"IMPACT OF THE SANITARY AND PHYTO SANITARY AGREEMENT ON THE EXPORTS OF MARINE PRODUCTS FROM INDIA WITH SPECIAL REFERENCE TO KERALA"

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PARVATHY P

Reg. No. 3247

Under the guidance of

Prof. (Dr.) D RAJASENAN

DEPARTMENT OF APPLIED ECONOMICS

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

KOCHI – 682 022, KERALA

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Impact of the Sanitary and Phyto Sanitary Agreement on the Exports of Marine Products from India with Special Reference to Kerala

Ph.D. Thesis under the Faculty of Social Sciences

Parvathy P
Research Scholar
Department of Applied Economics
Cochin University of Science and Technology
Kochi - 682022
Email: parvathy.stc@gmail.com

Supervising Guide

Prof. (Dr.) D. Rajasenan
Professor
Department of Applied Economics
Cochin University of Science and Technology
Kochi - 682022
Email: rajasenan@cusat.ac.in

Department of Applied Economics
Cochin University of Science and Technology
Kochi - 682022

November, 2012

DEPARTMENT OF APPLIED ECONOMICS
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
KOCHI – 682 022, KERALA, S. INDIA

Phone: 0484 – 2576030, 2862561
Email: appliedeconomics@cusat.ac.in

Dr. D. Rajasenan
Professor

Date: ……………..

Certificate

This is to certify that the thesis entitled *"Impact of the Sanitary and Phyto Sanitary Agreement on the Exports of Marine Products from India with special reference to Kerala"* is a record of bona fide research work carried out by Ms. Parvathy P under my supervision and guidance. This is an original piece of research and has not formed the basis for award of any degree, diploma, associateship, fellowship or other similar title of any other University or Board and is worth submitting for the award of Doctor of Philosophy under the Faculty of Social Sciences of Cochin University of Science and Technology.

D Rajasenan
Supervising Guide

Declaration

I hereby declare that the dissertation entitled **"Impact of the Sanitary and Phyto Sanitary Agreement on the Exports of Marine Products from India with Special Reference to Kerala"** is a record of the bona fide research work done by me and that it has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other title of recognition.

Kochi - 22 *Parvathy P.*

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Abbreviations

AB	Appellate Body
AD	Anti-Dumping
AP	Assessment Panel
AR	Auto Regressive
ACF	Auto Correlation Function
APR	Average Annual Percentage Growth Rate
BF	Block Frozen
BTA	Bio Terrorism Act
CAGR	Compound Annual Growth Rate
CFU	Colony Forming Unit
CIFT	Central Institute of Fisheries Technology
COOL	Country of Origin Labeling
CWI	Consignment Wise Inspection
DDT	Dichloro Diphenyl Trichloroethane
DDE	Dichloro Diphenyl Dichloroethylene
DSB	Dispute Settlement Body
EC	European Commission
EEC	European Economic Commission
EEZ	Exclusive Economic Zone
EIA	Export Inspection Agency
EIC	Export Inspection Council
EU	European Union
FAO	Food and Agriculture Organization
FSMSC	Food Safety Management Based Certification System
GATT	General Agreement on Tariffs and Trade
GHP	Good Hygienic Practices
GM	Genetically Modified
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
IDP	Inter Departmental Panel
IF	Individual Frozen

IPQC	In- Process Quality Control
IQF	Individual Quick Frozen
ISO	International Organisation for Standardisation
LDCs	Less Developed Countries
MA	Moving Average
MAPE	Mean Absolute Percentage Error
MEA	Middle East Asia
MPEDA	Marine Products Exports Development Authority
MPN	Most Probable Number
MRLs	Maximum Residue Limits
NAMA	Non Agricultural Market Access
NETFISH	Network for Fish Quality Management and Sustainable Fishing
NMFS	National Marine Fisheries Services
NTMs	Non Tariff Measures
NTBs	Non Tariff Barriers
OBM	Outboard Motors
OECD	Organization for Economic Cooperation and Development
PACF	Partial Auto Correlation Function
PCGDP	Per Capita Gross Domestic Product
PCBs	Poly Chlorinated Biphenyls
Pg	Picogram
PPC	Pre Processing Centres
PPM	Part Per Million
RASFF	Rapid Alert System for Food and Feed
RTAs	Regional Trading Agreements
SE	Standard Error
SEA	South East Asia
SEAI	Seafood Exporters Association of India
SPS	Sanitary and Phyto Sanitary Measures
SSOP	Sanitation Standard Operating Procedures
TBT	Technical Barriers to Trade
TRI	Trade Restrictiveness Index
TUSMP	Technology Up gradation Schemes for Marine Products
UN	United Nations

UNCLOS	United Nations Conference on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
US	United States
US DOC	United States Department of Commerce
USFDA	United States Food and Drug Administration
UV	Unit Value
VERs	Voluntary Export Restraints
VIF	Variance Inflating Factor
WTO	World Trade Organization

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Chapter

1

MARINE PRODUCT EXPORT TRADE OF KERALA – AN EXPLORATION OF ISSUES IN THE BACKGROUND OF THE SANITARY AND PHYTO SANITARY AGREEMENT OF THE WTO

1.1 Introduction

International trade in marine products has increased tremendously because of their high health attributes. With the high unit value, sea food has been acclaimed as one of the fastest moving commodities in the world market. As per Food and Agriculture Organization (FAO, 2012), the volume and value of fish and fishery products exported are 57 million tonnes and US $ 109.3 billion respectively. International trade in fish and fishery products represented 10 percent of total agricultural exports and one percent of world merchandise exports in terms of value (FAO, 2012). The developing nations have emerged as the major net exporters of fish and fishery products since 1970s. Net exports of fish and fishery products from developing countries in terms of value increased from US $ 2.9 billion in 1978 to US $ 27.7 billion in 2010. About 75 percent of the fish and fishery product exports in terms of value from developing nations are directed to the developed countries (FAO, 2010). The major markets for the fish and fishery product exports of the developing nations are the European Union (EU), the United States (US) and Japan. Hence developments in these markets have implications for fish and fishery product exports from developing nations.

Fish and fishery product exports comprise a significant part of the exports of India accounting for 10 percent of agricultural exports in 2010-11 earning a foreign exchange of US $ 2856.93 million (Government of India, 2012; MPEDA, 2012). Kerala possessing 10 percent of the coastline of India accounts for 16 percent of marine product exports of India in terms of value in 2010-11 (MPEDA, 2012). Historically, the major markets of exports of marine products of Kerala have been the EU, the US and Japan. At the start of the WTO period, about 87 percent of value of marine product exports from the state was directed to these markets reflecting a very high degree of market concentration.

1.2 Statement of the Problem

A significant development that influences the international trade in fish and fishery products is the establishment of the World Trade Organization (WTO) in 1995. The WTO has several agreements that are relevant for trade in fish and fishery products especially with reference to developing countries. These agreements are Technical Barriers to Trade Agreement (TBT Agreement), Sanitary and Phyto Sanitary Agreement (SPS Agreement), Agreement on Anti-dumping, Agreement on Subsidies and Countervailing Measures and Agreement on Rules of Origin. Trade in fisheries does not come under Agreement on Agriculture and is hence discussed under Non Agricultural Market Access (NAMA). The aforementioned agreements have been created with the intent to facilitate trade in commodities including fish and fishery products. With the establishment of the WTO, there has been a lowering of tariff barriers on imports in line with the spirit of free trade principle. But the post WTO period witnessed a rise in non tariff measures (NTMs) imposed by the developed countries on the imported food products, especially fish and fishery products. The measures applied by the developed countries on the imports of fish and fishery products from developing countries are in the form of quality and safety standards, labeling, and packaging and other technical requirements, countervailing and anti-dumping duties etc.

Fish and fishery products being food products belong to the categories of credence goods (Bureau et al., 1998; Deodhar, 2005). This necessitates measures such as quality and safety standards and labeling and marking requirements to signal information to the consumers regarding the quality of the food product they consume. This, to an extent serves to eliminate asymmetric information and reduces transaction cost. The SPS Agreement in line with the spirit of the WTO Agreement advocates free trade without compromising on the safety and quality of the food product traded. The provisions of the SPS Agreement recognize the rights of every member nation of the WTO to apply sanitary and phyto sanitary measures to protect the life and health of plants, animals and human beings based on scientific evidence. The Agreement however emphasizes that these measures should not be used to arbitrarily or unjustifiably discriminate between the member nations when identical conditions prevail. It also calls for harmonization, equivalence, assessment of risk, transparency and the need for special and differential treatment for the developing nations. In the wake of the SPS Agreement, there has been a strengthening of food safety standards and quality regulations in the developed countries especially, the EU, the US and Japan probably due to greater levels of concerns and awareness about such quality related issues in these countries. This is reflected in a series of developments that have happened on this front in the EU, the US and Japan in the Post WTO Phase. To cite a few among them are the emphasis on net to fork principle, rising numbers of Rapid Alert System on Food and Feed (RASFF) notifications pertaining to fish and fishery products, stringency of Maximum Residue Limits (MRLs) set on various deleterious substances applicable to fish and fishery products (the EU); the need for mandatory registration of fish processing units with the United States Food and Drug Administration (USFDA) as per the provisions of the Bio Terrorism Act, 2002 and the imposition of the Country of Origin Labeling for fish products (the US); and stringency of MRLs on heavy metals and antibiotic residues especially for farmed fish (Japan). These developments have relevance for the marine product exports of Kerala that have been primarily targeting these markets. In the context of the excessive dependence of the marine product exports of Kerala on these markets in 1995-96, focus is on the implications of strengthening of food safety standards and quality regulations in its principal markets for the marine product exports of the state in the post WTO phase.

The present study examines the type of NTMs, especially the quality regulations and safety standards encountered by the marine product exports of Kerala in its major import markets of the EU, the US and Japan. An analysis of whether the safety and quality standards prescribed by these developed countries on the imported fish and fishery products are purely based on risk assessment and scientific evidence or are they erected as disguised barriers to trade is attempted.

1.3 Importance of the study

Fish and fishery products are regarded as healthy foods and there has been a significant increase in their global trade. Besides that, trade liberalization policies, globalization of food systems and technological innovations have furthered the increase in international trade in fish and fishery products. According to FAO 2006, the total world trade of fish and fishery products reached a record value of US $71.5 billion representing a 23 percent growth relative to 2000 and a 51 percent increase since 1994. In 2010, the exports of fish and fishery products further rose and stood at a high of US $ 109.3 billion in value terms (FAO, 2012). The rise in global trade in fish and fishery products was accompanied by a significant change in the direction of flow of fish and fishery product exports. Since the mid 1970s, it is found that the developing countries have transformed from being the net importers to net exporters of fish and fishery products. Fish and fishery products have assumed growing importance in the export basket of developing countries. In 2008, developing countries accounted for 80 percent of world fishery production. The developing countries rely heavily on the developed countries as the markets for their fish and fishery product exports. In 2008, about 75 percent of fish and fishery product exports in terms of value were directed to the developed countries (FAO, 2010). Among the developed countries, the major import markets for the fish and fishery product exports of the developing countries are the EU, the US and Japan.

Fish and fishery product exports have a significant place in the export basket of India. Export earnings of India from fishery products increased from ` 4 crores in 1960-61to ` 12901.47 crores in 2010-11(MPEDA, 2012). The share of export earnings from fish and fishery products as a percentage of total agricultural exports of India increased from a low of 1.76 percent in 1960-61 to a high of 25.06 percent in 1994-95. But its share declined to 16.60 percent in the following year. Though its share in agricultural exports of the country has declined since then, in 2010-11, marine product exports accounted for 9.61

percent of total agricultural exports of India representing a significant share (Government of India, 2012).

Kerala is one of the coastal states in India accounting for a sizeable share in the fish and fishery product exports of India both in terms of quantity and value. Kerala has a coastal belt extending over 590 kms and an extensive inland water spread of around 4 lakh hectares. The Exclusive Economic Zone lying adjacent to Kerala coast is spread over 36000 sq.km. The inland water bodies consist of 44 rivers (with an area of 85000 ha), 53 reservoirs (44289 ha) and 53 backwater and extensive brackish water area (65213 ha) (Economic Review, 2011).

