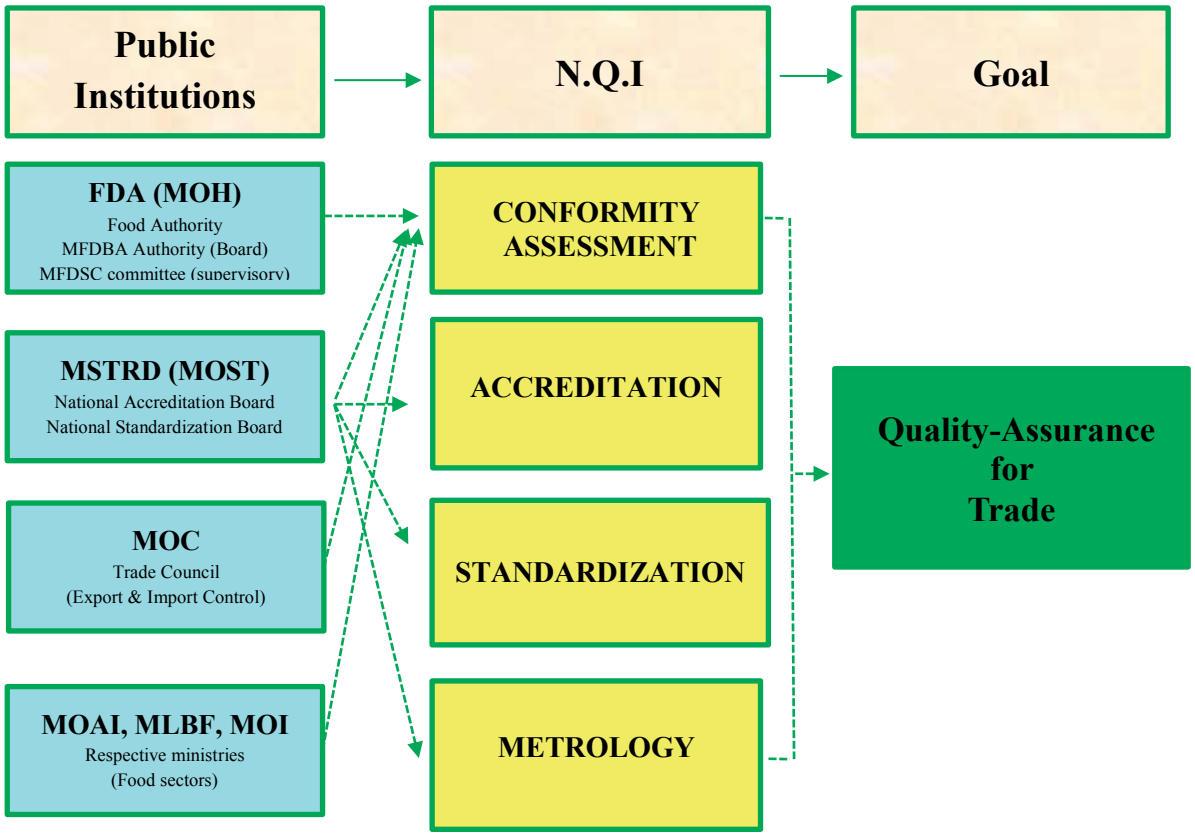
Conformity assessment and accreditation are closely related with each other because accreditation is the procedure by which an authoritative body (the accreditation body) formally recognizes that an organization is competent to conduct specified conformity assessment services (that is,testing,inspection,or certification)(Tippmann,2013).Every country needs a National

Accreditation Body to evaluate the conformity and competence of the testing/calibration laboratories called Conformity Assessment Bodies-CABs.Accreditation system is a scheme in which an authoritative accreditation body approves CABs that conform to relevant requirements for their competence to conduct test calibration,or other conformity assessment activities in specific technical areas for ensuring the confidence and reliability of the data measured,tested, and calibrated by laboratories or the results of product certification (NITE,2015).

Some articles of WTOAgreements related with standards and compliance are Sanitary and Phytosanitary(SPS)Article 4 and Technical Barrier to Trade-TBT Article 6.Article 4 of the SPS Agreement states how recognition agreement could be made between trading partner countries to account for equivalence level in inspection, testing and other relevant procedures.The article 6 of the TBT Agreement mentions how central government bodies of trading partner countries achieve mutual recognition of conformity assessment through accreditation.The primary purpose of accreditation is to facilitate trade by acceptance of certification, inspection, testing worldwide (Silva,2015).

4.2.2. Relationship between NQI's functions and food control public agency

The following figure (4.1) shows the public institutions' involvement in four functional areas of NQI in Myanmar.



Legend
MOH Ministry of Health
MOST Ministry of Science and Technology
MOC Ministry of Commerce
MOAI Ministry of Agriculture and Irrigation

MLBF Ministry of Livestock, Breeding and Fishery
MOI Ministry of Industry
FDA Food and Drug Administration
MSTRD Myanmar Scientific and Technological Research Department
Source: Author

It is important to comprehend the role and capacity of these agencies so as to know if Myanmar has a sound National Quality Infrastructure for better market access.All the agencies involved in MNQI relate with at least one functional area of NQI to all four functional areas. Depending on the functions of NQI, public institutions in Myanmar can be generally categorized into two such as (1) testing and inspection agency (Conformity assessment function) and (2) accreditation agency that accredits for the testing agency and inspection agency (Accreditation function and three other functions).

4.2.3. Conformity assessment, accreditation, standardization and metrology in Myanmar

Conformity Assessment (i.e.food control laboratories' testing) is more developed in Myanmar, if comparing with Accreditation, Standardization and Metrology (NES,2015).All laboratories including FDA engage in testing services.

Myanmar Scientific and Technological Research Department-MSTRD under Ministry of Science and Technology-MOST plays the central role in MNQI because it is legally responsible for providing all functional areas of NQI such as accreditation,conformity assessment, standardization and metrology.It is the focal point for Quality management.MSTRD drafted two laws on Standardization and on Metrology and the new standardization law of 2014 specifically tasked MSTRD with conducting standardizations and specifications of weights and measures, equipment and machinery, raw materials and finished goods.It is a correspondence member of ISO since July 2005, an affiliate member of the IEC in 2007,and a WTO TBT enquiry point 2008 (Nemeroff,2015).It has participated in the regional work of ACCSQ (ASEAN Consultative Committee on Standards and Quality) since 1997.So far,19 technical committees were formed to draft the Myanmar international standards adoption[14].73 identical adoptions and 4 modified adoptions were made (Moe,2015).

Accreditation capacity was non-existence in Myanmar. Myanmar National Accreditation Body-MNAB and Myanmar National Standard Body-MNSB are under the functions of MSTRD. There was no accreditation body in Myanmar yet.The responsible agency exists just being as "a focal point or an accreditation desk" so far and it is regarded as the initial point of accreditation. Kellermann insisted that establishing a national accreditation system is no longer negotiable, because it is needed to ensure conformity of testing labs,calibration labs, inspection bodies, and certification bodies. The head of Accreditation Section of MSTRD,Dr.Cho Cho Lwin stated that MNAB will be

[14] The three degrees of regional or International standards adoption are identical (IDT), modified (MOD) (less, more, alter as part, alternative modification), not equivalent (NEQ) in terms of technical content, structure and wording.

established based on the requirements of ISO/IEC Standard 17011,Conformity assessment-General requirements for accreditation bodies accrediting conformity assessment bodies and be compliant with International and regional rules and procedures e.g.ILAC,PAC,APLAC as much as possible.There is a plan to enter into a Memorandum of Understanding MOU with Accreditation Body of Singapore or Thailand to perform joint accreditation (Lwin,2015).

As regard with standardization,two main functions of MNSB are to prepare law, regulations and to provide technical regulations on standardization.In Myanmar,respective ministries enacted technical regulations and consequently, some technical regulation information gap between National Standard Body NSB and Trade Promotion Organization TPO was reported (NES,2015,Wai and Yamao,2014b).The Standards Division was originally charged with diffusing information related to international standards, foreign standards and measurements to stakeholders.This role later evolved to include functions of an NSB, including the creation and adoption of 65 national standards in the 1970s. These include one agricultural and food product standard, 10 chemical standards,11 civil engineering standards, nine electrical standards and 27 textile standards(NES,2015).A recent study by the United Nations Industrial Development Organization (UNIDO) highlighted that deficiencies in the NQI are especially noticeable in the fields of standardization and metrology as a result of inadequate human resources, equipment and facilities.Although MSTRD employs roughly 250 well-trained staff, the SD is severely understaffed. Of its 20 employees, three works for Legal Metrology and seven work at the Industrial Metrology.

The main elements of the Law of Standardization (2014) are to address (1) the establishment, functions and responsibilities of the Myanmar National Standards Body,(2) preparation, adoption and application of Standards,(3)formation of a Technical Sub-Committee and functions and duties, (4) preparation, adoption, publication and application of technical regulations, (5)development of a code of practice for technical regulations and (6) establishment, functions & responsibility of the Myanmar National Accreditation Body.

4.3. Capacity-based Assessment of Food Control Laboratories Involved in MNQI

4.3.1 Food control laboratories involved in MNQI

This study focused on seven main food control laboratories involved in NQI of Myanmar to observe the existing capacity of Myanmar food control laboratories so as to identify how these public institutions could support trade.Table (4.1) shows main food control laboratories of Myanmar.

Table 4.1.Food Control Laboratories in Myanmar

No.	Name of laboratories	Type	Year	Tasks
1	Food Quality Control Laboratory (A lab) Food and Drug Administration (FDA) Ministry of Health MOH	Public	1995	Routine analysis, compositional analysis, food contaminants analysis
2.	Standard Division (B lab) Ministry of Science and Technology MOST	Public	1973	Formation of standards, Toxic heavy metal, others
3.	Commodity Testing and Quality Management, (C lab) Ministry of Commerce MOC	Public	1985	Aflatoxin, Hydrogen Cyanide
4.	Myanmar Inspection & Testing Services Ltd, Ministry of Commerce MOC (D lab)	Semi Public	2000	Oils and fats, etc.
5.	Pesticide Analytical Laboratory (E lab) Plant Protection Division Ministry of Agriculture and Irrigation MOAI	Public	1979	Analysis of chemical residue (pesticide residue)
6.	Livestock Breeding and Veterinary Department, Ministry of Livestock Breeding and Veterinary MLBV	Public	1985	Feed Analysis, others
7.	Analytical laboratory (F lab) Department of Fishery, Ministry of Livestock Breeding and Veterinary MLBV	Public	1985	Quality control (pathogens, heavy metal, parasites, antibiotic residue, Sulphur dioxide)
8.	Food Laboratory(G lab) Ministry of Industry MOI	Public	1982	Chemical Oxygen Demand, Biological Oxygen Demand, water analysis

Source: Author's Master Thesis (2013)

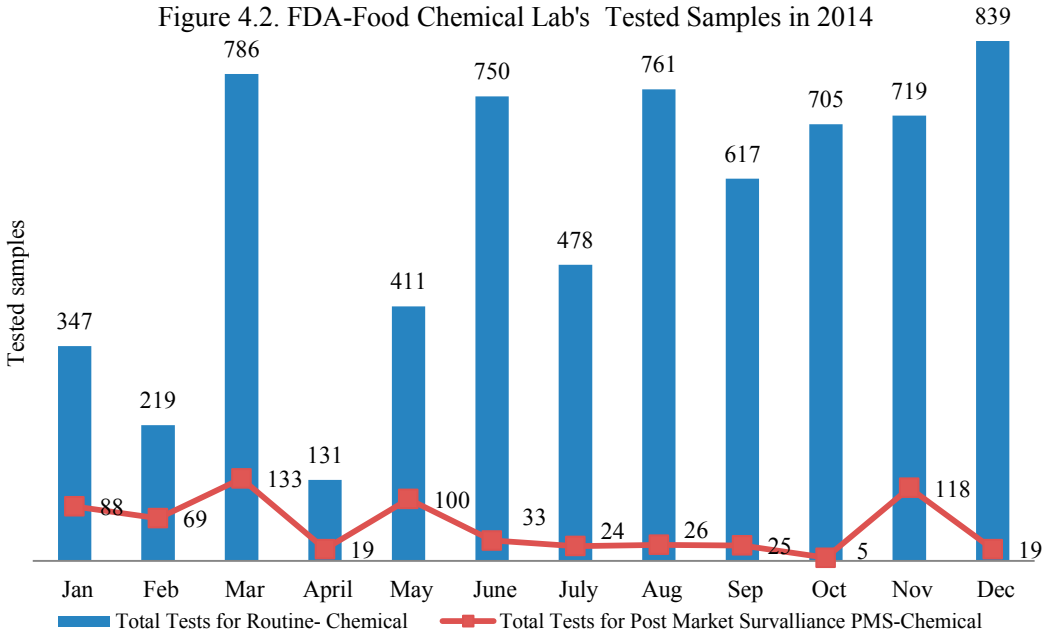
(1) **FDA Food Authority (A lab)** For controlling food, Myanmar has Food and Drug Administration (FDA) under DOH,like some other countries.It is the focal point of food control at the national level and the only agency that can issue "Health Certificate" [15] for all food items. For specific sector food control, other related ministries are involved with the subordinate role, being as the sector–wise food control particularly.

There are 3FDAs in Myanmar; the long-standing one is FDA-Yangon and two newly formed FDAs are situated in Naypyitaw and Mandalay.FDA-Naypyidaw is for administrative purpose mainly and comprises 2types of food quality testing laboratories (Food Microbiology Lab and Food Chemical Lab) and 4 types of drug and medical devices testing laboratories (Drug Micro Lab,Bio-standardization Lab,Pharmaceutical Chemistry Lab and Medical Device Lab &Cosmetic Lab).FDA-Yangon and FDA-Mandalay comprise two food quality

[15] It is issued by the local authority (States or Federals) according to the system in place in the country of origin. There are some types of health certificates such as (1) fitness for human consumption,(2) declaration of inspection of premise (3) endorsement of existing health certificates (4) Visual examination, etc.(WFP).

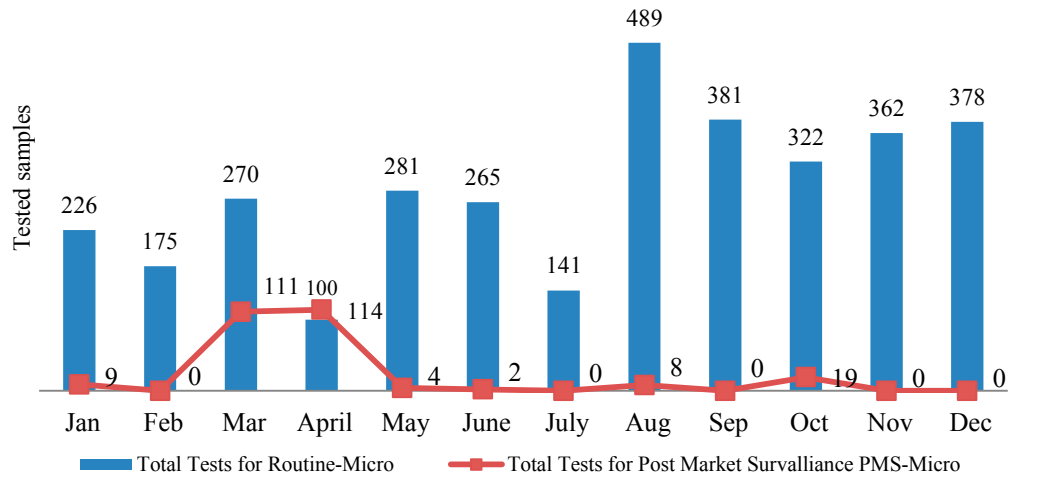
testing laboratories and one Pharmaceutical Chemistry Lab.All of them are not accredited yet.90% of samples are tested in FDA-Yangon.

Figure 4.2. FDA-Food Chemical Lab's Tested Samples in 2014



Source: Interview with FDA (2015)

Figure 4.3. FDA-Food Microbiological Lab's Tested Samples in 2014



Source: Interview with FDA (2015)

The quantitative performance of food laboratory of FDAs in terms of tested samples for both routine samples testing and post market surveillances PMS sample testing are shown in figure (4.2) and (4.3).The routine testing is for food trade and the post market surveillance testing is for monitoring food safety of food products selling at markets.It was found that the 2014 annual average routine samples tested is 91.65% of the total samples and that of the

PMS samples tested was 8.35% in both Chemical and Microbiological labs of FDAs.The ratio of the routine samples tested and the PMS samples is about 9:1.

As regard with the qualitative performance or the credibility of the FDA services, FDAs were not certified with ISO 17025.They were just taking part in Food laboratory's Proficiency Testing Scheme PTS[16] with 4 respective agencies;(1) ASEAN food testing reference laboratories[17],(2)QUATEST 3,Vietnam,(3)Health Science Authority,Singapore,(4) Physikalish Technishe Bundesanstalt Medicine Control Lab.According to the interview, FDA(Yangon) is going on the acquisition of ISO17025 for drinking water testing (microbiology and heavy metals with ASS) by mean of the strengthening National Quality infrastructure Project of UNIDO.As regard with the accuracy and the reliability of the tests, it was stressed that most of the equipment were not calibrated due to lack of the calibration laboratory in Myanmar.Fortunately,most of the technicians were well-trained.According to interview,it was known that staffs number in FDAs will be increased up to 2000 in the future.

This is the performance of FDAs in terms of their services for public health and business,and the credibility of their services with respect to international norms.

(2) **Standard Division (B lab)** This division is legally responsible for standardization, metrology and accreditation at national level. There were only 20 staffs for all these tasks and it was severely understaffed (NES,2015).Lacking of National Accreditation Body-NAB hinders food control laboratory access to accreditation service for conformity assessment.The accredited laboratory (Glab) stressed that the cost of implementation and accreditation fees was so expensive.In 2014,UNIDO started to provide on the job training to the SD of MSTRD to manage the standardization process and build capacity in standards development with a medium to long term plan also for the development of the Standards Department as a National Standards Body –NSB (2013).

(3) **Commodity Testing and Quality Management (C lab)** This agency has six laboratories for testing the quality of exportable agricultural produces,was established in 1985.None of the laboratories possessed ISO-GLP.It was formerly known as Post-harvest Technology Application (PTAC) but was changed the name to CTQM in 2014.It is to assist export by provision of quality assurance services to exporters with the tests results.

(4) **Myanmar Inspection & Testing Services Ltd MITS (D lab)** It is a semi-government organization formed by Ministry of Commerce for trade facilitation.FDA delegates inspection and sampling services to MITS for the controlled foods import.It possesses ISO 9001:2008 certificate for "Commodity inspection services in coordination with Government authorized

[16]Proficiency testing (comparative testing) is an important way of meeting the requirements of ISO/IEC 17025 in the area of quality assurance of laboratory results.

[17] It is designated mainly to provide technical support in the area of competence of the ASEAN's members States government laboratories.

laboratories & Palm oil testing services" on 16.12.2014.It has a plan to get ISO17025 in the future.

(5) **Plant Protection Division (E lab)** This agency is legally responsible to issue Phytosanitary Certificates & Import Certificate according to Plant Pest Quarantine Law(1993).Two main activities are (1)testing pesticides residue in agriculture crops(Sanitary measure) and (2) inspection and issuing the Phyto-sanitary certificates (Phyto-sanitary measure).It didn't have ISO yet and took part in PTS for (1) method validation for pesticides quality analysis,(2) the screening method for pesticide residue analysis and (3)analysis of endosulfan sulfate residues in black tea.

(6) **Livestock Breeding and Veterinary Department (F lab)** Livestock sector is not significant for export in Myanmar and this agency was excluded in this study.

(7) **Analytical laboratory (G lab)** This laboratory is responsible for fishery export facilitation and an accredited laboratory complying with ISO/IEC17025(1225/55)[18].It has annual training plan regarding the quality management and technical requirements,in accordance with ISO guidelines.This lab took part in PTS with five agencies from UK, Singapore,Thailand and Vietnam for seven types of chemical testing and eight microbiological testing.It stressed that the cost of accreditation fees was so costly due to lacking of accreditation capacity in Myanmar and calibration provider for ISO 17025:2005.

(8) **Food Laboratory (H lab)** It is also a government owned laboratory established in 1982 for checking food staffs produced by domestic private industries.As regard with the accuracy and the reliability,it can use only portable meters and titration methods that highly depend on technicians' skill.It did not have ISO and it did not take part in PTS tests also.

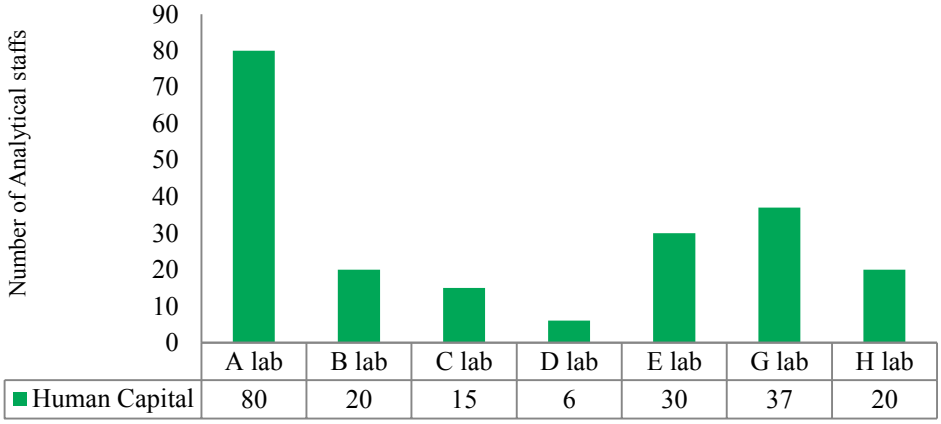
4.3.2. Assessing the capacity of food control laboratories

For the capacity-based assessment of the food control laboratories, five specific areas were covered such as (1)human capacity(analytical staffs and their skills),(2)financial capacity,(3) technical capacity,(assurance with third-party certification, participation in proficiency testing scheme PTS (4) structural capacity (areas of concern, specific scope of testing,instruments used) and (5) the direction of the laboratories based on their influence level on cross sector and capacity responses to sector needs.In addition to the interviews conducted,secondary materials such as the agencies' annual reports, technical reports,internet pages,etc. were used in evaluation to support in assessing the capacity of food control laboratories.

[18] http://webdb.dmsc.moph.go.th/ifc_qa/dbqa/default.asp?iID=EMGHKG and http://webdb.dmsc.moph.go.th/ ifcqa/DBQA/17025/EN/1225552014.pdf

(1) Human capacity of the food control laboratories

Figure 4.4.Human capacity of food control laboratories



Source: Survey in 2015

The numbers of the analytical staffs for each laboratory are described in figure (4.4).According to interviews, most of the food control laboratories reported that they need more staffs.For instance,A lab said that Microbiologists and Food Chemists should be recruited urgently to solve the timeliness issue of their service. B lab was restructuring. C lab has six food testing laboratories and 15 analytical persons was limited number indeed. E lab stressed that due to exposure to pesticides health concern, it was a challenge to keep analytical in place for long-term. F lab followed its management according to ISO guidelines to recruit the new blood. G lab did not give comment about the level of the capacity.

In human capacity, majority stressed the need of staffs. Only one lab practiced the ISO standard recruitment scheme.These labs are, however, public agencies that are supposed to conduct the tasks with less staffs. Therefore, only one food control laboratory had high human capacity and others had medium human capacity. The level of human capacity is based on the number of technician staffs.

(2) Financial capacity of the food control laboratories

All laboratories, except D, were run by government budget. It was reported that E lab and G lab received 30% of the total analytical fees and F lab was occasionally supported by the exporters' association[19].NES stressed that laboratories cannot manage their services based on the generated-revenue,as it needs to send back to the government resulting that they are unable adjust their prices to reflect actual costs of tests (2015).The levels of financial capacity are based on(1) having additional supporters on regular basis (if yes,the financial capacity is regarded high),(2) if they did not have regular supporters but still receiving some percentage from testing (if

[19] Detailed information on the reason of support and what type of deal existed between them were unavailable during the interview.

yes= medium) and (3) otherwise, the financial capacity is regarded as low.It can be observed that one lab was supported regularly (high capacity), two labs were financed (medium) while other labs had low financial capacity level.

(3) Technical capacity of the food control laboratories

Table4.2.Possession of ISO among food labs and their areas of concern

	Laboratories	ISO certified	Is there any plan to apply ISO in the future ?	Taking part in PTS[20] ?	Areas of Concern							Total number of Areas concern
					Food Food Products	Agriculture Produces	Aquaculture Produces & Seafood	Pharmaceutical Products	Cosmetics & Toiletries	Minerals from Mining Activities	Medical Devices	
1	A		+	+	+	+		+	+		+	5
2	B		+		+							1
3	C		+	+	+	+						2
4	D	+	+		+	+						2
5	E		+	+	+	+						2
6	G	+		+			+					1
7	H				+	+		+				3
Total		2	5	4	6	5	1	2	1	0	1	16

Source: Survey (2015)

The result of table (4.2) shows that not all these laboratories acquired the good laboratory practices ISO-17025 certificate, the requirement for competency of testing and calibration laboratories.Only one agency was accredited by ISO17025(GLP) and another with ISO9000 then.Only 2 agencies possessed ISO certificates.All other laboratories, except H lab, have a plan to apply ISO for GLP in the future, according to interviews.Four laboratories were taking part in PTS.The areas of concern of the agencies were identified to apprehend more about the nature these responsible laboratories.

The levels of technical capacity are based on (1) having ISO certificate (if yes, the technical capacity is regarded high),(2) if they did not have ISO but they still join

[20] Proficiency test scheme PTS is suitable for food control laboratories worldwide in the food and water industries. It is an independent assessment of the competence of laboratories to perform tests accurately and precisely, providing a challenge to the effectiveness of the quality system of a laboratory and adherence by staff to that system (Roberts,1999)

proficiency tests and future plan for acquiring ISO (the technical capacity is regarded as medium) and (3) otherwise the technical capacity is regarded as low.

The result of the technical capacity shows that two labs had high level capacity, five labs had medium level and only one lab had low level of technical capacity.

(4) Structural capacity of the food control laboratories

Scope of Testing More detailed scope of testing of these laboratories was identified so as to examine the coverage of the testing as follows.

Table 4.3.Total scope of testing of the food laboratories involved in National Quality Infrastructure

	Laboratories	Specific scope of Testing														Percentage of scope of Testing
		Metal Contaminates, Heavy Metals	Preservatives	Vitamin	Fats & Fatty Acids Composition	Minerals	Alcohols	Food Additives	Contaminates Drug residue	Permitted Artificial Color	Artificial Sweetener	Pesticides	Mycotoxin	Microbiology	Water Analysis	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	100
2	B			+		+		+								21
3	C				+							+	+			21
4	D				+							+		+		21
5	E	+										+	+		+	28
6	G	+						+	+					+		28
7	H		+		+	+	+	+		+	+			+	+	64
Total		3	2	2	4	3	2	4	2	2	2	4	3	4	3	

Source: Survey in 2015

According to table 4-3, some overlapping in the scope of testing could be observed. Most of the laboratories, except-A,have limited scope of testing and capability.

It was stressed that every ministry in Myanmar wanted to own laboratory, even though most of them were not considered competent and efficient (UNIDO, 2013) because there is an option to work as a network of laboratories;an independently managed central national lab to reduce duplications in testing services. According to a report jointly conducted by Ministry of Commerce and International Trade Center (ITC), another impediment to the cross-sector is the lack of a network

of laboratories that would enable them to pool resources and perform tests jointly (2015).

However,it is important to recognize that all laboratories are taking responsible with sector-wise approach with their food control system for safety.So, all of them have their own expertise in the specific food sector while providing their services to market requirements.

Instruments used Table(4.4) depicts the instrumental capacity of these laboratories;it also illustrates how deficient they were,except A, for not being well-equipped with those instruments necessary for the food control laboratories.

Table4.4.Instruments used for assay, impurity and other related tests

	Laboratories	Instruments							Total
		High Performance Liquid Chromatography	as Chromatography	tomic Absorption pectro-photo meter	V-spectrophotometer	ourier Transform ifrared Spectroscopy	I detector	Others	
1	A	+	+	+	+	+	+	15	21
2	B							15	15
3	C	+	+	+	+			1	5
4	D							1	1
5	E	+	+	+	+				4
6	G	+		+	+			4	7
7	H							1	1
Total		4	3	4	4	1	1	37	54

Source: Survey in 2015

The level of structural capacity is based on the scope of tests and the instrument used.Alab mentioned that there was no shortcoming relating to instruments in performing routine.Hlab stated that they could use only portable meter.As for Blab,it has no service provision yet, but well-equipped with newly installed instruments aided by an international trade-support organization in 2014.D lab is accredited for inspection and thus testing is not the main task.Among them,H lab's instrumental was the most underprivileged in terms of the scope of testing and technology used.

(5) Result of capacity-based assessment of food control laboratories

The result of the capacity-based assessment of food control laboratories is mentioned as shown in table (4.5) based on detailed discussion described previously.

Table 4.5. Capacity-based assessment of food control laboratories

Food Control Laboratory	Levels of Capacity			
	Human Capacity	Financial Capacity	Technological Capacity	Structural Capacity
A	M	L	M	H
B	M	L	M	L
C	M	L	M	M
D	M	M	H	M
E	M	L	M	M
G	H	H	H	H
H	M	M	L	L

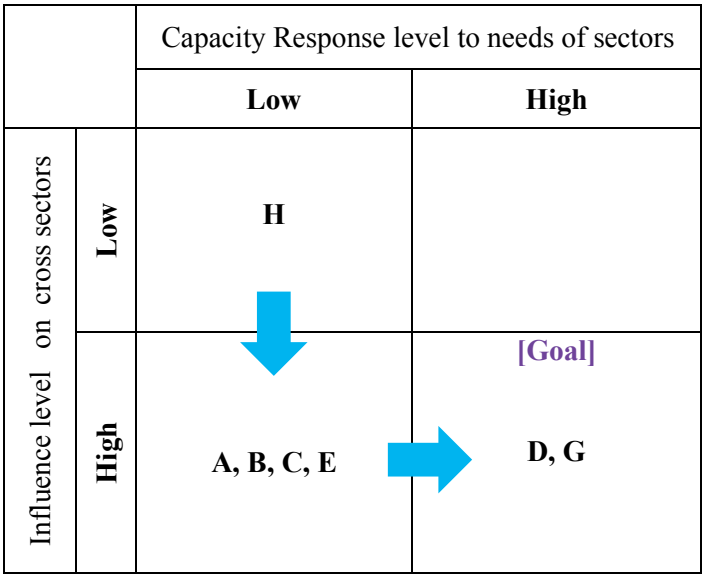
Legend
H = High capacity
M = Medium capacity
L = Low capacity
Source: Survey in 2015

In human capacity, majority stressed the need of analytical staffs and only one lab had high level human capacity.It is due to practicing ISO standard recruitment scheme. In financial capacity, three labs were supported while other had low budget level.In technological capacity,two labs had high level for having accredited with ISO while four labs had medium level for having plan to acquire ISO and taking-part in proficiency test scheme.Only one lab had low level without plan for ISO and PT tests.As regard with structural capacity,one lab had capacity for all testing and another lab had specific structural capacity.

4.3.3. Future direction of food control laboratories

Among all laboratories, A, B, D, E,G labs are legally responsible for food control and other 2 labs C and H are existed due to requirements of markets.To be exact,C lab is export-oriented and H lab is only for domestic food sectors.Therefore, it becomes clear that all the laboratories, except H-lab, play the role and their capacity have high influence on export (success).The existing position and the future directions of the laboratories are identified in figure (4.5) depending on influence level[21] on cross-sector and the existing capacity responses to sector needs.

Figure4.6. Existing capacity and direction of the labs



Source: Survey in 2015

In the last 30 years, there has been little investment in equipment and facilities, with the exception of some food testing laboratories; this has in turn limited technical capacity building (UNIDO,2013).Some exceptional laboratories like D and G these were willing to upgrade themselves in accordance with market-requirements,faced financial and quality infrastructure issues. Requirements in international food trade are increasingly higher and as a consequence, the capacities of these laboratories need to be upgraded to fulfil market requirements.

[21] Influence level is based on the status and role of the institutions on which stakeholders depend on for services and guidance, critical for shaping export performance (NES,2015).

4.4. Compliance-based Assessments

4.4.1. Existing food control over quality assurance in food trade

In term of export, fishery and agriculture are important among all food sectors of Myanmar. Agriculture and fishery sectors accounted for 37% of GDP in 2013; they contributed a majority of labor forces,being about 60% of population. This is the reason why agriculture export success is considered very important.However, agri-export success has been facing with the challenges: due to weak in food control works such as lack of appreciation on commodity standards formation, insufficient resources in food control works, etc.(Wai and Yamao,2014a).There are general export procedures for all exported goods (EU,2014) however, over 90% of Myanmar primary produces are selling to the countries with less rigorous SPS regulation requirements (Wai and Yamao,2014a and Aye,2005) due to lacking of fulfilling the lucrative markets' requirements. CBI mentioned that there was no strong brand image of Myanmar products,for example; sea food in international market (CBI,2012).However,neighboring countries like the world's largest producers of fishery products China,Thailand,Bangladesh are buyers and re-exporters of Myanmar fishery products (Wai et.al, 2015).The following table shows the existing status of quality assurance in food sectors.