The fish production in the state consists of both marine capture fish production and inland fish production. Marine capture fisheries have always dominated the total fish production in the state. Marine fish production accounted for about 82 percent of the total fish production of the state during 2010-11. The exports of marine products from Kerala increased from ₹ 183.93 crores in 1987-88 to ` 2002.10 crores in 2010-11. The exports of marine products from the state in terms of quantity increased from about 35576 tonnes in 1987-88 to 124614 tonnes in 2010-11. Of the total marine product exports of India, the state accounts for about 15 percent in terms of quantity and 16 percent in terms of value (MPEDA, 2012). Historically, the major export markets of Kerala have been the EU, the US and Japan. But the post WTO period witnessed certain developments that could have some bearing on the fish and fishery product exports from the state. During this period, there has been a reduction in tariffs on the imports of traded products including fish and fishery products. But this period also witnessed strengthening of food safety standards and quality regulations in the import markets of developed countries especially the major fish and fish product importing markets. Since fish and fishery products fall in the category of credence goods, the imposition of such regulations are required to ensure the safety of the food products that the people consume. This necessitates an examination of whether these quality controls and food safety standards applied by the developed countries in line with the SPS Agreement under the WTO are meant to protect the life and health of the citizens or simply to restrict imports into their markets. In other words, whether such NTMs are based purely on risk assessment or arbitrarily used as disguised barriers to trade. In the light of these developments in the international trade scenario with the establishment of the WTO, it is necessary to examine the impact of these measures on the exports of marine products from Kerala.

1.4 Review of Literature

Trade in food products is always characterized by asymmetric information. There is a need to signal to the buyers, the quality attribute of the food products they consume. With the growing prominence of trade in food products, especially fish and fishery products, more focus has to be placed on ensuring the safety and quality of traded products. An attempt is made to trace out the evolution of quality regulations and safety standards on food products in general and fish and fishery products in particular. This further necessitates an examination of the impact of these measures on trade in fish and fishery products. With this view, a review of the existing theoretical literature that elaborates methods to measure the impact of the NTMs on trade in food products is made. Then it surveys literatures attempting to explain the specific issues faced by the developing nations in the food product trade in the recent times in the wake of application of NTMs, especially safety standards and quality regulations. It also examines the response of the seafood export companies to the new developments in the international fish trade scenario.

The review of existing literature can be broadly classified into four: studies pertaining to the evolution of quality controls and safety standards on trade in food products in general and fish and fishery products in particular, studies pertaining to the measurement of the impact of these measures on trade, studies relating to the impact of the quality and safety standards on the food product trade of the developing nations and studies dealing with the response of the seafood export industry to the new developments.

1.4.1 Evolution of Quality and Safety Standards on Trade in Food Products

International trade in food products is affected by the quality and safety standards placed by countries on the imported food items. A number of studies focus on the evolution of the quality and safety standards in the field of international trade in food products.

John (2002) traces the development of national and international systems to assure the quality and safety of food supplies at domestic and international trade levels. National food legislation in food production, processing and marketing systems have evolved in most countries to ensure better quality and safer foods. For e.g., the US Food and Drugs Act of 1906 was enacted to curb undesirable hygienic practices. At the international level, a number of efforts were taken to ensure free and fair trade in safe foods. The thrust of the United Nations Conference on Food and Agriculture 1943 was to promote better food production for adequate supplies of good quality and safe foods. In 1940s, 1950s and 1960s, FAO in conjunction with the World Health Organization (WHO), the General Agreement on Tariffs and Trade (GATT) and Codex attempted to strengthen systems to promote better food supplies and improve their quality and safety. The joint work of FAO and WHO led to the creation of review mechanisms for food additives and pesticides residues. Since 1995 WTO and other major Agreements such as the SPS and the TBT play a key role in facilitating free trade in safe and quality foods.

The trends in the evolution of international regulations on health, safety and environment are examined by Micklitz (2000). In the course of evolution of international regulations on health, safety and environment, there has occurred a shift of paradigm. It was the United Nations (UN) that performed a dominant role in the 1980s to ensure international regulations on health, safety and environment. The UN developed guidelines define basic minimum standards of health and safety. Both pre-market and post-market measures were used to protect consumers from threats to their health and safety. But the UN failed to develop a comprehensive food policy and modernize its guidelines on consumer protection. Currently, international safety regulation is closely linked to free trade perspectives. GATT/WTO plays a dominant role in framing of the standards. The provisions of the SPS and TBT agreements under the WTO try to ensure that regulatory standards do not disrupt international trade. There has occurred a shift of emphasis from regulations to protect health and safety of the consumers to regulations that ensure health and safety without disrupting free trade.

Deodhar (2005) examines the reasons for the need of a regulatory mechanism to ensure the quality of food products that are traded. Credence nature of food products is emphasised. This creates market imperfections thereby justifying the need for some regulatory mechanism to ensure the quality of the food product that is traded. The SPS and TBT agreements symbolise the efforts on the part of the international community to deal with quality issues in international trade in food products. Based on India's experiences in food trade with developed countries, it concludes that the SPS and the TBT restrictions applied by the developed countries on the food imports from the Less Developed Countries (LDCs) create a non tariff barrier to trade.

A few studies examine the major provisions of the SPS and the TBT Agreements that aim to promote food safety and quality, at the same time facilitating international trade in food products. It is through the illustration of several legal battles among the nations on the SPS and the TBT issues that these studies explore the evolution of quality and safety standards in the present trade scenario. The perceptions of different nations on the application of the SPS and the TBT measures are brought out through the respective stances taken by each nation at the dispute settlement body of the WTO. A perusal of these litigations on the SPS and the TBT issues makes it clear that in most cases, the developed nations such as the US, Japan and the EU countries are the initiators of the SPS measures. This gives strong evidence that the developed nations through the application of tighter regulatory requirements and stringent food safety and quality stipulations do interfere in the international trade in food products.

The SPS and the TBT Agreements are the two multilateral trading agreements under the WTO to ensure food safety and consumer protection. The SPS measures aim to ensure food safety and protect human, animal and plant life and health. The TBT Agreement aims to achieve national security and prevent deceptive practices. A comparative study of the two Agreements reveals that both share certain common elements such as obligations for non discrimination, setting up of notification authority and establishing enquiry points to ensure transparency. The major differences between the two agreements are; the SPS Agreement is based on scientific assessment to protect human, animal and plant life and health, while the TBT Agreement is based on geographical and technological factors to achieve national security and prevent deceptive practices. SPS can be applied on a provisional basis but this provision does not exist in TBT Agreement (Garg, 2004).   .

There are provisions under the SPS Agreement that recognize the rights of countries to protect themselves from SPS risks. It contains number of instruments such as risk assessment, principles of harmonization, equivalence, regionalization, transparency, notification, SPS committee and special trade concerns to achieve its objectives without causing trade barriers (Burnquist et al., 2004).

One of the important provisions of the SPS Agreement relates to the use of the Precautionary Principle. In the light of the European Commission (EC) ban on hormone treated beef from the US, John (2002) questions this principle because it is used irrationally to negate the competent scientific data. Sandin (2006) gives an overview of the arguments for and against the precautionary principle of the SPS Agreement advanced in the area of food safety. In regulatory as well as general context, there are several versions of this principle that approve the use of precautionary measures against a potential threat, even though the existence of threat is not scientifically certain. Objections to precautionary principle emphasize that it is ill defined, unscientific and incoherent. Its application would lead to increased risk taking. The article however emphasizes that food safety is the area that requires the application of precautionary principle.

Charlier and Rainelli (2002) analyze the approach of the WTO to the notion of assessment of risk on the basis of the WTO dispute between the EC and the US on the EC ban on hormone treated beef from the US. The stances of the Dispute Settlement Panel (DSP) and the Appellate Body (AB) bring out the differences in their interpretation of the SPS agreement. The DSP interprets article 3.1 of the SPS agreement in such a manner that the recommendations and standards of international agencies are to be treated as binding norms for the member nations when they frame regulatory standards. The AB interprets the SPS Agreement in such a manner that harmonization of sanitary measures must not undermine the autonomy of members to establish their own sanitary measures. The AB emphasizes the significance of scientific assessment of risk while enforcing regulatory standards by a member country. Based on the judgment of the dispute over the hormone treated beef, it is concluded that a SPS measure can be treated as a protectionist practice if a member country maintains it without conducting a risk assessment.

Bureau et al., (1999) review several international trade disputes that involve food safety and quality issues. In this context, an analysis of some conceptual issues is made. The SPS agreement requires the members to base their SPS measures on the assessment of risk. But there are different conceptions of risk ranging from risk elimination to risk control. Besides there is disagreement among the nations of the world on ethical and cultural quality attributes. These factors are responsible for differences in the food safety standards across the nations. The study reviews the economic analyses to deal with the above problem to define an optimum quality. This leads to certain areas where further research is required in the context of liberalization of international trade. These are the questions of adequacy of international standards, the influence of social standards and consumer preferences on setting of standards and the role of private standards on trade.

Poli (2004) examines the role of Codex Alimentarius Commission and its standards to ensure food safety and quality within the framework of WTO legal system. Since national measures based upon food standards adopted by the Codex Commission are presumed to comply with the WTO, it offers incentives to WTO members to comply with Codex standards leading to harmonization of national SPS measures. This is illustrated with the classic examples of the WTO sardine case and the hormone treated beef case. In both of the above cases, the Dispute Settlement Body of the WTO used the standards of the Codex as the benchmark and found that the national standards were not compatible with the Codex standards. The finding is that Codex offered a forum to harmonize the positions of different countries that have divergent views.

Victor (2002) attempts to explore whether the operation of the SPS agreement has led to harmonization of national SPS policies. It also examines whether there has been tightening or weakening of national SPS policies due to the implementation of the SPS agreement. It is based on the 3 WTO cases: the EC's ban on imports of bovine meat, Australia's ban on imports of fresh and frozen salmon, and Japan's ban on numerous varieties of fruits and nuts. The AB based its decisions in all the 3 cases on the assessment of risk. In all the 3 cases, the AB struck down the SPS measures by pointing out that the countries failed to impose measures based on assessment of risk. This shows that the AB has interpreted the original agreement as allowing greater flexibility for nations to set their own SPS measures based on assessment of risk. This indicates that the SPS Agreement has failed to harmonize national SPS levels and measures, but it has produced harmonization of national SPS procedures such as the requirement for the assessment of risk. This also encourages the national governments to increasingly apply the precautionary principle.

Guzman (2005) analyses the impact of the existing WTO dispute settlement framework with respect to food safety standards and quality issues on the world trading system. The researcher illustrates the WTO cases on hormone treated beef and Genetically Modified (GM) foods. In the case of the dispute on hormone treated beef, the EC's decision to impose restrictions on the imports of hormone treated beef was found to violate the rules of the WTO. In the case on GM foods too, the EC is the defendant as it has imposed restrictions on the imports of GM foods. In this context, Guzman identifies two issues: the first is acknowledging regulatory sovereignty of a nation and the second is restricting the scope of protectionism. He approves regulatory diversity if the policy adopted by the nation reflects the preferences and priorities of the citizens rather than protectionist motives even if the policies can have an effect on trade. In the SPS context, it is observed that a losing defendant may prefer the cost of withdrawal of concessions by the winning counterpart over exposing to products that it considers potentially harmful to health and safety. This is illustrated by the case of the EC, which refused to lift the ban on imports of hormone treated beef despite losing the case at the WTO. In the case of the SPS Agreement, the tradeoff between more accurate domestic decisions and unbiased WTO decisions tilt towards domestic decisions.

Bingen (2002) examines how standards define the quality of our agro food system. He provides empirical evidence for developing a conceptual framework of agro-food standards. The issues focused are identification of participants in food safety negotiations, exploration of standards that can encourage or discourage access to markets, and analysis of the positive and negative outcomes of different standards. Case studies reveal that dominant roles of national public and governmental agencies in standard setting and implementation have waned and private agro food standards are set by agri-business and multinational retail firms. The new standards exclude small and medium producers who fail to upgrade the facilities to meet new standards. So he asks for a value based standards setting as economy is embedded in systems of social norms and institutions.

1.4.2 Evolution of Quality and Safety Standards in Fish and Fishery Products Trade.

Slack (1971) traces the historical development of quality controls applied in fish and fishery products. According to him, the concept of quality control was well established towards the end of the 14th Century when the Dutch Government recognized the economic importance of applying improved methods of handlings of herrings for the purpose of shipping it throughout the Europe without the fear of deterioration.

Anderson (1971) is of the view that as fishery resources are not unlimited, further gains from the ocean will depend on better utilization of the harvest. Quality control and inspection are thus very important. Quality control involves prevention of spoilage and protection from contaminants and other influences. Quality control is to be exercised between capture and delivery to the processor and also during the stages of storage, transportation and distribution of the finished product. The conditions peculiar to the fish products vis-a-vis other food products like meat and poultry are highlighted; hence demanding a stricter quality control programme. It is found that fish are free from bacteria of public health significance when taken from water and contamination occurs at the time of handling and processing. He emphasizes that an effective quality control programme must take into account the basic principles of good sanitation and food hygiene and provide vigilant inspection of all handling and processing operations.

Jackson (1971) examines the importance of exercising quality control in fish and fishery products to ensure fuller and rational utilization of world fishery resources. On the basis of the data on the world fishery resources that emerged from various studies conducted by the FAO, the researcher has estimated the optimum technical and financial effort necessary for exploiting fishery resources. The estimates about the future market demand for fish also suggests that there is a need for fuller and rational utilization of fish resources. The author also points out that with the increasing importance of fish products in international trade, the existing differences in quality requirements of fish products will be eliminated and will lead to general application of modern food processing technology, plant sanitation and food hygiene.

There are some fundamental differences in grading fresh fish and fresh meat. The characteristics of meat at the time of slaughtering determine its grade and quality and post mortem deterioration is not considered at the time of grading. But in the case of fresh fish, many of the systems of grading are based on the extent of post mortem deterioration, overlooking the influences of physiological and environmental factors on the quality of fish. The seasonal factors affect the quality of fish as bacterial break down takes place quickly in the summer caught fish. It is stated that quality of fish is to some extent determined by the physiological conditions at the time of catching and the significance of this quality is different for fresh and frozen fish (Castell, 1971).

Rajasenan (2005) states that the demand for stringent and hygienic standards in the production and processing facilities of fish and fish products greatly increased, after the stipulation of Hazard Analysis and Critical Control Point (HACCP) in 1993 by the USFDA. The safety standards and quality regulations framed by the EU also enhanced the need for implementation of standards and hygiene at various stages of supply chain of fish and fishery products.

Huss et al., (2004) examine the approaches in place to ensure the safety and the quality of fish and fishery products. The traditional approach to food safety and quality is based on the application of codes of Good Hygienic Practices (GHP) and Good Manufacturing Practices (GMP). In contrast to the traditional approach, HACCP system identifies food safety problem and also where and how they can be controlled. HACCP system is a measure used to enhance food safety. The safety of the seafood products are based on factors such as the origin of fish, microbiological ecology of the product, handling and processing practices and preparation before consumption. Seafood products are categorized into different groups based on the above factors. HACCP plan is prescribed for different categories of fish like molluscan shell fish, fully cooked fresh or frozen fish and crustaceans, lightly preserved fish products, fermented fish, semi preserved fish, mildly heat processed, heat processed or sterilized and dried and heavily salted fish to deal with significant hazards.

Ababouch et al., (2004) explain the basics of microbiological and chemical risk assessment for sea foods. It outlines the basics of risk assessment, how to perform risk assessment (stepwise progression) and how to use risk assessments (risk management and HACCP). It can be used as a working tool that allows systematic ranking of the risks associated with different sea food product categories. Risk assessments can be qualitative and quantitative risk assessment. Qualitative risk assessment is based on factors such as likelihood of occurrence and severity of hazard. Every HACCP plan employs qualitative risk assessment in the HACCP worksheet. Quantitative risk assessments are done for specific purposes and provide numerical risk estimates to answer the questions that are posed by the risk managers.

The aforementioned literatures discuss the evolution of regulations and standards on traded food products including fish and fishery products, the need for such regulations, the issues of quality, the concept of risk and its assessment, the systems that are in place to ensure quality and safety standards based on risk assessment. As these food safety standards and quality regulations imposed on food products can have a bearing on the trade in food products, it is necessary to study the impact of such measures on trade. A review of existing literature is made to measure the impact of such NTMs on trade in food products.

1.4.3 Methodologies on Measurement of Effects of NTMs on Trade

A number of economic models have been developed to examine the impact of non tariff barriers (NTBs) on international trade in food products. Henson and Loader (2001) cite several studies that acknowledged that SPS measures can act to impede trade in agricultural and food products (Petrey and Johnson, 1993; Ndayisenga and Kinsey, 1994; Sykes, 1995; National Research Council, 1995; Hillman, 1997; Thilmany and Barrette, 1997; Unnevehr, 1997; Digges, Gordon and Marter, 1997; Jaffee, 1999). Henson and Loader (2001) classified the impacts of SPS measures on trade into 3 groups: 1) a measure that can prohibit trade by imposing ban or by increasing production and marketing costs, 2) measures that can divert trade from one trading partner to another due to discrimination across potential suppliers, and 3) measures that reduce overall trade by increasing costs and raising barriers.

There are several methodological approaches to evaluate the impact of the SPS Agreement on agricultural trade. All these approaches attempt to measure NTBs either by regarding residuals from the estimated regression as representing NTBs or by using various dummy variables. The models used are reduced form models, comprehensive general equilibrium frameworks, price wedge analysis, gravity models, risk assessment approaches to cost benefit calculations, inventory approach etc. (Beghin and Bureau, 2001; Burnquist et al., 2004).

A fuller analysis of the effects of SPS restrictions on domestic industry and consumers is made by James and Anderson (1999). They employ partial equilibrium framework to explore the economics of quarantine policies. An empirical analysis of Australia's ban on import of banana suggests that a move to free trade may cause a contraction of banana growing in Australia, but the economic welfare gains to consumers are certain to outweigh the losses to producers. A movement from autarky to either a free trade or a partially quarantine restricted trade, assuming zero disease entry is likely to produce net gains in economic welfare.

James (2000) uses an economic model to study the effects of hormone treated beef ban imposed by the EU and its removal under certain conditions. The partial equilibrium analysis reveals that the EU would be better off if the ban on hormone treated beef is lifted and a costless labeling scheme is introduced. It considers how the analysis changes if the market is segmented such that there are two separate demand curves for two types of beef; hormone free beef and hormone treated beef. If the ban is lifted, and hormone treated beef is available, hormone indifferent consumers would buy it, as it is cheaper. The quantity of the hormone free beef consumed falls, but the total quantity of beef sold in the EU increases resulting in net gain. It also examines the legitimate role of economics under the SPS Agreement. It outlines the weaknesses of using economic analysis to justify SPS measures. When advocating an economic analysis, it should be kept in mind that the economic efficiency test will not always yield trade liberalization recommendation and is not a legal basis for a SPS measure under the SPS Agreement. However using economic analysis in risk management decisions will improve the efficiency of SPS policies and promote the balance between achieving gains from trade reform and protecting human, plant and animal health.

The phyto sanitary barriers imposed by Japan on the apple imported from the US are quantified by calculating the tariff rate equivalents. Trade as well as welfare impact of removing phyto sanitary barriers and tariffs are examined under two assumptions on transmission of the bacterial disease, fire blight. If welfare effects of removing the technical barrier to trade are examined under the assumption that fire blight cannot be transmitted, there arises net gains from trade. However if it is assumed that fire blight can be transmitted, the size of gains from trade depends on the extent of reduction in yield due to disease. Their major finding is that technical barriers in Japan on an average are more important than tariffs in deterring trade (Calvin and Krissoff, 1998).

An analytical framework is developed by Bureau et al., (1998) based on the EU-US trade dispute on beef treated with hormone in order to compare the welfare effects under the conditions of autarky, trade liberalization without labeling and trade liberalization with labeling in the case of credence goods. It is found that coexistence of imported and domestic product due to trade liberalization may enhance consumer’s imperfect information about quality. This leads to market inefficiencies linked to adverse selection, such as decrease in demand and potential exclusion of a higher quality from the market. It is suggested that the possible welfare losses caused by imperfect information must be measured against the welfare gains resulting from increased competition, international specialization according to comparative advantage and increase in product diversity. It emphasizes that cost benefit analysis should be the fundamental criterion to evaluate sanitary and phyto sanitary measures and technical barriers.

A model so widely applied to examine the trade effect of strengthening of food safety standards and regulations on food products is the gravity model. The quantum of trade between the nations depends on the explanatory variables such as the size of the per capita gross domestic products of the exporting and importing nations, distance between the nations, and other specific variables added in the equation to capture the effects on trade. The gravity analysis employed gives results that suggest that the strengthening of standards and regulations does produce adverse impact on the exports of food products from developing nations (Otsuki et al., 2001; Wilson et al., 2003; Babool et al., 2007; Yunus, 2009).

The review of the above literature shows that there are alternative methods to measure the impact of NTMs on trade. Both partial and general equilibrium analyses have been employed to analyse the impact of NTMs on trade. Methodologies such as Inventory Approach, Price Wedge Approach, Methods of Subsidy equivalents, Trade Restrictiveness Index, Gravity Models, etc. purely focus on the impact of these NTMs on trade. But the Cost Benefit method employed is capable of analyzing the impact of NTMs on trade as well as welfare. Literatures dealing with the specific issues faced by the developing nations in the wake of tightening of the safety standards and quality regulations in the import markets of developed nations are examined. Further it also analyses the response of the seafood exporting companies to meet the new requirements.

1.4.4 Effects of NTMs on Trade with reference to Developing Countries

A number of studies examine the concerns and challenges faced by the developing countries in the wake of the SPS measures adopted by the importing nations. These studies throw light on some of the problems encountered by developing countries in enforcing and implementing quality standards. A number of studies have attempted to assess the impact of SPS measures on the exports of food products from the developing countries. SPS measures are claimed to be an impediment to exports of fish (ESCAP, 1996; Josupeit, 1997; Cato, 1998); spices (UNCTAD/Commonwealth Secretariat, 1996); oilseeds, oils and fats (FAO,1998); livestock products (FAO, 1994; Petrey and Johnson, 1993; Colby, 1997; Johnson, 1997); and horticultural products (Giles, 1997; Kortbech-Olesen, 1997; Gilmour and Oxley, 1998; Sullivan, Sanchez, Weller and Edwards,1999). Developing countries find it difficult to meet the quality standards prevalent in the developed countries due to differences in the quality and safety requirements maintained by them.

Mayeda (2004) evaluates the benefits of legal harmonization within the framework of international trade law with a particular focus on the effects on developing countries. Legal harmonization is justified on the basis of normative perspective. A concrete conception of procedural justice that ensures the involvement of all individuals and groups in deliberation oriented towards consensus building create benefits for marginalized interests. This protects the interests of the developing countries that are frequently marginalized. In the analysis of the SPS and the TBT Agreements, the institutional approach to legal harmonization enables to recognize the need to accommodate local differences. The article examines the tools available within the WTO system for accommodating the different institutional challenges confronted by the developed and developing countries. From the perspective of an institutional paradigm supported by a procedural conception of justice, both international and domestic institutions can be improved to make developing countries better informed and to rectify imbalances in decision making power between developed and developing nations in order to make these countries more free to choose regulatory schemes that accord with their domestic policy goals.

Organisation for Economic Cooperation and Development (OECD, 2005) analyses the NTBs that are of concern to developing countries, especially by non OECD countries. It relies on data on notifications of NTBs by the non OECD countries to the WTO negotiating group on NAMA, trade disputes brought to the WTO and the tribunals of the Regional Trade Agreements (RTAs) and surveys of the private companies. Based on the above data, the NTBs that are of concern to the developing countries in the North-South trade and the South-South trade are identified. In the trade with developed countries, the NTBs that are primarily applied are customs and administrative procedures, technical barriers and SPS measures. The NTBs that are primarily found in the South-South trade are trade remedies, customs and administrative procedures and charges on imports. The NTBs applied are found to vary among product groups. The NTBs applied to live animals are SPS measures and customs related procedures. In the case of prepared food stuffs, the major NTB applied is technical regulations.

The impact of environmental standards and the SPS measures on the trade of the developing countries in the South Asian region is analyzed (Jha, 2002). The effects of TBT and SPS measures on trade from South Asian countries are examined on the basis of empirical evidence. The finding is that the general problems faced by the South Asian countries are the inability to participate in setting of standards, lack of technical expertise, financial constraints and the complexity of the SPS standards in the export markets. It also explores the impact of the SPS measures on specific products such as rice, mango pulp, peanuts, spices, tropical beverages and marine products. Analysis of the data obtained on the basis of interviews with the exporters, industry associations, government officials etc. reveals that cost of compliance with the international standards is found to be high in all the selected South Asian countries. Certification cost, especially inspection and testing costs are beyond the reach of small and medium enterprises. Besides that, the compliance with the stipulated standards is not a sufficient condition to get higher prices in the export markets.

Burnquist et al., (2004) examine the trade effects of the SPS Agreement on developing countries. They bring out the problems that are prominent in the developing countries. Information, a critical factor in the implementation of the SPS Agreement is under-supplied in the LDCs. Other problems include high implementation costs, insufficient access to technical and scientific expertise, incompatibility of SPS requirement with domestic production and marketing methods.

The specific problems that developing countries face in meeting the SPS requirements are identified and spelt out by Henson and Loader (2001). Tariff liberalization in international trade is accompanied by a proliferation of technical measures such as food safety regulations and labeling requirements that can act as an impediment to trade. To understand the problems faced by the developing countries, a series of in depth case studies of 10 countries was undertaken. It revealed that the products for which SPS requirements created a significant problem were meat/meat products, fish/fish products and fruit and vegetable products. The case studies suggested that the major problems faced by the developing countries were insufficient access to scientific and technical resources and incompatibility of SPS requirements with domestic production and marketing methods.