Table 4.7. Food sectors and Public agency's food control for trade (Export & Import)

Food Sectors	FOOD CONTROL		INTERNATIONAL TRADE		
	Food Control System (overall)	Authority	Import	Export	
				Approved, Export (EU)	Export to countries with lower SPS standards
	(1)	(2)	(3)	(4)	(5)
Fishery	☑☑	☑☑	-	☑☑	☑☑
Agriculture	☑	☑	-	-	☑☑
Animal Husbandry	☑	☑	-	-	☑☑
Food Processing	☑	☑	-	-	☑

Legend
Domestic Control agency's capacity in respective food chain (Food Control System & Authority)
☑☑☑☑ 100% food control system with accredited lab,registered inspection, farm level food control: GAP,GHP
☑☑☑ 75% food control system with accredited lab and Registered Inspection
☑☑ 50% food control system with accredited lab
☑ 25% food control system (generic)
Intensity of International Trade Success (amount of Import / Export)
☑☑☑☑ 100% , ☑☑☑ 75% , ☑☑ 50%, ☑ 25%, - less than 25 % or negligible: 0%
Source: Survey in 2015

The related institutions possess just general assurance (except fishery sector) without improvement,lack of proper planning for trade success.Overall framework was designed with weak resources.The production systems at the farm level were without application of good practices and it possessed a serious drawback in export.Insubstantial quarantine service hampered the safety of food in border trade surveillance and monitoring.

4.4.2. Compliance-based assessment of two selected commodities

Two commodities, Bean: food of non-animal origin FNAO and Fishery products: food of animal origin FAO,were selected to clarify the gap between the requirements of EU markets and the existing compliance situation of these two commodities.The evaluation criteria in compliance-based assessment is are based on five key components of specific food control system for EU market requirements.

(a) **Bean commodity's compliance** Myanmar is a world second largest exporter of bean and it accounted for 65% of total export earning of agricultural sector in 2008.However 80% of export destination is India that does not demand high SPS regulation and farm level good agriculture practices.

It was stressed that Myanmar exporters are currently reliant on what farmers produced in terms of seed selection,production technology,quality of produces,etc. Downstream supply is mostly financial and nothing about improved quality seed and others. Therefore,there is a need to examine the compliance status of Myanmar bean's food control at farm level,to know if Myanmar bean is acceptable for EU market.The official inspection report of EU was used to assess disparity between the requirements and the compliance situations (EU,2014).

Table 4.8.Compliance-based assessment for Bean export to EU

	Evaluation criteria in Food Control System	Requirements	Compliance Situation [responsible public institution]	Result
I	Food Legislation	EC 178/2002 EC882/2004 EC852/2004	Legal framework existed. But, detailed legally required regulation did not cover for Bean export [Responsible agency-MOH,MOAI,MOC]	System cannot ensure human consumption, Competent Authority can't clarify Compliance
II	Competent Authority	CA must exit to enforce effectively	No food control at farm level [eg:GAP,GHP] [Responsible agency at farm level-MOAI]	
	Official Control in food chain	CAC 53-2003	No official control for food safety (It did not meet the requirements)	
	- Document Procedure [Health Certificate]	EC211/2013	Plant health control = In place (but generic,reactive) Hygiene control = No (these did not meet the requirements)	
	- FBO registration	CAC/RCP1-1969, EC852	Health Certificate did not cover safety at processing Bean collectors got license without inspection (these did not meet the requirements)	
	-Cultivation	Hygiene practice	No specific hygiene practice (it did not meet)	
	-Process and Storage	EC852,CAC1-1969	No ability to fully trace (without traceability-code) (it did not meet)	
	-Non-conforming NC products		No N-C consignment was detected (up to the audit time)	
III	Inspection Services	ISO Inspection	ISO accredited inspection was in place.	
	Methods of sampling	ISO Sampling method	Existed one did not cover all hygiene requirement (it did not meet the requirements)	
IV	Laboratory Services	Accredited laboratory	1.FDA laboratory -not accredited (it did not meet) 2.Private laboratory met the requirements 3.DOF laboratory met the requirements	
	Certification Procedures	EC.211/2013	Only Generic form was in place (it did not meet the detail requirement)	
V	IEC	FDA(MOH) was responsible for RASFF notification within 25 days		

Source: FVO(2014)

What Myanmar was lacking is the adoption of good practices to attest assurance practically to become technically acceptable when import country checks the whole specific food control system.Lacking the adoption of good practice in production doesn't necessarily mean that all the produces are not fit for human consumption.In reality,no non-compliance(NC) consignment was found when EU checked the produces at the port of arrival.

It was reported that there was no food control on primary production and no GAP certified farmers.Local DOA staffs responsible to train farmers,received GAP knowledge through a cascade procedures provided by regional staffs.That's all done for food control by the responsible agency at farm level.EU stated that there was no primary production level food control at farm in terms of adoption of Good Agriculture Practices GAP or Good Hygiene Practices GHP (EU,2014).

Consequently;it was no wonder that EU regarded that the existing system could not ensure the human consumption for EU market.

Testing the produces just before export is also no longer adequate nowadays.Testing service also faced with the assurance issue.Thus,investment in food control system of exportable commodities or export potential produces is urgently required to get market access and to earn the reasonable profit for the actual growers.

(b) **Fishery product's compliance** It is also based on the interview (2014)with the responsible personal-Competent Authority of Department of Fishery and also based on an official report of EU,2009.The following table is for identification of food control in fishery sector based on five key components of fishery food control system.

Table 4.9.Compliance-based assessment for fishery products export to EU

	Evaluation criteria in Food Control System	**Requirements**	**Compliance Situation [responsible public institution]**	**Result**
I	Food Legislation	EC 178/2002 EC882/2004 EC854/2004	Legal framework existed. Legally required regulations cover for export [Responsible agency-MLBF]	System can ensure human consumption, Competent Authority can clarify Compliance
II	Competent Authority	CA must exit to enforce effectively	In place	
	Official Control in food chain -Organization control	EC 853,EC 853 EC854/2004	FIQCD'sOfficial control was in practice Number of staffs-sufficient Knowledge-not sufficient yet	
	- Document Procedure	EC2074/2005 EC854/2004	Health Certificate	
	- FBO registration [Approved fishery processing plants]	EC853/2004 EC852/2004 EC178/2002	National approved list was in place HACCP system was in place for plants Compliance of FBO was in place	
	-Cultivation	Not required	It is from the wild-caught source	
	-Process and Storage	EC2074/2005 EC853/2004	Required condition of production in place With trace-code (Traceability purpose)	
	-Non-conforming NC products	EC 852/2004 EC 853/2004	It is monitored periodically	
III	Inspection Services	EC853/2004	In place	
IV	Laboratory Services	Accredited laboratory	DOF laboratory is accredited by ISO Mini-labs established for approved firms	
	Certification Procedures	EC 211/2013 EC 96/93	In place	
V	IEC	FIQCD is responsible for RASFF notification with DG-SANTE		

Source: Interview in 2014 and the FVO(2009)

Fishery sector is the only one sector that could fulfill the requirement of EU standards. The laboratory expert of DOF stressed that the cost of implementation and accreditation fee. In fact,the exportable fishery products to EU are from wild-caught:aquaculture fishery products export is not allowed yet,as it needs Good Aquaculture Practices-GAP at farm level.

To sum up this study,Myanmar faced lacking of enabling quality infrastructure and incompliance issues in food trade.It can also observe that laboratory and inspection services faced the accreditation problems.The specific technical expertise along with its food control system is required for every commodity along the food chain.Thus,the responsibility of vertical chain food control (from farm to export) should be taken by one institution equipped with financial and technical supported by public agencies involved in quality infrastructure.A strong coordination is required reducing overlapping tasks and to achieve the goal, export success.

Myanmar is in transition period, changing its economy into market oriented one.All-round development in respective fields are constantly pursued by the State; including designing National Export Strategy in which quality management is the prim-mover for export promotion.However, many impediments along the supply side and demand side are making the development pace to a somewhat slow.Accordingly,considering the current situation of food control system supported by MNQI, urgent improvements are needed in coordination of food control laboratories now working in quality management circle toward export-led growth in Myanmar.

Chapter 5

Food Control for a Domestic Sector: Street Food Control

5.1.Introduction

Street food is, as a matter of fact, an unimpressive artisanal business regarded as an informal food sector.Still it serves food for 2.5 billion people every day in the world (FAO,2007).Street food vending is the growing trade in many developing countries (Draper,1996) which had become an indispensable part of both urban life and urban diets.

The contribution of street food vendors to the economies of developing countries was vastly underestimated and neglected (Winarno and Allain,1991). Most of street foods vendors are often with poor knowledge on food safety (Khairuzzaman et.al.,2014).The attention of authority concerned is commonly insufficient on the safety aspect of street foods and vendors often face precarious working condition (Etzold,2014).

The widespread food borne diseases and the mushrooming of wayside food vendors who lack an adequate understanding of the basic food safety issues are important public health issue directly related with street foods and a great concern to everybody (Rane,2011).Hazards and violations of good practices can occur easily at every stage of street foods productions (Barro et.al,2007). The place of preparation, utensils for cooking and serving, raw materials, time and temperature abuse of cooked foods and the personal hygiene of vendors are major sources contributing to contamination (Rane, 2011).The need to reduce food contamination through education and provision of sanitary facilities at vending is required, as vendors do not put their awareness in practice, according to a street food study of Uganda(Ackah et.al.,2011).Codex Alimentarius Commission(CAC) has adopted 2 regional guidance documents on street foods, based on regional code of practices to be adopted by each country and enforced by local authority (FAO,2002).

Street foods consumption is inevitable for city dwellers; yet very little was known in Myanmar about the consumer's attitudes on this informal food sector from safety perspectives.This study has four research questions as follows:

(1) To investigate the authority's controlling aspects of street foods towards safer food production
(2) To investigate health and personal hygiene knowledge of vendors
(3) To find out constrains that prevent them following proper handling practices and

(4) To explore street food consumers' attitude towards food handling practices, how they view street foods safety and what they expect from authority for safety of street foods in Yangon, Myanmar.

In late 2011, a study on the effectiveness of food safety training program to street food vendors was conducted by a group of researchers of the University of Public Health Yangon,Myanmar.They examined the comparative study of vendors' knowledge, attitude and practice K,A,P scores before and after the training intervention.In the post intervention, the improvement of knowledge, attitude scores found higher; however no significant improvement in practice was found while checking the fecal coliform count result of vendors' food samples.It concluded that the food safety training program improved food safety knowledge and attitude only.Therefore,it suggested that health educations as well as supportive measures such as financial assistance, continuous monitoring, etc. are necessary to improve the vendors' food safety practices and personal hygiene (Maung et.al,2012).

In managing street foods business, authority concerned may choose one of the following governance steps such as

(1) repression or eviction for hawkers' encroachment on the crowded streets-side
(2) temporary approval within the limited timeframe (with or without registration fees, within or without zoning area) and
(3) the official recognition of the street foods existence and the protecting the selling right of hawkers (at public place) along with the corrective rules to be abided by vendors.

Rane (2011) mentioned that Malaysia, Philippines and India are the three countries which have regulations for protecting street vendors.India and Thailand have developed hygienic practices for street vendors so as to upgrade hygiene and quality of street foods (Dawson,1996).

5.2. Result of the Assessment of Street Food Control System

5.2.1. Governance of street food in Yangon

Regulator or authority has a vital, multi-faceted role in consumer protection, although the ultimate responsibility of food safety lies on food producers (FDA,2006).

Street food vending is one of the tourist attractions with varieties of local foods (WHO,1997). It, however,has some public health risks associated with consumption of street food in developing countries (Ackah et.al.,2011).

For the case of Myanmar, FDA[22] developed the definition of street foods.It explained that street food is foods and beverages prepared and /or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation (Nwe, 2011).

In Yangon, the health department of Yangon City Development Council YCDC is mainly responsible for safety and controlling food establishments that are with or without license. Street food stalls are regarded as the informal business run without license, but under the control of YCDC. According to interview, the temporary selling approval has been allowed for the duration of 3 pm to 8 pm, without registration fees and zoning limit.YCDC has its own definition for street foods.

5.2.2. Food control system for food stalls

5.2.2.1. Food legislation

As regard with the food legislation in controlling food stalls, the National Food Law of 1997, the City of Rangoon Municipal Act of 1922 and the City Development Committee By-law of 1999 exist for preventing the public from consuming unsafe food. The City Development Committee Health By-law of 1999 comprised of eight Chapters with forty six Sections. With the aim of ensuring safe food production, the detail descriptions of the role and responsibilities of committee, the responsibility of food producers,approval and denial of food production license and selling permission,etc. are provided in Chapter II and III of the Yangon City Development Committee Health By-law(1999).

The definition of road-side stalls including street foods stalls is mentioned in Section 2 of Chapter II of the Yangon City Development Committee Management By-law of 1999.In Section 18 of Chapter VI: tax payable by road-side sellers is mentioned however, the colleting tax in vending was no longer effective during the survey period (Aye,2013).

5.2.2.2. Food control management

Controlling, monitoring and surveillance activities of the governing authority are crucial for the effectiveness of food control system. Licensing for food stalls, issuing health certificates for handlers and surveillances activity are conventional steps in operational level of street food safety.Ackah suggested that one of the common ways of regulating street vended food in the developing countries is though medical examination of food vendors (2011).

According to YCDC, food sectors are generally divided into four categories such as markets and stores,food production factories, slaughter houses and prepared foods selling shops.Among them, street food shops are under prepared foods selling shops category together with the restaurants and

[22] YCDC is under the FDA's supervision when it comes to technical aspects of food sanitation and safety, according to interview with YCDC.

schools food stalls.Restaurants and schools food stalls are under supervision of YCDC,Food and Drug Administration FDA and regional health department, in terms of licensing, issuing health care certificate and conducting training courses for food handlers.However, street food stalls were still excluded from these steps (Aye,2013),even though YCDC is responsible for sanitation of street foods in Yangon, according to the City Development Committee Management By-law (1999).

The health department of YCDC issued a statement comprised of ten rules about the sanitary requirements for street food stalls (YCDC).

5.2.2.3. Inspection service

Food and Drug supervisory committee at central, state, district and township levels carried out the inspection for prepared foods selling shops in cooperation with the Department of Health of the Ministry of Health, the Departments of City Development Committees(CDCs).The authority said that every 32 township in Yangon has its own inspectors who are physicians, midwives, and health care professions assigned at the township medical administrative offices.Food handlers and foods with its utensils are two common elements to be inspected.Deworming the food handlers and the nasal swab tests are carried out by the authority during the inspection process (Aye,2013).

In this inspection service,it was found that inspectors' roles and responsibility were pre-determined and designated for the inspection process.However, their duty for inspection is an additional task that is attached to their main health care professional job. Frequency, effectiveness and follow-up action after the inspection are still questionable for managing the successful inspection procedures.Above of all, restaurants or food shops that need to apply the registration for applying license to YCDC are eligible for these inspection steps. Street foods still excluded then.

5.2.2.4. Laboratory service

YCDC has its own laboratory starting from March,2013; it is, however, technically under FDA's laboratory supervision.Food control laboratories are the essential part by providing the scientific information that helps decision making process in dealing with the food safety problems (FAO,2006).

5.2.2.5. Information, education and communication IEC activity

Food safety education is the most effective when messages are targeted toward changing behaviors for preventing food borne illness (Medeiros et.al.,2001).In IEC activity,YCDC played an active role in conducting trainings for inspection personals and training for food handlers since 1996. These were carried out 4 times a year,with 2 days training course for 50 participants per batch (Aye, 2013).It also provides training manual including safe food handling.

A range of personal, social, and environmental factors influence food handlers practices and thus these factors need to be addressed in order to change food handlers' behavior (Gul,2012).A year after an FAO-supported street foods quality improvement campaign, food vendors in one area of Bangkok announced that sales were up 20%(FAO,2002).It shows the necessity to assist the improvement of street foods quality,from controlling perspective.Authority must elucidate a policy aimed at assisting,controlling and maintaining the street food sector(WHO,1997)it can be achieved through better communication with vendors.

During the past, selling permission on the road side was often evicted by the authority.There were a lot of discussions (Aung and Thaw,2011)on how vendors should be allocated and about the existance of this infomal business in lively downtown.They were often criticized by the authority due to their encroachment on the public place of the crowded Yangon.Nevertheless,after the political tranformation of 2012,vendors have been allowed doing their business without fees to the authority, but within the time frame of 3pm to 8 pm,out of consideration for the socio-economic welfare of vendors.

5.3.Result of the Assessment of Vendors

5.3.1. Demographic profiles of vendors Seventy two street food vendors (n=72) from downtown area were included.Table (5.1) shows the demographic profiles of vendors.

Table 5.1.Demographics of Vendors-respondents

Variables	n	%
Sex (72)		
Male	23	31.9
Female	49	68.1
Household-size (72)		
1 - 3	42	58.3
4 - 6	27	37.0
More than 6 persons	3	4.7
Marital Status(72)		
Single	22	38.6
Married	50	61.4
Age years (72)		
Up to 20	-	0
21-30	16	22.2
31-40	16	22.2
41-50	21	29.2
Older than 50	19	26.4
Education (72)		
Up to Elementary Level	11	15.3
Up to Secondary Level	18	25.0
Up to High School Level	32	44.4
Up to University Level	11	15.3
Higher than University Graduate	-	0

Source: Wai and Yamao (2014c)

The demographic profile of the street food vendors is shown in table (5.1).The result revealed that most of the vendors (68%) were women[23].That result is not varied so much with the previous study's result of (59%)reported by (Maung et.al,2012).According to FAO,women employment represents from 70% to 90% of the street food vendors (2002).58% of them had 3 family members and more than 30% had three to five family members[24].

15% of the respondents had at least primary school education and 25% was up to secondary school level. It is in agreement with the result 33% of previous study of Maung et.al (2012).

Nearly half of the respondents started their businesses more than seven years ago and about 10% started less than a year.Nearly two third of respondents (61%) were married.More than 70 % of them were born in Yangon and less than 30% was migrated[25] to Yangon and engaged in street-foods vending then.More than 80% have their own trash bin and the great majority of them (89%) throw trash into YCDC garbage bins.73% used public toilet,other used toilet from kith and kin and 80% of these toilets had facilities for hand washing.

5.3.2. Health and personal hygiene knowledge of vendors

Health and personal hygiene knowledge of the vendors are mentioned in table 5.3. All most all of them (more than 95%) knew that used plates and glasses cannot be washed by just quick rinsing in a pail of water and washing in tub with the oily and or soapy reused water. All most all knew that soap and water are required cleaning utensils however,two third didn't know that rinsing with hot water and drying with clean clothes should be done after washing the utensils.

The majority of respondents (94%) replied that they had heard of the word food borne illness. Almost all responded that they were aware of that food borne diseases might be associated with the consumption of contaminated foods.Among the respondents,(22%) of vendors' respondents attended the food safety trainings conducted by the authority.A food safety training program was launched in this study area during 2012 for conducting the research mentioned in the literature review.Personal hygiene knowledge found rather high as a result of that intervention.No vendors had health certificate. Nearly half of them (47%) had no idea that it is necessary to wash their hand after touching money. The need of wearing hair restraint was understood by majority of respondents (86%).It is higher than (72%) positive responses of wearing apron.All respondents demonstrated that they could not handle food safely while suffering from Diarrhea. Half of the respondents (50%) knew that rings are a source

[23] The sex ratio is 98.9males per 100 females at national level (Aye et.al.,2010).
[24] Total fertility rate TFR at National level is standing at 2.03 and Marital fertility is 4.7 children per married couple and the trend has been decreasing (Aye et.al.,2010).
[25] One in ten people in Myanmar moves from their residents' states at least once in their life time and internal migration from rural to urban exceeds that of urban to rural.Yangon sends and receives migrants from every state in substantial numbers (Aye et.al.,2010).

of contaminants.Insufficient hand washing throughout the day was understood by most of the respondents (89%) among faults that reduced personal hygiene of vendors.

Table 5.2.Health and persoanl hyigene knowledge of vendors (n=72)

Questions	No of positive responses	%
Types of food contaminants include		
- Worms and Parasites	67	93.1
- Invisible germs in foods	66	91.7
- Unpermitted Food coloring(industrial used dyes),contaminated flavoring and spices	65	90.3
- Insects and/or their droppings	68	94.4
- Dust and dirt	71	98.6
Hand washing is necessary for street food vendors		
- After trip to toilet	71	98.6
- After touching money	38	52.8
- Even when handkerchief is used for sneezing	37	51.4
- Even when hands are not yet wet, sticky and visibly dirty during continuous food handling	69	95.8
While vending, Street food vendors		
- Should wear hair restraints	62	86.1
- Should wear aprons	52	72.2
- Should not wear jewelries (especially-ring) in their hands and arms as a sources of contaminations	36	50.0
Street food vendors cannot safely handle foods, while suffering sick with		
- Diarrhea	72	100
- Typhoid	67	93.1
- Hepatitis	68	94.4
- Food poisoning	66	91.7
- Helminthiasis	67	93.1
- Communicable diseases	70	97.1
- When they have an open wound in the hands even if it is fully bandaged	65	90.3
- Sick of family members	41	56.9
It is not safe to eat food		
- That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae	71	98.6
- Which come in contact with dirty surface	71	98.6
- Found containing hairs or staple wire provided these were removed prior to consumption	72	100
Faults that reduce personal Hygiene of Vendor		
- Touching food with bear hands during serving	57	79.2
- Allowing buyers touching foods with bare hands	53	73.6
- Speaking while serving	43	59.7
- Using food-preparing-hand to exchange money	52	72.2
- Insufficient hand-wash throughout the day	64	88.9

Source: Wai and Yamao (2014c)

According to table (5.2) result, it could be found that most of the vendors were aware of health and personal hygiene knowledge.The same types of findings were found in the Philippines' street food study conducted by Azana et.al.(2005) and in Accra-Ghanna's street food study done by Ackah et.al.,(2011).

The eight constraints cited by the vendors include lack of availability of clean water sources (67%),unfavorable condition for good practices and lack of awareness on good handling practices (64%),lack of price competency (58%),lack of access to clean toilet facilities and weak in food-safety knowledge (58%),lack of timely support for garbage disposal system (56%) and high mobility (54%). Barro et. al, pointed out that vendors need better premises with proper infrastructures such as access to running water,sewage system and drainage system,etc.(2007) to promote safe food production.

According to a report of a Myanmar delegate attended the regional consultation on safe street foods held in 2011 Bangkok,it mentioned that the constraints experienced in the implementation of street food safety include limitation of infrastructure such as potable water supplies,washing and waste disposal facilities;difficulty in controlling some street food vendors because of their mobility and temporary nature; insufficient training for inspection personnel; training given did not cover the large number of vendors on basic food safety measures (Nwe,2011).

5.3.3. Correlation analysis for the vendors' response

Table 5. 3.Correlations among variables (Pearson Correlation)

	Age	Sex	Established Year	Educational qualification	YCDC intervention	Knowledge	Attitude	Practices
Age	1							
Sex	-.093	1						
Established Year	.148	-.096	1					
Educational qualification	-.222	-.105	-.124	1				
YCDC Intervention	.141	.029	-.151	.140	1			
Knowledge	.124	-.173	-.217	.180	**.305****	1		
Attitude	.136	-.155	-.139	.166	**.425****	**.569****	1	
Practices	.110	.116	.162	-.109	-.100	-.020	-.035	1

**. Correlation is significant at the 0.01 level (2-tailed)
Source: Surveyed data calculated using IBM SPSS statistical software

This analysis is to know the relationship between the agency's food control and the vendors' responses. It was found that there was no significant correlation between the established year and vendors' knowledge,attitude and practices concerning with standardized questions.However,a moderate significant correlations was found between the YCDC's intervention and vendors'

knowledge and attitude on cleanness as a parameter considered in buying ingredients with r=0.305, n=72,p=0.009 and r=0.425,n=72,p=0.000.Those two points showed that agency's food control is required to improve knowledge and attitude of the vendors.It might be hard to improve their knowledge and attitude by themselves.

5.4.Result of the Assessment of Consumers

Very limited information was available about consumers study on food control aspects of street foods in Yangon. Still, consumer are one of three the primary stakeholders. Consumers could be a great for changing vendors' behavior that is a vector of various contaminations (Barro et.al.2007). Consumers who are attracted by convenience and low prices may overlook aspects of hygiene or sanitation or may lack of the understanding of proper practices and the potential for foodborne illness (Winarno and Allain,1991).Nowadays, the role of consumer becomes prominent as an active group in risk governance framework that formally institutes stakeholder consultation and dialogue through a transparent and accountable process (Cope and Frewer,2010).A total of 167 consumers-respondents took part in this study.

5.4.1. Demographic of street food consumers

Table 5.3 shows the demographic of the consumer respondents.

Table 5.4.Demographics of consumers-respondents

Variables	n	%
Sex (167)		
Male	68	40.7
Female	99	59.1
Household-size (167)		
1 - 3	69	41.3
4 - 6	89	53.3
More than 6 persons	9	5.4
Marital Status(167)		
Single	98	58.7
Married	69	41.3
Age years (167)		
Up to20	29	17.4
21-30	44	26.3
31-40	26	15.6
41-50	36	21.6
Older than 50	32	19.2
Education (167)		
Up to Elementary Level	13	7.8
Up to Secondary Level	26	11.8
Up to High School Level	50	33.7
Up to University Level	67	40.1
Higher than University Graduate	11	6.6

Source: Wai and Yamao (2014d)

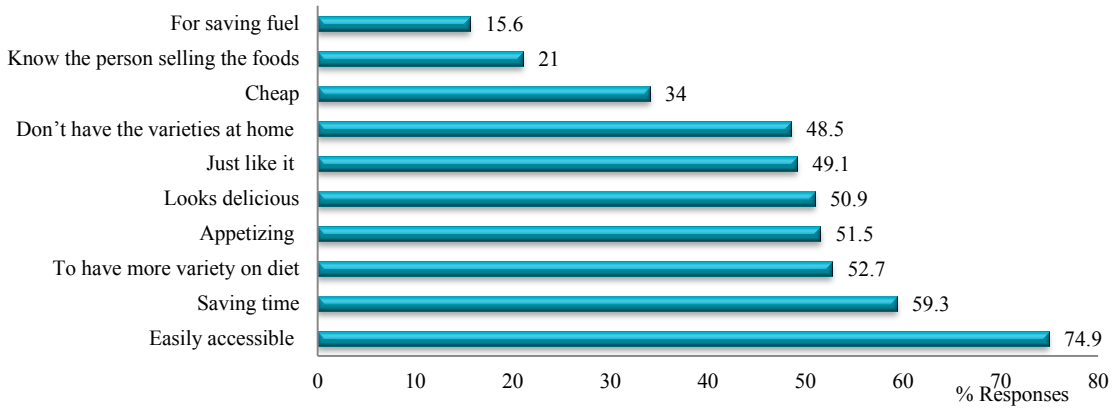
More than half (60%) of the street food consumer-respondents were women. More than half of them were single[26]. In terms of the educational level, nearly half (40%)of the respondents possessed up to university level and the second largest group (34%) possessed up to high school. The age-ranges of the respondents spread across all ranges with more or less 20%.Most of the respondents (53%) had four to six family members and the average household size in Yangon is 4.3.

5.4.2. Reasons for buying street foods

Street food consumption is one of the important consumption patterns associated with urban life in developing world.The busy life style also encourages the street food consumption. Street foods are a bargain for customers when the demands of time and costs of food, fuel, cooking equipment and transportation are taken into account (Winarno and Allain,1991).

In this study, the most cited reason for buying street foods is the easy accessibility with 74.9%. This finding is in accordance with other results of Barro et.al.(2002b),Mensah et.al.(2002) and Collins(1997).They mentioned that the consumers who depend on such food are more interested in easy accessibility (Barro et.al.,2007).Patel et.al., also discussed that consumer decisions to purchase street food is due to its convenience that in relation with their busy schedules (2013).The second reason is for saving time (59.3%) and the third one is for having more variety on diet (52.7%), according to figure (5.1).

Figure 5.1.Reasons for buying street foods



Source: Wai and Yamao (2014d)

5.4.3. Opinions on price,appearance,taste of street-foods

68.9% responded that street foods price was affordable and nearly 30% said it was cheap. More than half (52.1%) said home-made foods had better taste while nearly one fifth (21.6%) responded that street food taste was not better than other foods and have same taste like other foods. Only 8.45% said street food taste was better.

[26] According the national census collected in 2014, being single becomes the trend.

Table 5.5.Opinions on price,appearance,taste of Street-foods(n=167)

Description	frequency	% of responses
(1) Price		
- Expensive	3	1.8
- Affordable	115	68.9
- Cheap	49	29.3
(2) Taste		
- Better taste	14	8.4
- Same as other	36	21.6
- Home-cook is better	87	52.1
- I don't know	30	18
(3) Appearance		
- Appetizing	64	38.3
- Seems clean	10	6
- Can't help buying	6	3.6
- No difference with other foods	51	30.5
- I don't know	36	21.6

Source:Wai and Yamao(2014d)

In terms of appearance, 6% replied that street foods looked clean and only 3.6% said they could not resist buying whenever going past the street-foods.30.5% had opinion that street foods appearance was no difference with other foods.

5.4.4. Awareness and occurances of food-borne illnesses after street-foods consumption

Patel et. al., discussed that consumers from all socioeconomic backgrounds are concerned with health and food safety issues (2013).The great majority of respondents 93.4% were aware of that food borne illness could be transmitted through the consumption of (unclean) foods.More than half (53.3%) were often concerned over food safety issues of street foods.34.7% of respondents experienced some symptoms such as diarrhea,vomiting,stomach cramp after eating Street-foods, at least once in their life.

Table 5.6.Awareness and occurances of food-borne illnesses after Street-foods consumption

Questions	frequency	% of responses
(1) Are you aware that food-borne illnesses/ diseases can be transmitted through consumption of (unclean) foods?		
- Yes	156	93.4
- No	11	6.6
(2) Are you concern over food safety issues of street food?		
- Very much	71	42.5
- Often	89	53.3
- Sometimes	7	4.2
(3) Are you satisfied with street-foods from safety perspectives?		
- Yes, I am	9	5.4
- No, I'm not	145	86.8
- I have no idea	13	7.8

(4) Have you ever experienced any symptoms such as Diarrhea,vomiting, stomach cramp after eating street-foods?		
- Yes	58	34.7
-No	109	65.3

Source: Wai and Yamao (2014d)

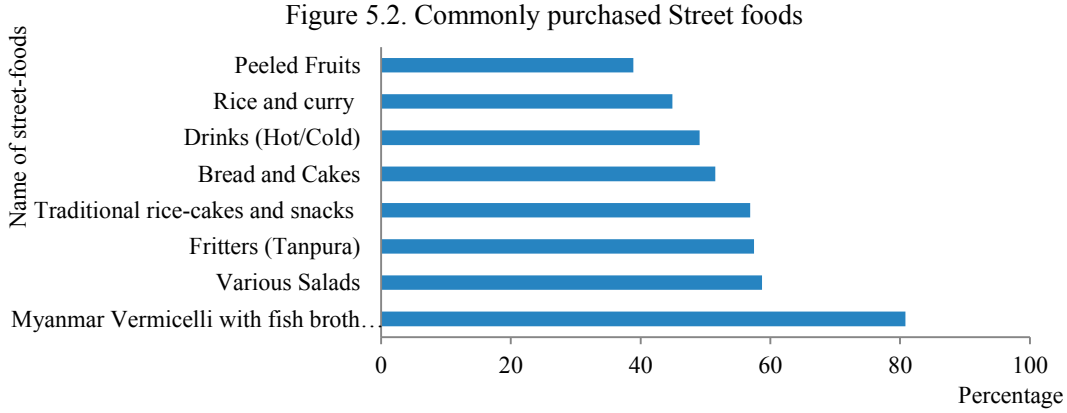
More than half of the respondents (52.1%) were not aware that Yangon City Development Council-YCDC is controlling stationary restaurants' food safety in voluntary basis.65.3% of the respondent thought that stationary restaurants' food safety was better than street foods:however 13.8% still thought that both would have the same level of food safety.Approximately three fourth (75.4%) of them thought that street food shop should be under control of YCDC.Whitehead mentioned that consumer expects the setting of acceptable levels of risk and monitoring of safer food supply from authority concerned (1995).Moreover, consumers are taking unprecedented interest in the way food is produced,processed and marketed,and are increasingly calling for their Governments to accept greater responsibility for food safety and consumer protection (FAO/WHO,2003).