Athukorala and Jayasuriya (2003) review the issues related to the trade effects of food safety standards on developing countries. The SPS standards are less transparent and are used as an instrument of protection by the developed countries. The specific problems encountered by the developing countries are resource, manpower and institutional constraints. Besides SPS standards diverge considerably across importing countries, making compliance more costly for exporters. Export value per detention (total dollar value of exports divided by number of detained shipments) is used as a relative measure of inter country differences in the ability to meet SPS standards. In a comparison among the countries, a higher numerical value of the ratio would suggest a better performance in meeting standards. The figure was $2.3 million, $1.16 million, $1.15 million for developed, upper middle income and low income countries respectively. Another finding is that large companies are better placed to undertake additional investments needed to meet international SPS standards.

In the light of tightening of food safety requirements in the EU, Doherty (2004) examines the problems faced by the food product exporters of Africa. The problems peculiar to African agricultural product exporters owing to the imposition of the SPS measures by the EU are identified. African countries are unable to meet the farm to fork approach insisted by the EU on the imports as they lack an effective overall food safety framework. Lack of coordination among the government departments entrusted with the responsibility of ensuring food safety, lack of credibility in local certification, absence of institutional capacity building, limited role of governmental and private agencies in the international standard setting and the lack of private sector initiatives in improving the quality of national products are issues encountered by the agricultural exports from Africa. The aforementioned problems have enhanced the cost of compliance and stood as NTBs to the export of agricultural products from Africa.

Dey et al., (2005) examine how the rising consumer concern about a range of food safety matters and increasingly stringent regulatory standards related to fish product pose challenges to the sustained international market access of many developing country suppliers. It reviews the implementation of various food safety measures by the major fish exporting countries in Asia. It also analyses the costs and benefits of implementation of these measures in these countries. Results show that at the factory level, implementation of the standards has significantly increased the cost of processing and the cost per unit of fish processed is higher for the smaller plants. These economies of scale could exclude small operators in developing countries. Continued competitiveness of small plants would seem to require government policies and support designed to minimize the cost of compliance with international standards.

The impact of quality and safety standards imposed by the OECD countries on the exports of fresh and perishable agricultural and fishery products from the developing countries is analysed by Willems et al., (2005). It makes a comparative analysis of supply chain for fish and fishery products and other food products such as fruits and vegetables. Data are obtained from the survey of producers and exporters in the developing countries and also from the survey of the buyers in the importing countries. Some of the major findings are the following. In response to several food scandals that shook Europe, the public and private sectors imposed tighter food safety requirements. A major problem faced by the producers or exporters of fruits and vegetables is the differences in standards and regulations imposed by the different member nations of the EU. But the food safety regulations for imported fish are harmonized within the EU. It is also found that retailing sector is the major driving force behind the emergence of private sector food safety and quality standards in the case of fruits and vegetables. This is not true in the case of fish and fish products because the main market outlet for fish and fish products is the wholesale sector. But the number of food safety problems in the fish sector is significantly higher than the problems in the fruits and vegetables sector. The buyers' priorities are found to be the volume, reliability of supply and price of the product. A major finding with regard to the cost of compliance is that producers and companies operating in the different types of supply chains face different costs of compliance due to different levels of organization and operation.

Greenhalgh et al., (2004) examine the impact of liberalization of trade in fish and related issues such as the application of SPS measures, eco labeling, subsidies and anti-dumping measures on different categories of stakeholders in the fisheries sector of the developing countries. Case studies have been conducted in Bangladesh, India, Uganda, Viet Nam and Guinea. Some of the major findings pertain to the impact on exports, employment and cost of compliance in fisheries sector of these developing countries. Analysis of exports of fish and fishery products from Bangladesh, India and Uganda reveals that the application of SPS measures on the exports of fish has adversely affected the industry. In Bangladesh and Uganda, the export ban and the required quality improvements led to the closure of several small plants leading to loss of jobs. Besides, the auxiliary industries such as packing, fish net manufacturers, the transport industry were also affected. In India, the EU's requirements on the integration of processing and preprocessing operations led to the loss of job opportunities for the female workforce. The industry that was worst affected was the trawling industry of Kerala as their operations were focused on the export species. In the case of Viet Nam, the value of fish exports in 2003 experienced a decline due to the impact of the anti-dumping tariff imposed by the US. In Viet Nam, the anti- dumping duty imposed by the US led to the loss of employment among the workers in small scale fish farm households, as well as processing plants, the majority being women. Another significant impact of application of SPS measures is on the cost of compliance. The cost of compliance to meet additional requirements was found to be high in all these developing countries.

Jaffee and Henson (2004) examine the changes that take place in the environment of standards and their impact on existing and potential exporters of high value agricultural and food products in developing countries. They however make a significant departure from ‘standards as a barrier’ perspective to ‘standards as a catalyst’ perspective in the context of developing countries. Developing countries face capacity constraints in meeting quality standards. They are administrative, technical, scientific and regulatory capacities. In discussing effects of standards on trade, the authors not only adopt traditional approach of using quantitative measures of changes in trade such as the data on agricultural and food product detentions by industrialized countries and the number of complaints that have been recorded in the SPS Committee, but also present some illustrative case studies. These case studies analyze the losses or gains from trade arising due to international food safety and regulatory standards within the context of wider supply chain challenges. These case studies on Kenyan exports of Nile Perch, Guatemalan exports of raspberries and exports of Peruvian asparagus reveal that the key question for developing countries is how to exploit their strengths and overcome their weaknesses such that they are gainers.

The food safety standard prescribed by the industrialized nations serving as a catalyst is supported by another study conducted by Fredriksson and Wendel (2005) with reference to seafood exports from Morocco. An evaluation of institutional framework in place in Morocco to ensure food safety and quality reveals that the government adopted a strategy of compliance. The impact of food safety standards on Moroccan seafood industry is analysed based on secondary data on volume and unit values of seafood exports of Morocco and a survey of the seafood export units of Morocco. An examination of volume, value and direction of exports of various forms of fish products reveals that exports of canned sardine, semi preserved products, and fresh fish exhibited a rising trend in terms of volume and unit value. The decline in the volumes of frozen fish is attributed to the exhaustion of cephalopod populations while the fluctuations in the unit values of different types of frozen products during the study period is an indication of variations in the forces of demand and supply rather than the evolution of quality standards. Analysis of the direction of exports shows that the EU still remains a major importer of the Moroccan seafood products especially in terms of value. Thus it can be concluded that despite the sharpening of food safety standards in the industrialized markets and Morocco being a relatively poorer developing country, its seafood exports sector has not been adversely affected. Thus Moroccan example can be cited as an evidence for standards as catalyst view rather than barrier view.

The potential impact of the food safety standards on the ability of the developing countries to gain and maintain access to markets of the industrialized countries are analyzed by Henson and Jaffee (2007). They outline how the proliferation and increased stringency of food safety creates a new landscape that can form a basis for the competitive repositioning and enhanced export performance of developing countries. However institutional weaknesses such as lack of administrative, technical and scientific capacities and recurring compliance cost create problems for developing countries. The authors use the conceptual framework developed by Hirschman to characterize alternative strategic responses to food safety standards. It is apparent that the best strategic option for developing countries is to combine voice with proactivity. But a study of data on number and nature of complaints and counter notification made through SPS committee reveals that among the developing countries, only a small number of middle income countries adopted this approach. The paper presents the national compliance strategies for fish and fishery products for India and Kenya. In both countries the dominant strategic responses to emerging food safety standards in fish products were reactive and loyal by the government and private sector. The hygiene and antibiotic controls were upgraded in response to the regulatory standards enforced by the EU. In Kenya little action was taken until inspections by the EC, while in India the government had undertaken some reforms to its regulatory framework though insufficient. Across both India and Kenya there were examples of exporters that adopted enhanced food safety standards proactively but represented a small part of the total industry.

Gebrehiwet et al., (2007) attempt to quantify the impact of the SPS regulations imposed by the OECD countries on the exports of food products from South Africa. Their main objective is to estimate the amount of food exports from South Africa that is foregone due to aflatoxin standard set by 5 OECD countries. Gravity model is employed to analyse the effects of NTBs on trade. The regression variables specified in the gravity model are population as well as the GDP of both exporting and importing country, distance between the countries and the total aflatoxin standards set by the importing country. The findings support the hypotheses that stringent SPS standards are limiting trade markedly. Moreover the simulation result based on the assumption that the OECD countries adopt the total aflatoxin level recommended by the Codex , shows that South Africa would have gained an estimated additional amount of US $ 69 million per year from food exports to these countries during the period of 1995 to 1999.

Donovan et al., (2001) present a case study that examines how the level of food safety in the domestic market is affected by the foreign regulatory standards imposed on the fish product processing industry in Brazil. This is done by analyzing national data and firm level data. This study shows that to date in Brazil, the adoption of HACCP systems has been concentrated in the export sector, with only small impact on domestic standards and food safety levels. To evaluate the relative importance of the export market in processors' decisions to implement HACCP, they compared adoption rates between firms that were and were not on Brazil's export roll. The HACCP adoption rates for plants that were on the export roll were 38.6 percent while it was just 9.3 percent for firms not on export roll.

In the late 1990s, the EU imposed repeated bans on fish imported from Uganda on the basis of food safety concerns. A case study of the Nile perch export industry of Uganda in the context of strict food safety standards is conducted. Information is collected from various quarters such as government officials, logistics, cold storage providers, locally based fish importers, trainers, certifiers, lab operators through interviews. The EU import bans had wide ranging effects on Uganda's fish export industry. It led to lower fish exports and loss of export revenue. It also led to the closing down of 3 plants and less than full capacity utilization of the remaining plants. At the same time, compliance with the EU standards by the Ugandan fish industry in reaction to import bans resulted in some positive effects. They are streamlined regulation with a strengthened competent authority under one roof, the formulation of a new fishery policy, improved monitoring and inspection systems, regional efforts for harmonization of handling procedures in 3 countries sharing Lake Victoria; Uganda, Tanzania and Kenya, upgradation of small number of landing sites and plans for upgrading a substantial number of others, upgrading of processing plants, procedures and design, increase in the number of processing plants compliant with HACCP, and improved export performance and access to the US market (Ponte, 2007).

Sawhney(2005) explains the Indian experiences in meeting the food safety challenges in the export sector in the context of structural and institutional changes taking place within the country. Government took steps to enhance the credibility of India’s pre-shipment inspection and certification agency. The economic impact of imposition of food safety standards on Indian sea food processing industry which comprises both large and small firms is analysed. This has been done in two ways: firstly by studying the cost of compliance with the new standards in large as well as in small fish processing units. The firms have identified that the best strategy to cope with technical lag and market access problems in export markets is to build up international technical partnership and joint venture agreements. Secondly by analyzing the trends in the destination pattern of India’s marine fish product exports during 1990-2001. Since the second half of the 1990s, markets such as China and Thailand have emerged as important importers of India’s marine product exports. The smaller seafood processing facilities that failed to obtain approval for the European markets are catering for the lower end South Asian markets.

Mehta and George (2003) study the processed food product industry of India and examine the impact of the application of SPS measures on a few select product lines such as poultry products, marine products, mango pulp, peanuts and mushroom. The case studies conducted reveal that SPS measures affect the exports of all the above processed food products from India. The presence of NTBs is ascertained on the basis of the data on detentions of consignments of food product exports from India. Another implication of the implementation of the SPS measures is the need for introduction of capital intensive technologies by the processors imposing financial constraints. A contrasting picture in the exports of poultry products and marine products is made. In the former, the imposition of stricter food safety standards led to the close down of 3 egg powder units and reduction in capacity utilization of almost all units. In the case of marine product exports, it was observed that following the imposition of stricter SPS measures by the EU and the US, the exporters have explored alternative markets and the realized unit value of exports has declined.

The impact of the SPS measures and ecolabeling measures on the exports of shrimp from Bangladesh with focus on the stakeholders in the sector was studied by Khatun (2004). The methodology used is participatory as it employs field level survey accompanied by focus group discussions, individual case studies and personal observations. Analysis of the impact of implementation of the SPS measures on the shrimp industry has brought out that it has adversely affected the economic conditions of farmers, transporters and processing workers. However, the impact of the SPS measures on the processing factories was short term and they could recover the initial losses. Implementation of the SPS measures has also increased the foreign exchange earnings of Bangladesh from the exports of shrimp. In the absence of actual information on the impact of ecolabeling, the study undertakes a tentative estimation of cost and benefit associated with its implementation. It concludes that SPS measures and eco labeling measures serve as NTBs on shrimp exports from Bangladesh affecting the livelihoods of various stakeholders in the supply chain.