93.4 % of the consumer respondent was aware that food born disease may be transmitted through consumption of uncleaned food. 65.3% of the respondents suffered FBD' symptom,at least one time after eating street foods.There is a strong evidence between bad experiences and the understanding of the possibility of FBD occurrence with Pearson Chi-square value 4.34 at p=0.037.

5.4.5. Commonly purchased street-foods

The commonly purchased street foods identified by respondents are (1) Mohingha (80.8%),(2) various salads (58.7%),(3) fritters(Tenpura)(57.5%),(4)traditional rice cakes and snacks(56.9%),(5) bread and cakes(51.5%),(6)drinks(49.1%),(7)rice and curry(44.9%)and (8)peeled fruits (38.9%). Maung et.al. mentioned that Mohingha and salads are two of the favorites foods of Myanmar people (2012).

Figure 5.2. Commonly purchased Street foods



Source: Wai and Yamao (2014d)

5.4.6. Consumers' attitude on street foods vending practices

The three levels (agree,not sure,disagree) of attitude were employed in consumer street foods questionnaires.They are mainly divided into seven principles as shown in table and results are as follows:

Table 5.7.Attitude on street foods vending practices (n=167)

Detailed statements	Attitude Level (n,%)			Mean	S.D
	Agree	Not sure	Disagree		
(1) Hand washing is necessary					
-After handling raw materials	164(98.2%)	3((1.8%)	-	1.0180	0.01031
-After handling garbage	145(86.8%)	20(12.0%)	2(1.2%)	1.1437	0.02976
-After touching money	147(88.0%)	20(12.0%)	-	1.1198	0.02520
-After using toilet	163(97.6%)	4(2.4%)	-	1.0240	0.01187
-After blowing nose	160(95.8%)	7(4.2%)	-	1.0419	0.01555
-After having meals	159(95.2%)	7(4.2%)	1(0.6%)	1.0539	0.01948
(2) Vendors should temporarily stop from vending or cooking if suffering from					
-Cough and colds	123(73.7%)	36(21.6%)	8(4.8%)	1.3140	0.43230
-Diarrhea	145(86.8%)	15(9.0%)	7(4.2%)	1.1737	0.03701
-Stomach cramps	146(87.4%)	14(8.4%)	7(4.2%)	1.1677	0.36680
-Typhoid	131(78.4%)	30(18.0%)	6(3.6%)	1.2515	0.03958
-Hepatitis	131(78.4%)	28(16.6%)	8(4.8%)	1.2635	0.04179
-Food poisoning	128(76.6%)	31(18.6%)	8(4.8%)	1.2814	0.42370
-Helminthiasis	128(76.6%)	33(19.8%)	6(3.6%)	1.2695	0.40230
-Communicable diseases	139(83.2%)	22(13.2%)	6(3.6%)	1.2036	0.03755
-Sick members of family	74(44.3%)	64(38.3%)	29(17.4%)	1.7305	0.05725
(3) Vendors should consider some parameters in buying raw(to be cooked for vending)					
-Price	164(98.2%)	3(1.8%)	-	1.0180	0.01031
-Freshness	158(94.6%)	9(5.4%)	-	1.0539	0.01753
-Sold by reputable wholesaler	141(84.4%)	23(13.8%)	1(0.6%)	1.2216	0.06656
-Quality Aspects	147(88.0%)	19(11.4%)	1(0.6%)	1.1257	0.02720
-Expiration date	156(93.4%)	10(6.0%)	1(0.6%)	1.0719	0.02177
(4) Vendors should					
-Thorough washing of food(raw) to be cooked	164(98.2%)	3(1.8%)	-	1.0180 1.0479	0.01031 0.01658
-Use of safe water for cooking	159(95.2%)	8(4.8%)	-		
-Use of fresh ingredient /raw to be cooked	161(96.4%)	6(3.6%)	-	1.0359	0.01445
-Use of food covers to protect cooked food from dust and insects	162(97.0%)	5(3.0%)	-	1.0299	0.01323
-Adequate cooking of food (time and temperature)	155(92.8%)	11(6.6%)	1(0.6%)	1.0778	0.02246

(5) Vendors should discard foods if food is contaminated with					
-That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae	157(94%)	4(2.4%)	6(3.6%)	1.0958	0.39930
-Which come in contact with dirty surface	156(93.4%)	5(3.0%)	6(3.6%)	1.1018	0.40531
-Found containing hairs or staple wire provided these were removed prior to consumption	153(91.6)	7(4.2%)	1(0.6%)	1.1737	0.87110
(6) Methods employed in cleaning utensils needed in food preparing and vending					
-Washing with soap and water	159(95.2%)	7(4.2%)	1(0.6%)	1.0539	0.25168
-Rinsing with hot-warm water	124(74.2%)	38(22.8%)	5(3.0%)	1.2874	0.51603
-Drying with clean clothes	117(70.1%)	44(26.3%)	6(3.6%)	1.3353	0.54453
(7) I think Street food vendors					
-Should wear hair restraint	148(88.6%)	16(9.6%)	3(1.8%)	1.1317	0.38886
-Should wear apron	144(86.2%)	21(12.6%)	2(1.2%)	1.1497	0.39007
-Should not wear jewelries in their hands and arms as a possible source of contaminants	122(73.1%)	40(24.0%)	5(3.0%)	1.2994	0.52083

Source: Survey (2013)

(1) Results show that great majority of the consumer respondents agreed with the hand washing principle: only 12 % was not sure that hand washing is necessary after touching money.

(2) As regard with the temporary halt of vending for the exclusion of ill-food handlers, only 44% of respondents agreed that vending should be stopped when one of the family members is sick and 17.4% disagreed and more than one third (34.5%) were not sure about that. More than two third (>70%) agreed that vendors should stop their business temporarily, when they suffer from cough and cold, diarrhea, stomach cramps, typhoid, hepatitis, food poisoning, helminthiasis and communicable diseases.

(3) The majority of consumer respondents (>88%) agreed with all the facts concerning with the parameters to be considered by vendors in buying raw materials.

(4) More than 92% agreed with the facts about proper handling of foods and adequate cooking.

(5) Most of the respondents (>92%) agreed that vendors should discard the contaminated foods, if facing with the (mentioned) three possible contaminant-causing conditions.

(6) More than 95% agreed that vendors should use soap and water in cleansing of utensils. 22.8% was not sure that rinsing with hot-warm water should be followed after cleansing utensils and 26.3% was not sure that rubbing with clean clothes should be followed in the last step of cleaning.

(7) More than 88% thought vendors should wear hair restraint and 86% of respondents also thought that vendors should wear apron. However, nearly 25% of respondents were not sure that vendors should not wear jewelries in their hands and arms as a possible source of contaminants.

FAO suggested that watches, bracelets and rings prevent the thorough cleaning of hands and forearms.

The consumers-respondents agreed with the good practices, as regard with the attitude of the street food vending practices but some of them (the range between 5% and 26%) were still not sure of some detailed facts of utensils cleaning and wearing jewelries.

The constraints cited by the respondents include (1) weak in food-safety knowledge of vendors (93.4%), (2) lack of availability of clean water source (92.8%),(3) lack of timely support for garbage disposal system (91.0%), lack of access to clean toilet facilities (90.4%),(5) lack of price competency and (6) due to lack of good practices awareness (86.2%) and(7) due to high mobility (81.4%).

5.4.7. Correlation Analysis for street-foods consumer responses

Table 5.8.Correlation Matrix for opinion on Control authority and socio-economic characteristics of consumers

	Sex	Age	Marital Status	Educational qualification	Do you know that YCDC is controlling stationary food stalls?	YCDC should control street food safety?	Do you know that food borne diseases may be transmitted through consumption of uncleansed foods?
Sex	1						
Age	-.071*	1					
Marital Status	-.171*	.617**	1				
Educational Qualification	.146	.053	-.060	1			
Do you know that YCDC is controlling stationary food stalls?	-.136	.021	.050	.095	1		
YCDC should control street food safety?	-.037	.009	-.027	.083	.436**	1	
Do you know that food borne diseases may be transmitted through consumption of uncleansed foods?	-.124	.048	.022	-.127	.206**	.297**	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed)
Source: Surveyed data calculated using IBM SPSS statistical software

This analysis is to find out the relationship between the consumers' interest on responsible agency's food control and whether the respondents wanted food control of the agency or not. It was found that there was a positive correlation between "knowing YCDC's food control for stationary food stalls" and "the desirous of agency's controlling for street foods" with r=0.436,n=167,p=0.000.

Two other relevant correlations are (1) there is a positive correlation between “the desirous of agency’s controlling for street foods” and “knowing the possibility of food borne diseases transmission through unsafe food consumption” r=0.297,n=167,p=0.000.(2).There is a positive correlation between “the desirous of agency’s controlling for street foods” and “Consumer’s concern on street food safety r=0.165, n=167,p=0.03.It can imply that the consumer respondents concerned on street food safety and most of them appreciate the agency’s food control.

To sum up this chapter, all key components of the food control system for food stalls established.However, street foods stalls were not well-controlled if comparing with the registered stationary food stalls.It was found that the street foods consumers wanted the concerned authority’s food control for better safety and sanitary condition of street foods. Even though consumer preferred the home-made foods,they bought street foods for easy accessibility and saving time. Majority thought that the concerned authority YCDC’ food control is required to monitor and control the sanitary condition of street foods production.Vendors in Yangon did not need to pay tax; however, their existence was not legally protected, unlike vendors in neighboring developing countries such as Thailand,India and Malaysia.Vendors’ existence should be legally acknowledged and tax payable by vendors should be used in providing infrastructure such as clean water sources,toilet facilities,garbage disposal facilities, etc.Most of the vendors surveyed possessed a good knowledge of health and personal hygiene,though there is a need to put their knowledge into practice.To support this,authority-supported awareness raising training programs and periodic monitoring should be introduced to street food vending in Yangon.Street food stalls should be registered and the sanitary condition of street food production should be monitored.

Chapter 6

Food Control in Export: Control of Fishery Products for International Trade

6.1 .Introduction

According to Adam Smith and David Ricardo,factors condition (labor, land, natural resources, and infrastructure) of production are determinants for national competitive advantage[27].However, Michael Porter argued that factors must be specialized to an industry's particular needs because country cannot inherit instantly but instead it have to improve or recreate these factors with investment by innovation and integration to be sustainable (Porter,1990).

This study is to explore what Myanmar fishery sector has been doing with its factors[28] of production especially focusing on food control system and its integration at government level and firm level to know the value creation capability in tapping the advantage.

This chapter is divided into three main parts such as (1) fishery sector in Myanmar including fishery export of Myanmar and fishery food control for international trade,(2) assessment of fishery food control system and the need of system integration for export and (3) assessment of the approved fishery processing plants on firm level adoption of standards for international trade.

The aims of this chapter are -

(1) To explore the provision of food control by the competent authority for export success and to identify the existing quality assurance of the important trading partner countries in this specific fishery sector and
(2) To investigate food safety management system at firm level and to investigate incentives for and challenges to adoption of HACCP of the approved firm.

Taking part in international trade demands government investments in quality infrastructure (Hochman et al.,2013) due to the ever increasing consumers' demand, markets requirements, etc. It is no longer just a public health issue but also a market development issue (Unnevehr et.al.,2003).Thus export promoting policies will need to look well beyond tariffs and subsidies towards the establishment of standards (FAO,2012).Small producers of developing countries have been facing challenges in fulfilling export requirements mainly due to technical and financial limitations.

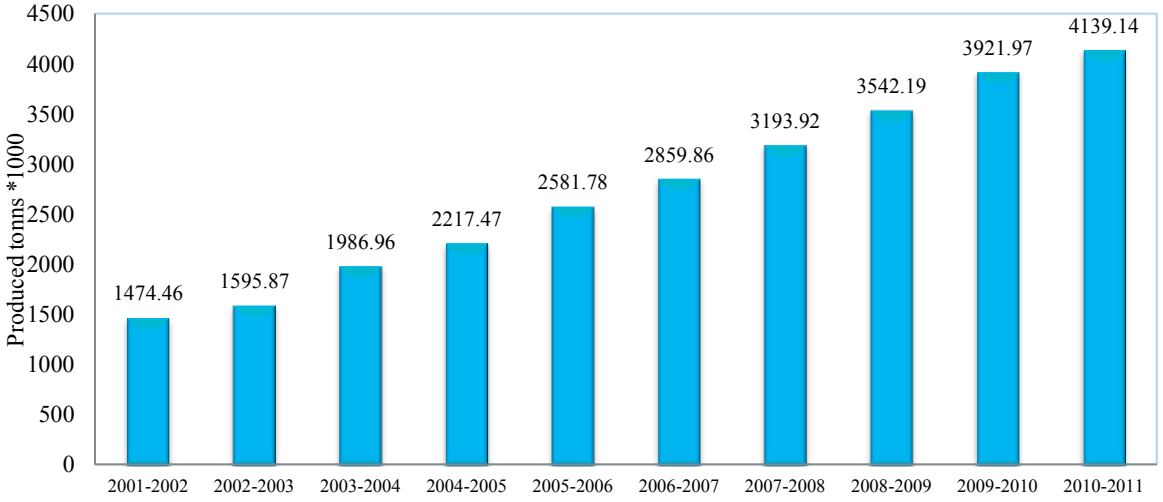
[27] Competitive advantage refers to the ability gained through attributes and resources to perform at a higher level than others in the same industry or market (Chacarbaghi and Lynch (1999), Kay (1994),Christensen and Fahey (1984), Porter (1980)).
[28] Myanmar fishery resources especially from marine remained largely untapped due to late privatization (Okamoto,2008).

6.1.1. Fishery sector in Myanmar

Myanmar possesses a long coastline of 2,832 kilometers, the total area of swamps is about 0.5 million hectares that provides good basic for development.Fishery sector has a huge potential to contribute economic development, fishery and livestock sector contribute 7.8% of GDP in 2010.

In 2012,fishery production amounted to 4.14million metric tons, being higher than Bangladesh (3.1MMT) and Thailand (2.9 MMT).Figure (6.1)shows a trend of Myanmar fishery production during last decade.

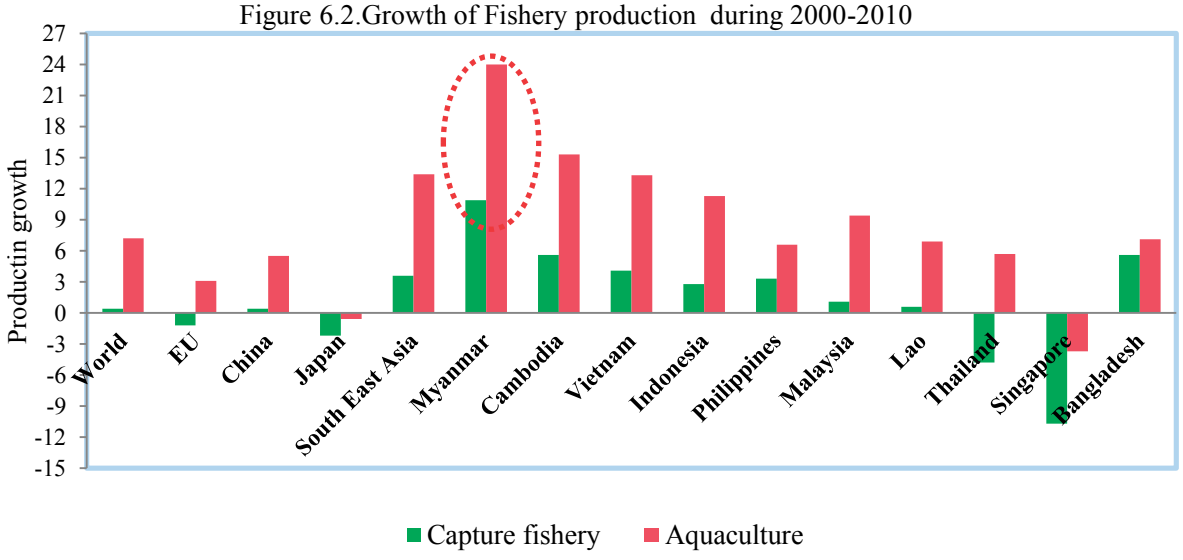
Figure 6.1.Production of Myanmar fishery sector during 2010-2011



Source: Fishery statistic by Department of Fishery (2012)

During the last decade, the growth of Myanmar fishery production both in capture and aquaculture outnumbered than that of the world and Southeast Asian regional trends as shown in figure (6.2) (FAO,2012).

Figure 6.2.Growth of Fishery production during 2000-2010

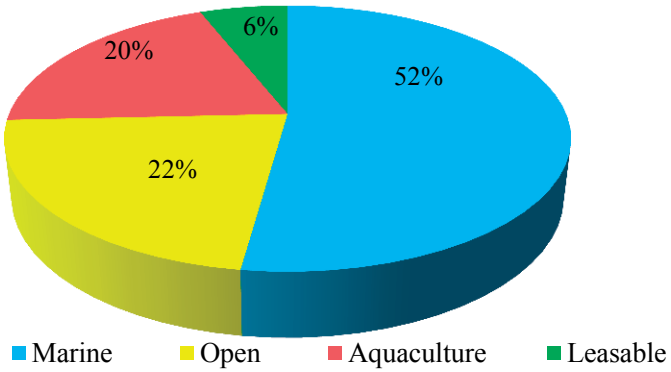


Source: FAO (2012)

The recent growth of Myanmar fishery production was explained by Okamoto that due to the late privatization of Myanmar in the mid-1990s, the export-oriented fisheries of Myanmar was 30 years left behind South East Asian countries that had developed in the 1960s and 1970s (2008).

Marine source accounted for more than half (52%) of fishery production in 2010-2011 (DOF, 2012).The share of fishery production depending on the four main sources is mentioned in figure (6.3).

Figure 6.3.Sources of production in 2010-2011

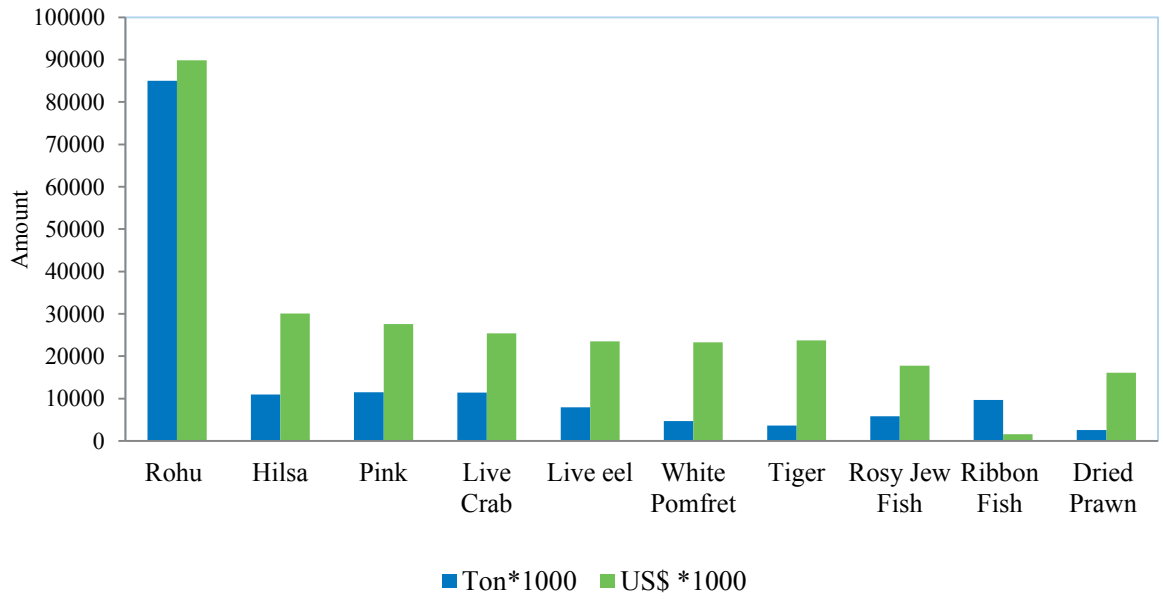


Source: Fishery statistic by Department of Fishery (2012)

Internationally, shrimp, mud crab, sea bass have large commercial potential to EU,Japan, etc. and are exported to 27 different countries.Regionally,Indian carp, Hilsa have high demand according to Department of fishery (2012).

Figure (6.4) indicates the production volume and the value in US dollar of the top ten fishery products in 2010-2011.

Figure 6.4.Top ten fishery products in 2010-2011

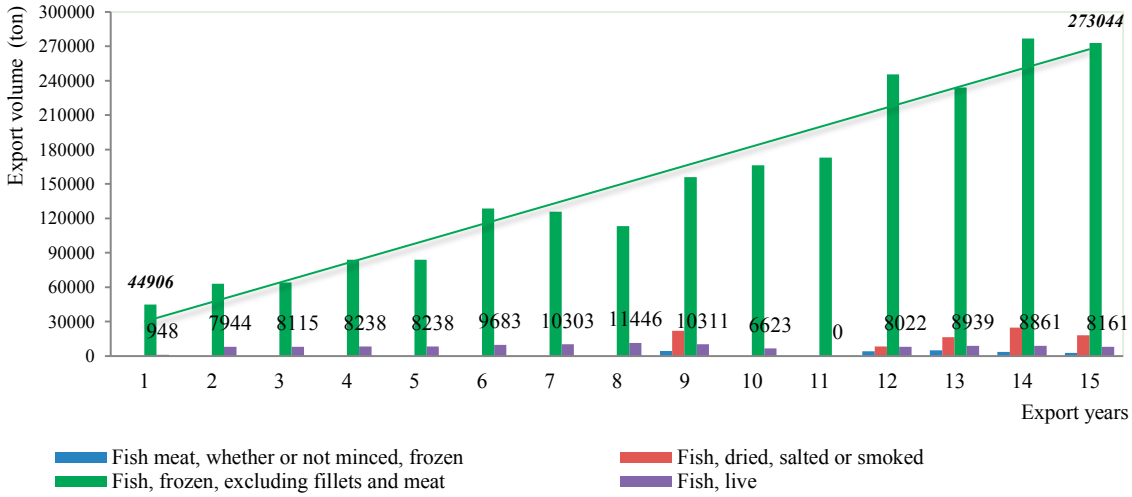


Source: Fishery statistic by Department of Fishery (2012)

6.1.2. Fishery export in Myanmar

International trade of fisheries products had rapidly grown from US$15 billion in 1980 to US$56 billion in 2001.Developing countries' share of total exports rose from 40% to 80% of total world fishery.Imports are concentrated strongly in Europe,USA,Japan and other developed countries (Greenhalgh,2004).The Myanmar fishery export volume's been increasing especially frozen fishery products item as shown in figure (6.5).

Figure 6.5.Export of Myanmar fishery :1998-2011



Source: Fishery statistic by Department of Fishery (2012)

Figure (6.5) indicates that the export of frozen fish in volume increased sharply during last fifteen years while the exports of other items remained stagnant. Moreover, nearly 40% of Myanmar fishery export was through international trade while more than 60% sold through border trade. The level of food safety requirements is different between frozen fish and live fish, and also between international trade and border trade.

Despite the fact that Myanmar produced 4.1 million metric tons of fishery products in 2012 (DOF,2013),it was conceded that there was no strong brand image of Myanmar sea food in international market (CBI,2013).Neighboring countries especially China,Thailand and Bangladesh have been buyers and re-exporters of Myanmar fishery products (Wai et.al.,2015).Thus,it is required to know the value creation capability in terms of food control along the fishery chain and the ability to meet the market requirements of the important trading partner countries for export success.

The investigation was started in April and conducted in May and June 2014 in Yangon. This study focuses on the provision of government food control for the trans-boundary fishery export and the adoption of food safety standards of the EU approved fishery processing plants in Myanmar.

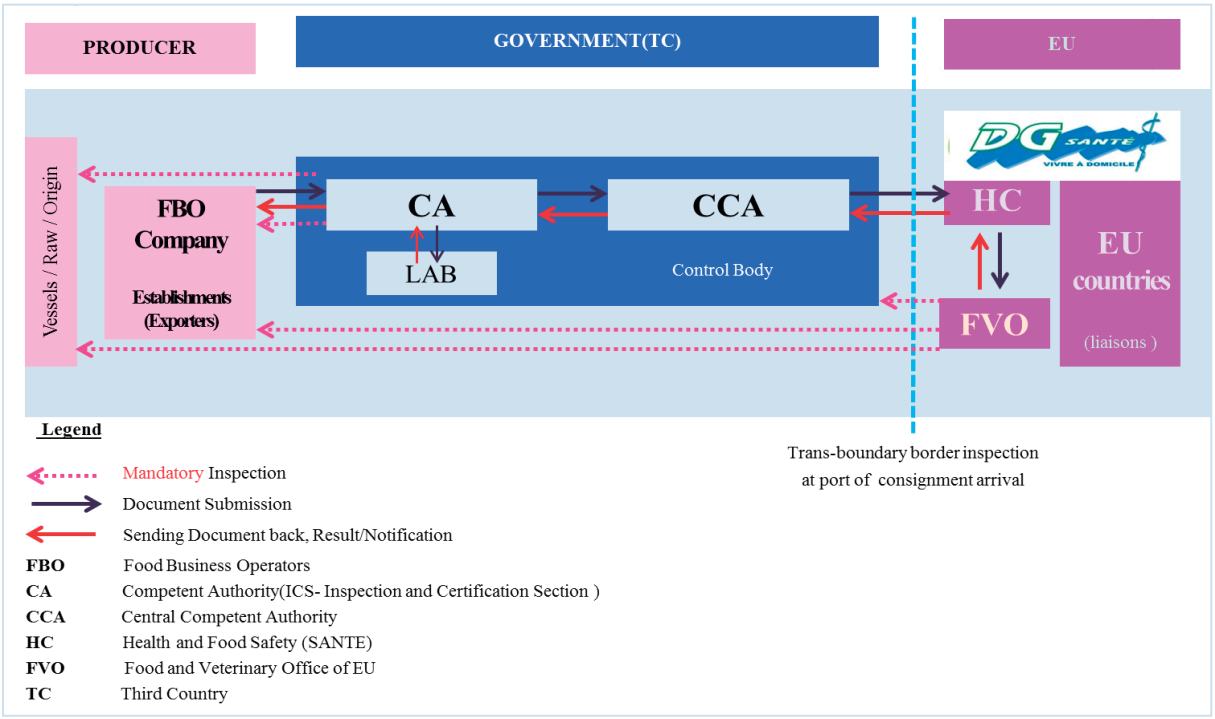
6.2 Food Control over Fishery Products for International Trade

Food safety standards and technical requirements differ from market to market.EU market based on EU directives for food safety and sanitation,US market based on United States Food and Drug Administration requirements and Japanese market based on Food and Sanitation Law (De Silva, 2011).

Among those markets,EU has been at the forefront of developing food safety standards and has a profound influence on the development of food export industry (Greenhalgh,2004).Its' regulatory environment provides a wider range of cost-effective opportunities by closer collaboration between regulatory agencies and producers,while putting the safe food production responsibility on producers (Martinez et.al,2004).

Figure (6.6) illustrates how EU practices food chain approach in export country mandatorily required for EU consumers.

Figure6.6. Schematic food control for EU markets



Source: Wai et.al.,(2016)

Some deficiencies of the Myanmar fishery food control system were found in 2009 by the Food and Veterinary Office (FVO),the inspection mission of EU.

6.3 Results of the Assessment of Fishery Food Control System

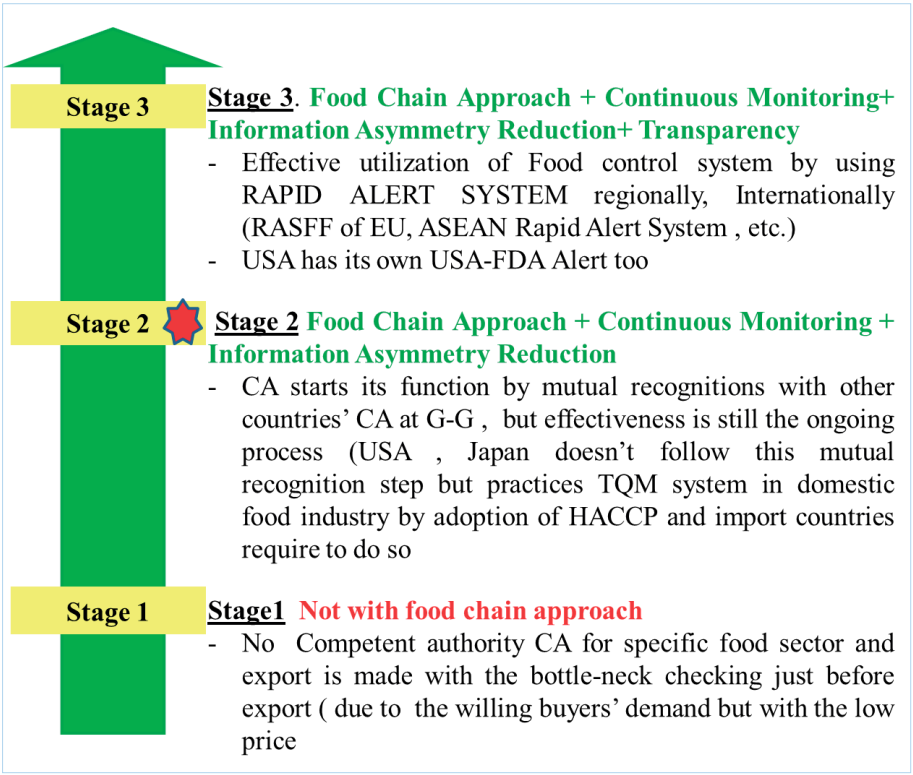
To be able to export successfully,food production countries need to invest in their food control system with the continuous improvement made by integration of the system.For protecting the consuming public,the government needs a sound policy and operational coordination between government to government at the national level (Sarter et.al,2010).

During the last decade,the integration of food control system in major food importing countries can be seen in the form of a closer collaboration vertically between CAs of export and import countries.

6.3.1. Vertical integration of food control system at government level

The vertical integration of food control system can evolve with the three stages. Figure (6.7) demonstrates these steps with descriptions.

Figure 6.7.Vertical integration of food control system at government level



Source: Author

At the initial stage, there is no delegated CA for food control in a specific food sector even though the country establishes all fundamental components of the food control system.Export is possible with end-product testing approach just before export.It may be due to weak capacity and also due to willing buyers' demand coming from outside of domestic but with a low price.At this stage, food control for safety does not practice with food chain approach.Reactive measures will be taken if food-borne outbreak occurs which normally ends up with export rejection.

At the second stage, export country's CA could discharge its' functions after being approved by import country's CA through Mutual Recognition Agreement (MRA).In this case, there are generally three steps for CA to be approved such as (1) harmonization of rules and regulations with the import country,(2) verification visit of an inspection mission of import country and once the export-country demonstrates and fulfills the requirements of the import country during the visit and(3) mutual recognition between CAs starts.The MRA creates liberalized food trade environments cost-effectively without compromising food safety standards.Some countries like USA and Japan do not follow this step, instead following Total Quality Management System (TQMS).

At the third stage, the effective utilization of a rapid alert system governed by CA through its website is practiced to control food borne illness incidents and to disseminate the real-time information as soon as possible.The rapid alert system of import country publishes lists of approved factories on their web sites so that the import company can contact directly to them.It could prevent a common problem of technical regulation information gap between the trade promotion organization and national standard bodies, because export facilitation and quality regulation supervision are carried out by the same CA. If an incident happens in some cases, the alert system will publish the occurrence in a transparent manner. For example:Rapid Alert System for Food and Feed(RASFF)is the EU's alert system to ensure that urgent notifications are sent, received and responded collectively and efficiently(EU,2014).It is a key tool to swiftly react when risks are detected in the food chain.RASFF database is an interactive searchable online database that gives public access to the transmitted RASFF notifications (EU,2014).

6.3.2. Vertical integration in international markets

There are seven major markets for Myanmar fishery sector.According to table (6.1), it can be observed that EU and China have integrated the food control systems vertically. US integrated completely also and has the same requirements at the second stage with Japan that lack the third stage so far.That type of vertical integration was initiated by EU and followed by China, Vietnam and ASEAN[29] with varying degrees of intensity.

Up to 2014,twenty Myanmar fishery factories were approved for EU markets, seventy-eight factories for the China market and twenty-four factories for the Vietnam market.

Table(6.1)shows the seven major export markets of Myanmar and their requirements at the second and third stages of vertical integration as follows:

29 ASEAN encourages its member countries to integrate their food control system and to follow the food control integration practiced by EU member countries. However, most ASEAN countries were not ready to practice it in reality.