Deb (2006) examines the types of NTBs imposed by the developed and developing countries on agricultural imports from LDCs such as Bangladesh and Cambodia. The product specific incidence of NTBs for all major commodities of export interest to Bangladesh and Cambodia are analyzed using the procedure of frequency index followed by the UNCTAD. A major finding of the study is that the exports facing NTMs as a percent of total exports to the EU, the US and Japan were 91, 94 and 68 percentages respectively. Non-traditional NTMs such as the SPS and the TBT and related measures were the most prevalent accounting for a sizeable share in the EU (96 percent), the US (95 percent) and in Japan (64 percent). The impact of the SPS and the TBT measures are categorized into short term, medium term and long term. The short term negative effect due to the ban on fish product exports from Bangladesh resulted in net losses. But the medium to long term losses arose from market diversion and erosion in prices offered to the exporters. Besides the upgradation of facilities and equipments to meet the stipulated standards enhanced the cost of compliance.

Henson et al., (2005) analyse the impact of SPS measures on the fish and fishery product industry of Kerala. On the basis of the secondary data on the exports of fish products from India, they observe a decline in the value of exports to the EU from Kerala and India in the wake of the export ban imposed by the EU. A survey of the processing plants based on the their recurring and non recurring costs of compliance, size of operation, capacity utilization, and prevailing hygiene standards give the following results. The upgrading of hygiene standards has imposed considerable non- recurring and recurring costs on the fish processing sector. The investment imposed hardship on processors especially those operating at low levels of capacity leading to the exit of a number of processors from the industry. The imposition of stricter safety standards by the EU and the consequent controls implemented by the Government of India had the greatest impact on the preprocessing sector leading to the closure of a number of independent preprocessing operations.

Kulkarni (2005) examines the impact of regulatory standards imposed by the EU and the US on the Indian seafood export industry. He examines in detail the sea food supply chain in India that consists of fishermen, commission agents, supplier and exporter and also their functions. It relies on the information obtained from the exporters and the regulatory agencies. The finding is that the EU and the US product regulations have a negative effect on seafood exports compared to process regulations since the severity of import regulations are based more on precautionary principles rather than actual foods safety concerns. Besides Indian seafood export industry requires a bottom up approach starting from the lowest actor of the supply chain to ensure better quality and safety. Infrastructural constraints pose problems in the implementation of HACCP and GMPs. It identifies critical concerns at the bottom of the chain by studying the four landing sites in Mumbai and Cochin. This brings to light the infrastructural problems at the natural beach ports and constructed ports.

Oyejide et al., (2000) attempt to analyze the effects of the SPS measures on trade in agricultural and food products with reference to Africa. A comparative study of the NTBs faced by the exports of food products from African countries in the major export markets of the US, the EU and Japan reveal that, the US has the least number of NTBs, the EU has high number of

NTBs and Japan has the highest concentration of NTBs. Another major finding is that the incidence of SPS measures was higher for processed and semi processed agricultural products than for those in the raw form. To quantify the effects of the SPS measures on trade in food products with reference to Africa, it is necessary to consider the cost of complying with the standards. But in the context of Africa, the costs of meeting the standards not only include compliance cost at the firm level, but also the macro costs of services provided by the public agencies. In fact the macro cost associated with compliance with the SPS measures in African countries are significant. They suggest that in order to fully capture the impact of the SPS measures on African export of processed agricultural and food products, it is necessary to design a data gathering methodology that covers both the firm level and macro cost elements.

Loc (2003) cites the study conducted by Than Thu (2001) on the problems faced by the seafood companies of Viet Nam in the main export markets. The SWOT analysis is used to judge the state of Viet Nams' seafood exports to the foreign markets such as the US, the EU and Japan. The major threats faced by the Viet Namese seafood companies in the 3 export markets are high competition from other fish product exporting countries such as Thailand, India, and Bangladesh as well as very strict quality control requirements in the US, the EU and Japan. However the strengths of the seafood companies of Viet Nam are the improvement in the quality of seafood products and product and market diversification.

The quality issues involved in the seafood supply chain in Mekong Delta,Viet Nam are analysed by Loc (2003). A survey of the heads of quality control in the seafood companies in the region brings out the following results. About 96.9 percent of the seafood companies surveyed have implemented the

HACCP system. But the HACCP has not been implemented in all the stages of supply chain such as hatchery production, farm production/capture fisheries, collectors or wholesale buyers and the distribution stage. There are some deficiencies in the supply chain of shrimp products in Viet Nam. The first deficiency is the inability of seafood company management to exercise quality control in the primary stage of production. Thus it cannot control the quality of shrimp materials delivered from the farmers to the company via the collector and wholesale buyers. The other deficiency is that the seafood companies have only knowledge of customer information and quality requirements from the import companies or other common communication sources and have no access to information specific indicators on TBT and sanitation performance standards. This necessitates the intervention of the government to correct the deficiencies in the supply chain.

1.4.5 Factors Affecting the Adoption of Quality Control Programme in Firm/Industry

Jayasinghe et al., (2006) assess quantitatively the economic incentives for the firms to adopt food safety controls. They focus on the red meat and poultry processing sector in Canada. A two stage research program was conducted. The stage one helped to identify 10 specific incentives for firms to implement enhanced food safety controls. Stage two was designed to quantify the extent to which the identified specific incentives influenced the propensity of firms to implement enhanced food safety controls. The major finding is that anticipated sales and the reputation of the firm are the predominant drivers behind the food safety responsiveness of plants in the Canadian meat and poultry processing industry. Another strong motivating factor is good practices. The results indicate that government regulations and liability laws have a negative impact on food safety responsiveness. This creates challenges for regulators in defining policy instruments that promote greater levels of food safety control in the food processing sector.

The correlation between the characteristics of the firm and the adoption of food safety and quality assurance practices are examined by Herath et al., (2007). This study is done on the food processing sector of Canada. The results from binomial logistic regressions indicate that characteristics of firms are closely associated with the adoption of enhanced food safety and quality assurance practices. The firm size and industry subsector have a much more pronounced effect on the probability of adopting HACCP alone or in combination with other food safety and quality assurance practices than the other firm characteristics. The other characteristics that influence the adoption of standards are level of innovativeness and the level of export orientation of the firm.

Suwanrangsi (2002) examines the implementation of HACCP based programme in seafood processing industry of Thailand. Data on exports of seafood products from Thailand to various markets are used for analysis. The major markets for Thai seafood products are Japan, the US, the EU, Canada, Australia and new markets such as China, Korea, the Middle East, South Africa, Argentina and Brazil. The major factors that hinder the implementation of HACCP are high financial costs, especially for small scale and traditional product producers, lack of technical and trained personnel, differences in the stipulation of standards in various export markets, insufficient audits due to lack of familiarity about the procedures and resource constraints. The research also throws light on some unresolved issues such as the extension of the quality control programmes to primary production, small scale firms and the firms focusing on the domestic market.

Survey of the existing literature has brought out some of the issues affecting the international trade in fish and fishery products. It is evident from the review of existing literature that since the latter half of the 1990s, there has been an increase in the application of NTMs especially, safety and quality standards and other technical requirements on the imports of food products in general and fish and fishery products in particular. It can also be found that most of the NTMs imposed on the imports of fish and fishery products are by the EU, the US and Japan; the 3 major import markets for fish and fishery products. The quality and safety standards and other regulatory and technical requirements placed on the imported fish and fishery products in these markets are very stringent. These requirements had profound implications on fish and fishery product trade of developing countries. The existing literature evaluates the impact of the food safety standards, quality regulations and other NTMs on the exports of fish and fishery products from several developing countries of Asia, Africa and Latin America. The studies also discuss on the methodologies used to measure and quantify the effects of NTMs especially SPS measures on trade in food products.

Since fish and fishery products comprise an important place in the export basket of India and Kerala, it is necessary to analyze the impact of such aforementioned developments on our marine product exports. This is especially relevant because traditionally, the major markets for the marine fish and fishery products of India and Kerala had been the EU, the US and Japan. As has been stated earlier, these markets had been strengthening the quality standards and regulatory requirements on the imports of fish and fishery products coming into their markets. In this context, it is essential to examine the impact of these measures imposed by the EU, the US and Japan on the marine product exports of India and Kerala. This is also an attempt to explore whether the food safety standards and quality regulations applied on fish and fishery product imports are meant to ensure quality or are they erected as NTBs to limit trade. Following are the objectives of the study.

1.5 Objectives

1) To identify the non tariff measures, especially the quality and safety standards and other regulatory requirements encountered by the marine product exports from Kerala in the major markets of the EU, the US and Japan.

2) To analyze the market wise exports of marine products from India and Kerala in terms of quantity and value in the pre and the post WTO periods.

3) To study the measures adopted by the government and seafood export industry to comply with the new requirements in the import markets.

4) To examine the costs and benefits of the implementation of standards for the marine product export industry of the state.

1.6 Hypotheses

Following hypotheses have been developed.

1) Country wise safety standards affect the marine product exports from India.

2) The institutional set up in force helps in overcoming the SPS stipulations.

1.7 Theoretical Framework

The theory of international trade advocates that free trade is the most benign as it enhances the welfare of the world. Economists belonging to various schools of thought beginning from the English Classical school proved the significance of free trade in the promotion of the welfare of the world. A number of theories can be traced that attempted to explain the reasons for international trade and its consequent gains. These include Smith's Absolute Advantage model (1776), Ricardian Comparative Advantage model (1817), Haberler's Opportunity Cost Theory based on Ricardian analysis (1933), Hecksher – Ohlin Factor Endowment theorem (Hecksher, 1919; Ohlin, 1933), Samuelson's Factor Price Equalization theorem (1948), etc. The more recent developments in the arena of international trade are the theory of intra-industry trade that focuses on trade in imperfect markets.

However, policy interventions in trade in the form of tariffs and NTMs have been pursued by nations to achieve certain objectives such as protection of infant industry, strategic industry, other socio-political reasons etc. A framework for assessing the impact of both tariffs and NTMs on the imports of commodities has been developed in the arena of international trade.

1.7.1 Definition of NTMs

Commercial trade policies can be classified into tariffs and NTMs. NTMs have been defined variously by several economists. Francois and Reinert, 1997 observe that the most theoretically satisfying definition on NTM is the one given by Baldwin (1970a). Baldwin defines non tariff distortion as any measure (public or private) that causes internationally traded goods and services or resources devoted to the production of these goods and services, to be allocated in such a way as to reduce potential real world income.

Laird and Vossenaar (1991) have classified NTMs according to intent or immediate impact of the measures. They identify 5 categories such as measures to control the volume of imports (quantitative restrictions, Export Restraint Agreements), measures to control the price of imported goods (variable levies, anti-dumping duties, countervailing duties etc.), monitoring measures including price and volume investigations and surveillance (licenses), production and export measures either directly applied to output or indirectly applied to inputs in the production process(subsidies) and technical barriers(standards for health, safety reasons etc.).

The effects of trade measures can be classified into price and quantity effects on trade and production, employment effects and welfare effects. Among the aforementioned NTMs, anti-dumping duties, countervailing duties etc. have an impact on the prices of imports, while quotas and Voluntary Export Restraints (VERs) affect the quantity of imports. However, technical barriers, standards and regulations imposed on imports operate either way and produce effects on both quantity and price.

1.7.2 Measurement of NTBs.

A number of measures have been developed to measure the impact of NTMs on international trade. Following approaches to measure NTMs have been outlined in the works of Baldwin (1989); Francois and Reinert (1997); Beghin and Bureau (2001); and Deb (2006).

Inventory Approach to NTMs has been developed to estimate the extent of trade covered by NTMs or their frequency of application in specific sectors or against individual countries or groups of countries. The percentage of trade subject to NTMs for an exporting country is given by the trade coverage ratio while the percentage of import transactions covered by a selected group of NTMs for an exporting country is the frequency index.

Modeling Approach is a more comprehensive approach to quantifying the effects of trade barriers. Models are designed to capture the quantity effects of trade measures and derive a price effect. Cross country or cross commodity regression techniques are used within the model designed to explain trade (Leamer, Stern 1970). Feenstra (1988); Laird and Yeats (1990); and Hufbauer and Schott (1992) designed models to examine the effects of NTMs.

Tariff equivalent or the price wedge approach is widely employed by the economists such as Baldwin (1975); Bhagwati and Srinivasan (1975); and Roningen and Yeats (1976). Price wedge is the difference between the free world price of a product and the domestic price which is protected by NTMs.