Table 6.1.Requirements of major markets in vertical integration and approved factory lists

Import Country/ Markets	2nd stage of vertical integration			3rd stage of vertical integration	Number of Myanmar fishery factory approved by import country CA
	(1) Harmonization	(2) Verification Visit	(3) Mutual recognition between CAs	Alert system web-sites	
EU	Required	Required	Required	RASFF	20
Japan	Not necessary	Not necessary	Not necessary	-	*
USA	Not necessary	Not necessary	Not necessary	US-FDA	* (exporters/factory can apply directly to US-FDA)
China	Required	Required	Required	CNCA-AQSIQ	78
Vietnam	Required	Not yet	Required	NAFIQAD	24
ASEAN	at preparation stage	Not yet	Not yet	ARASFF (ASEAN alert)	*
GCC countries	Not necessary	Not necessary	Not necessary	-	*

Legend
1.RASFF Rapid Alert System for Food and Feed
2.US-FDA U.S. Food and Drug Administration
3.CNCA Certification and Accreditation Administration of the People's Republic of China
4.AQSIQ General Administration of Quality Supervision, Inspection & Quarantine of China
5.NAFIQAD National Agro Forestry Fisheries Quality Assurance Department
6.ARASFF ASEAN Rapid Alert System for Food and Feed
7. * It is are not required for processing factories to be approved by the CA of the import country
Source: Wai et.al. (2015)

6.3.3. Vertical integration of fishery food control system in Myanmar

Among all food sectors such as agriculture, livestock, animal husbandry, fishery, etc., the fishery sector is the only one that has reached at the second step of the vertical integration.In April 3rd2009,Department of Fishery(DOF) could successfully harmonize its legislation with EUrules EC.no.852/2004 and EC.no.853/2004 by promulgating with the directive number 3/2009.It is also called legalization of EU rules for (fishery) export products for ensuring hygienic foods.This integration step is concerned with the food legislation,the first component of food control system.

Presently, Myanmar is listed in annex V,the list of beneficiaries Least Developing Countries (LDCs) under the EU's new Generalized Scheme of Preferences GSP -Everything but Arms-EBA,with 48 other countries.

(1) **Adoption of EU law (food legislation)** The FIQCD is the CA designated by the Ministry of Livestock, Breeding and Fisheries and delegated by EU with the legislations that contain all powers necessary for the approval and listing of the processing establishments and all components of the supply chain (FIQCD,2009). Facilitating technical needs for export success is the main responsibility of FIQCD

(Wai,2014).The aforementioned EC.852 and 853/2004 became the public standard of CA for international fishery trade on a voluntary basis.FIQCD categorized national approved lists into two such as(1)the source of raw materials-Jetty and,(2) establishments-processing factory (Wai,2014).

(2) **Food control management (Collaboration between CA to CA)** During 14th to 21st October 2009, the verification visit of the FVO[30] was carried out after checking the pre-mission questionnaire to access and report the compliance situation in the fishery supply chain.Then,FIQCD became recognized by the CA of EU,DG-SANCO or the Directorate General for Health and Consumer Affairs of the EU leading to the mutual recognition between the CA of Myanmar fishery,FIQCD and CA of EU,DG-SANCO.FIQCD is also a corresponding authority in dealing with DG-SANCO and the delegated authority for controlling purpose along the fishery supply chain (See figure (6.6) for detail).

(3) **Inspection and Laboratory services** It is mandatory that fishery processing plants need to be approved[31] by CAs for export access to EU countries. In the Inspection and Certification Section ICS of the FIQCD,altogether 29 inspectors were well trained through a standardized in-house training.As regard to the laboratory service,it is an ISO17025 accredited laboratory[32] that checks the sample of products of the approved factory on a monthly basic.The inspection and certification section and the laboratory service are regarded as "Official Control" and "Official Analysis" of fishery food control system (FIQCD,2009).

(4) **IEC (Labelling, Traceability, Transparency)** Information sharing and education through training intervention are at the core of the effective utilization of food control system and traceability (Annex13).Trainings for inspectors and food business operators (FBOs) of firms are provided by the FIQCD. Attending four types of training such as HACCP basic training,Quality Audit/Quality Control (QA,QC) training,Lab-test training, other processing related training is compulsory for HACCP team-members of fishery firms desirous of applying for the CA's approval.Trace code must be clearly stated on each packing and carton, for informing the consumer about the products and for traceability purpose.The rapid alert system is also used in ensuring the rapid cross-border flow of information.Among seven major markets of

[30]It came to Myanmar with their own expense, upon the request of FIQCD.FVO publishes finding of their on-site inspection (downloadable via online) and the CA of the third country could address the shortcomings by presenting the action plan to the FVO (Khoi,2008)

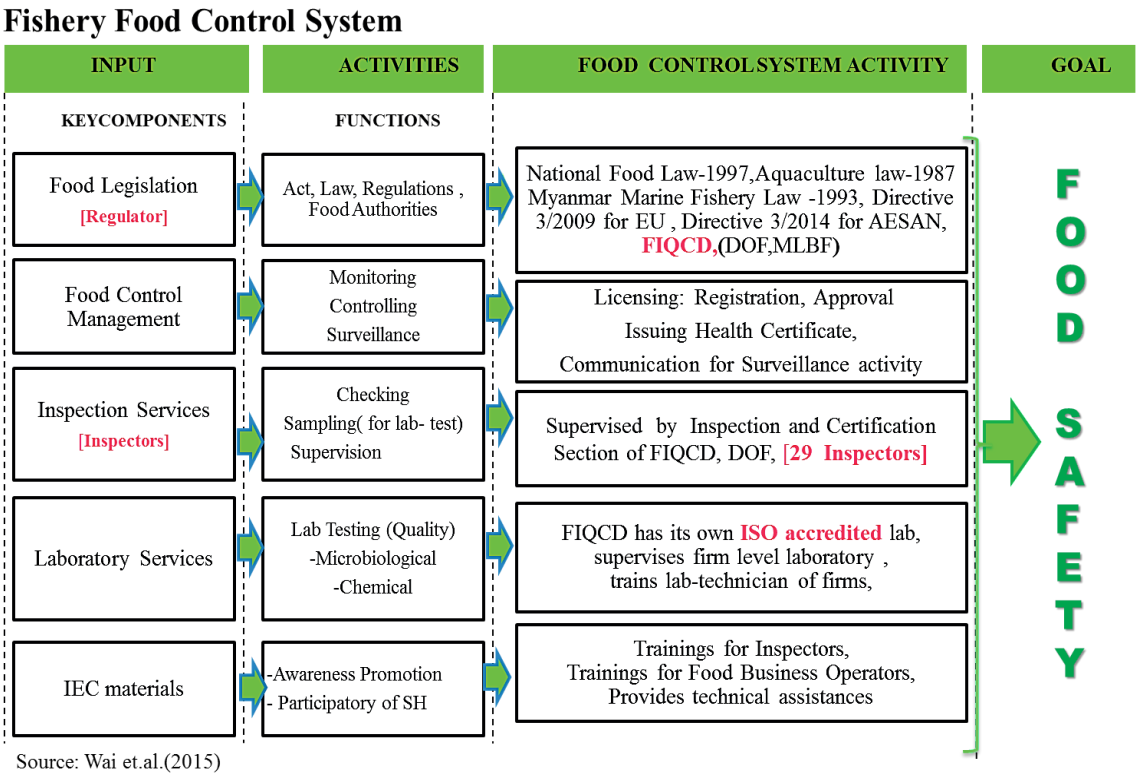
[31]The approval decision will be made on the status of application.The successful applicant shall be entered into the national approved list while unsuccessful applicants will be provided with a list of non-compliant items to be corrected for re-assessment.

[32]It is the only one laboratory that possesses ISO 17025 certificate:Good Laboratory Practice GLP,among all laboratories run by government.Even Food and Drug Administration FDA's laboratory does not have that certificate.

Myanmar, five have their own websites[33] for publishing the approved factory list and for sharing defect via the alert system in the fishery trading (see Table (1) for detailed information).Since CA started its' new food control function in 2009,RASFF notification numbers have been reduced dramatically and export volume has increased as expected.The official control plan of CA stated that FIQCD's Incident Management Team-IMT[34] will investigate,if it receives RASFF notifications from EU's CA, along two parallel fronts (1) elimination of the remaining risks along the food chain and (2) clearing up the causes of non-conformance (FIQCD,2009).

Myanmar fishery exportable items to EU are only the primary fishery item from wild-caught that does not have chemical usage at the production area:at sea.The establishment of National Residue Monitoring Plan is being planned to be able to export aquaculture products.That will be a huge step of technical and financial investments for the CA and firms.

Figure 6.8.Fishery food control system governed by CA



Source: Wai et.al.(2015)

Source: (1) Interview with the head of the Fishery Inspection and Quality Control Division FIQCD
(2) Documents from DOF

[33]ASEAN rapid alert system allows only ASEAN State network members to access certain information and functions in the website (ARASFF,2014).
[34]Team members of IMT will be from the key Central Competent Authority CCA of DOF, such as director of FIQCD, the head of inspection and the analytical experts (FIQCD,2009).

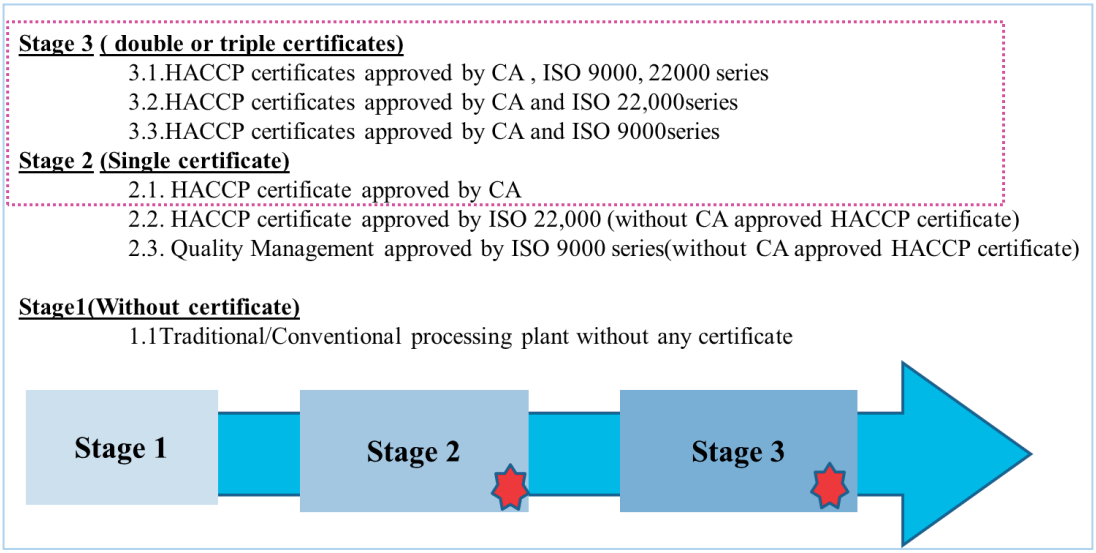
6.4 Results of the Assessment of Approved Fishery Processing Plants

6.4.1. Horizontal Integration of FSMS at firm level

The ultimate responsibility for achieving food safety lies in the hands of production firms i.e.,food business operators.The capacity of integration depends on their ability to follow.It is still obligatory that fishery processing plant needs approval of CA as a mean to integrate FSMS.In what way firm enhances FSMS horizontally,the adoption of public and private standards, and incentives and challenges of the surveyed firms were discussed in the following part.

6.4.1.1. Horizontal integration The horizontal integration of FSMS at the firm level is illustrated with three stages in figure (6.9) as follows.

Figure 6.9.Horizontal integration of Food Safety Management System at Firm level



Source: Author

At the initial stage, a firm does not have any certificate to be proven for safety. The absence of a certificate limits market access,but then FSMS can be started by acquiring single certificate from either public or private sources.So,the acquisition of the single certificate can be regarded as the second stage because products differentiation achieved by effective utilization of HACCP system enhances the firms' competitiveness to increase sale in the markets.However, the cost of compliance could be burdensome particularly for food businesses in developing countries.In this regard public food safety program at the national level could contribute towards overcoming that barrier (FAO,2010).At stage 2, there can be three different types of single certificate such as 2.1, 2.2 and 2.3 as shown in figure 6.9. Only firm that possesses HACCP approved by CA (2.1 type) can export to EU. Firm must be approved by own country's CA,otherwise they cannot export to EU no matter how much private standard they possess.Thus, four types of firms (2.1, 3.1, 3.2, and 3.3 inside the

dotted-pink box) are eligible for export to EU among all seven types of firms classified in figure (6.9).

At the third stage,the firm would acquire both private certificate and private certificates so as to enhance its reputation and to expand to potential lucrative markets.

6.4.1.2. Adoption of private and public standards in Myanmar fishery firm

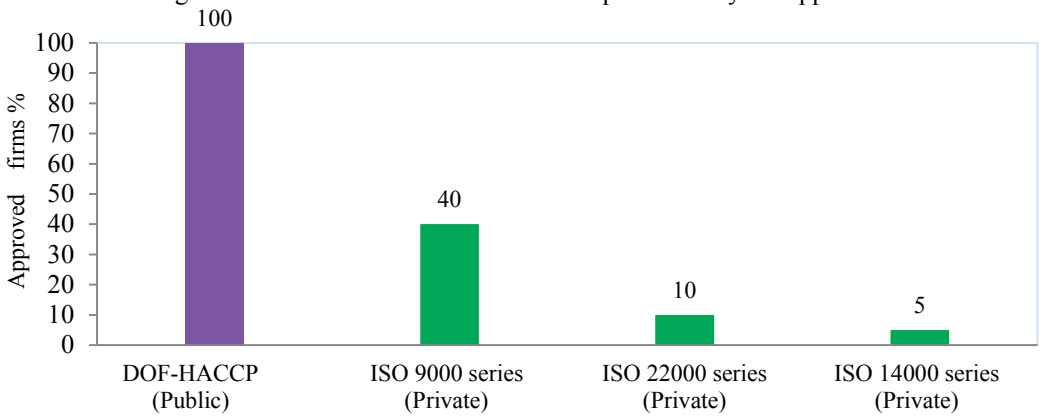
In this study, both public and private standards adoption are voluntary and so firms are free to choose and can apply as long as they have desire and capacity. Private standards encompass any standards developed by an entity outside of government (ISO,2010) and are remarkably varied with respect to who they are developed by, who adopts them, the issues they address,etc.(Henson and Humphrey,2008).Standards can be classified into process standard and product standard. HACCP is the process standard mandated for EU markets and it must be controlled by public authority.The product must be processed by a HACCP certified factory and must have well-informed labels on package including trace code.

Public standard for international market in Myanmar is governed by the FIQCD of the DOF.This study mainly focuses on twenty approved fishery firms for EU market[35].In most countries, as a rule there are two costs borne by firms such as the cost paid to CA for supervision service and the cost for the correction of non-compliance,NC.For the case of Myanmar, the fishery firm does not need to pay CA for the supervision;it just have to correct NC verified by the CA (Wai,2014).

The main difference between public and private standard is eligibility or accessibility to export to EU.Only the firm that is approved by CA can export to EU,regardless of how many private standards they acquired.It is a prerequisite for EU that export country's public authority with the necessary legal power ensures food control along the food chain in all relevant aspects of hygiene,public health and animal health(EU,2007).The additional difference is the compliance cost of standard to be approved.As mentioned above, there is no need to pay for the public standard in Myanmar whereas there is a need to pay for the private standard.For both standards, the cost for correction of non-compliance solely depends to which extent corrective action is needed to meet the HACCP requirements.Private standards used by fishery firms are with ISO series of 9000,22000 and 14000.

[35] EU market is important for Myanmar fishery sector in term of high food safety regulations. Being recognized by EU is a remarkable achievement for developing country like Myanmar (Wai,2014).

Figure 6.10 .Public and Private Standards possessed by the approved firms



Source: Wai et.al.(2015)

In 2009, there were only 8 approved factories in the CA's list.The number rose to 13 in 2013 and by 2014 April there were 20 approved factories for the EU markets.

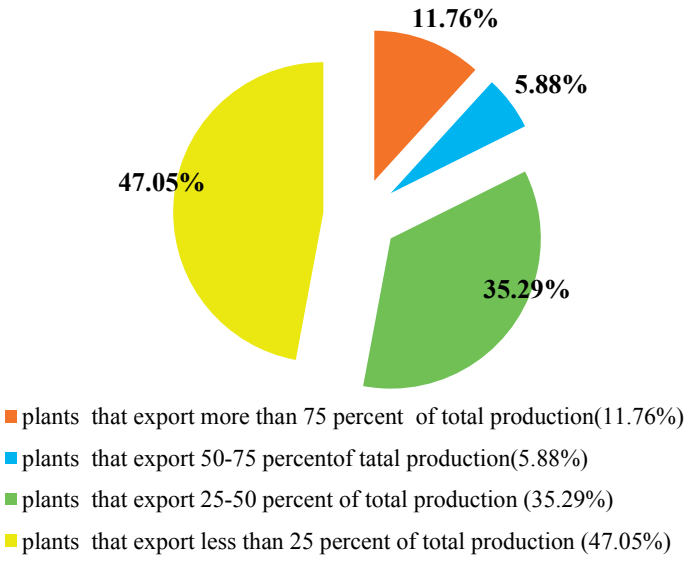
Among them,40% had ISO 9000 series while 10% of them possessed ISO 22000. Only one processing company had 14000 series (See figure (6.10)). It is understood that all the approved factories had already been checked and verified by the CA, but the production capacity, cold store rooms, air blast freezers installed varied in quantity with each factory.

Among twenty approved factories,17 approved factories (85%) responded to the questionnaires mainly focusing on the adoption of standards, firms' size and FSMS at firm level. The following is a more detailed discussion on the private fishery processing plants.

(1) Possession of private standard 59% of the respondents did not have private standards including ISO.Among them, more than half of them did not have a plan to apply for private standards in the future for the integration of their FSMS horizontally.

(2) Percentage of export in total production Nearly half (47%) of all factories exported less than 25 percent of its total production to EU countries.Only 6% exported 50% to 75% of its total production.11% of the factories exported more than 75 % of its total production.

Figure 6.11 . Four groups of approved processing plant based on amount of Export in total production



Source: Wai et.al. (2015)

(3) Size of the approved firms The number of employees and investment amount are important criteria to determine the size of firms.The firms are classified into three categories such as firms with less than 100 laborers,firms having laborers between 100 and 300,and firms with more than 300 laborers. Only 18% of the approved firms had more than 300 employees,47 % had between 100 and 300 and 35% hired less than 100 employees.The minimum investment amount of these factories was two million US $,however investment data were not made available by all factories.(Size of SMEs is mentioned in Annex12)

(4) HACCP Plan The number of HACCP plan for products varied with the range between 1,the minimum HACCP plan number to 41,the maximum.All factories have its own mini lab and could perform three main tests such as Total Plate Count-TPC,*Coliform* and *E.coli* test.

6.4.2. Incentives for and challenges to adoption of HACCP system

(1)Incentives To comply with the regulatory requirements was the major incentive for all respondents.To comply with customers' requirements and to get easy access to new markets were also two other major incentives for great majority (94%) of the factories.Most of factories (88%) used HACCP for the improvement of product quality.Reduction of production cost was just a minor incentive for most (76%) of them.These results agree with the pattern seen in the Mexican pork industry as studied by Em-Maldonado et al.(2009).

(2) Challenges The need to retain trained staffs and trained managerial staffs were a great difficulty for 53% of the factories.The introduction of new products was not a challenge for (71%) of processing plants but a minor challenge for (18%).Table (6.2) shows detailed results on the challenges facing the application of HACCP in the approved fishery firms.

Table 6.2.Identification of Challenges faced by the approved fishery firms

		Challenge				No challenge		**Result**	Finding in Rank	
		Major		Minor						
		PP	%	PP	%	PP	%		Major	Minor
1	Need to retain trained production workers	9	52.94	6	35.29	2	11.76	Major (53%)	1st	
2	Need to retain trained supervisory/managerial staffs	9	52.94	6	35.29	2	11.76	Major (53%)	1st	
3	Attitude /motivation of production workers	6	35.29	10	58.82	1	5.88	Minor (58%)		1st
4	Attitude / motivation of supervisor/managerial staffs	7	41.17	7	41.17	3	17.64	Major & Minor (41%)		3rd
5	Reduced flexibility of production staffs	1	5.88	3	17.64	13	76.47	No (76%)		
6	Reduced staff time available for other tasks	2	11.76	3	17.64	12	70.58	No (70%)		
7	Recouping cost of implementing HACCP	4	23.52	8	47.05	5	29.41	Minor (47%)		2nd
8	Reduced flexibility to introduce new products	2	11.76	3	17.64	12	70.58	No (71%)		

Legend

1. PP the number of the approved processing plants

Source: Wai et.al.(2015)

For all the approved firms, in-house trainings for employees were provided by QA-QC members initially trained by the CA.The time taken for the approval varied according to the compliance status identified by the CA and took six months at least.It was highlighted during interviews that if the firm pays attention in acquiring more HACCP plans approved by the CA, then they can export more varieties of products without worrying about any particular resource shortage.It is cost effective for firms in developing countries if the responsible authority is competent in managing the food control system of a specific sector.The CA itself needs integration along with its food control system's components.The size of firm and the possession of private standards do not matter to become an approved firm.As long as the FSMS of the firm is horizontally integrated by acquiring the public HACCP certificate under CA's supervision, it can be listed as an approved firm of the CA and can take part efficiently in international markets.

The plethora of private standards and their associated costs as well as the technical requirements demanded by lucrative markets make it difficult for firms in developing countries to enter into international markets.Fortunately,EU's new food control regulatory environment offers food production firms in developing countries more access to competitive international markets.One of the opportunities is dual integrations involving the vertical integration at the government level and the horizontal integration at the firm level.At the national level,Myanmar fishery food control system was found to be at the second stage of vertical integration.FIQCD leads in its competency among all other food sectors,even though it still has some shortcomings in integration.It promoted trade(export) by facilitation technical needs supported for domestic firms and controls food quality for safety along the food chain.Private fishery firms play an important role in the export business; however their food safety management system FSMS must be horizontally integrated under the control of the CA.They are producers as well as exporters who borne the cost of compliance.Thus,export promotion policy should support private firms to pave the way towards export promotion.Furthermore,Myanmar fishery exportable items to EU was currently only from wild-caught sources and there is room to develop aquaculture for export diversification.

Chapter 7

Food Control for Transboundary Trade: Import Food Monitoring of Myanmar and Japan

7.1 Introduction

Import is one of two sources of food supply for domestic consumer.Ensuring safety of imported food is as important as domestically produced food safety.At national level,food authority executes imported food monitoring as an important part of food control for protecting consumer against adulterated food and preventing lesser quality foods dumping.

Those countries which increasingly import food have developed and operated monitoring system with varying level depending on their capacity with specific food safety objectives FSO[36] designed for achieving appropriate level of protection ALOP[37].The ALOP for one country would not be the same for other country thus regulatory requirements in import monitoring also differ to some extent.

Jeo classified the type of food demand into two: hygiene-based demand and price-based demand, depending on consumer's purchasing power (2010), even the price-based food demand needs safety.Increased food safety concerns have led to the adoption of international guidance on the key elements for national food control system (Al-Kandari,2009).It is responsibility of government to protect consumers adequately from illness or injury caused by food and to maintain confidence in internationally traded food (CODEX,1997).WTO stated that member countries are free to choose a high standard if they can show using risk assessment based on science because they have the right to take SPS (human, animal and plant life and health) measures.

Thus,import food monitoring of Myanmar and Japan are chosen to explore how countries allocate their capacity in dealing with imported food safety.The case study for each country is based on four main themes such as (1)regulatory framework,(2)related organizations for monitoring,(3) quarantine station's import food control and (4) National standards for consumer protection.

This chapter is divided mainly into two for analysis of import food monitoring of Myanmar and Japan.The aims of this chapter are

(1) To examine import food monitoring of Myanmar whether it has a sound import food monitoring system aimed at food safety objectives FSO for consumer protection and

(2) To assess Import food control and Requirements of Japan markets especially focusing on monitoring and comparison with global model on Application of Risk

[36] FSO Food Safety Objective as a tool to develop food standards, guidelines and related texts (Schothorst et.al.,2002)

[37] FSO and ALOP are suggested by international governmental bodies as a means for competent authorities to make food safety control transparent and quantifiable

7.2. Import Food Monitoring in Myanmar

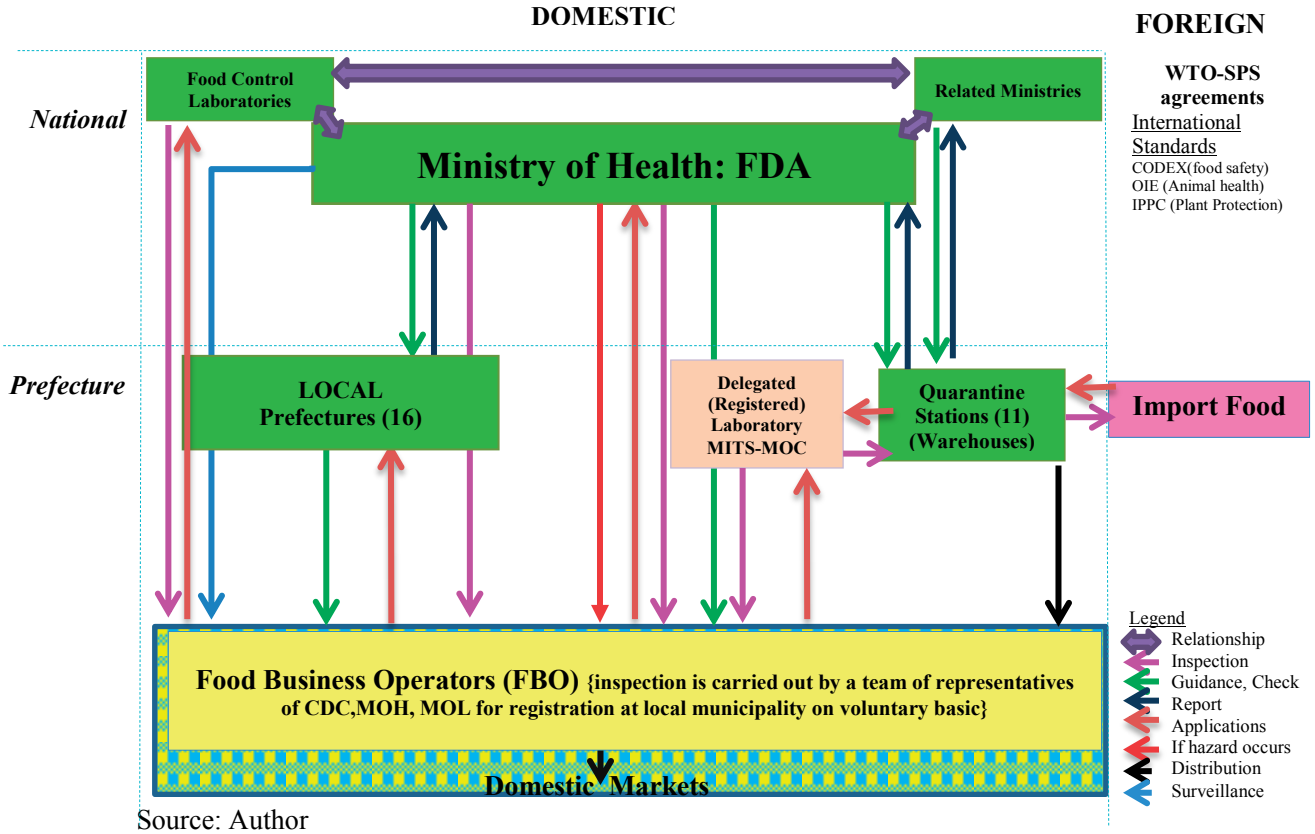
7.2.1. Regulatory framework for import food monitoring

Import food monitoring is an important part of (every) national food law, according to FAO's model national food law.The regulatory framework for import food control is established under National Food Law of Myanmar of 1997.The Law calls for the formation of board of authority, Myanmar Food and Drug Board of Authority-MFDBA[38] and mandates the duties of the authority concerning with (1)laying down the policies for food business, inspection, testing laboratory, labelling, advertisements, food additives, food standards,(2) governing good practices for quality assurance and (3) supplementing the function of state/ district, township level supervisory committee for enabling the supervision.There was no separate defined and published policy on food safety as part of food policy (Wai and Yamao,2012b).

7.2.2. Related organizations for monitoring of import food

Food and drug administration FDA[39] is food authority at National level under department of health of the MOH.Only FDA can issue "Health certificate: fit for human consumption certificate", among all food control laboratories in Myanmar.Figure (7.1) illustrates food safety administration of Myanmar.

Figure 7.1.Food Safety Administration of Myanmar



Source: Author

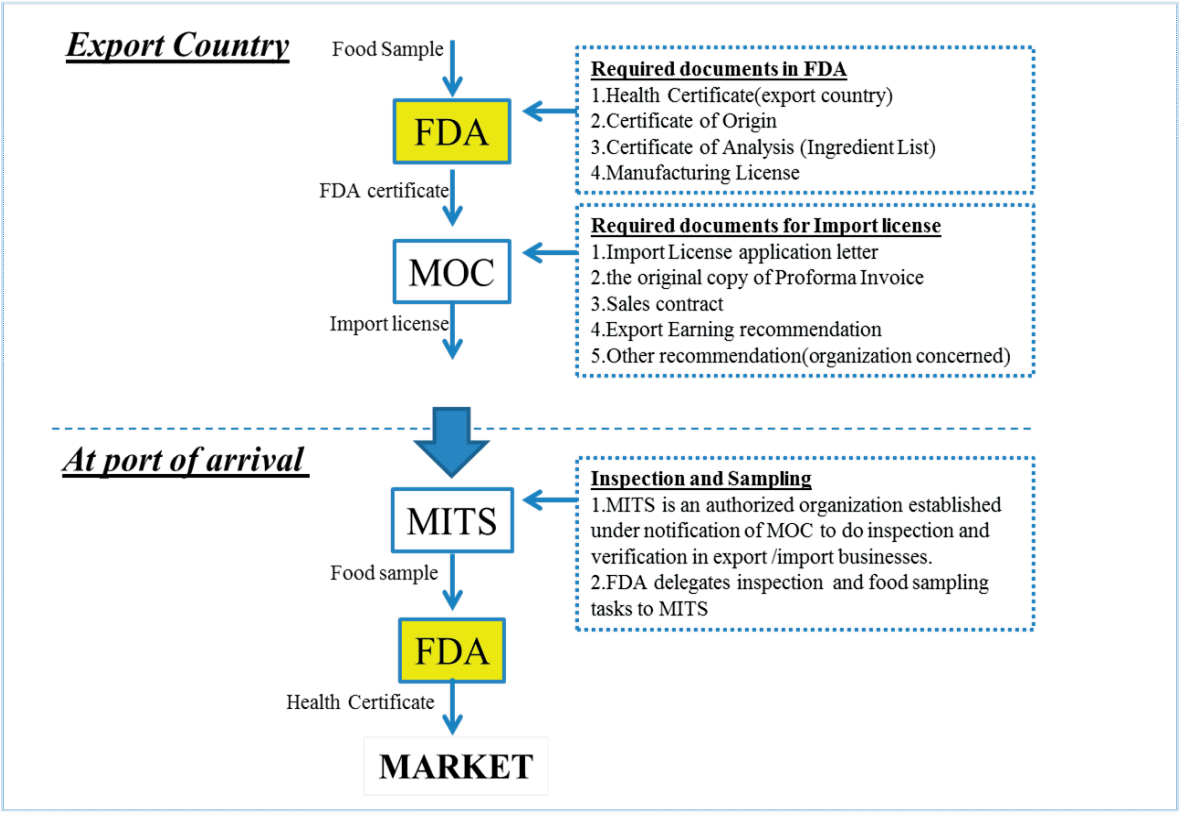
[38]It is headed by Minister of Heath MOH to set out regulations for controlling production, storage, distribution, inspection, labelling, advertising and sale of foods

[39] FDA's food control measures can be generally divided into three parts depending on food sources (1) food importation (2) food exportation and (3) domestic food production..

As for import and export of foods, it needs product recommendation from FDA, according to the MNFL.Consignments arriving at the Myanmar port of entry are allowed to be distributed only after being assessed and issued with a health certificate by FDA of the Department of Health (Myanmar,2004).

Prior to import, food importer has to submit four documents[40] to FDA in order to get the FDA certificate:Once the importer receives the "FDA certificate", the importer has to present the certificate to the Ministry of Commerce in order to receive the Import License[41] for a specific product.When import food arrives at port,inspection will be made by Myanmar Inspection and Testing Service-MITS as per terms and conditions of the import license.Distribution in the domestic market can only be made upon receipt of the health certificate that the product is fit for human consumption, issued by FDA,Myanmar(MOC,2008).The following figure(7.2)states the overview of the import food monitoring in Myanmar.

Figure7.2. Overview of import food monitoring systems in Myanmar



Source: Author

[40] (1) Health Certificate issued by export country,(2)Certificate of Origin,(3)Certificate of Analysis (Ingredient List) and (4) Manufacturing License.

[41] (Documents attached for applying Import Licenses are (1)Import License application letter with company's letter head, (2) Import License application letter (with 6kyats revenue stamp),(3)the original copy of Proforma Invoice,(4) Sales contract, (5) Export earning recommendation and (6)Recommendation from government departments concern of and organization concerned (If necessary)(MOC,2008).

7.2.3. Quarantine stations: Import food monitoring

Import food can be generally classified into three items such as (1) processed foods, (2) food of animal origin FAO and (3) food of non-animal origin FNAO.Foods like condensed milk, edible oils, milk powder,canned sardines etc. can be tested by FDA.The monitoring of FNAO and FAO are as follows:

(1) **Food of Animal Origin FAO** Ministry of Livestock Breeding and Fisheries-MLBF is responsible for the inspection of imported meat and meat products, according to the Animal Development and Health Law1993.However, before meat and meat products can be imported, the importer must obtain an import permit or license from the Ministry of Commerce.In addition to the import permit,each shipment must be accompanied by a health certificate issued by the export country's CA,and the declaration of the shipment's contents.If the shipment passes the inspection for wholesomeness and quality, the office of the Director General of Livestock Breeding and Veterinary Department will issue a certificate of recommendation,which will allow the shipment to be released.There are four quarantine stations,six check points and six diagnostic laboratories to control and notify throughout Myanmar.Table (7.1) shows animal quarantine stations in Myanmar.

Table.7.1: Animal Quarantine Stations in Myanmar

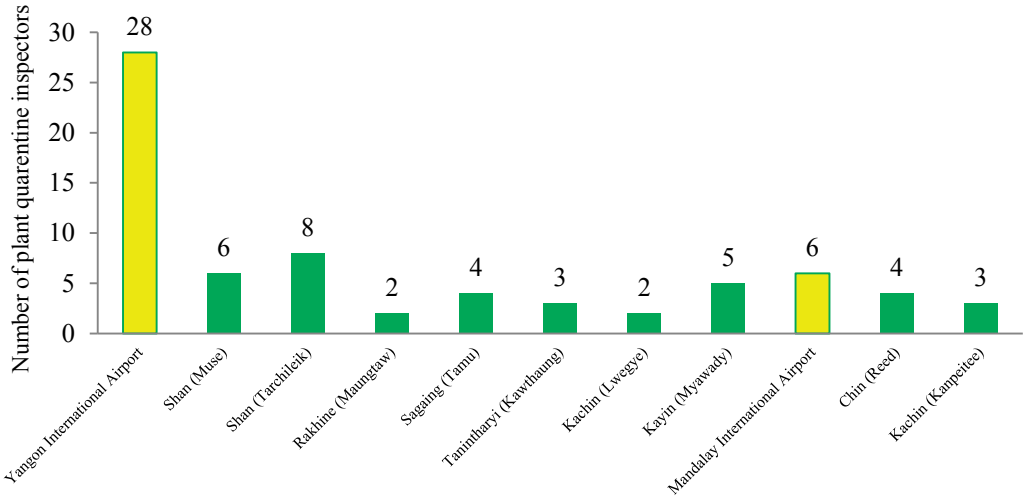
	Monitoring	Places or region of monitoring	Number of Places
1	Animal Quarantine Stations	1.Yangon International Airport 2.Mandalay International Airport 3.Kyauk Phyu Seaport 4.Thilawa International seaport	4
2	Check Points	1.Tamu 2.Maung daw 3.Muse 4.Tachilate 5.Myawaddy 6.Kaw Thaung	6
3	Diagnostic Laboratories	1.Mandalay region 2.Pathein region 3.Yangon region 4.Muse region 5.Kyaing Tone region 6.Taunggyi region	6
Total			16

Source: Burgos et.al. (2009)

(2) **Food of Non-Animal Origin FNAO** As regard with FNAO import control, Ministry of Agriculture and Irrigation MOAI is also responsible for the FNAO products inspection with statutory authority given by the Plant Pest Quarantine Law-1993.MOAI's role is to issue import certificates for the import of plants and plant products before applying for an import license or permit from the Ministry of Commerce.Importers must apply the Quarantine Certificate from MOAI.If the certificate is issued,then the importer must apply for an Import Permit with the Ministry of Commerce.There are eleven

quarantine stations with 79 SPS inspectors stationed throughout Myanmar (Kyi,2014) (Annex13).Figure (7.3) shows about inspectors and plant quarantine stations in Myanmar.

Figure 7.3. Plant quarentine stations



Source: Kyi (2014)

One major problem of Myanmar is non-uniformity of food control in nationwide implementation.Quarantine stations or border check point for FNAO and FAO foods are not under the control of food authority.

In every quarantine station: either international ports or border ports, there should be enough food sanitation inspector and plant and animal quarantine inspectors (CODEX,2003).However, the capacity of FDA at border control points is very weak in terms of technical capacity and human capacity (number of staffs).According to interview with food authority, the total existing staff in FDA is only eighty in 2015.The need of capacity expansion was emphasized responsively during the interview with FDA in 2012(Wai and Yamao,2012b).However,the existing capacity in 2015 became double since then and still far from the targeted staff capacity,2000 to implement nationwide uniformly.

7.2.4. National standards for technical references

MFDBA is responsible for setting regulations and standards for controlling production, storage, distribution, inspection, labelling, advertising and sale of foods. So far the authority has yet to prescribe the regulations or standards (Vasquez et.al.,2012).Myanmar adopted[42] Codex[43] guidelines and standards as national references in 2005.So,FDA defers codex standards in import food monitoring.

[42] Myanmar just uses the codex standards by adoption and yet to implement the three levels of Codex implementation (1) forming the national codex committee,(2) establishing the national codex website and (3) publishing the codex country manual (Sareen and Meno,2012).

[43] WTO considers that CODEX is the international reference for food safety standards, guidelines and codes of practice contribute to the safety,quality and fairness of this international food trade.The numerical Codex standards for food additives, veterinary drugs maximum residue levels and pesticide maximum residue levels, can also be accessed via databases that facilitate their use(Codex).

The characteristic of the food control system of Myanmar for import food monitoring is generally in accordance with GL47/2003 CODEX, the international guideline other than uniformity in nationwide implementation[44].The link between the food authority and food control at quarantine stations is totally lost.Import food safety is, in fact, the concern of most Myanmar population including food importers, food exporters and inspectors. According to the survey conducted in 2012, not all food inspectors showed strong confidence in the trans-boundary food control inspection in which they were professionally involved (Wai and Yamao,2014d). Myanmar food control system for monitoring in transboundary food trade found conventional while relying on reactive measures (Wai and Yamao,2012b).The comparison table of food control system, national standards and CODEX adoption among ASEAN countries is described in Annex17.For preventing the adulterated food import,monitoring of import foods needs the integration of food control system in technical and managerial capacities so as to implement import food control effectively.

7.3. Import Food Monitoring in Japan

Japan is an important market for food production-export countries,as the two third of food intake on calorie basis relies on import.

Major food export countries to Japan are USA with 29% of all imported food into Japan, China with 11%,Australia 7% and Canada 6.76% respectively (AAFC,2010).The exporters to Japan can expect highly-educated consumers base with significant disposable income and desire to increase consumption of foreign food products, as the Japanese are exposed to more global culture and media (AAFC,2010).Takahashi stressed that Japanese consumers are very worried about "the efficiency of the import inspection system" (2009) because of the expanding food import since 1970s (Jussaume.et.al).

Fish & fishery products and Fruits & vegetables are 2 major food groups rejected mainly for bacterial contamination and drug residues (UNIDO,2013).It is recognized among exporters of developing countries that Japan import rules and regulations are strict due to high food safety standard.

Surveys were performed at a private inspection corporation and a public quarantine station respectively for this study.The first survey was conducted at Japan frozen food inspection Corporation JFFIC, one of the five largest private inspection institutions of Japan in 2014 November. Short surveys were carried out with two times visits to JFFIC[45] situated in Kobe.The second survey was conducted in July 2015 at Hiroshima Quarantine Station, Ministry of Health, Labor and Welfare MHLW.

[44] Uniform nation-wide implementation in operational procedures is recommended by CODEX. It is explained that programmes and training manuals should be developed and implemented to assure uniform application at all points of entry and by all inspection staff (CODEX,2003).

[45] The officials explained JFFIC's role and involvement in food inspection at the port of arrival, food safety administration of Japan and opinion on existing inspection and monitoring of food control system.

7.3.1. Regulatory framework for import food monitoring

In Japan, the first Food Sanitation Law was promulgated in 1947.It covers all aspects of safety of all types of foods,containers and packages,toys for the consideration of human health (Takahashi,2009).It was amended in 2002 to give guidance to Food Safety Basic Law that is the foundation of the responsibility of all primary stakeholders: government, food business operators FBO and consumers.Government (Local/State) must implement policy for ensuring food safety,food business operators need to corporate policy implementation and consumers have to endeavor to improve their knowledge and to express their opinion on the policies,according to Food Safety Basic Law(2003).Japan has already established its complete set of food control system which has been improved accordingly in response to food scares.

At the National (central) level, MHLW is food authority and municipal governments are also responsible at the prefecture level.Narcotic measures,Water quality measures,Chemical substances safety measures,Household products safety measures,Environmental health measures and Quarantine measures are the six measures of MHLW for all types of safety.Every measure has its act and responsible branches of MHLW and its own management practices that cover all aspects of safety such as drug,water,chemical substances,environmental and food.Table (7.2) states these measures as follows:

Table 7.2. Six Measures of MHLW for all types of Safety

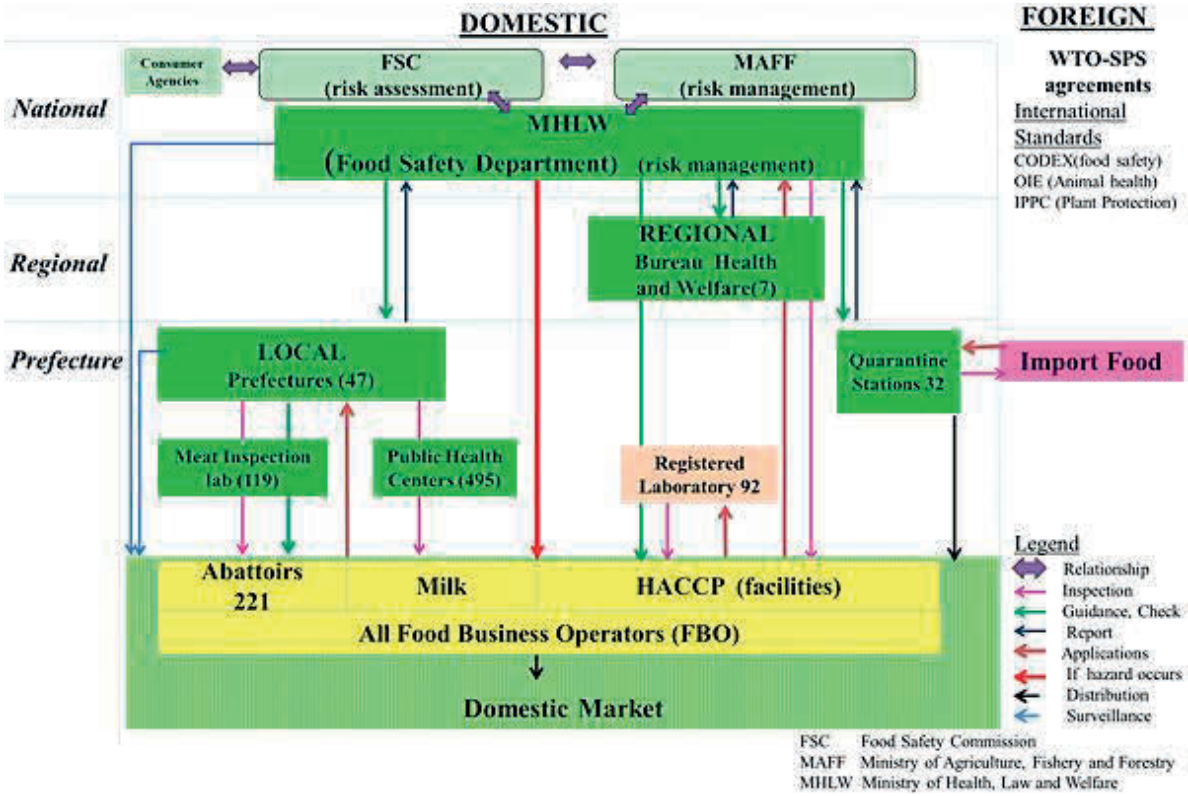
No.	Name of Measure	Act/Law	Actions (Others)
1	Narcotic	Narcotics and Psychotropic control Act Opium Act, Cannabis Act, Stimulants Control Act	Prefecture level plays the role 8 departments,3 branches nation-wide
2	Water Quality	Water Supply Act	Both public and private water suppliers needs to report to MHLW
3	Chemical Substances	Evaluation of Chemical substance Manufacturing Act	Obligation to dealers, prohibition to other uses must be in line with the technical guidelines , instructions
4	Household Products	Control of Household Products containing harmful substances Act, Consumer product safety Act	Consumer can complain and consult directly to prefecture offices that can also support to dealers and importers
5	Environmental Health	Environmental Health Industry Act Business Area Adjustment Act Japan Finance Corporation Act	Incentives(subsidy, tax reduction) Adjustment of large-size enterprise (excessive competition) Environmental sanitation inspectors
6	Quarantine	Food Sanitation Act Food Safety Basic Law (2003)	32 Quarantine stations 406 Sanitation inspectors (2015)

Source: Wai et.al.(2016)

7.3.2. Related organizations and food control system for import food monitoring

In the context of a growing concern of Japanese consumer on imported food safety,MHLW - food authority takes continuous restructuring of food control system including partial revision of food sanitation act in 2002,enactment of food safety basic law in 2003,introduction of positive list system for farm chemical residues,introduction of approved facilities in 2003,launching of Food Safety Commission(FSC) in 2003 and Consumer Agency in 2009.

Figure.7.4.Food safety administration of Japan



Source: Wai et.al.,(2016)

The inspection system of food started introduced in 1952 in the Food Sanitation Law (MHLW).The law mandates MHLW to formulate guidelines for the monitoring and guidance on food sanitation to be implemented by the State,under the Article 22.Japan has its own guidelines based on risk analysis for ensuring sanitation.

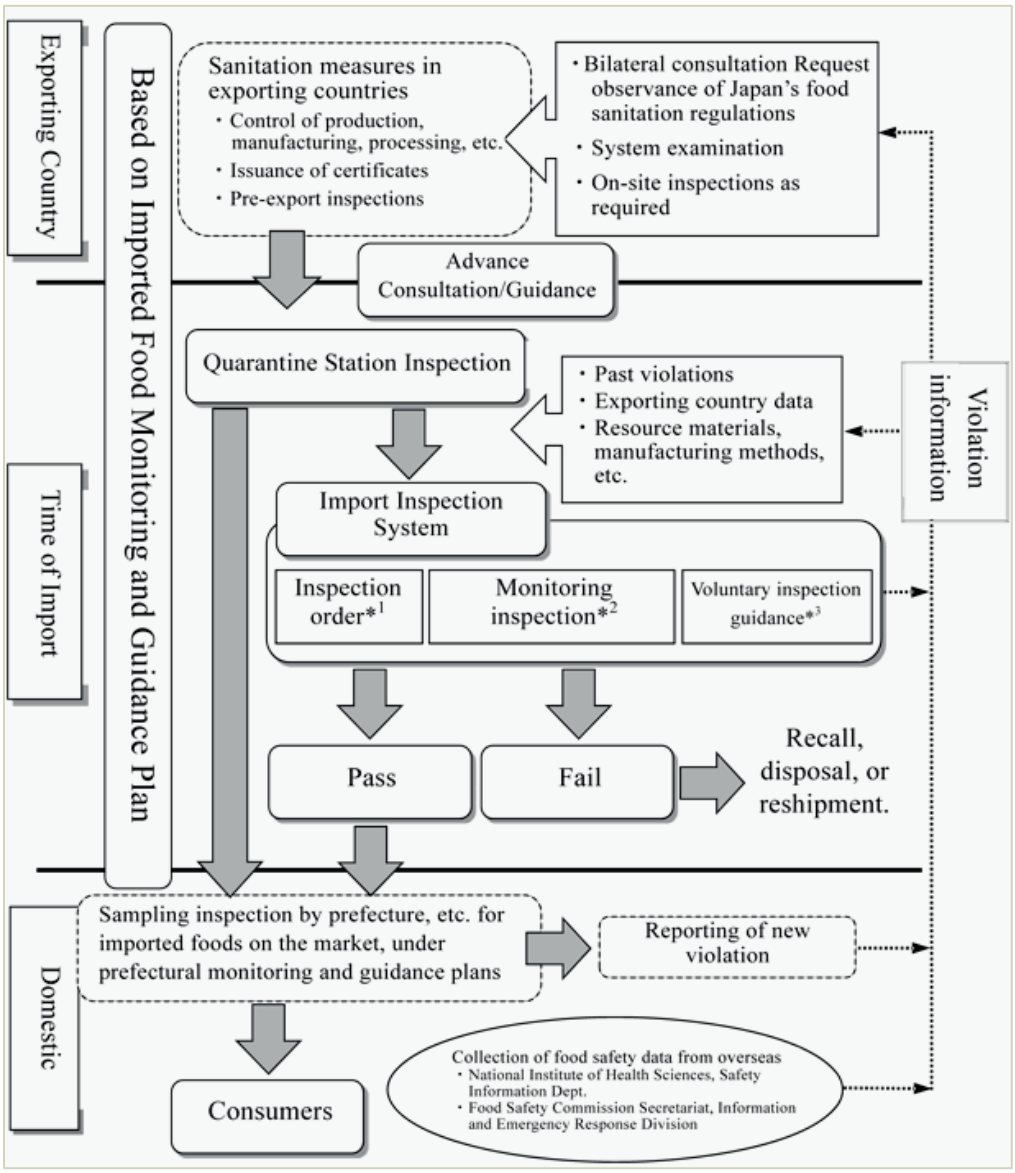
The law calls for MHLW to establish "*A guidance plan: imported foods monitoring and guidance plan at National level"* for imported food, additives, apparatus, and container and packaging, by promoting intensive,effective and efficient import inspections and monitoring and guidance of importers, for every fiscal year, according to the Article 23.

At prefecture level, the Article 24 obligates prefectural governor to establish prefectural plan for the monitoring and guidance on food sanitation in accordance with the guidelines established by MHLW.Food both from domestic and imported supply must be monitored at prefectural quarantine stations under the direct control of MHLW.

7.3.3. Quarantine stations: Import food monitoring

It is widely known that Japanese consumers are among the most health conscious and health aware consumers (AAFC,2010).So, the main focus of this study is to examine how competent authority provides import food monitoring system efficiently.Imported foods in Japan are classified as (1) livestock and processed livestock,(2) aquatic and processed aquatic food,(3) agricultural food and processed agricultural food,(4) food additives,(5) foods subject to enhanced inspection and (6) other foods.These foods need testing for antibiotics, residues of agricultural chemicals-pesticides, additives,standards for constituents, mycotoxins,GMO.There are three measures executed in ensuring safety of import food such as (1) measure at exporting country,(2) measure at the time of import and (3) measure in domestic,as shown in figure (7.5).

Figure 7.5.Overview of Import food monitoring system in Japan

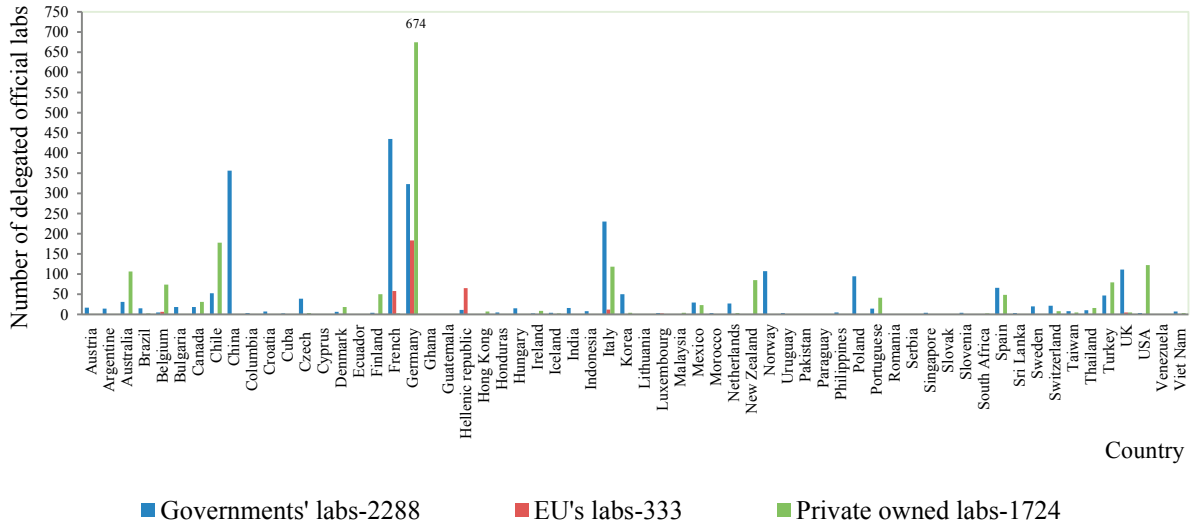


Source: MHLW (2006)

(1) **Measures at export country**

(a) **Advance consultation service at export country** Before submission notification form to MHLW,exporter to Japan can get the advance consultation service provided by the competent government agency of the exporting countries or the official laboratory designated by MHLW.There are about 4345 laboratories in 62 countries.More than half of 53% (2288) of the official laboratories belonged to governments.

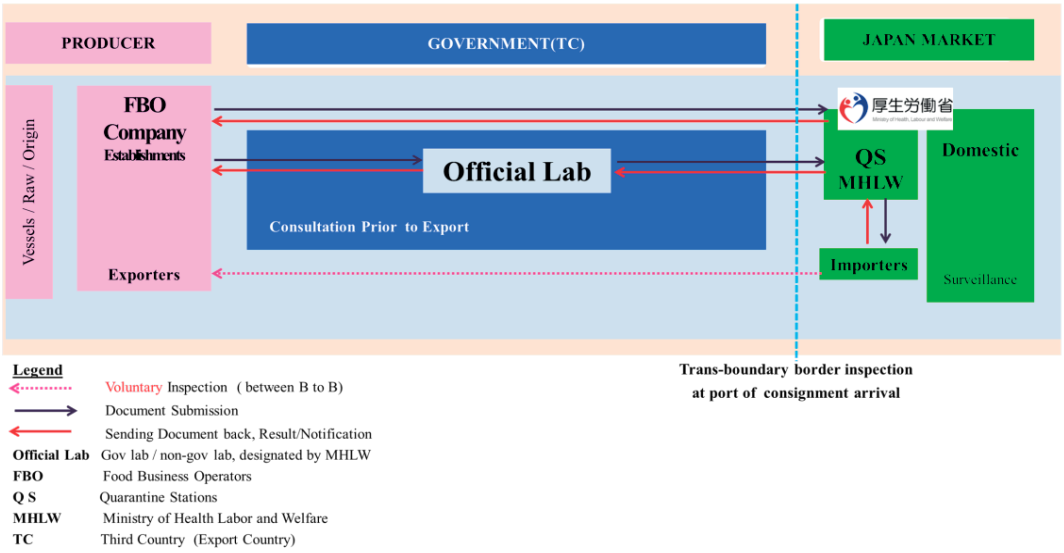
Figure 7.6. Three types of delegated officials laboratories in 62 foreign countries



Source:Wai et.al.(2016)

(b) Promotion of sanitation measures at export country Japan requests exporting governments to establish sanitation control measures for promotion stronger control and monitoring systems for agricultural chemicals,etc.,and pre-export inspections,through bilateral talks and on-site inspections.Figure(7.7) illustrates the interaction between MHLW and export country's CA,and the relation between business to business (Exporters-Importers) as follows:

Figure.7.7.Schematic food control for Japan market



Source:Wai et.al.,(2016)

That measure is more flexible than EU system at which export country's competent authority must control and ensure the sanitary condition along the supply chain of exportable item to EU.It is mandatorily required for EU consumers.

According to the interview with the official of the Hiroshima Quarantine Station,it was reported that Japan did not demand from the competent authority of the export country like EU system (in terms of mutual recognition agreement MRA),with the exception of some varieties of foods such as meat, fish from China, etc.But,Miyagawa insisted that the Food Safety Basic Law requires appropriate measures at any stages of food chain and thus that should cover in oversea food supply chain (2009).The MHLW guides importers how to deal with import food safety effectively.

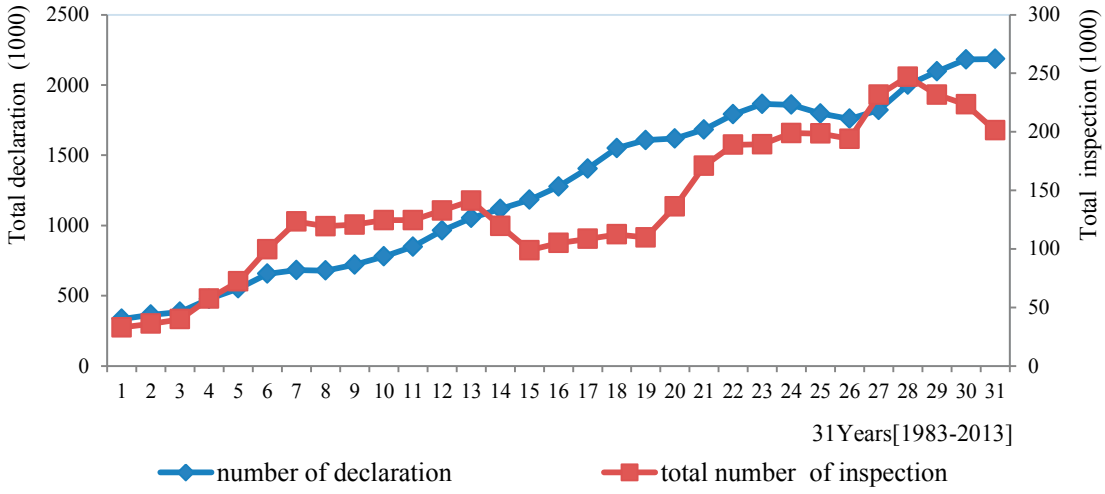
(2) Measure at time of import

(a) **Notification at quarantine station** Import food inspection is one of the two main functions of quarantine station.An interview with the official of the Hiroshima quarantine station was made in July,2015.

Submission of "Import notification" to a Quarantine Station of the MHLW is mandatorily required, under the article 17 of the Food sanitation Law, hrough on line application- food automated import notification and inspection system-FAINS and paper-based application,so as to carry out document examination and inspection by food sanitation inspectors to see the imported foods comply with the law.Annex 14 describes the amount of import food and the notification made between 1983 and

2013.Annexes 15 and 16 illustrate the procedures of notification and notification form.Calculated based on the MHLW's data of last thirty one years, a strong positive correlation between the declaration number and the inspection number was found with r value: r = 0.883, n=31, p=0.000.

Figure 7.8. Declaration vs Inspection



Source: calculation based on 31 years data of MHLW

(b) **Inspection at quarantine station** There were 406 food sanitation inspectors across 32 quarantine stations in Japan.After receiving the notification form,food sanitation inspectors inspect the commercial food import products with two tiers of inspections:document examination and physical inspection based on the notified information.

(1) **Document checking** It mainly focuses on the country of export,imported item,manufacturer,place of manufacturer,ingredients and materials,method of manufacturing,additives used, to examine and confirm whether imported food complied with the manufacturing standard,additives standards,etc. under the food sanitation law(MHLW).According to the interview with the official of Hiroshima quarantine station; four main elements are being inspected in document checking such as(1) sanitary health certificate [46],(2)standard requirements [47],(3)official notices from the MHLW[48] and (4) notices from foreign countries [49].

[46] Submission of `Sanitary Health Certificates-SHC issued by the export country` s government is required by Law.
[47] All imported food must meet the respective standard of Japan and it is required by law.Five broad-based foods items are mentioned in Annex 2.
[48] There are about 200 documents per year coming from MHLW.If the imported food is in the list of the official notices of the MHLW,then Inspection Order(the strictest inspection)is required along with the special documents at quarantine stations.
[49] If there is a new risk or new outbreak of diseases occurred and informed by FDA of USA,ESFA of EU,etc.,then inspection would be enhanced.

(2) **Physical checking (and Testing task)** After the thorough document checking, physical checking is formulated depending on the levels of potential violation such as (1)monitoring inspection and other monitoring inspection[50], (2)inspection order[51] and (3) comprehensive ban[52].Of these, the actual physical checking is taken for monitoring inspection,other monitoring inspection and inspection order.Public and private laboratories are sharing imported foods testing tasks depending on the type of inspection level based on the document checking and priority items of the MHLW's guidance.

Monitoring inspection and other monitoring inspection fall under a conventional administrative inspection conducted by quarantine stations and thus importers do not need to wait at the port of arrival.However, if there is something wrong with the quality of foods, the distribution will be stopped and recall will be made.So it is categorized as a monitoring inspection.Testing the food quality and inspection are done by quarantine stations:the Public administrative agency. Testing takes about a week for getting the result. If there is a problem, then it will take more than a week.

Introduced in 1995,inspection order is to be executed by the registered institution:private testing company with the expense of importers (MHLW,2009). It is required if the import food includes in the list of official notices (issued for the food items which are highly expected to commit a violation) of the MHLW.150 private laboratories are being delegated by the MHLW across Japan, as of 2014.Situated in Yokogawa,Hiroshima Kenkakyo Hoken Kyokai is the private laboratory delegated by Hiroshima quarantine station, according to the interview.

In this regard,testing tasks of laboratory service play the role in ensuring import food safety.4345 foreign laboratories as well as 103 domestic private testing companies are sharing the task with MHLW:food authority that approves by registration to delegate the testing task to these accredited[53] private companies. Japan Frozen Foods Inspection Corporation-JFFIC is one of the five biggest private inspection and testing companies among 103 companies inside Japan.

[50] Monitoring inspection and other monitoring inspection are under the administrative inspection category.That is the systematic inspection based on statistical concepts that takes into account the volume of imports and violation rates, etc., for different food types.Other monitoring inspection is required when(1)the cargo will import for the first time,(2)accident occurs during transportation and (3) for other necessary occasions.

[51] Inspections are ordered by MHLW at each and every importation of items having a high probability of being in violation of the Law.Items are not permitted to be imported or distributed unless they pass that inspection

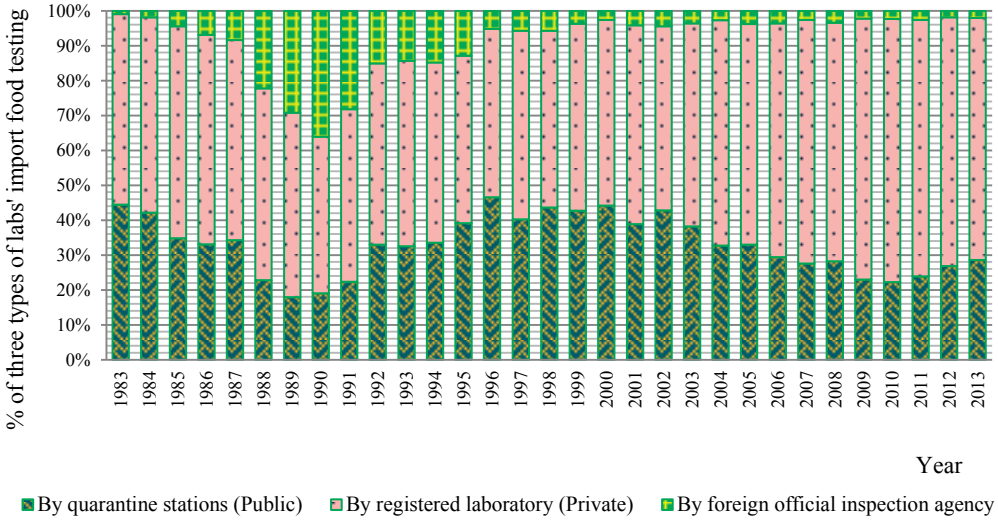
[52] Regulations by which the Minister of MHLW can prevent the sale or import of specified foods, without the need for inspections, in cases where it is deemed necessary from the perspective of preventing harm to public health (MHLW,2006)

[53] JAB Japan accreditation board's accredited laboratories.With 12 broad activities,JAB is a member of several international groups including Mutual Recognition Agreement-MRA to accredit the testing laboratories (JAB).