The method of subsidy equivalents is used to measure the transfers that are a result of government policies to producers. It is measured by the direct and indirect government expenditures to producers or by imputing the effects of policies by calculating the difference between actual domestic prices and what they would have been in the absence of trade interventions.

The Trade Restrictiveness Index (TRI) developed by Anderson and Neary (1991) is defined as the uniform tariff equivalent of the consumption and production distortions. TRI is used to measure the change in the restrictiveness of trade policy overtime for a single economy or sector of an economy, i.e., comparing two distorted situations rather than comparing against the free trade benchmark.

Stylized macroeconomic approaches estimate the effects of NTMs by observing the displacement of the market equilibrium induced by a regulation. It helps in assessing how much trade is foregone due to regulations and what the effect of harmonization of regulations is for a particular nation.

Gravity model originating from Newton's Gravity Law is used to examine the trade flow between nations. This model captures the trade effect of the NTMs. Tinbergen (1962) has been the first to apply the gravity equation to explain international trade flows. The quantum of trade between the nations depends on the explanatory variables such as the size of the per capita gross domestic products of the exporting and importing nations, distance between the nations, and other specific variables added in the equation to capture the effects on trade. The gravity model fits into the framework of classical, neoclassical and new trade theories. International trade flows resulting from specialization can be attributed to difference in technology as in the Ricardian model (Eaton and Kortum, 2002); differences in factor endowments subject to constant returns to scale and perfect market as in neoclassical model (Deardroff, 1998); and due to product differentiation, economies of scale and imperfect competition as in the new trade theory (Anderson 1979; Helpman and Krugman 1985; Bergstand 1985; 1989). All these generate a force of gravity leading to international trade flows between the centers of economic activity. The gravity model is used to the study the effect of various factors including standards and requirements on trade between countries.

The cost benefit analysis helps to capture the welfare effects of the imposition of standards. The theoretical foundations of the cost benefit analysis are rooted in the welfare economics. The welfare effect is analyzed on the basis of producers' surplus and consumers' surplus. Producers' surplus is analyzed using the variations in the profits of the producers. The consumers' surplus depends on the effect of the NTMs on the price of the product sold in the import markets and the quantity of the output sold in those markets. It is possible to capture the welfare effect on the basis of the variation in the willingness to pay of the foreign buyers and the consequent change in the damage caused by the low quality food. The cost benefit analysis studies not only the trade effect of NTMs but also the welfare effects of their implementation.

The present study basically employs gravity model to capture the effects of standards, regulations and other NTMs on the exports of marine products from India. Responses of the marine product export industry of Kerala to the emerging requirements in the import markets are analyzed within the cost benefit framework though not in its authentic form and hence failing to bring out the welfare effects of the standards and regulations. The computation of specific costs, both non recurring and recurring borne by the marine product exports sector of the state in the post standards era along with the appropriation of probable gains resulting from compliance with the requirements throw light on the variations in the producers' surplus. This exposes the impact of the rising standards and regulations in the import markets on the cost structure of the marine product export industry of Kerala and the consequent benefits they receive.

1.8 Research Design

Research Design used is exploratory and descriptive. The study seeks to examine whether the food safety standards and quality regulations applied by the developed countries are NTMs meant to limit the imports of fish and fishery products. The proliferation of the standards and quality regulations occurred since the mid 1990s especially in the markets of the EU, the US and Japan. The food safety standards and quality and hygiene requirements prevalent in the EU, the US and Japan are outlined. A gravity model is employed to find out whether the standards implemented in the major markets of the EU, the US and Japan have emerged as barriers to the exports of marine products from India. Based on the findings of this model, the hypothesis can be tested and used to prove whether these standards are indeed NTMs meant to restrict trade. It also analyses the market wise flow of marine product exports from India and Kerala. The markets are categorized into traditional markets and the non-traditional markets; the former consisting of the EU, the US and Japan and the latter consisting of the South East Asia (SEA), the Middle East Asia (MEA) and 'Others' comprising rest of the importing nations; the prominent being China, Turkey, etc. A comparative study of the exports of marine products from India and Kerala in the pre WTO period (1987-88 to 1994-95) and the post WTO period (1995-96 to 2009-10) to these markets serves to bring out whether significant changes have taken place in the direction of marine fish and fishery product exports from India and Kerala between these two phases. Time series analysis has been employed to explain the underlying structure of the data on quantity and value of marine product exports from Kerala to the aforementioned markets in the pre and post WTO periods. Time series modeler is used to identify the model of best fit and based on that forecast of quantity and value of marine product exports to various markets is made. This helps to assess whether significant changes have taken place in the direction of marine product exports from Kerala in the light of tightening of standards and regulations in the traditional markets of the EU, the US and Japan.

The response of the government to meet the challenges that have arisen in this sector in the wake of the rigorous stipulations in the major import markets is examined. This helps to bring out whether the institutional support has enabled the marine product sector to overcome the challenges that have arisen in the major import markets. An analysis of the impact of the new requirements on the marine product export sector of Kerala is also done. It identifies and computes specific costs incurred by the firm to meet the new requirements. The costs include both the fixed costs of upgrading the infrastructure and other facilities as well as the recurring cost of compliance. The benefits of implementation of standards for the marine product export units too are examined.

1.9 Methodology

The study uses secondary and primary sources of data. The secondary data pertaining to the quarter wise quantity and value of marine product exports from India and Kerala to various markets of the EU, the US, Japan, the SEA, the MEA and 'Others' are obtained from the published and unpublished export statistics of the Marine Products Exports Development Authority, Kochi. The secondary data used also include the stipulations based on sanitary measures in the import markets and the data on alert and information notifications issued by the EU on fish and fishery products as well as data on detentions and rejections of consignments of marine product exports from the state at the import markets. Bulks of these data are obtained from the Exports Inspection Agency, Kochi and from the websites of Exports Inspection Council, Europa, RASFF, USFDA and FAO. Details of financial and institutional support provided to the marine product export sector of India and Kerala are collected from the MPEDA, Kochi. The other main sources of the secondary data are the websites of the Department of Fisheries, Government of India and Government of Kerala and of Ministry of Commerce, Government of India and various books and journals.

Primary data are collected by conducting a survey of seafood export units of the state. For the purpose of the survey, 24 seafood export units from Ernakulam, Alappuzha and Kollam, 3 major coastal districts of the state that possess largest number of seafood export units are selected. The surveyed units can be categorized into the EU approved units and the non EU approved units. Due to the preponderance of the EU approved units in the state, the sample consists of 18 EU units and 6 non EU units. The sampling method adopted was purposive to bring out the specific issues faced by the marine product exporters in the new environment.

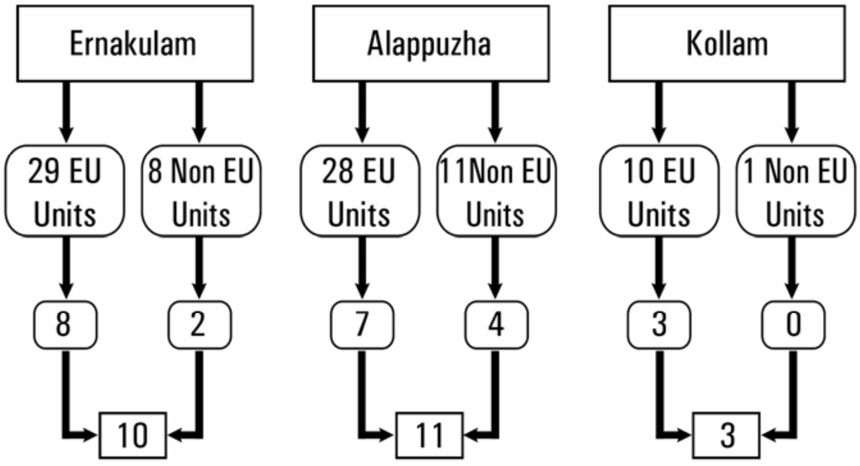

Figure 1.1. Sampling Frame

1.9.1 Statistical Tools

The models of best fit are identified to explain the underlying structure of the quantity and value of marine product exports from Kerala to various markets. The models of best fit obtained are ARIMA, simple seasonal, simple, winters' additive and winters' multiplicative Model. The estimates of the model parameters generated are used to make short term forecast for bringing out the relative importance of various markets for the marine product exports of Kerala.

The study also employs various parametric (t test, ANOVA) and non parametric tests (Mann Whitney U test) to study the cost structure of the marine product export units of the state classified on the basis of status of approval and production capacities measured in terms of tonnes per day. These tests are also used to study the benefits appropriated by the marine product export units of the state in the post standards regime.

1.10 Chapterisation

Introduction, Statement of the Problem, Importance of the Study, Review of Literature, Objectives, Theoretical Framework, Research Design, Methodology, Limitations. ⇒ Chapter I

⇓

Global Trade in Fish and Fishery Products-An Overview, The SPS Agreement of the WTO and its Provisions relevant for international Trade in Fish and Fishery Products, The SPS measures adopted and implemented by the major importers of the EU, the US and Japan that have ramifications for the marine product exports of India and Kerala. ⇒ Chapter II

⇓

Market wise Exports of Marine Product from India – A Comparative Analysis of the Pre and the Post WTO Periods, Impact of the Standards in the EU, the US and Japan on the Marine Product Exports from India – A Gravity Model Analysis, Market wise Exports of Marine Product from Kerala in the Pre and Post WTO Periods – A Time Series Analysis, Market wise Forecasts of Marine Product Exports From Kerala ⇒ Chapter III

⇓

Institutional Support to the Marine Product Export Sector – India and Kerala, Role of the Export Inspection Council, Financial Support extended by the Marine Products Exports Development Authority. ⇒ Chapter IV

⇓

Responses of the Marine Product Export Industry- Kerala, Profile of the Surveyed Units, Costs and Benefits of Implementation of the Standards. ⇒ Chapter V

⇓

Conclusion and Policy Options ⇒ Chapter VI

1.11 Limitations

The major limitation is the inability to apply the cost benefit framework of analysis in its authentic form. The inability to conceptualize cost and benefit so as to capture the welfare implications of implementation of standards is indeed a limitation. With a view to facilitate collection of data, only costs and benefits that are measurable and observable were brought within the framework of the study. Further the cost and benefit analysis is studied purely from the perspective of the producers. The cost and benefit dimensions relevant for the buyers do not figure and hence fail to capture the effects on consumers' surplus. The effects of standards on welfare could be captured only partially through the analysis of impact on suppliers. But it can be assumed that in the event of strengthening of standards and regulations, better compliances and improvement in the levels of hygiene and quality of the products, buyers definitely benefit. The costs they bear could be in the form of rising prices in their respective domestic markets owing to limitations in the free entry of products from markets with a comparative advantage leading to a squeeze in their consumers' surplus. The question to be addressed here is whether the consumers in the foreign markets are indeed willing to pay a premium price for better quality product which is linked to the demand elasticities of the quality sensitive and quality indifferent buyers. This is an area which can be taken up by researchers to make an assessment of the impact of standards on marine product export trade.

End notes:

The official definitions of certain concepts used such as standards, regulations and technical regulations are given below.

Standards: According to the International Organization for Standardization (ISO), standard is a document, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results aimed at the achievement of the optimum degree of order in a given context. Standards should be based on the consolidated results of science, technology and experience and should be aimed at the promotion of optimum community benefits. International standard is the standard that is adopted by an international standardizing organization and made available to the public.

Regulation: regulation is a document providing binding legislative rules that is adopted by an authority.

Technical Regulation: technical regulation is regulation that provides technical requirements, either directly or by referring to or incorporating the content of standard, technical specification or code of practice.

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Chapter

2

THE SPS AGREEMENT AND FOOD SAFETY STANDARDS IN THE PRESENT GLOBAL FISH TRADE SCENARIO

This chapter presents an overview of the international trade in fish and fishery products. It also discusses the major issues that have come to the fore in international trade in fish and fishery products in the context of the Sanitary and Phyto Sanitary Agreement of the WTO that have implications for the marine product exports of Kerala.

2.1 Overview of International Trade in Fish and Fishery Products

International trade in fish and fishery products has assumed significance in the recent times owing to factors such as high health attributes of fish products, growth of population and rising levels of living of the people. However, international trade in fish and fishery products can be traced back to historic period ever since the techniques of preservation of fish were known to man. Kurien (2005) cites Thompson (1995) that seafood as commodities have been preserved and traded since the Bronze Age. Preservation techniques of drying and salting made fish an item of the diet of the explorers and colonial settlers (Kurien 2005; Alder and Watson 2007).

As per the OECD (1989), the earliest global estimate of fish trading is available for the year 1963 and it was recorded to be 5.3 million tonnes. But the detailed statistics of global trade in fish and fishery products are available from 1976 onwards. In 1976, the quantity and value of fish and fishery products traded stood at 8 million tonnes and US $ 8 million respectively (Alder and Watson, 2007). Since then, there has occurred a steady increase in the volume and value of fish and fishery products exported. As per FAO (2012), the volume and value of fish and fishery products exported are 57 million tonnes and US $ 109.3 billion respectively. Over the period 1976 to 2010, the average annual percentage growth in the volume and value of fish and fishery products exported are 18.18 percent and 32.9 percent respectively. This testifies the growing importance of fish and fishery products in the past 35 years. Table 2.1 shows the volume and value of fish and fishery products exported for the period 1996-2010.

Table 2.1. Value and Volume of Fish and Fishery Product Exports at the Global Level

Year	Value of Exports (in billion US $)	Quantity of Exports (in million tonnes)
1996	52.5	22
1998	51.5	39
2000	55.5	49
2001	55.9	49
2002	58.2	50
2003	63	48
2004	71.5	53
2005	78	56
2006	85.9	54
2007	92.8	53
2008	102	56
2009	94.86	56
2010	109.3	57

Source: FAO, 1996 to 2012

Alder and Watson (2007) cite the references of the following authors (Arbo and Hersong 1997; Kurien 1998; Thorpe and Bennett 2001) to show that there are 3 distinct phases in the growth of international trade in fish and fishery products. They are: the first was the expansion of distant water fleets after the World War II through the mid 1970s, the second was the introduction of the United Nations Conference on the Law of the Sea (UNCLOS) and the declaration of the Exclusive Economic Zone (EEZ) throughout the 1970s and the early 1980 and the current stage is the development of neo liberal economic policies and strengthening of the globalization process. An examination of these phases in the development of global fish trade reveals certain facts. In the first phase, till 1970s, the developed countries had an upper hand in the exports of fish and fishery products. The distant water fleets helped the industrialized countries to commercially exploit the fish resources in the coastal waters of the developing nations. But with the UNCLOS, several developing nations declared the EEZ that entitled them to the territorial rights of sea waters up to 200 nautical miles. This limited the access of the developed countries to the waters of the developing nations. Further the rising cost of operations of the distant water fleet also led to the decline in the exports of fish and fishery products from the developed countries. This is true in the case of Japan which was once a leading exporter of the fish and fishery products and later transformed into a leading importer of fish products. Swartz et al (2010) observe that the distant water fleets of Japan have been on decline since the late 1970s, faced with increased cost of operations and the rising cost of accessing foreign fishing grounds. But during this period significant gains were made by the developing countries as they emerged as net exporters of fish and fishery products since 1970s. Net exports of fish and fishery products from developing countries in terms of value increased from US $ 2.9 billion in 1978 to US $9.8 billion in 1988 and further to US $ 17.4 billion in 1998. As per the FAO (2012), the net exports of fish and fishery products from developing countries in 2010 stood at US $ 27.7 billion. Among the developing countries, China is the leading exporter of the fish and fishery products accounting for 12 percent of the total value of the fish exported. The value of exports of fish and fishery products of the top ten countries of the world is depicted in Table 2.2.

Table 2.2. Top Ten Fish Exporters of the World (Exports Value: US $ million)

Countries / Year	1994	1996	1998	2000	2002	2004	2006	2008	2009	2010
China	2320	2857	2656	3606	4485	6637	8968	10114	10246	13268
Norway	2718	3416	3661	3533	3569	4132	5503	6937	7073	8817
Thailand	4190	4118	4031	4367	3676	4034	5236	6532	6236	7128
Denmark	2359	2699	2898	2756	2872	3566	3987	4601	3981	4147
Viet Nam	484	504	821	1480	2030	2403	3358	4550	4309	5109
USA	3230	3148	2400	3055	3260	3851	4143	4463	4145	4661
Chile	1304	1698	1958	1785	1869	2484	3557	3931	3606	3394
Canada	2182	2291	2266	2818	3044	3487	3660	3706	3240	3843
Spain	1021	1447	1529	1600	1890	2565	2849	3465	3143	3396
Netherlands	1346	1470	1365	1344	1803	2452	2812	3394	3138	3558
Top 10 sub total	21243	23648	23225	26344	28498	35611	44072	51695	49117	57321
Row* total	26267	29139	28226	28853	29744	35897	41818	50289	46844	51242
World total	47511	52787	51451	55197	58242	71508	85891	101983	95961	108562

Source: FAO, 1996 to 2012

**Rest of the world*

China, Thailand, Viet Nam and Chile are the major developing countries that top the list of exporters of fish and fishery products. India's rank in the list of leading fish exporting nations is 17 as per FAO (2010). Compared to the other developed countries, the rate of growth of fish exported by these countries especially Viet Nam and China are quite high. This is evident from the average annual percentage growth rate (APR) calculated for various exporting countries given in Table 2.3.

Table 2.3. Average Annual Percentage Growth rate of Exports of Fish and Fishery Products during 1994-2010 (Exports Value: US $ million)

Countries	APR
China	29.49
Norway	14.02
Thailand	4.38
Denmark	4.74
Viet Nam	59.72
USA	2.77
Chile	10.02
Canada	4.76
Spain	14.54
Netherlands	10.27
Top 10 sub total	10.61
Row* total	5.94
World total	8.03

Source: Computed from Table 2.2
**Rest of the world*

During the period 1994-2010, the developing countries such as Viet Nam and China recorded very high average annual percentage growth rate of 60 percent and 29 percent respectively. Chile too recorded a fairly high APR of 10 percent while Thailand showed a small APR during the period. Besides the developing nations, the developed nations also figure in the list of leading exporters indicating that they are the main suppliers of raw materials for the fish processing industries of developing countries which are further processed and re-exported. Among the developed countries, Norway, Spain and Netherlands registered a higher APR during the given period. The average annual percentage growth rate of value of fish and fishery product exports at the global level stood at 8.03 percent. The value of imports of fish and fishery products of the top ten countries of the world is shown in Table 2.4.

Table 2.4. Top Ten Fish Importers of the World (Imports Value: US $ million)

Countries / Year	1994	1996	1998	2000	2002	2004	2006	2008	2009	2010
Japan	16140	17024	12827	15513	13646	14560	13971	14947	13258	14973
USA	7043	7080	8576	10453	10065	11967	13271	14135	13858	15496
Spain	2639	3135	3546	3352	3853	5222	6359	7101	5908	6637
France	2797	3194	3505	2984	3207	4176	5069	5836	5579	5983
Italy	2257	2591	2809	2535	2906	3904	4717	5453	5060	5449
China	856	1184	991	1796	2198	3126	4126	5143	4976	6162
Germany	2316	2543	2624	2262	2420	2805	3739	4502	4571	5037
UK	1880	2065	2384	2184	2328	2812	3714	4220	3594	3702
Denmark	1415	1619	1704	1806	1806	2286	2838	3111	2735	3316
Republic of Korea	718	1054	569	1372	1861	2233	2729	2928	2694	3193
Top 10 sub total	38063	41489	39534	44257	44290	53090	60534	67377	62233	69949
Row* total	13104	11297	15517	15751	17318	22202	25357	39750	37496	41837
World total	51167	52787	55051	60008	61608	75293	85891	107128	99729	111786

Source: FAO, 1996 to 2012
**Rest of the world*

Japan, the US and the EU are the major importers of fish and fishery products accounting for more than 50 percent of total world imports. Currently the US is the world’s largest single importer of fish and fishery products with imports worth US $ 15.5 billion in 2010. The EU is the largest market for imported fish accounting for about 26 percent of the value of world imports. In 2010, the EU imported fish and fishery products worth US $ 26.5 billion (FAO, 2012).

The developed nations comprise the major market for the fish and fishery product exports of the developing countries. Developed nations account for 78 percent of the total value and 58 percent of the total volume of fish and fishery product imported indicating the importance of those fish products with higher unit values in the export basket of the developing nations. Shrimp continues to be the largest single commodity in value terms accounting for 15 percent of the total value of internationally traded fish and fishery products. The other important varieties that figure in the export basket are salmon, tuna and cephalopods. Salmon accounted for 14 percent of the total value of internationally traded fish, while tuna accounted for about 8 percent in 2010.

Another distinct feature of the internationally traded fish and fishery products is that the major part of them is meant for human consumption. According to the FAO (2010), about 71 percent of the traded fish is for human consumption. Another major aspect of the fish traded internationally is that 90 percent of it is in processed form. Frozen products account for 39 percent while prepared and preserved fish account for 18 percent of the total processed fish traded internationally (FAO, 2012).

It is very evident that the international trade in fish and fishery products is growing over the years both in terms of volume and value. The pattern of trade is biased in favor of developing nations as they have become the net exporters of fish and fishery products since 1970s. These developing nations are excessively reliant on the developed countries especially the EU, the US and Japan for marketing their products. Besides that, the items that are prominent in the export basket are those with high unit values such as shrimp, salmon, tuna, cephalopods etc. Kurien (2005) observes that fish and fishery products are among the high value products that have income elasticities not only much higher than traditional agricultural products, but also in excess of unity. These high valued fish and fishery products possess an inherent characteristic of being subject to standards and regulations mostly found in the case of luxurious manufactured products rather than traditional agricultural products. Hence it was only natural for the international trade in fish and fishery products to become tangled in several food safety stipulations and regulations.

The food safety standards and regulations applied on fish and fishery products in the major import markets of the EU, the US and Japan in the backdrop of the SPS Agreement are outlined. This is significant considering the present scenario of global fish trade with developing countries being the major exporters of fish and fishery products and being excessively reliant on the markets of the EU, the US and Japan. The post WTO phase has witnessed a strengthening of the food safety standards and hygienic requirements in the markets of the EU, the US and Japan in response to the need for ensuring the quality of the food consumed. Fish and fishery products, being in the category of credence goods, need some mechanism to signal the consumer on the quality of the product he consumes. Hence, measures have to be adopted to ensure that the imported food products are safe and prepared hygienically.

Before outlining the measures adopted by the major importers to ensure the quality and safety of the imported fish and fishery products, it is necessary to sketch the major provisions of the SPS Agreement.

2.2 The SPS Agreement

The SPS Agreement applies to all sanitary and phyto sanitary measures which directly or indirectly affect international trade. These sanitary and phyto sanitary measures should be developed and applied in accordance with the provisions of this Agreement.

Sanitary or phyto sanitary measures include all relevant laws, decrees, regulations, requirements and procedures including, *inter alia*, end product criteria; processes and production methods; testing, inspection, certification and approval procedures; quarantine treatments including relevant requirements associated with the transport of animals (including fish) or with the materials necessary for the survival during transport; provisions on relevant statistical methods, sampling procedures and methods of risk assessment and packaging and labeling requirements directly related to food safety.

SPS Agreement recognizes the right of every member country to adopt Sanitary and Phyto Sanitary measures based on scientific principles for the protection of human, animal or plant life or health. SPS Agreement also emphasizes the need for harmonization of SPS measures applied by the member countries in line with the international standards, if they exist. It also requires that the sanitary measures must be based on the assessment of risk. However, the SPS Agreement provides for the application of precautionary principle. Article 5.7 of the SPS Agreement permits the member nations to apply SPS standards provisionally even in the absence of sufficient scientific evidence, though it must seek to obtain additional information for the objective assessment of risk within a reasonable period of time. It is interesting to note that the SPS Agreement emphasizes on the Special and Differential treatment for the Less Developed Countries.

Following are the major provisions of the SPS Agreement

2.2.1 Basic Rights and Obligations

- Members have the right to take sanitary and phyto sanitary measures necessary for the protection of human, animal or plant life or health.
- Members should ensure that the sanitary and phyto sanitary measures are based on scientific principles.

- Members shall ensure that their sanitary and phyto sanitary measures do not arbitrarily or unjustifiably discriminate between members where identical or similar conditions prevail.

2.2.2 Harmonization

- Members shall base their sanitary or phyto sanitary measures on international standards, guidelines or recommendations where they exist.
- Members may introduce or maintain sanitary or phyto sanitary measures which result in a higher level of protection than would be achieved by measures based on the relevant international standards, if there is scientific justification.

2.2.3 Equivalence

- Members shall accept the sanitary or phyto sanitary measures of other Members as equivalent, even if these measures differ, if the exporting member objectively demonstrates to the importing member that its measures achieve the importing member’s appropriate level of sanitary or phyto sanitary protection.

2.2.4 Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phyto sanitary Protection

- Members shall ensure that their sanitary and phyto sanitary measures are based on assessment of risks taking into account risk assessment techniques developed by the relevant international organizations.
- In the assessment of risks, members shall take into account available scientific evidence.

- In cases where relevant scientific evidence is insufficient, a member may provisionally adopt sanitary or phyto sanitary measures on the basis of available pertinent information. In such circumstances, members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phyto sanitary measures accordingly within a reasonable period of time.