Therefore,in terms of the number of testing laboratories,the delegated laboratories in foreign countries outnumbered 42 times higher than that of the domestic laboratories.In terms of the testing function, the average percentage of imported food testing by the quarantine station, the domestic private laboratories and the delegated foreign laboratories are 32%,58% and 10% respectively.Even though the number of the delegated foreign laboratories is the highest they shared only 10%of total testing of the imported food.As regard with the private testing laboratories,they just need to test the imported food inspected by order of the MHLW but the final decision whether rejection or not is made by the quarantine station of the MHLW.

Figure (7.9) shows the percentage of the imported foods tested in Japan by three different types of laboratories during last thirty-one years.

Figure 7.9.Testing import food at three different types of laboratories



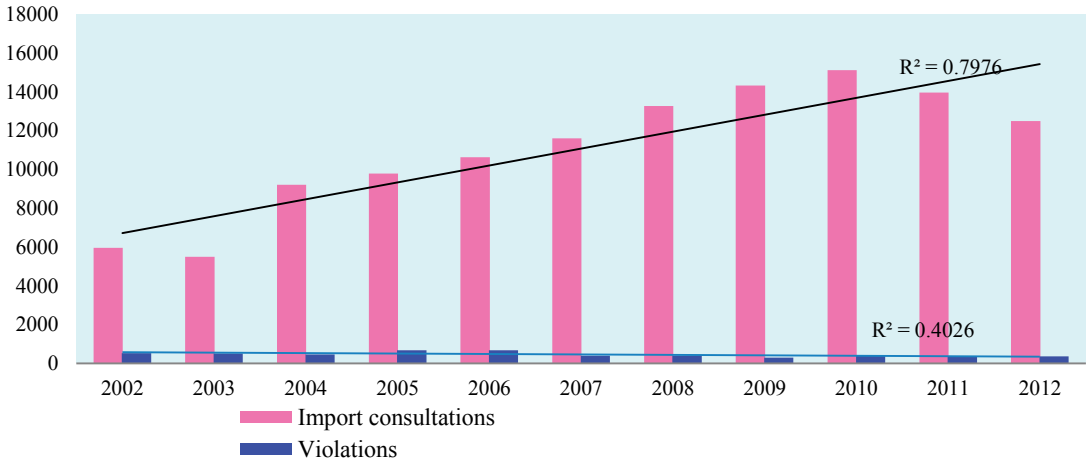
Source:Wai et.al.,(2016)

(1) Measures in Domestic

(a) Consultation at Quarantine Stations The preliminary consultation [54] of the MHLW given to importers is to reduce violation rate at port of arrival and ensure food safety with food chain approach.Decreasing violation rate is a quantifiable indicator to examine the effectiveness of the import consultation.Of 32 quarantine stations,13 can provide the consultation on import foods.Figure (7.10) mentions the data on violation with respect to the introduction of import consultation.

[54] It is given by the MHLW about the import procedures, inspection systems, standards, record keeping, prohibition and suspension of imports, dissemination of food sanitation knowledge etc.Risk factors and the related information are mentioned at the MHLW website accessible to everyone.

Figure 7.10 Consultation before import and Violation reduced



Source: MHLW(n.d)

Figure (7.10) shows the opposite trend between the consultation and the violations rates of imported food.It means that the more consultation MHLW made before import, the lesser violation rate at the port of arrival.A strong negative correlation was found with r value - 0.785, n=8,p=0.021,based on the correlation analysis of the data.

(b) Violation and causes of violations in imported foods Effective food control systems are vital in enabling countries to assure safety and quality of food products for international trade and to verify that imported food products meet national requirements (FAO/WHO,2005).Data on import detention and rejections supports the importance of a strong food import control system for preventing the dumping of lesser quality food (Kenney,1997).

Table 7.3: Major causes of Violations

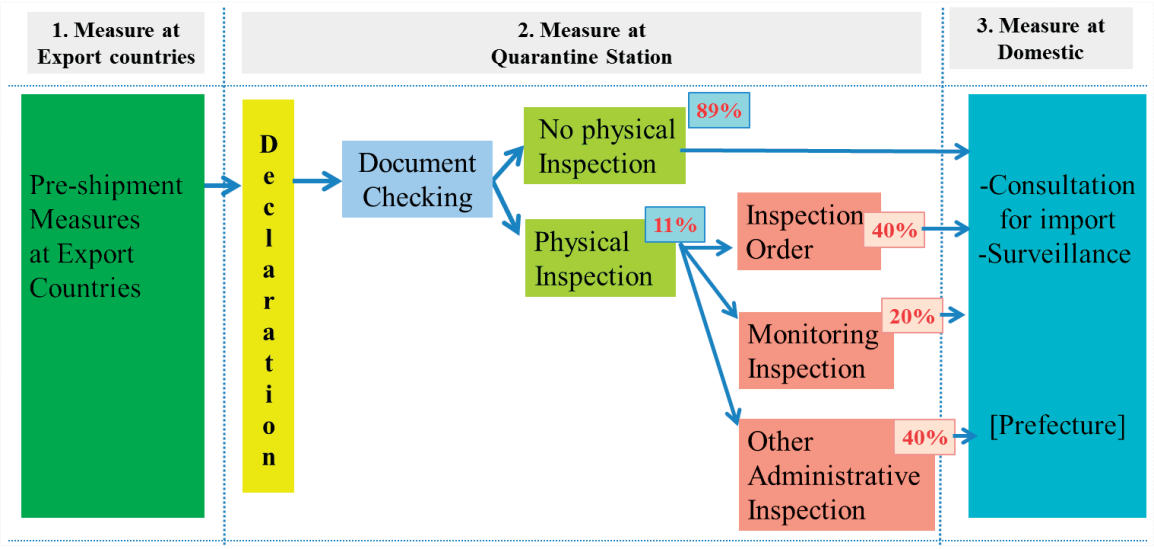
Causes of Violations	**Years**									average
	2004	**2005**	**2006**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	
I. Non-compliance with Standards	66.7	64.7	66.1	69.1	51.7	53.8	58.8	59.4	52.4	60.3
II. Contamination	11.7	14.6	21	20.9	30.9	28.4	27.1	27.7	31	23.7
III. Food additives	14	16.2	10.8	5.3	4.5	7.9	6	6.4	9	8.9
IV. Packaging materials	3.3	3.8	1.9	3.5	9.8	8.6	6.3	5.1	5.2	5.27
V. No attached Health Certificate	3.6	0	0	0.6	0.2	0.1	0.4	0.4	1.8	0.78
VI. Possible injure to Human Health	0.7	0.5	0.2	0.7	2.9	1.3	1.4	0.6	0.6	0.99

Sources: Wai et.al.(2016)

In every year,the most frequent violated case related with Article 11 of food sanitation law concerning with non-compliances of established standards, specification of food products and process standards with more than 60 percentage on average.It suggested that export country must invest in product and process standards to be able to export successfully to lucrative markets like Japan.The second most frequent violated cause was related to the contamination with hazardous or toxic substances such as aflatoxin with average percentage of 24% under Article 6 of the Law.

Figure (7.11) mentions three import monitoring measures of import food safety for Japan, mainly focusing on the second measure: the quarantine station's import food monitoring.

Figure.7.11.there measures of import food monitoring for Japan



Source:Wai et.al.,(2016)

It was found that the scope of Japanese import food control covers (1) giving guidance to importers inside Japan and (2) providing consultation to exporters to Japan, with food-chain approach for some selective imported food items. In this case, the scope of the EU imported food monitoring covers all imported foods with food-chain approach that must be governed by the competent authority in export countries on behalf of EU.Therefore,Japan has less advantage in terms of scope and food items,if comparing with the EU's imported food monitoring system that provides the highest level of food safety in the world.

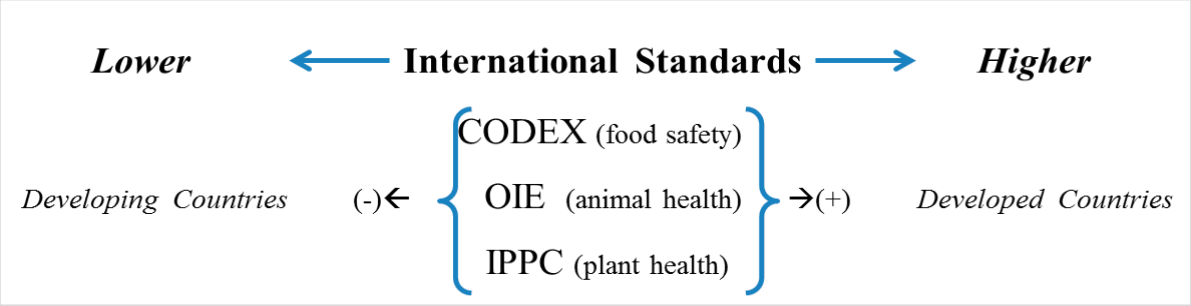
The amount of the actual physical inspection is about 11 percent of the all imported food declared at quarantine station, according to calculation based on during the last 31 years data.This means that about 89% of the imported food required document checking only, as illustrated in figure (7.10).According to the interview at the JFFIC, it was stressed that 11% of physical checking is risky.

On the other hand,Japan still follows globally accepted risk-based inspection in document checking such as food specific, country-specific, monthly report, classification of foods such as GMO, organic,etc.,using code of manufacture,exporters,administrative penalties,manufacturing process etc. The notification form used in the document checking is mentioned in Annex (16).

7.3.4. National standards for technical reference

According to WTO, member countries are free to choose a high standard on the condition that these standards are required for achieving acceptable level of protection ALOP based on sciences. When it comes to import food control, every country has its own national standards with varying level more or less higher than internationally accepted standards.In most cases, developed countries are standard-makers in ensuring ALOP whereas developing countries are standard-takers by adoption. The following figure (7.12) shows the typical international food standards used by countries depending on their capacity.

Figure.7.12.Varying level of Standards used in countries



Source: Author

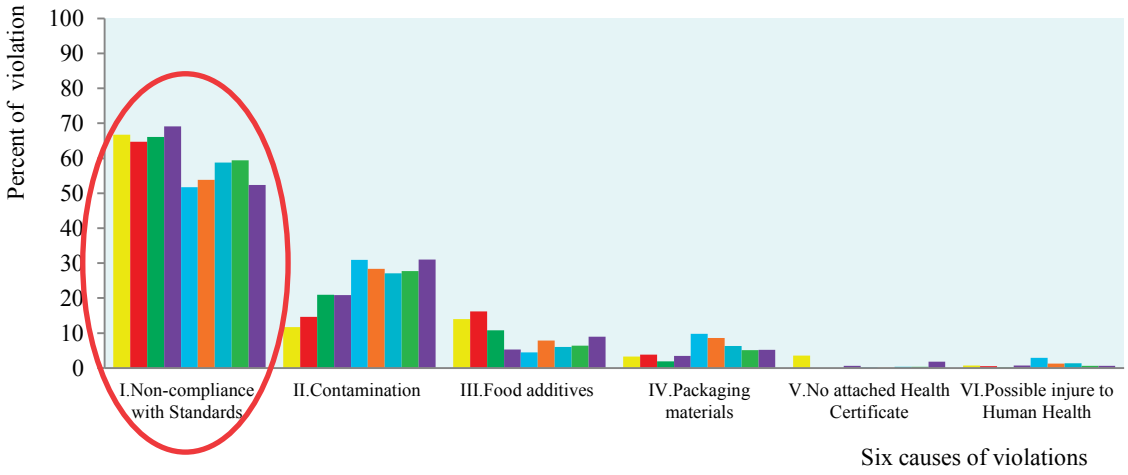
In Japan,the Food Safety Basic Law No. 233 of 1947mandates risk management activities[55] of MHLW and Ministry of Agriculture,Fishery and Forestry(MAFF) to establish standards and guidelines and to launch various branch offices for the enforcement of their regulation (Miyagawa, 2009).Administered by MHLW,Article 11 of the law provides standards for food and additives in terms of processing method,ingredients and the mandatory labelling system.It also stipulates the procedures to investigate food poisoning causes and to report investigation results for preventing the public health risks arising from human consumption of food (Hironaka et.al.,2014).Having these standards are advantageous for monitoring import food from health and trade perspectives.It was disputed by Chinese vegetable exporters to Japan that Japanese food standards are striker than necessary after the introduction of positive list system in Japan (UNIDO,2013).However,it was argued that as long as the standards formulation method in Japan is in accordance with the internationally accepted norms,exporters like Chinese need to improve food safety regulation of export item to Japan by taking the counter measures as soon as possible (Shi).

[55] Working principles of risk analysis to be applied(MHLW,n.d.).

At document checking, the very beginning stage of the inspection, the compliance with standards is considered priority in judging the imported foods safety.With the technological advancement,food export country can assure food safety with a number of food safety management system FSMS designed for product standards and processing standards resulting that relying on document checking becomes possible nowadays.

Figure (7.13) shows evidently that the highest major causes of violation in imported food related with non-compliance with standards.

Figure.7.13.Major violation during 2004-2013



If one looks at the system level, it is true that Japanese import food control is more flexible and weaker than the EU system. Still, Japan believes that the role of the importers[56] being as crucial in achieving imported foods safety and thus puts that responsibility in the hands of importers governed by respective regulations and laws.

The case study of Japanese import food control shows clearly that it is viable to achieve food imported safety,as long as government sets up efficient food control system supported by the functional areas of National quality infrastructure such as conformity assessment,inspection, testing, and standardization.

Thus, two case studies of this chapter show the significance of having efficient food control system with national standard for appropriate level of protection from import country perspective. Moreover,the need of food control investment in exportable items is required from export country perspective for fulfilling the import country's requirements in transboundary food trade.

[56] Article 8 stipulates food importer to ensure taking every appropriate measures such as voluntary inspection at initial importation and on regular basis, record-keeping, etc.(MHLW,2006). For those importers who violates repeatedly could get the suspension or ban on importation, according to the Article 55 of the food safety law (UNIDO,2013).

Chapter 8

Conclusion and Recommendations

8. 1. Conclusion

In the context of a growing consumers' mistrust in food safety, challenges in an attempt to validate safe food production become growing concern among food business operators particularly small producers of developing countries.In international trade,requirements for food safety assurance have been restructured continuously and thus testing the quality parameters of food just before export is no longer sufficient nowadays.As a result, food exporting countries have little choices but to invest in food control at farm level, processing level and even at authority level so as to cope with dynamic global food system.In this regard, striking the right balance between health and trade interests is the utmost priority of food control authority.Encompassed with more than two food sectors, assessing the level of food control managed by public institutions and private sectors through the mechanism of food policy is the main emphasis of this doctoral dissertation.As such, various actors of food sectors comprising food authority/competent authority, laboratory technicians, traders, consumers, food producers included in this study.

The principal aim of this study is to explore the necessity of integrated food control systems for trade and health efficacy especially for Myanmar.The study commenced with assessing the capacities of the control agencies to examine how SPS diplomacy for trade interest was achieved by the existing capacities.As regard with domestic food sector particularly focusing on street foods, three types of investigations were explored:(1)assessing the street food control regulatory principles managed by the concerned authority and how they implemented in reality,(2) investigating of street food vendors' demographic,their opinion on the authorized agency's food control and their understanding on proper practices and(3)examining street food consumers' opinion on the authorized agency's food control.

The assessment on fishery export-oriented processing plants focuses on investigation of how food control in fishery sector has achieved by fishery competent authority CA and firms for export success and to examine the challenges firms faced for further trade promotion. Moreover, the surveys on import food monitoring of Japan and Myanmar were intended to explore how lucrative market like Japan provides food control in import food monitoring for consumer protection against the adulterated imported foods.This study encompassed Myanmar national quality infrastructure, domestic street-food sector,export-oriented fishery sector,import-monitoring of developed and developing countries aimed at providing recommendations in food control system integrations towards trade success and food safety.

The following section is composed of four conclusions for four case studies and recommendations of this dissertation for policy implication in food control field.

8.1.1. Assessing capacity of food control laboratories involved in Myanmar national quality infrastructure

The overall capacity of food control laboratories assigned with trade-related quality assurance task and the functional capacity of the supporting national quality infrastructure NQI are considered prime-movers in overcoming non-tariff measures in transboundary food trade. Organizing these capacities with sound policy is a must-have input for achieving the desired output: export success by being compliance with the requirements of import markets.For this reason, the functional areas of the NQI need to be operated with compelling institutional capacity to fulfill the compliance-based demand.Having considered that food safety is public goods, it is reasonable to examine the capacity of food control laboratories that assure safety for trade and businesses.

After the political transformation in 2011, domestic as well as transboundary food trade has been expanding.Accordingly,that situation demands more and more food testing samples in number and varieties.The existing human capacity of Myanmar food control laboratories assigned with trade-related quality assurance task needed recruitment if their services are still considered crucial for trade.Likewise,other financial, structural and technical capacities were not compatible with the workload and outdated in service provision for trade and business that call for update restructurings from time to time.It was found that the laboratories faced the timeliness problem due to weak human capacity even at the business as usual scenario.The food authority of food and drug administration FDA stressed that the technology they used in testing was actually outdated and time-consuming handed down since several years ago.There were many cases that traders send food samples to neighboring countries because no public and private laboratories could test some testing required for trade.

Another issue is lacking of functional capacities in accreditation and conformity assessment for manifestation of the competency of food control laboratory.Even though fishery food control laboratory is an accredited food control laboratory,the accreditation function for the laboratory was not available in Myanmar but provided with expensive fee by an agency of other neighboring country,the Bureau of Laboratory Quality Standards (BLQS) of Thailand.Fragmented institutional condition with weak capacity was also found in functional capacities of NQI in support of the proof of competency to services of these laboratories.Consequently,the deficiencies in the functional components of food control systems for the main export-commodities hindered access to lucrative markets.Technical regulation information gap was often reported.Ministry of Science Technology that is responsible agency for NQI needs urgent provision on creation of national

accreditation board(NAB) to confer the credibility of quality signals of goods and services including testing facilities.

No agency (with the exception of fishery agency) was taking responsible for formation of agricultural commodity and food standards that are used as references for manufacturing,trade, exports and imports and certifications.Moreover,there was no farm level quality assurance by adoption of standardized good practices especially for export-oriented agricultural produces. Severity of supply-side constraints such as institutional capacity-based and compliance-based constraints to agricultural production systems showed the main drawback in export-led growth and that is a galvanizing issue for an agrarian country like Myanmar.

8.1.2. Food control in a domestic sector: Street foods control

In fact,the concerned food authority had developed the components of the food control system and the standardized practices for food establishments including street food stalls. Apparently,the supply of street foods in Yangon is an unregulated food supply that is very dubious to socially optimal level of food safety.In one hand, the competent (food) authority CA of street food sector was not sure about the opinion of urban planners on the official recognition of the vendors.On the other hand, the CA expressed that the vendors' encroachment at the road side created a negative impression within urban areas and caused difficulty to pedestrians (there was a casualty case in 2013) at the traffic-jam lively downtown Yangon.It was in fact a challenging situation for the CA in dealing with both groups.That underlying institutionalization issue exacerbated the resource-poor food control measures in this informal sector.Vendors and consumers showed their concerned on food safety and appreciated control agency's food control management.At the existing situation, there was no chance to reduce the hazard and the possible exposure.

An additional important aspect is the politic of the acceptance of this informal sector.The case study found a steady progress in the recognition of street food business.However,there was no official recognition aiming at protection of the vendors' right whilst paving the way to safer food production.The concerned authorities-both the urban planner authority and the competent (food) authority,should extend their knowledge on other developing countries' success story in institutionalization and managing the street food control for maintaining the confidence of consumer.Traditional pattern intervention "command and control CAC approach" should be shifted towards "market-based approach".Vendors should be registered and their practices should be monitored aiming at institutionalization of street food to become a safer food production sector. Moreover,vendors should be allowed doing their business with license that could give a status supporting a way of entitlement in pursuing their livelihoods.Not only vendors but also consumers had some limited knowledge on safer food handling practices.That evident suggests that the concerned authority should put more effort on the training tool of the street food control system.

Emphasis should be on reduction of hazards by closer collaboration with the concerned stakeholders in favorable milieu for the benefit of the stakeholders.The existing politic of recognition for this sector prevents the implementation of food control measure in practice.It reveals that without enabling environment and infrastructure, application of food control practices is still not feasible.

8.1.3. Food control in export: Control of fishery products for international trade

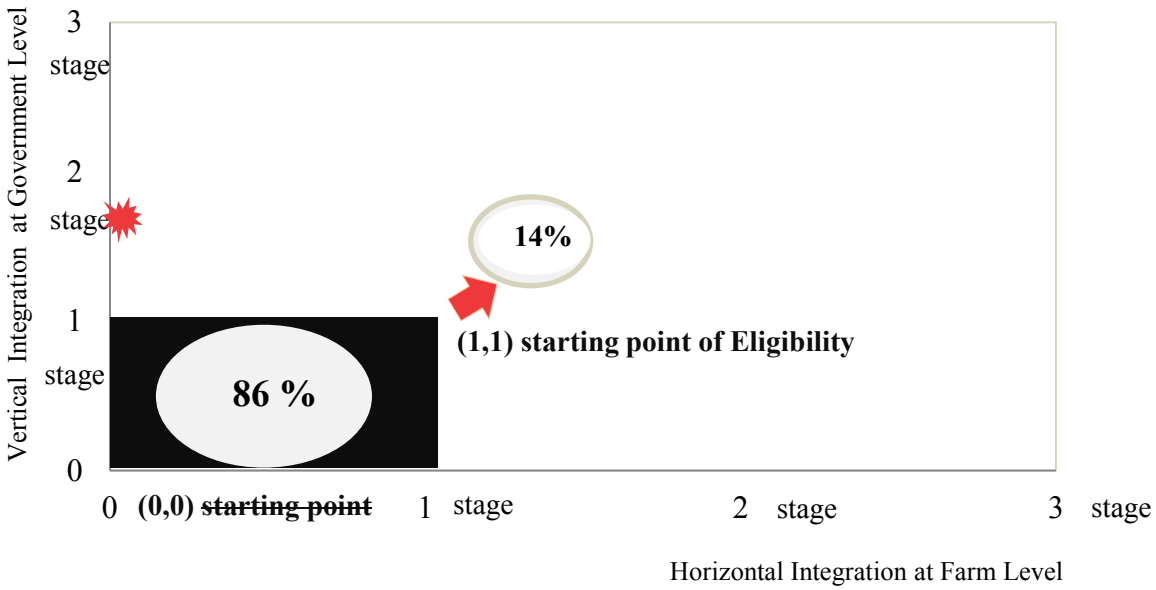
The case study of Myanmar fishery export sector found that fishery competent authority CA initiated integration of fishery control system successfully (among all other food sectors) and achieves mutual recognition agreements MRA with EU,China, Vietnam,ASEAN markets. It is in response to the requirements of markets; there were still some shortcomings though. Private firms play the role in fishery business**;**however they have to be controlled by the CA,regardless of how many private standards they possessed.The more fishery firms can invest in DOF's quality assurance by means of HACCP plans, the more they can export to several markets.Thus, dual integration both at government and firm level are required.That evidently showed the need of investment in Quality infrastructure.

For food production countries,export opportunity is a driving force that let the process of firms transforms from a traditional one to become an integrated firm[57].Investment in dual integrations is obligatory to export success destined to EU markets that involves the vertical integration at government level and the horizontal integration at firm level(Wai et.al.2015). Since the initiation of EU's structural food safety reform in 2009, that dual integration[58] requirement has been spreading to other markets as well with varying levels.

Figure (8.1) exemplifies how dual integrations in government and firm level required simultaneously for taking part in global food trade.In other word, an X-Yplane is to explain dual integration by being put those two integrations together in the X-Y plane so as to allocate the position of firms intended for destined markets,with respect to their integration level (x value) relating to the level of destined markets' requirements (y value).

[57] Traditional firms employ low level of technology whereas integrated firms use advanced technology and thus the former is regarded as informal and the latter as formal.Only formal firms could fulfil the greater assurance over food safety and quality demanded by lucrative markets (Henson and Cranfield,2009).
[58] Three steps of two types of integrations are previously described in chapter 7 in detail.

Figure 8.1.Positioning of fishery firms on dual integration plane



Source: Author

As stated in this graph, (1,1) is the starting point of eligibility for a food industry of an export country aiming at EU market because when the value of x is greater than1, firm already possess public standard and when y value is greater than 1,CA already has MRA with import country. That plane can be used for the comparison of eligibility among different markets.The detailed explanation is attached in Annex(17).

As mentioned in the graph, more than 86% of fishery processing firms of Myanmar were still inside the black box and approximately 14% of the approved firms were eligible for export to EU markets.

8.1.4. Food control for trans-boundary trade: Import food monitoring of Myanmar and Japan

When it comes to food control in transboundary food trade either export or import, it is vital to have sound NQI designed for supporting the implementation of food control measures aimed at quality assurance provision in export and protection of consumer against adulterated foods in import.Thus,responsible agencies,its regulatory framework in monitoring import food at quarantine stations and national standards for technical references are determining factors weighed with international accepted standardized guidelines particularly CODEX.

For the case of Myanmar, the fragmented institutional capacity (as previously discussed in chapter 4) adversely affected the monitoring of imported food.In the form of reactive measure, import food monitoring exists just for conventional maritime trade.It largely depends on

document checking and testing the food samples taken by importers.That situation is ambiguous for ensuring food safety.Being a mainland country,Myanmar has less advantage in import food monitoring along the porous cross-border line.That type of non-uniformity in nationwide food control implementation should be averted by integration of food control measures.

For the case of Japanese import food monitoring system,it employs global risk-based inspection model.The surveyed private inspection institution stressed that 11% physical testing of all imported foods was risky.Given the advantage of technological improvement in food production,it is still possible for Japanese import food controlling agency MHLW to rely on document checking for ensuring food safety.Even so,two tiers of checking: document checking and physical checking, are still necessary for import food monitoring.

In terms of food control coverage along food chain in export countries, Japanese import food monitoring seems weak,if comparing with EU system.In actual fact,Japan also restructured in consort with the 2009 reform of EU.Japan starts taking investigation on food control systems of exportable items in the third country in 2009.It is a new preventative approach started since 2009 that covered 27 investigations in export countries,even though it could not cover all import items yet.Although it is not exactly required by law,Japan's import food control is streamlined in accordance with the global trend.

As regard with sharing responsibilities between public and private laboratories,it was found that Japan allocates its resources at best.Testing the susceptible imported foods is carried by private testing institution with the expense of importers whilst food authority pays attention more on standardization, risk-management and other surveillances activities of food control measures.

This dissertation concluded that Myanmar quality infrastructure particularly in food sectors is on the brink or in the middle of quality assurance crisis due to insufficient capacity at institutional level and a widespread informality food control at business level.The investments in food control at farm level,processing level and institutional level are urgently required to support the nation's economy strategically in Myanmar.

8.2. Recommendations for Future Policy Implication

Based on the conclusions of four case-studies, five recommendations are described below in terms of (1) generic type of food control needed for food sectors,(2)policy choice for the concerned food authority in food production developing countries,(3)priority areas of food control for quality assurance in export country,(4)priority areas of food control for consumer protection against adulterated foods in import country and (5) the role of enabling environment and infrastructure.

(1) Risk-based food control Food control measures are to address the potential risk arise in food chain for protecting consumers,risk-based food control is necessity as an integral part of food legislation recommended by SPS of WTO for food sectors whether it is for domestic or foreign markets.

(2) Policy choice for authorized food control agency A state-led effort in food control is not always feasible all along especially for trade interest (i.e.export success) especially in developing countries.Their limited resources should be put in guiding role rather than taking the role in testing, as both require large investment. In other word, the guiding role of the authorized food control agency should not be compromised by taking the role in food testing services.It would be better-off for food control agencies if they could engage more in decision making role with robust mechanism of food policy,instead of taking the role in (testing) services.These two functions seem similar but go in different direction with diverse outcomes.The bottom line is the investment in food control measures must support and reflect the need of food sectors.

(3) Priority area of food control in export country Food export country needs to focus on competency of testing facilities (establishing accreditation board),quality assurance system at farm level (process standard,product standard) to ensure the integrity of the produces.Most of these works demand government investment for promoting agribusiness in agriculture value chain, in terms of investing in official food control body.As regard with farm level food control,the investments of multinational enterprises MNEs in agriculture sector should be encouraged through the inflow of foreign direct investment FDI for export-oriented growth in agribusiness sectors.

(4) Priority area of food control in import country For food import country, the task of testing (laboratory) services can be shared between public and private but they must be under national level control agency's registration and accreditation.Private sector can play the role in testing (even in inspection service partly) while public agency remains playing the role in monitoring,controlling and surveillances for ensuring socially optimal food safety level.

(5) Enabling environment and infrastructure The level of investment in quality infrastructure that supports food control system and the institutionalization of the widespread informal–small size businesses are two main fundamental factors that indicate success or failure of food control measures devised for health and trade interests.

Annex 1

Questionnaire

Name of Study

Assessing the capacity of food control laboratories in Myanmar

Objectives:

For obtaining information on laboratory concerned comprised in National Quality Management Framework in food trading activities of Myanmar

Rational of Study

Myanmar is in transition period, changing its economy into market oriented one.All around development in respective fields are constantly pursued by the State;including designing National Export Strategy in which quality management is the pri-mover for export promotion. However,many impediments along the supply side and demand side are making the development pace to a somewhat slow.The smooth functioning of the QM framework through enhanced collaboration is severely hindered by a limited amount of public–private dialogue as well as public–public cooperation.Stakeholders cite the absence of a favorable environment to establish dialogue and enhance cooperation. Key challenges are the time-intensive nature of establishing such dialogue and agreements, as well as a lack of counterparty confidence.Above all,lack of coordination and resource sharing within the QM framework hinders cross-sector efficiency and development. Accordingly, considering the current situation,it is necessary to access a study on the capacities of these food control laboratories now working in quality management circle.The questionnaire is to be distributed among them and based on this; further necessary steps are to be taken for the benefits of stakeholders.

A. Profile of Laboratory

1. Name of Laboratory

……..……...

2. Type of laboratory (private,public,donated by foreign country)

……....……

3. Organization

……..……

……

4. Year of establishment

……

5.Budgetary of lab

(1) Stand-alone on its own totally
(2) Stand-alone mostly but financed by some organizations (if necessary)
(3) Run by government budget
(4) Run by government budget but sometime informally financed by private

Others……

……..……

6. Email & phone, Address

……

7 Human Capacity

(1) Staffs number in (a) PhD, (b) M.Sc.,(c)Bachelor , (d) others
(2) Total average number of staffs per year (during last 20 years)(please fill in the following table)

Years	PhD holder	Master	Bachelor	Other	Total number

8. Physical infrastructure

(1) Fixed assets (ex: building, machine)

..……

……...

(2) Comment on that matter (especially limitation for routine function properly)

……

……..

(3) Continuous investment (ex:Chemical reagent, maintenance, etc.)

……

……..

(4) Comment on limitation for routine function properly

……

……

(5) Others (Comment on limitation other aspects of infrastructure)

……

……

B. Area of Concern

1.	Food and Food Products	YES	☐	NO	☐
2.	Agriculture Produces	YES	☐	NO	☐
3.	Aquaculture Produces & Seafood	YES	☐	NO	☐
4.	Pharmaceutical Products	YES	☐	NO	☐
5.	Cosmetics & Toiletries	YES	☐	NO	☐
6.	Minerals from Mining Activities	YES	☐	NO	☐

Others:

……

……..

……

……..

……

……

C. Specific scope of Testing

1.	Metal Contaminates /Heavy Metals	YES		NO	
2.	Preservatives	YES		NO	
3.	Vitamins	YES		NO	
4.	Fats & Fatty Acids Composition	YES		NO	
5.	Minerals	YES		NO	
6.	Alcohols	YES		NO	
7.	Food Additives	YES		NO	
8.	Contaminates	YES		NO	
9.	Permitted/Artificial Coloring Substances	YES		NO	
10.	Artificial Sweetener	YES		NO	
11.	Pesticides	YES		NO	
12.	Mycotoxins	YES		NO	
13.	Microbiology	YES		NO	
14.	Drinking Water Analysis	YES		NO	

15. Technicians' opinion on Accuracy, Reliability and timelines on Testing

……

……

……

……

……

……

D. Instruments used for assay, impurities and Others

1.	High Performance Liquid Chromatography	YES		NO	
2.	Gas Chromatography	YES		NO	
3.	Atomic Absorption Spectrophotometer	YES		NO	
4.	Ultra Violet Spectrophotometer	YES		NO	
5.	Fourier Transform Infrared Spectroscopy	YES		NO	
6.	RI Detection	YES		NO	
7.	UV-VIS Spectrophotometer	YES		NO	

Others:

……
……
……
……
……

E. Participation in any proficiency testing scheme-pts conducted by any international agency

1. Did the laboratory participate in any PTS during the last 5 years period?

	YES		NO	
If "NO" is there any plan to participate in PTS.	YES		NO	

If "YES" please proceed further below: Name of the agency that conducted the PTS.

……
……
……..

Title of the Proficiency Testing.

……

F. Inspection and Certification

1. ISO certification (ISO 17025 and the like) YES ☐ NO ☐

Apart from ISO certification, has the QC lab been inspected/audited by any other agency?

YES ☐ NO ☐

If "NO" has the QC lab applied for any inspection? YES ☐ NO ☐

If "NO" has the QC lab intended to apply in the near future?

YES ☐ NO ☐

Others:

……

……

G. Additional suggestion and comments

……

……

……

……

……

……

……

……

……

Thank you very much

Annex 2

I. Questionnaires for Key Person (Street–foods)

No……

Date……..

Name of interviewee

…….……..…

Name of organization

……..……...…

Location

……..…….……

Type of Organization (National /R & D or laboratory or inspection)…….....……..

Accredited by (If any)……..…….....

Type of Food Sectors (Overall, fishery or agricultural or others)……

A. Personal Information

1. Gender ( ) Male ( ) Female

2. Year of service …….…….……..Years

3. Education ( ) Bachelor ( ) Higher than bachelor

Others……

4. Main Responsibilities……..……..

5. Involvement in Food Safety Program (ex. as Voluntary or Compulsory) …..…….……..

6. Definition of Street food

……
……

7. Street food control governed by YCDC

(1) Monitoring (locations/areas, food and water safety, Personal hygiene, frequency of monitoring, roles and responsibilities and Others)

……
……
……..

(2) Controlling and Surveillance (inspection checklists, number of poisoning cases, portions of vendors with certificates, no of field test per year, rewards and punishments and Others)

……
……
……
……
……

B. Food Legislation and Management

Statements	Perception	
	Yes	No
Food legislation & Management 1) How does your government agency view the rules/ legislation of food control management system? Do you think that it is enough? 2) Do you think that the existing food control management is adequate to meet the needs of challenges? 3) Do you think that the existing one needs to reform /upgrade to adopt better management?		

Please chose the following:

I think that :

1) Existing management system is enough to reduce the possible risks concerning with control measures
2) Existing management system is merely enough in minimizing risks concerning with control measures
3) if you think that 1 and 2 are not your opinion, please kindly mention your opinion

…….
…….
……

Role and Responsibility {Food control Management at the system level}

1) Food control management

Questions /Concern	Very Much	Often	Sometimes
1) How much your role in work concerned with food control management for food safety?			
Please specify,			

2) Which component(s) relate(s) with your work?
   1) Food law and legislation
   2) Food control management
   3) Inspection Services
   4) Laboratory Services
   5) Information, Education and Communication
   6) Others
3) Scope and structure of food control management at the system level

Questions	Yes	No	Not sure
1) Do you think that the scope and structure of food control management practiced in your organization is sufficient for food safety?			

	2) If you think No for the above question and if you have any suggestion that you want to propose, please mention below. …… ……

C. Inspection Services

Questions	Perception		
	Yes	No	Not sure
1) Do you think that the inspection services are good enough for food chain safety?			
2) Do you think that the laboratory services in Myanmar need more cooperation for better food control measures?			
3) Could you please kindly mention the name of private and private inspection teams? …… …….. ……			

D. Laboratory Services

1) Could you please kindly mention if you have any suggestions for public and private laboratory services concerning with better food control measure? …… …….. …… ……

E. Information, Education and Communication (IEC)

Questions	Perception			
	Yes	No	Need more effort	Not sure
1) Do you think that the existing IEC activities are good enough for informing or increasing awareness especially concerning with food safety (microbiology) aspect?				
2) What does your organization involved in IEC activities and who are your targeted audiences? …… ……. 3) Please kindly mention if you have any suggestion for informing consumers especially concerning with food safety …… … …….				

F. Some constraints in food control and related infrastructure

Constraints	Yes	No	Not really
In implementing food safety objectives , resources are -------- (1) Insufficient Capacity (2) Insufficient with trained staffs (3) Lack of risk science based approach (4) Lack of Funding (5) Lack of transparent in decision making process (6) Weak in support or cooperation from related agencies			

G. Suggestion and recommendations

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Thank you very much for your time and cooperation.

Wai Yee Lin and Masahiro Yamao

Annex 3

Interview Schedule for Street-foods Vendors

Date:…….

No……

A. Personal Information

1. Name of interviewees……..
2. Age ……..……
3. Name of stall……
4. Started running this shop since……
5. Main Food items…….
6. Marital Status…….
7. Educational qualification……
8. Place of Birth……
   a) (If not in Yangon) Since when did you migrate to the existing place……
   b) Name of place where you are staying……
   c) Number of family members……

No.	Name of family member	Relation to Head	Sex	Marital status	Age	Level of education	Occupation
1							
2							
3							
4							
5							

B. Household income and vending activities

1. Total household income

No.	Statements		Levels
1	Paying money for Place		1) No need to pay 2) To some one 3) Others
2	Vending cart type		1) Push Cart (sq-area) 2) Makeshift stall 3) Others vehicles
3	Stove		1) Gas 2) Charcoal 3) Firewood 4) 1 and 2 5) 1 and 3 6) 2 and 3 7) Others

4	Daily Investment for vending activity		1) <10,000Ks 2) >10,000~20,000Ks 3) >20,000~30,000 4) >30,000~40,000 5) >40,000Ks
5.	Hired Labor		1) Yes (numbers) 2) No
6.	Seating Capacity		1) Nil 2) Up to 3 3) Up to 5 4) More than 5
7.	Covering of vending place		1) Without cover 2) Temporary cover 3) Cart and tent Cover (Set)
8.	Utensils		1) Closed type glass box 2) Opened-type box 3) Styrotex box 4) 1+2 5) 1+3 6) 2+3 7) 1+2+3 8) Others

2. Related Parameters in Vending

No.	Statements		Levels
1	Seasonal		1) Yes (which season) 2) No (all year round)
2.	Daily working hour	About ( ) hours	
3.	Daily Activity start at----- ~ up to(-----)		1) Before 5 am ~ (…….) 2) After 5 am ~ (……) 3) Noon ~ (……..) 4) 3pm ~ (……..) 5) Random
4.	Source of water for cooking		1) Tap/ faucet (Public) 2) Tube well 3) Purified Drinking water 4) Others
5.	Source of water for all purpose (ex: hand washing, plates washing, etc.)		1) Tap/ faucet (Public) 3) Tube well 3) Others
6.	Do you have your own garbage bin?		**1) Yes** If Yes- (a) Plastic bucket (b) Plastic bags (c) Others **2) No** If No, (a) Put to the near-by bins (b) Leave on the ground (c) Others
7.	Number of municipal garbage bin at the site		1) one 2) two 3) three

			4) none
8.	Type of final Garbage disposal		1) Municipal containers 2) roadside on bear ground 3) Others
9.	Type of Toilet		1) Public toilet 2) By Others (kith and kin)
10.	Condition of Toilet facilities		1)Hand washing facilities with soap 2) nothing for hand washing

C. Food Safety knowledge of Vendors

1) Knowledge of vendors

Statements	**True**	**False**
<u>Parameters considered in buying raw to be cooked for vending</u> - Clean items - Freshness - Sold by reputable wholesaler - Evidence of damage in package - Checking expiration date		
<u>Steps taken to ensure safety of vended foods are</u> - Thorough washing of food to be cooked - Use of clean water in cooking - Use of fresh ingredient /raw to be cooked - Use of covers (such as lid or clothes) to protect cooked food from dust and insects - Adequate cooking (time, temperature etc.) of food		
<u>Types of food contaminants include</u> - Worms and Parasites - Invisible germs in foods - Unpermitted Food coloring(industrial used dyes),contaminated flavoring and spices - Insects and/or their droppings - Dust and dirt		
<u>Methods employed in cleaning utensils needed in food preparing and vending</u> - Washing with soap and water - Rising with hot water - Drying with clean clothes		
<u>Hand washing</u> is necessary for street food vendors - after trip to toilet - after touching money - even when handkerchief is used for sneezing - even when hands are not yet wet, sticky and visibly dirty during continuous food handling		
<u>While vending, Street food vendors</u> - Should wear hair restraints		

- Should wear aprons - Should not wear jewelries (especially-ring) in their hands and arms as a sources of contaminations		
Street food vendors cannot safely handle foods, while suffering - sick with diarrhea - Typhoid - Hepatitis - Food poisoning - Helminthiasis - Communicable diseases - when they have an open wound in the hands even if it is fully bandaged - sick of family members		
Used plates or glasses cannot be washed adequately by - Quick rinsing in a pail of water - Tub-washing with reused water which is soapy or oily		
It is not safe to eat food - That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae - Which come in contact with dirty surface - Found containing hairs or staple wire provided these were removed prior to consumption		
When preparing food , it is not sufficient to - Just rinse soiled chopping boards and knifes with water before reusing it - Just wipe soiled hands with clothes prior to touching cooked food which is ready for serving		
Common symptom of food-borne illness - Stomach pain - Diarrhea - Vomiting/ Nausea - Fever - Headache		
Have you ever heard the word "Food borne illness"?		
Do you aware that foodborne diseases may be associated with the consumption of contaminated foods?		
Have you ever attended the training conducted by YCDC?		
Please chose the flowing **(1) Practices that improve Personal Hygiene of Vendor are-** (a) Finger nail cut and clean ( ) (b) Using Hair restrain ( ) (c) Wearing Apron ( ) (d) Wearing Clean clothes ( ) (e) Proper Hand washing ( ) **(2) Faults that reduce personal Hygiene of Vendor** (a) Touching food with bear hands during serving ( ) (b) Allowing buyers touching foods with bare hands ( ) (c) Speaking while serving ( ) (d) Using food-preparing-hand to exchange money ( ) (e) Insufficient hand-wash thoroughly throughout the day ( )		

2) Attitude of vendors

Statements	Agree	Not sure	Disagree
Hand washing is needed - After handling raw materials - After handling garbage - After touching money - After using toilet - After blowing nose - After having meals			
Vending or cooking should be halted temporarily if suffering from - Cough and colds - Diarrhea - Stomach Cramps - Typhoid - Hepatitis - Food poisoning - Helminthiasis - Contagious diseases - Sick family members			
Some parameters considered in buying raw(to be cooked for vending) are - Cleanness - Freshness - Sold by reputable wholesaler - Evidence of damage in package - Checking expiration date			
Steps taken to ensure safety of vended foods are - Thorough washing of food to be cooked - Use of clean water in cooking - Use of fresh ingredient /raw to be cooked - Use of covers (such as lid or clothes) to protect cooked food from dust and insects - Adequate cooking (time, temperature etc.) of food			
I think , it is not safe to serve/sell food - That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae - Which come in contact with dirty surface - Found containing hairs or staple wire provided these were removed prior to consumption			
Food should be discarded if it is contaminated with - Worms and Parasites - Invisible germs in foods - Unpermitted Food coloring(industrial used dyes),contaminated flavoring and spices - Insects and/or their droppings - Dust and dirt			

Following methods should be employed in cleaning utensils - Washing with soap and water - Rising with hot water - Drying with clothes			
Washing hand should be done - after trip to toilet - after touching money - even when handkerchief is used for sneezing - even when hands are not yet wet, sticky and visibly dirty during continuous food handling			
While vending, Street food vendors - Should wear hair restraints - Should wear aprons - Should not wear jewelries (especially-ring) in their hands and arms as a sources of contaminations			

3) Practices (self-reported behavior) in Vending activities

Statements	**Practice always**	**Practice sometimes**	**No Practice**
I do Hand washing - After handling raw materials - After handling garbage - After touching money - After using toilet - After blowing nose - After having meals			
I will consider some parameters in buying raw - Cleanness - Freshness - Sold by reputable wholesaler - Evidence of damage in package - Checking expiration date			
I will do - Thorough washing of food to be cooked - Use of clean water in cooking - Use of fresh ingredient /raw to be cooked - Use of covers (such as lid or clothes) to protect cooked food from dust and insects - Adequate cooking (time, temperature etc.) of food			
I will not use food - That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae - Which come in contact with dirty surface - Found containing hairs or staple wire provided these were removed prior to consumption			

I will employ following methods in cleaning utensils needed in food preparing and vending - Washing with soap and water - Rising with hot water - Drying with clothes			
I will wash my hands - even when toilet paper is used after trip to toilet - after touching money - even when handkerchief is used for sneezing - even when hands are not yet wet, sticky and visibly dirty during continuous food handling			
I - wear hair restraints when vending - wear aprons when vending - don't wear watch , bracelets ,rings and jewelries in their hands and arms as a sources of contaminations			

4) Constraints in practicing good practices

Constraints	**Yes**	**No**
1. Lack of availability of clean Water source		
2. Lack of access to clean toilet facilities		
3. Weak in food-safety knowledge		
4. Lack of timely support for garbage disposal system		
5.Lack of price competency		
6.Due to high mobility		
7. Unfavorable condition for good practices		
8.Lack of awareness about sufficient information of good handling practices		

If you have any further suggestion please make comments

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Thank you so much for your kind cooperation
Wai Yee Lin and Masahiro Yamao

Annex 4
Interview Schedule for Street Food Consumer

Date: …….

No:……

A. Personal Information

1. Name of interviewees……
2. Age ……....
3. Marital Status……..……..
4. Consuming days of street foods per week…….……..... (1)1-2days per week (2) 3 – 4 days per week (3) 5-7 days per weeks
5. Frequency of consuming street foods per weeks …….
6. Educational qualification……..
7. Place of Birth……..……..
8. (Existing) Name of residential Township……
9. Number of family members…….…...
10.

No.	Name of family member	Relation to Head	Sex	Marital status	Age	Level of education	Occupation
1							
2							
3							
4							
5							

B. Reasons for buying /consuming street foods

No.	Statements	Yes	No
1.	Street foods are cheap in price		
2.	It is easily available		
3.	We just like it		
4.	It looks delicious		
5.	We don't have the varieties at home		
6.	We know the person selling the foods		
7.	To save fuel		
8.	To save time		
9.	To have more variety on diet		
10	It is appetizing		

C. Consumers' Opinion and perception on street foods

a) Opinion for buying /consuming street foods

No.	Statements
1.	What do you think about sanitary condition of food handling and vending , if comparing with street food shops and stationary restaurants (1) I think stationary restaurants are better than street food shops (2) I think street food shops are better than stationary restaurants (3) I think they might have the same condition (4) I don't know
2.	Do you know that YCDC is controlling stationary restaurants' food safety? (1) I know (2) I don't know
3.	Do you think that street food shops should be under control of YCDC? (1) I think so (2) I don't think so
4.	The price of street foods are (1) Too expensive (2) Just right (3) Cheap
5.	The appearance of street foods seems (1) delicious (2) clean (3) I can't help enjoying these foods whenever I am in down town being as a passer by (4) Just like other types of foods (5) Don't know
6.	The taste of street foods are (1) Better than other kind of foods (2) No difference (3) Home prepared is better (4) Don't know
7.	Do you know that that food borne diseases may be transmitted through the consumption of (uncleansed) foods? (1) I know (2) I don't know

D. Commonly purchased items

Statements	Yes	No
Myanmar Vermicelli with fish broth (Mohingha)		
Various Salads		
Traditional rice cake snacks		
Bread and cakes		
Fritters		
Drinks / Juices (cold and hot)		
Peeled Fruits		
Rice and curry		
Others		

Statements	Yes	No
Consuming unsafe foods can cause 1. Typhoid 2. Hepatitis 3. Food poisoning 4. Helminthiasis		

E. Concern and Perception on safety issue

Statements	Answers	Levels
Are you concern over food safety issues of street food?		1)Very much 2)Often 3)Sometimes 4)Not at all
Do you think that street foods are cooked and prepared as safe as home- made foods?		1) Yes, I think so 2) No, I don't think so 3) I have no idea
Are you satisfied with street food from safety perspectives?		(1) Yes, I am (2) No, I am not (3) I have no idea
Have you ever experienced any symptoms such as Diarrhea, vomiting, stomach crump after eating street foods?		1) Yes If yes, (1) One time (2) 2 or more (3) Often (4) sometimes 2) No

F. Consumers' Attitude towards vendors' vending practices

Attitudes	Agree	not sure	Disagree
<u>Hand washing is necessary</u> - After handling raw materials - After handling garbage - After touching money - After using toilet - After blowing nose - After having meals			
<u>Vendors should temporarily stop from vending or cooking if suffering from</u> - Cough and colds - Diarrhea - Stomach cramps - Typhoid - Hepatitis - Food poisoning - Helminthiasis - Communicable diseases - Sick members of family			

Vendors should consider some parameters in buying raw(to be cooked for vending) - Price - Clean items - Freshness - Sold by reputable wholesaler - Quality aspects - Expiration date			
Vendors should - Thorough washing of food to be cooked - Use of safe water for cooking - Use of fresh ingredient /raw to be cooked - Use of food covers to protect cooked food from dust and insects - Adequate cooking of food (time and temperature)			
Vendors should discard foods if food is contaminated with - That has been exposed to pests like rats ,cockroaches and flies even if there is no visible evident of gnawed parts or pest larvae - Which come in contact with dirty surface - Found containing hairs or staple wire provided these were removed prior to consumption			
Methods employed in cleaning utensils needed in food preparing and vending - Washing with soap and water - Rising with hot water - Drying with clean clothes			
I think Street food vendors - Should wear hair restraint - Should wear apron - Should not wear jewelries in their hands and arms as a sources of contaminations			

G. Constraint and concerns over street foods

Constraints	Yes	No
1. Lack of availability of clean Water source		
2. Lack of access to clean toilet facilities		
3. Weak in self-safety knowledge		
4. Lack of timely support for garbage disposal system		
5.Lack of price competency		
6.Due to high mobility that bring about unable to do good practice		
7. Due to lack of good practices awareness		

If you have any further suggestion please make comments

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Thank you so much for your kind cooperation.

Wai Yee Lin and Masahiro Yamao

Annex 5

Interview Schedule (Fishery Sector)

Questionnaires for Competent Authority

No……
Date……..

Name of interviewee ……..……..……....
Name of organization…….…….
Location ……..……...
Type of Organization (National /Provincial/Township level)……...……..……..
Accredited or delegated by (If any)…….....
Type of Service (Management, Inspection, Laboratory, others)…… ……

A. Personal Information

1. Gender ( ) Male, ( ) Female
2. Total year of Service ( ) Years, since …… (Year) in this Section….Years already
3. Education ( ) Bachelor ( ) Master, ( ) Diploma ( ) Others
4. Involvement in Food Safety Program (ex. Position)…….…..……..
5. Main Responsibilities……...……
6. Attended Special training for this duty (if any-with the specialist areas of study)…….…….

……...……..
……...……
……...……

B. Legislation & Management

4) Do you think that the existing laws and directives are enough? Please give your opinion.

(Law)……...
…….
(Directives)…….
…….
……

5) How directives were prepared? Were they compliance with the requirements of EU market? Are they really workable in practice?

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6) How many directives had already promulgated in this sector to be compliance with EU requirements? And what are these? When did these promulgate? Could you explain about "Major restructuring in system of inspection" chronologically?

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…….....

7) How does your government agency view the existing directives of DoF and the regulations of EU? Could you explain your opinion?

……
……

8) What do you think about the scope and structure of existing food control management? Is that adequate or more than enough to meet the requirements of EU? Is that difficult for firms to follow all the rules? Are there any areas that need to compromise so as to be more flexible or workable for domestic firms?

……
……..……
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……..…….

(1) Legislation …….
(2) Organization of competent authority and Control Body (staffs, facilities, etc.)……..…
……...
(3) Establishments (main areas)…….……....
……..……
……..…….
……...

9) Do you think that the existing rules and regulation need to reform/upgrade to adopt better management?

……
……
……

10) Does DoF have any record of RASFF Notifications and what kind of action will be taken by DoF to these establishments? (Apart from the action prescribed by RASFF) , if yes please describe , if no what will be the reason?

…….
……
……

11) I think that :

4) Overall existing food control management is fairly high to be followed by firms
5) Overall existing food control management is neither high nor low for firms to follow
6) Overall existing food control management is easy to follow without any difficulty

Please kindly mention your opinion for your chose answer

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……
…….

9) How about Law Enforcement and taking Action for infringement in particle field?

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……..…….
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……..……..

C. Inspection Services

(1) Ratio of firms, routines inspection to inspectors, please explains about the delegation of inspection tasks. Who are eligible to do this task?

……
……..…….
……

(2) Rate of Inspection fee (per establishment?, per operation number of that establishments, per products of that establishments)

……
……..……
……

(3) MDSFI System of Inspection

(1) Risk Category (Common rate result for establishments?) Within what range ?

(2) Defect Category (Common rate result for establishments?)

(3) Establishment rating (Common rate result for establishments?) Within what common range?

(4) Approval rate due to inspection result

……..
……..

5) Do you think that the existing inspection system is sufficient enough? Please state your opinion

……
……

6) Could you please mention if you have any suggestions for Inspection service concerning with food control measure?

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……

D. Laboratory Services

1). is the reference laboratory accredited? If not yet, is it trying to get it?

……
……

2) Can all test parameter be tested in your ref: lab?

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……

3) Could you please mention if you have any suggestions for laboratory service?

……
……

E. Information, Education and Communication (IEC)

4) How does your organization involved in IEC activities and who are your targeted audiences?

……
……
……

5) Do you think that the existing IEC activities of DoF are good enough for informing or increasing awareness especially concerning with food safety (microbiology) aspect?

……
……
……

6) Please mention if you have any suggestion concerning with improvement of this component

……
……

7) Could you please discuss about the efficiency of RASFF and

……
……

5) Issues in infrastructure

Infrastructure Issues

Issues	Please tick if your answer is "Yes", pls cross if "No"
In implementing food safety objectives , resources are -------- (7) Insufficient Capacity (8) Insufficient with trained staffs (9) Lack of risk science based approach (10) Lack of Funding (11) Lack of transparent in decision making process (12)Weak in support or cooperation from related agencies Please mention , if there is more constraints, ……	
Inspection - Technology - Staffs (trained personal, quantity, etc.)	
Laboratory - Technology (methods) - Technology (apparatus) - Technology (machine) - Staffs (trained personal) - Staffs (quantity) - Diagnostic facilities - Standard of Laboratory(Accredited)	
Financial - Support - Project - Development	

Suggestion and recommendations

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Thank you very much for your time and cooperation

Wai Yee Lin and Masahiro Yamao

Annex 6

Interview schedule for Approved fishery company

1. Company Name ……....
2. Type of Company (J.V , Private ,Foreign-owned enterprise,,etc.) ……
3. Establishment of processing plant (ex: established since 1999)……...
4. Numbers of PP established ……...
5. Is this company "the processor-cum-exporters"? (Roughly how many percent export and how many percent sell in domestic retail?) ……
6. Investment amount for fishery processing plant ……...

(1) Plant Registered number (DoF) YGN/……..

(2) Acquired Certificates for factory/ quality control (ex: ISO 9000/22000HACCP, etc.)

(1) Possession of ISO 9000
   1. Yes, we have valid certificate (Started since……Year (times renewed)
   2. Yes, we had but's not valid now
   3. No

(2) Possession of ISO 2200
   1. Yes, we have valid certificate (Started since……Year (times renewed)
   2. Yes, we had but's not valid now
   3. No

(3) Possession of ISO 14000
   1. Yes, we have valid certificate (Started since……Year (times renewed)
   2. Yes, we had but's not valid now
   3. No

(4) Others …….

(3) Origin of raw (fish or shrimp) (from domestic or foreign?)……

(4) Is there any CMP production? .....

(5) Space of processing plant compound (ex: acres) ……

(6) Processing capacity per day:…….

(7) Water treatment system (if any, gal/day) ……..

(8) Chlorine dosing pump (if any, number?)……

(9) Chilled water system……..

(10) Ice making machine (if any) Source of Ice ……

(11) Cold Storage (Number *Holding capacity) :……..….

(12) Does factory have own vessels? If yes , number ……..

(13) Number of Refrigerated trucks……..…….

(14) How about membership of Jetty? (If any, name and place) Is that only source for raw collection? ……

(15) Other explanation for collection of raw

……..

(16) Employees (Levels and number) Number of employees working at processing plant

……..

1. Level of HACCP

I. Interest (incentives , Challenges)

(1) Incentives

1. Comply with regulatory requirements (Major,Minor)
2. Comply with customers' requirements (Major,Minor)
3. Increases products quality (Major,Minor)
4. Reduce products costs (Major,Minor)
5. Access to new market (Major,Minor)

(2) Challenges

1. Need to retain production staffs (Yes,No)(Major/Minor)
2. Need to retain supervisory , managerial staffs(Yes,No)(Major/Minor)
3. Attitude /motivation of production staffs (Yes,No)(Major/Minor)
4. Attitude / motivation of super/man: staffs(Yes,No)(Major/Minor)
5. Reduced flexibility of production staffs (Yes,No)(Major/Minor)
6. Reduced staff time available for other tasks (Yes,No)(Major/Minor)
7. Recouping cost of implementing HACCP(Yes,No) (Major/Minor)
8. Reduced flexibility to introduce new products (Yes,No)(Major/Minor)

2. HACCP

1. Does your pp have ISO 9000 system? If your answer is yes, did it adopt before HACCP approval of DoF ?

   …….

2. Do you have the following?

Quality System	**1**	**2**	**3**	**4**
DoF approved HACCP adoption				
DoF approved GMP				
ISO 9000				
ISO 22000				

1. Fully operational
2. Being implemented (but not fully operated)
3. Planned but not implemented yet
4. Have no plan to implement

3. How long did it take to operate HACCP fully?

Quality System	**1**	**2**	**3**
DoF approved HACCP adoption			
DoF approved GMP			
ISO 9000			
ISO 22000			

1. Less than 6 months
2. 6to 12 months
3. More than 12 months

4. Number of HACCP team……..…….

5. Number of HACCP plans possessed …….

6. Training (In house training, out-side training,(by DoF, foreigners, in foreign countries)

No	Rank of Employees	Number	Training attended		Types of training attended (Good practices etc.)
			Yes	No	
1	Factory Head				
2	Managerial Level				
3	Clerk				
4	Workers for Processing and others in factory * women /men ratio?				
5	Others				

(1) Products and product amount after being inspected by competent authority DoF

No	Name of Products (Fish or Shrimp, etc.)	Type (frozen, etc)	Size or weight per pack (smallest)	Annual Total production For Oversea Trade-OT to all countries					
				Market	2009	2010	2011	2012	2013
1				OT					
2				OT					
3				OT					
4				OT					
5				OT					
6				OT					
7				OT					
8				OT					
9				OT					
10				OT					
11				OT					

12				OT					
13				OT					
14				OT					
15				OT					

I. Production for oversea trade including EU Markets

(2) How many kinds of Products are being produced in this factory so far? (after joining DOF in 2009)

……
……
……

(3) What are these?

……
……

(4) Flow of food / raw to products

1. Vessels (company has its own vessels- Yes, No)

   ……

2. Purchasing (timing/ seasonal, company's buyers or others' raw suppliers, place/ region of raw)

   1. Timing/ seasonal

   ……

   2. Company's buyers or others' raw suppliers

   ……

   3. Place/ region of raw (ex: from Yangon or Rakhine, etc)

   ……

   4. Requirements for safety (set temperature, hours of arrival, with ice, Etc.)

   ……

3. Receiving : Unloading(Storage-Pre production (requirements for food control) any documents require for safety) (Requirements-ex: Temperature, first in –first out)

   ……
   ……..
   ……..

4. Production

   ……
   ……

5. Storing (Post-production) (requirements for food control) any documents require for safety) (Requirements-ex: Temperature)

   ……
   ……

6. Service (Marketing) –Requirements

   ……

7. Traceability

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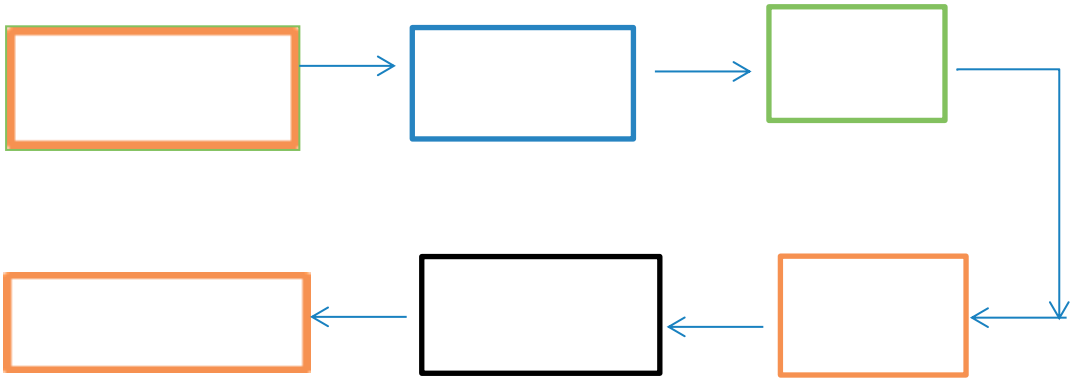
II. General description of supply chain of products for oversea trade (ex: from raw→ factory → market)



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Thank you very much for your time and cooperation

Wai Yee Lin and Masahiro Yamao

Annex 7

Questionnaire

Rationale Government agency is responsible for monitoring the quality and safety of foods to protect consumer against the defective food products. In this regard, it is necessary to explore how the responsible agency is doing at the prefecture level food control by monitoring and surveillance program based on food control system.

The questionnaire is composed of three main parts such as (a) profile of the responsible organization, (b) Import food monitoring (routine), (c) Surveillance (Post-market surveillance).

I. Profile of the organization

7. Name of Organization ……..
8. Established Year (e.g.: established since 1999)……
9. Under which ministry……. …….

   ……..

   ……..
10. Address, Email, phone, website

    ……..

    ……..
11. Human Resources (Rank, Numbers, Responsible areas, etc.)

No	Rank	Number of staffs	Responsible for 1.Inspection 2.Lab test 3.or others 4.overall	Remark

- Comment on this matter etc.

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……..……
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……..…
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……..…
……..……
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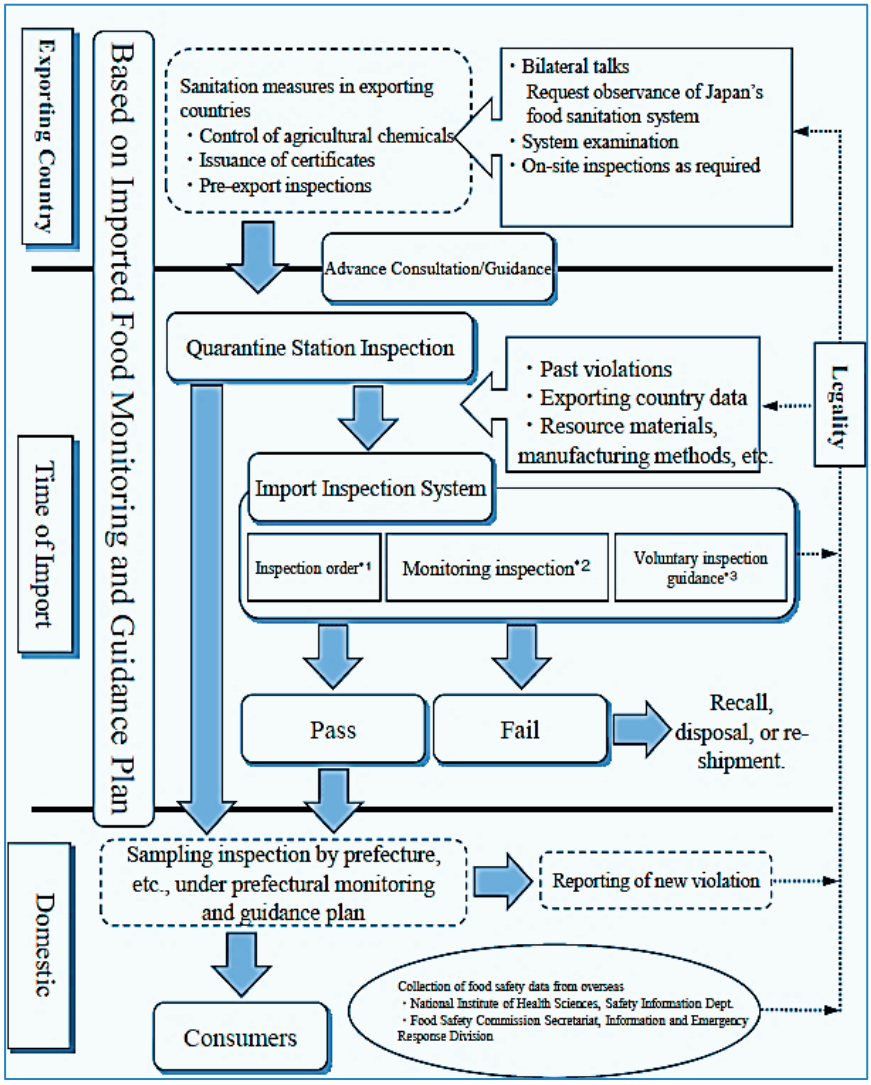
II. Import Food Monitoring

(1) Is the level of inspection intensity at Hiroshima port similar with other port?

(2) According to the following figure , there are 3 measures for import food monitoring in Japan such as (1) Safety Measures in exporting countries (2) Safety Measures at the time of import at arrival (3) Safety Measures in Domestic.

Does the scope or the coverage of the inspection of Hiroshima port cover the 3 measures?



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(3) Can importers accomplish all the import procedure (until the imported food reaches) at Hiroshima port?

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(4) **Document checking** : Facts to be considered in judgement for Document examination and Quantifying those facts with Risk Score or Rank (based on MHLW document,2009)

	Facts	**Remark on how Risk-based Inspection performed**
1	Country of (origin) export	
2	The imported items	
3	Manufacturer	
4	Place of manufacturing	
5	The ingredients and materials	
6	Methods of manufacturing	
7	Use of additives	
8	Others	

Source : MHLW 2009

Comment on this matter.

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(5) Physical checking for imported foods groups

	Food Groups	Items inspected	Remark on how Risk-based Inspection performed *(risk score)*
1	Livestock food and Processed livestock food	Antibiotics Residual agricultural Chemicals Standards for constituents Additives	
2	Aquatic food and Processed aquatic food	Antibiotics Residual agricultural Chemicals Additives Standards for constituents	
5	Agricultural food and Processed agricultural food	Antibiotics Residual agricultural Chemicals Additives Standards for constituents GMO Mycotoxins	
6	Other foods	Antibiotics Residual agricultural Chemicals Additives Standards for constituents Mycotoxins	
7	Food additives	Standards for constituents	
8	Foods subject to enhanced inspection	Antibiotics, Residual agricultural Chemicals, Additives, Standards for constituents, Mycotoxins GMO	

Source: (MHLW,2006)

- Comment on this matter

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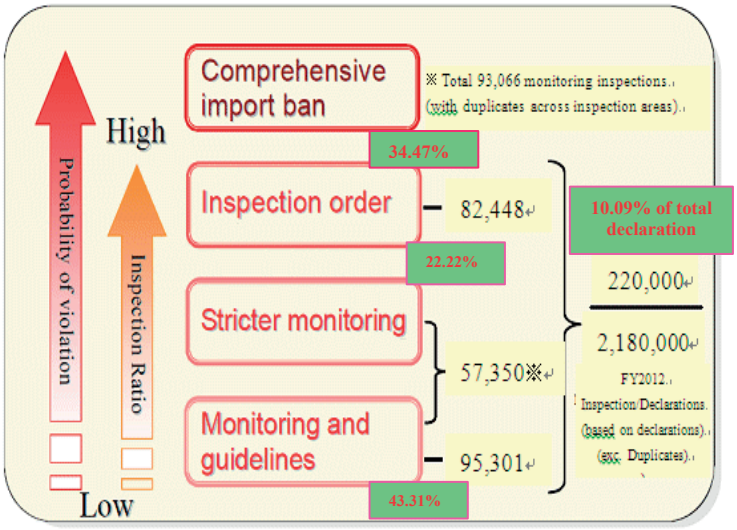
(6) According to the following (an example) diagram, there are 3 main inspections such as inspection order, striker monitoring, monitoring guidelines. How about the percentage of those inspections at Hiroshima port? Does Hiroshima port follow the same pattern? And Why? (Because of the MHLW annual guideline ?)



- Comment on this matter

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(7) Different type of public inspectors (Special requirements for inspector, etc.)

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(8) Role and involvement of Private inspection and testing company

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III. Surveillance (Post market)

(1) If the scope of inspection of Hiroshima port covers all 3 measures, then how domestic surveillance, the 3rd measure, is being performed? Timing, Frequency, etc.

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(2) Enforcement if defective foods is found during domestic surveillance

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(3) Presence of the following IEC tools and its use in Hiroshima Prefecture

a) Food label G men (Yes, No)

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b) Food labelling emergency call 110 (Yes, No)

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c) Food Safety Hot lines FSH (Yes, No)

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d) Others

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……..

Thank you very much for your time and cooperation

Wai Yee Lin and Masahiro Yamao

Annex 8

YANGON CITY DEVELOPMENT COMMITTEE

HEALTH DEPARTMENT

Sixth floor ,38th Street Plaza, Seike Kan Thar Street,

Kyauktada Twonship, Yangon

FOOD EXAMINATION REQUISITION FORM

Date…….

Kind of Product/ Name of Food Sample…….

Lab Code No……..

Source…….

Submitted by …….

Collection time …….

Received at ……..

Test required / reason for request…….

Signature…….

Name……..

Designation……

Township……..

Annex 9

Health Code of Practices for Food Establishment Regulated by YCDC

1. Water

   Ingredients and water used in preparing or cooking shall be clean

2. Keeping prepared foods

   (Prepared/Cooked) foods such as milks, meat, curry, drinks etc. shall be kept protected against flies, insects and dusts.

3. Utensil

   (1) There must be three types of utensil washing basins. And need to make sure that the drainage system shall be good enough to draw the used water off.

   (2) Other cooking materials and furniture shall keep clean at the clean and dry place

4. Disposal Management

   Garbage shall be kept in (fly-proof, odor-proof, water-proof (leak-proof) bin and it must be discarded at the designated place

5. Fuels

   (1) Fuels such as firewood, charcoal shall not be stored at Kitchen.

   (2) If storage is for the temporary use, it shall be kept inside the box with the covered- lids.

   (3) Fuels shall be stored in a container away from foods / raw materials.

6. Shop Management or Maintenance of Building

   (1) Shop owners shall be responsible for adequate sanitary conditions around the vending location

   (2) Kitchen shall be free of animals or pets. Other materials shall not be stored at kitchen

   (3) Cleaning for proper sanitary condition (cleanness and tidiness) shall always be maintained

   (4) No body shall dwell at night especially at food preparing, handling or serving places.

   (5) Shop walls shall be painted at least 6 months a time.

   (6) Adequate ventilation and lighting shall be provided. Floor shall be concreted or tile for easy cleaning purpose.

7. Sanitary Practices

   (1) Water, soap and napkin shall be provided for those who shall use after visiting the toilet

   (2) Toilet or rest-room shall be away from food stored room, kitchen.

   (3) Person contracted with infectious (contagious) diseases shall not be allowed entering especially at the food handling/preparing /cooking areas

8. Requirement for food-handler

   Food handlers shall take medical check-up at least twice a year or once in six months.

9. Prohibition

   If any person of the food vending shop is contracted with infectious disease, shop shall be closed till it gets the recommendation letter from the authorized health official.

10. Working gear

    Food handlers shall wear hair-restrain, gloves and apron

11. Food Handling

    Food shall be handled with cleaned-bare hands or by using disposable plastic gloves, or chopsticks, spoon, or fork or tongs

12. Certificate

    FDA's Certificate for vendors shall be validated.

Source: YCDC –Health Department's training manual

Annex 10

Code of practices for Street-foods of Department of Health, Thailand

Sanitary requirements for Street Food Stalls

1. Vending units should be designed and constructed so that they are strong and easy to clean. They should be kept clean, and food preparation surfaces should be at least at 60 cm above the ground.
2. Foods and drinks should be protected from contamination (microorganisms, toxic chemicals, dirt, etc.). Food displayed for sale should be protected by suitable coverings which can be made of glass, clear plastic or any clean material.
3. Seasonings and ingredients should be of a quality approved by the Food and Drug Administration.
4. Ice for human consumption and drinking-water should be clean and safe. Ice for human consumption should be kept in a clean container and covered. Nothing else should be stored in this container. Handling of ice for human consumption by hands is not permitted. A separate container should be used for the storage of ice used for purposes other than human consumption.
5. Utensils such as bowls, dishes, spoons, forks and chopsticks should be clean, in good condition and made of materials that do not release toxic or hazardous substances into food and drinks. They should be designed for sanitation and kept clean. Utensils with color decoration on inner surfaces are prohibited.
6. Utensils should be washed in three steps in suitable sinks maintained at least at 60 cm above the ground.
7. Utensils should be kept in a clean place at least at 60 cm above the ground. Bowls, dishes and glasses should be stored in upside-down position. Spoons, forks or chopsticks should be stored with the handles up.
8. Containers and spoons used for seasonings such as vinegar, soy sauce or hot sauce should be made of glass, stainless steel or white porcelain (with no colour decorations), and covers should always be used for protection from contamination.
9. Refuse containers should be of suitable size and designed with a cover. Containers should be emptied and cleaned routinely.
10. Food handlers should be trained specifically on the subjects of personal hygiene and food preparation. They should follow appropriate hygienic food handling practices. The cook should always wear a clean white apron, and hair should be covered.

Source:Department of Health,Bangkok,Thailand

Annex 11

Product Movement Document Format (1) of DOF

PMD(01)

F.S.R.D

ငါးလုပ်ငန်းဦးစီးဌာန

ရေထွက်ပစ္စည်းသယ်ယူသည့်အထောက်အထား
(Product Movement Documentation)

၁(က)။	ရေချိုငါးလုပ်ငန်း	ရေနောက်ငါးလုပ်ငန်း	ငါးမွေးမြူရေးလုပ်ငန်း	၁(ခ)။	ကုန်ကြမ်း	ပြုပြင်ပြီး	အရင်

၂။ စာအမှတ်		၃။ ထုတ်ပေးသည့်ရက်စွဲ	
၄။ သယ်ယူသူအမည် မှတ်ပုံတင်အမှတ်		၅။ လက်မှတ်	
၆။ နေရပ်လိပ်စာ			

၇။ သယ်ယူမည့်ယာဉ်အမျိုးအစား		၈။ ယာဉ်နံပါတ်	
၉။ သယ်ယူမည့်နေရာ/ဒေသ	မှ	သို့	
၁၀။ သယ်ယူသည့်နေ့ရက်	မှ	ထိ	

၁၁(က)။ သယ်ယူမည့် ငါး/ပုစွန်အမျိုးအစား	၁၁(ခ)။ သိပ်ံအမည်	၁၂။ အလေးချိန် (ပိဿာ/ကီလို/တန်)

၁၃။ ငါး/ပုစွန်ထွက်ရှိ/ဖမ်းဆီးရာအရပ် (အဝယ်ခိုင်/ဘုံ/အင်း/ပင်လယ်/ငါးမွေးကန်)		၁၅။ ဖမ်းဆီး/ဝယ်ယူခဲ့သည့်နေ့စွဲ
၁၄။ ငါးဖမ်းရေယာဉ်အမည် (ရေနောက်ငါးဖမ်းလုပ်ငန်းအတွက်) (လိုအပ်ပါက**PMD(02)** တွင်ဖြည့်စွက်ရန်)		

၁၆။ ရောင်းချသူအမည် အလုပ်အကိုင် နေရပ်လိပ်စာ		လက်မှတ်
၁၇။ ဝယ်ယူသူ/ကုန်ပိုင်ရှင်/ ကုမ္ပဏီအမည် နေရပ်လိပ်စာ (ပြေစာပူးတွဲတင်ပြရန်)		လက်မှတ်

၁၈။ ဝန်ခံချက် - ဖော်ပြထားသည့်အချက်များ မှန်ကန်မှု ရှိကြောင်းနှင့် မျှော်စာတွင်ပါရှိသည့် ကုန်အမျိုးအစာနှင့် ကုန်ချိန်မှန်ကန်မှုမရှိပါက ဥပဒေအရ အရေးယူခြင်း ခံယူရမည်ဖြစ်ကြောင်း ဝန်ခံကတိပြုပါသည်။	မျှော်စာထုတ်ယူသူအမည်နှင့် လက်မှတ်

ဌာနမှဖြည့်စွက်ရန် ၁၉။ စစ်ဆေးသူအမည်/ လက်မှတ် ရာထူး/ဌာနနှင့် ရုံးတံဆိပ်		၂၀။ အတည်ပြုသူအမည် လက်မှတ် ရာထူး/ဌာနနှင့် ရုံးတံဆိပ်	

231176

1/2013

Product Movement Document Format (2) of DOF

PMD(02EU)

ငါးလုပ်ငန်းဦးစီးဌာန
ရေထွက်ပစ္စည်းသယ်ယူသည့် အထောက်အထား
(Product Movement Document)

[redacted]

letter number စာအမှတ်								
Date ထုတ်ပေးသည့်နေ့စွဲ					Jetty ငါးဆိပ်ကမ်းအမည်			
No.	Fishing vessel name	Registration number	License number	Name of master	fish/shrimp	Weight (kg)	Catch area	Catch date
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
	Total							

Checked by :

Name
Designation / Department

Approved by :

Name
Designation / Department

000061

Source:FIQCD,Department of Fishery,Myanmar

Annex 12

Definition of SMEs in Myanmar

Size of SMEs	Number of Workers	Capital Investment	Annual Sale
Cottage industry	Less than 9	-	-
Small industry	10-50 persons	Up to 1 million Kyats	Up to 2.5 million Kyats
Medium industry	50-100 persons	Between 1 to 5 million kyats	Between 2.5 to 10 million Kyats

Source: Kyaw,(2008)

Annex 13

Quarantine Stations in Myanmar

Table: the number of inspectors and Quarantine Stations in Myanmar

No. of Stations	Quarantine Stations in Prefecture	Year started	No of Inspectors (agri-plant)
1	Yangon (Yangon International Airport)	1995	**28**
2	Shan (Muse)	1996	**6**
3	Shan (Tarchileik)	1996	**8**
4	Rakhine (Maungtaw)	1996	**2**
5	Sagaing (Tamu)	1996	**4**
6	Tanintharyi (Kawthaung)	1996	**3**
7	Kachin (Lwegye)	1999	**2**
8	Kayin (Myawady)	1999	**5**
9	Mandalay (Mandalay International Airport)	2000	**6**
10	Chin (Reed)	2006	**4**
11	Kachin (Kanpeitee)	2011	**3**
Total			**79**

Source:Myanmar Agricultural and Irrigation,(2015)

Annex 14

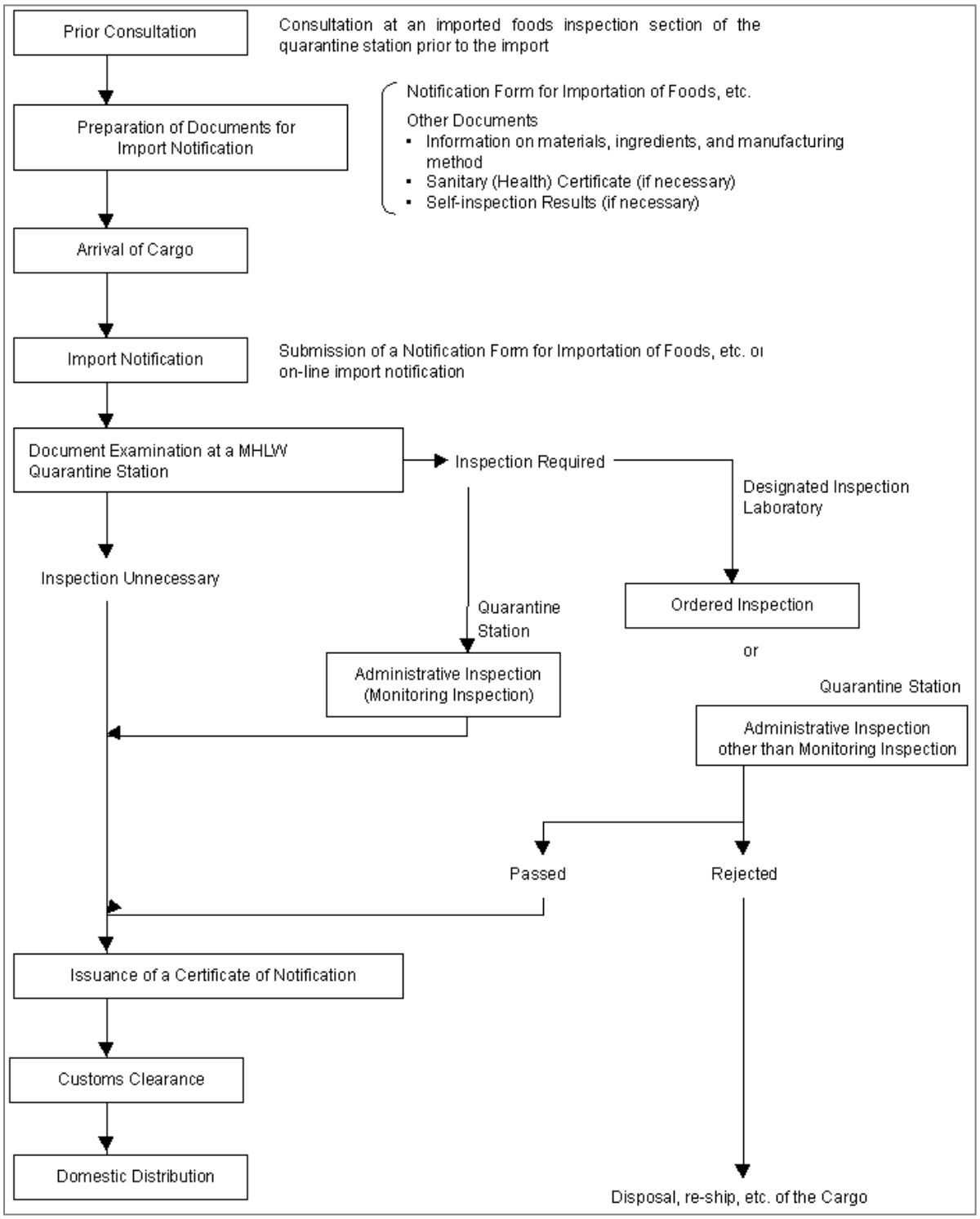
Data of Imported food in Japan from 1983 to 2013

	Year	Weight of Import (thousand)	number of declaration	total number of inspection	Number of Violations	total % inspection (combination of 3 breakdown inspection data)	violation rate in inspection (E*100/D)	violation rate in declaration (E*100/C)	possible max violation rate based on import vol (N*G)	possible max violation rate based on declaration (C*H)
1	1983	21924	334829	32835	469	10.8	1.42835389	0.1400715	31315231	46900
2	1984	22465	364227	36062	444	10.9	1.23121291	0.121902	27659198	44400
3	1985	22655	384728	39817	308	11.2	0.77353894	0.0800566	17524525	30800
4	1986	22284	477016	57553	558	13	0.96954112	0.1169772	21605254	55800
5	1987	22055	550568	72115	572	14.3	0.79317756	0.1038927	17493531	57200
6	1988	21924	655806	99659	1000	16.2	1.00342167	0.1524841	21999017	100000
7	1989	21866	682182	123294	956	19.5	0.77538242	0.1401386	16954512	95600
8	1990	21731	678965	119345	993	19.4	0.83204156	0.146252	18081095	99300
9	1991	32704	720950	120701	968	18.8	0.80198176	0.1342673	26228011	96800
10	1992	25035	779460	124572	1051	17.9	0.84368879	0.1348369	21121749	105100
11	1993	25462	848319	124578	798	16	0.64056254	0.0940684	16310003	79800
12	1994	30594	963359	132659	1126	14.9	0.84879277	0.1168827	25967966	112600
13	1995	28268	1052030	141128	948	14.8	0.67173063	0.0901115	18988481	94800
14	1996	26068	1117044	119630	781	11.6	0.65284628	0.0699167	17018397	78100
15	1997	28906	1182816	98774	775	8.7	0.78461943	0.0655216	22680209	77500
16	1998	29150	1276994	104918	881	8.7	0.83970339	0.0689901	24477354	88100
17	1999	28928	1404110	108515	948	8.2	0.87361194	0.0675161	25271846	94800
18	2000	30034	1550925	112281	1037	7.7	0.92357567	0.0668633	27738672	103700
19	2001	32508	1607011	109733	992	7.2	0.90401247	0.0617295	29387637	99200
20	2002	33202	1618880	136087	972	9.1	0.71424897	0.0600415	23714494	97200
21	2003	34162	1683176	170872	1430	11	0.83688375	0.0849584	28589623	143000
22	2004	34270	1791224	188904	1143	11	0.60506924	0.0638111	20735723	114300
23	2005	33782	1864412	189362	935	10.6	0.49376327	0.0501499	16680311	93500
24	2006	34096	1859281	198936	1530	11.2	0.76909157	0.0822899	26222946	153000
25	2007	32261	1797086	198542	1150	11.6	0.57922253	0.0639925	18686298	115000
26	2008	31551	1759123	193917	1150	11.7	0.59303723	0.0653735	18710918	115000
27	2009	30605	1821269	231638	1559	13.5	0.67303292	0.0855997	20598173	155900
28	2010	31802	2001020	247047	1376	13	0.55697904	0.0687649	17713047	137600
29	2011	33407	2096127	231776	1257	11.7	0.54233398	0.0599677	18660085	125700
30	2012	32156	2181495	223380	1053	10.8	0.47139404	0.0482696	15158147	105300
31	2013	30982	2185480	201198	1043	9.8	0.51839482	0.0477241	16060908	104300

Source: MHLW and own calculation

Annex 15

Procedures of Import Notification of Foods and Related Products



Source: MHLW

Annex 16

Notification Form to be submitted to MHLW [Food Authority] of Japan

Name and address of importer (Or name of importing corporation and its address)

Notification Receipt Number	*1	Name	
Classification of Notification	Prior Notification / Planned Import	Address	
Code of Importer		(Telephone Number)	
Name and Code of Country of Production		Registration Number of Importer Responsible for Food Sanitation	
Name, Address and Code of Manufacturer			
Name, Address and Code of Manufacturing Factory			
Name and Code of Port of Loading		Date of Loading	_____(Month) _____(Day) _____(Year)
Name and Code of Port of Discharge		Date of Arrival	_____(Month) _____(Day) _____(Year)
Name and Code of Warehouse		Date of Storage	_____(Month) _____(Day) _____(Year)
		Date of Notification	_____(Month) _____(Day) _____(Year)
Marks and Numbers of Cargo		Accident Brief Explanation (If Yes)	Yes / No
Ship Name or Flight Number of Aircraft		Name and Code of Submitter	
1 Classification of Cargo	Food / Food Additive / Apparatus / Container-Package/ Toy; Continuous Import; Y・N	Sanitary Certificate Number	
Item Code		If the cargo includes processed food, describe its ingredients and their codes. If the cargo includes apparatuses, container/packages or toys, describe the raw materials and their codes.	
Description of Article			
Shipped Volume (Number of Units)			
Shipped Volume (Weight)	kg		
Usage and its Code		If the cargo includes food with additives, describe the names and codes of additives. If the cargo includes manufacturing agents in the additives, describe the names and codes of additives. (Additives used as flavoring agents are excluded for either case.)	*2
Kind of Package and its Code			*2
Registration Number 1			
Registration Number 2			
Registration Number 3			
If the cargo includes processed food, describe the method of manufacturing or processing, and its code.			
Remarks		Stamp for Receiving Notification	

Notes:
*1: Do not write here.
*2: When the article in the cargo includes food additives that are generally supplied in food or drink and regulated by the relevant statutes, describe the names of the substances used. When the article includes manufacturing agents in the additives, excluding flavoring agents or food additives that are generally supplied in food or drink, write the names of the agents.

The seal of importer can be substituted by a signature of importer.

1	Classification of Cargo	Food / Food Additive / Apparatus / Container-Package/ Toy	Continuous Import	Y・N	Sanitary Certificate Number	
Item Code					If the cargo includes processed food, describe its ingredients and their codes. If the cargo includes apparatuses, container/packages or toys, describe the raw materials andtheir codes.	
Description of Article						
Shipped Volume (Number of Units)						
Shipped Volume (Weight)		kg				
Usage and its Code					If the cargo includes food with additives, describe the names and codes of additives. If the cargo includes manufacturing agents in the additives, describe the names and codes of additives. (Additives used as flavoring agents are excluded for either case.)	*2
Kind of Package and its Code						*2
Registration Number 1						
Registration Number 2						
Registration Number 3						
If the cargo includes processed food, describe the method of manufacturing or processing, and its code.						
Remarks					Stamp for Receiving Notification	

1	Classification of Cargo	Food / Food Additive / Apparatus / Container-Package/ Toy	Continuous Import	Y・N	Sanitary Certificate Number	
Item Code					If the cargo includes processed food, describe its ingredients and their codes. If the cargo includes apparatuses, container/packages or toys, describe the raw materials andtheir codes.	
Description of Article						
Shipped Volume (Number of Units)						
Shipped Volume (Weight)		kg				
Usage and its Code					If the cargo includes food with additives, describe the names and codes of additives. If the cargo includes manufacturing agents in the additives, describe the names and codes of additives. (Additives used as flavoring agents are excluded for either case.)	*2
Kind of Package and its Code						*2
Registration Number 1						
Registration Number 2						
Registration Number 3						
If the cargo includes processed food, describe the method of manufacturing or processing, and its code.						
Remarks					Stamp for Receiving Notification	

Source: MHLW

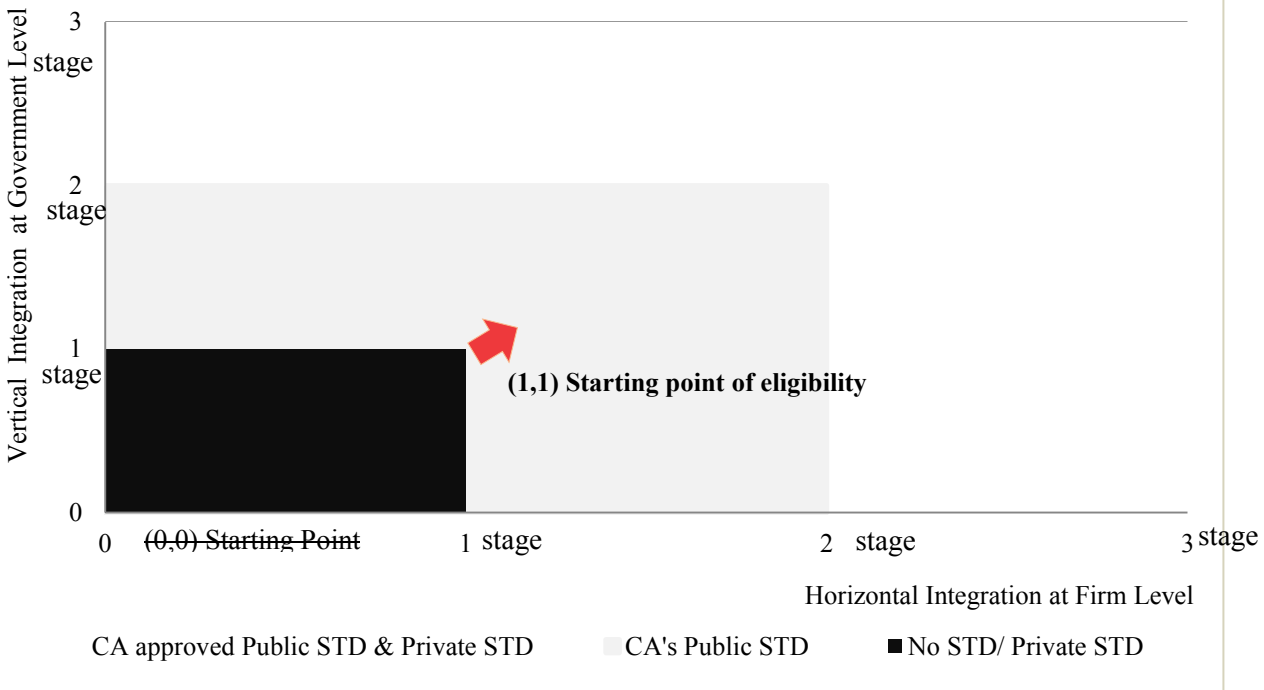
Annex 17

Dual Integration for food export

For food production countries,export opportunity is a driving force that let the process of firms transform from a traditional one to become an integrated firm[1].Investment in dual integrations is obligatory to export success destined to EU markets that involves vertical integration at government level and horizontal integration at firm level(Wai et.al.,2015).Since the initiation of EU's structural food safety reform in 2009,that dual integration[2] requirement has been spreading to other markets with varying levels.

The figure exemplifies how dual integrations in government and firm level required simultaneously for taking part in global food trade.In other word,an X-Y plane is to explain dual integration by being put those two integrations together in the XY plane so as to allocate the position of firms intended for destined markets,with respect to their integration level (x value) relating to the level of destined markets' requirements (y value).

Figure.Dual integrations required for export-oriented food sector for Market access



The aim of this plane is to generalize the requirement for export success (z) to function of two variables-horizontal integration (x) and vertical integration (y).

[1] Traditional firms employ low level of technology whereas integrated firms use advanced technology and thus the former is regarded as informal and the latter as formal. Only formal firms could fulfil the greater assurance over food safety and quality demanded by lucrative markets (Henson and Cranfield, 2009).

[2] Three steps in both integrations are previously described in chapter 7 in detail.

So the function becomes z = f (x,y).Where x and y are independent variables and z is dependent variable. It means that export success (z) relies on frim level integration (x) and CA' integration (y), from food control aspect.

It must be noted that, there are three levels[3] of integration in both X axis (that represents firm's integration) and Y axis (that represents the authority's integration) because these integrations are based on the global trend of firms' transformation and the food safety requirements of lucrative markets.

There are two basic assumptions behind this graph that Y regresses with X only to some extent because export success (the government goal) depends on the ability of firms' integrations. The real value of Y does not directly depend on X and as they are independent variables. Next assumption is the values of X are not cumulative but the rank,and it is needed to regard that the level of public standard is higher than private standard,according to the standardized requirements in EU markets.

(1) **Value of x in X axis** The X-axis represents the integration of firm in food safety management system horizontally.There are three scenarios in positioning the level of integration for individual firm as follows:
   (1) If the value of x is less than 1,it means firm possess private standard only or no standard.
   (2) If the value of x is between 1 and 2,it means firm possesses the public standard approved by CA only.
   (3) If the value of x is more than 2,it means firm possesses both public standard approved by CA and private standard.

(2) **Value of y in Y axis** The Y-axis represents the integration of authority in food control system as well as integration vertically by recognition between authorities. There are three scenarios for positioning the level of integration governed by authority as follows:
   (1) If the value of y is less than 1,it means ad-hoc quality assurance (testing) is made just before export.
   (2) If the value of y is between 1 and 2 ,it means the competent authority starts its function through bilateral or mutual recognition and food control along the food chain is assured with food chain approach, continuous monitoring.
   (3) If the value of y is more than 2,then it means that CA uses food control system's components effectively such as the use rapid alert system for transparency and traceability,with food chain approach, continuous monitoring, etc.

As stated, (1,1) is the starting point of eligibility for a food industry of an export country aiming at EU market because when the value of x is greater than 1, firm already possess public standard and when y value is greater than 1,CA already has MRA with import country. That graph can be used for comparison of eligibility among different markets.

[3] For proper positioning of firms on the X-Y graph, the three scales are assumed as interval scale such as less than 1, between 1 and 2 and more than 2 for both X axis and Y axis.

Annex 18

Food Control System, National Standards and CODEX Standards Adoption of ASEAN Countries [including Myanmar]

	ASEAN Countries	Food Control System		National Standards		CODEX	
		Main Food Legislation	Responsible Agency	Standards/Guidelines code of practices	Coverage	National Codex Committee NCC	Country Manual
1.	**Brunei Darussalam**	2	Ministry of Religious Affairs	1 (that covers food-chain)	Hala food	Under establishment	No
2	**Cambodia**	No specific law	Multi-agency system 6 ministries	18 voluntary Food Commodities standards, 5 General standards,24 Codex		Established in 2000, 4 working groups	No
3.	**Indonesia**	3	Multi-agency system	788 National Standards SNIs	All foods	Established 2012 www.codexindonesia.org	Yes
4.	**Lao PDR**	2	Multi-agency system	16 national standards, 60 codex standards		Established in 1998, 6 working groups	No
5.	**Malaysia**	2	Ministry of Health	Mandatory standards	All aspects of food safety	Established in 1985 http://fsq.moh.gov.my	Yes
6.	**Myanmar**	2	Multi-agency system Ministry of Health	Mandatory standards exist 6 guidelines Adopted codex in 2005		No	No
7.	**Philippines**	2	Multi-agency system	96 standards 14 code of practices	All foods	Established in 2005 http://www.fdc.net.ph/index.php? id1=23	Yes
8.	**Singapore**	1	Agri-food and Veterinary Authority AVA with **an integrated system**	>200 standards updated Adopted codex as National standards	All foods	http://www.ava.gov.sg/NewsEvents/HotTopics/	No
9.	**Thailand**	2	MOA and MOH	ACFS: responsible agency 72 commodities standards 77 production standards 32 general requirements		Horizontal & Vertical Technical CODEX Committee www.acfs.go.th	Yes (but only for internal use)
10.	**Vietnam**	1	Multi-agency system MOH, VHA	752 standards,46 regulations Out of 6379 STDs,3107 were adopted from others		VNCC in 1994 www.codexvn.org	No

Source : Sareen and Meno (2012)

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