2.2.5 Adaptation to Regional Conditions

- Members shall ensure that their sanitary and phyto sanitary measures are adapted to the sanitary or phyto sanitary characteristics of the area.

2.2.6 Transparency

- Members shall notify changes in their sanitary or phyto sanitary measures.

2.2.7 Technical Assistance

- Members agree to facilitate the provision of technical assistance to other members, especially developing country members. Assistance provided may be in the areas of processing technologies, research and infrastructure, technical expertise, training and equipment etc. to allow these countries to comply with the sanitary and phyto sanitary measures.

2.2.8 Special and Differential Treatment

- In the preparation and application of sanitary and phyto sanitary measures, members shall take account of the special needs of the developing countries, especially the least-developed countries.

- When new sanitary and phyto sanitary measures are introduced, longer time-frames for compliance should be accorded on products of interest to developing countries.

2.2.9 Consultations and Dispute Settlement

- In a dispute under this Agreement involving scientific or technical issues, a panel should seek advice from experts chosen by the panel in consultation with the parties to the dispute.

2.2.10 Administration

- A committee on sanitary and phyto sanitary measures is established to provide a regular forum for consultations. The committee shall carry out the functions necessary to implement the provisions of this Agreement and the furtherance of its objectives.

It is very evident from the provisions of this agreement that it is meant to facilitate trade in products which are subject to sanitary and phyto sanitary regulations. Sanitary and phyto sanitary measures can be used by a member nation to ensure that the imported products are safe and secure and fit for consumption. But they should not apply these measures so as to hinder or limit trade. As it has been already stated, fish and fishery products belong to the category of credence goods and hence should be subject to sanitary regulations based on assessment of risk. Since the conclusion of this Agreement, sanitary measures are being increasingly applied on fish and fishery products especially by its major importers such as the EU, the US and Japan. These markets have strengthened the sanitary measures such as the safety standards, quality and hygiene regulations applied on fish and fishery products in the wake of this agreement.

The following sections highlight the new standards and food safety measures that have come up in the markets of the EU, the US and Japan.

2.3 Food Safety Standards and Quality Regulations in the Import Markets – the EU, the US and Japan

2.3.1 The EU

The EU Regulations on fish and fishery products are contained in the new hygiene rules that came into effect on 1 January 2006. A key aspect of the new legislation is that the regulations apply at every stage in the food chain including primary production and hence is in line with the EU's farm or net to fork approach to food safety. The key acts governing food safety and hygiene standards in the EU are:

- Regulation (EC) 852/2004 on the hygiene of food stuffs
- Regulation (EC) 853/2004 laying down specific rules for foods of animal origin including live bivalve mollusks and fishery products.
- Regulation (EC) 854/2004 laying down the official controls on foods of animal origin intended for human consumption.
- Regulation (EC) 178/2002 laying down general principles and requirements of food law, establishing a European Food Safety Authority and laying down procedures in the matters of food safety.

When new legislation was introduced in 2006, 17 separate pieces of previous legislations were revoked. This included the directives; EU Directive 91/492/EEC that laid down the health conditions for the production and placing in the market of live bivalve mollusks and EU Directive 91/493/EEC that laid down the health conditions for the production and placing in the market of fishery products in general. Currently, the conditions for the production and placing in the market of fishery products and live bivalve mollusks are laid down in the council Regulation (EC) 852/2004 on the hygiene of food stuffs and Regulation (EC) 853/2004 on the specific hygiene rules for foods of animal origin.

The EU lays down stringent conditions for the imports of fishery products from the third countries. With regard to the foods of animal origin, the EU has always taken into consideration the guarantees on compliance with the EU food standards given by the Competent Authorities in the third countries. The system that had been in prevalence earlier continues even after 2006. Thus fish and fishery products can be exported to the EU provided that they meet the food safety standards set by the EU or those standards that are regarded as equivalent to the EU standards. Fishery products from the third countries that appear on the list of countries approved for export to the EU are permitted entry. Besides, the fishery products must originate from the establishments that are approved to export to the EU. The consignments of fishery products arriving from the EU approved countries and establishments must be accompanied by a health certificate. The Regulation EC no. 882/2004 authorizes the commission to request third countries to provide accurate and up to date information on their SPS regulation, control procedures and risk assessment procedures with respect to the products exported to the EU.

The new food law places the primary responsibility of ensuring the required food safety standards on all the operators in the food chain; i.e. from the primary producers to processors and finally to the retailers. This is in line with the farm or net to fork approach. Under the new regulation, primary producers akin to food business operators will have to be registered with the national competent authority. However, the primary producers are exempted from the implementation of the HACCP system. They are committed to implement the basic hygiene procedures such as the prevention of contamination arising from soil, water, feed etc. All the food business operators except primary producers have to implement the HACCP system. The food business operators other than primary production shall comply with the general hygiene provisions of Regulation EC 852/2004. They relate to hygiene requirements for food premises, including outside areas/sites, transport conditions, equipments, water supply, personal hygiene of persons in contact with food, wrapping and packing, heat treatment used to process certain food stuffs etc..

Following are the general requirements to be adhered to by the food business operators to ensure hygiene. The layout, design, construction, site and size of food premises should be such that it facilitates adequate maintenance, cleaning, pest control and protection against contamination and accumulation of dirt. The other requirements include adequate number of wash basins, flush lavatories (suitably located), natural or mechanical ventilation, natural or artificial lighting and a good drainage facility.

There are certain specific requirements to be adhered to by the processing establishments to ensure hygienic practices in the rooms where processing of food takes place. The design and the layout of the rooms should permit good hygienic practices including protection against contamination between and during the operations. Floors, wall surfaces, doors and surfaces where foods are handled are to be maintained in sound condition. To facilitate easy cleaning and disinfection, these surfaces should be made of non absorbent, washable, non toxic and corrosion resistant materials. Ceilings and overhead fixtures should be constructed so as to prevent accumulation of dirt. The articles and equipments with which the food comes to contact must be effectively cleaned and disinfected frequently to avoid any risk of contamination. Potable water should be used and ice used for the purpose of chilling must be from potable water. Personal hygiene of the employees is strictly demanded at the establishments. Persons with infectious diseases, wounds or skin diseases are not to be employed. Proper training in HACCP should be given to the employees to enlist their participation in ensuring good hygienic practices.

Wrapping and packing materials used should not be a source of contamination. Good hygienic practices must be ensured at the time of transportation as the containers carrying food stuffs should be maintained in sound condition and should be capable of maintaining the needed temperatures during transit.

The food business operators handling or making products of animal origin including fishery products must comply with the provisions of regulation (EC) 853/2004. There are specific requirements in the new legislation pertaining to fishery products. They are

2.3.1.1 Structural and Equipment Requirements

This mainly pertains to the design of vessels such as freezer vessels and factory vessels so as to avoid contaminations and ensure preservation under conditions of hygiene. Surfaces of the vessels with which fishery products come to contact must be made of suitable corrosion resistant material that is smooth and easy to clean. Similarly equipment and materials used for working on fishery products must also be made of suitable corrosion resistant material that can be easily cleaned and disinfected.

2.3.1.2 Requirements for Factory Vessel and Freezer Vessel

Factory vessels and freezer vessels must have areas for reserving products taken on board, work and storage areas, separate tanks for storage of waste, place for storing packing materials separate from the product preparation and processing areas, hand washing equipment for use by the staff designed to avoid contamination, refrigeration, freezing installation and pumping of waste. Disinfection must also be carried out on board the vessel.

2.3.1.3 Hygiene on board the fishing vessels, factory vessels and freezer vessels

Parts of the vessel and containers meant for the storage of fishery products must be kept clean and maintained in good repair and condition. Fishery products on board must be protected from contamination and heat. Potable or clean water must be used for washing fish and care must be taken to prevent bruising when handling fish. Fishery products other than kept alive must undergo chilling as soon as possible after loading.

2.3.1.4 Conditions of hygiene during and after the landing of fishery products

The equipments that come into contact with fishery products must be constructed of materials that are easy to clean and disinfect. Measures must be taken to avoid contamination during unloading and landing. Hygienic conditions are to be maintained at auction and wholesale markets. There are specific requirements for fresh and frozen fishery products.

2.3.1.5 Fresh, Frozen and Processed Fishery Products

Fresh fishery products should be stored under ice in appropriate facilities. Operations such as heading and gutting must be carried out hygienically. Operations such as filleting and cutting must be carried out so as to avoid contamination. Fillets and slices must be wrapped and packaged and chilled immediately after the preparation. Establishments that prepare frozen fishery products must meet requirements applicable to freezer vessels. Rapid cooling must follow cooking; potable water is to be used and shelling or shucking must be carried out hygienically. After shelling or shucking, cooked products must be frozen immediately.

2.3.1.6 Wrapping, packaging, storage and transport of fishery products

Fish and fishery products must be adequately wrapped. It should be ensured that wrapping material should not be a source of contamination. Food business operators must comply with certain requirements during storage and transportation. Fresh fishery products, thawed unprocessed fishery products, cooked and chilled products must be maintained at a temperature approaching that of melting ice. Frozen fishery products must be kept at a temperature of not more than -18^0celsius in all parts of the product.

2.3.1.7 Other Regulations

Traceability of food is also an essential element of the European Food Safety Law. In accordance with the Regulation (EC) 178/2002, food business operators must set up traceability systems and procedures for ingredients, food stuffs and where appropriate, animals used for food production. There are other specific rules relating to microbiological criteria. Regulation (EC) 2073/2005 includes limits for certain micro organisms on specified food stuffs. Limits have been placed for the following such as Listeria monocytogenes for ready to eat food, Salmonella for cooked crustaceans and mollusks shell fish and E.coli and Coagulase-positive staphylococci for shelled and shucked products of cooked crustacean. In addition to compliance with microbiological criteria, the processing establishments should ensure that depending upon the nature of the fish products, certain other standards are also to be met. They include

a) Organoleptic examination of fishery products to ensure compliance with freshness criterion.

b) Fishery products contaminated with parasites should not be placed in the market.

c) Food business operators must ensure that the limits with regard to histamine are not exceeded.

The EU has also set Maximum Residue Limits (MRLs) for contaminants, dioxins, poly chlorinated biphenyls (PCBs) etc. Table 2.5 presents the MRLs set by the EU on contaminants, dioxins, PCBs and microorganisms for various categories of fish and fishery products.

Table 2.5. MRLs set by the EU

Type of residues	**Type of fish products**	**Maximum Residue Limits** **Maximum levels (mg/kg)wet weight/ (pg/g') wet weight**
Metals/toxic elements		
Cadmium	Bivalve mollusks, Cephalopods	1.0
	Crustaceans	0.50
Lead	Bivalve mollusks	1.5
	Crustaceans/Cephalopods	1.0
Mercury	fishery products including crustaceans	0.50
Dioxins and PCBs	fishery products	8.0'
Microorganisms		
Salmonella	Cooked crustaceans, molluscan shellfish, live bivalve mollusks, etc.	Absence in 25 gm
E. coli	live bivalve mollusks, live echinoderms, tunicates	230MPN/100gm of flesh and intra-valvular liquid
Histamine	Fishery products from fish species associated with a high amount of histidine	m M 100mg/kg 200mg/kg
Coagulase positive staphylococci	shelled and shucked products of cooked crustaceans	m M 100cfu/g 1000cfu/g

Source: europa.eu, 2010
cfu colony forming unit
1 pg = 1.0 × 10^{-9} mg

Besides, the aforementioned types of residues, there are certain substances that are recognized as prohibited and for which MRLs are not established. Such prohibited substances in food products include chloramphenicol and nitrofurans.

2.3.1.8 Rapid Alert System for Food and Feed

The EU also has a Rapid Alert System for Food and Feed (RASFF) that provides for a procedure to inform the member states of the EU when a product presents a serious risk for the health and the safety of the consumers. The RASFF was established under Article 8 of Directive 92/59/EEC. RASFF deals with 2 types of notifications: alert notifications and information notifications. Alert notifications relate to products which are in the market and which presents a risk to the consumer. Information notification relates to products that pose risk to consumers for which it can be assumed that they are not on the market; for e.g., the products stopped at the border.

Table 2.6. Notifications issued by the RASFF

Year	Alert Notifications	Information Notifications	Year	Alert Notifications	Information Notifications
1992	10	1	2001	302	406
1993	21	1	2002	434	1092
1994	19	3	2003	454	1856
1995	10	2	2004	691	1897
1996	16	3	2005	956	2202
1997	67	16	2006	912	1962
1998	74	156	2007	953	1972
1999	97	263	2008	528	1138
2000	133	340	2009	557	1191

Source: RASFF, 1993-2010

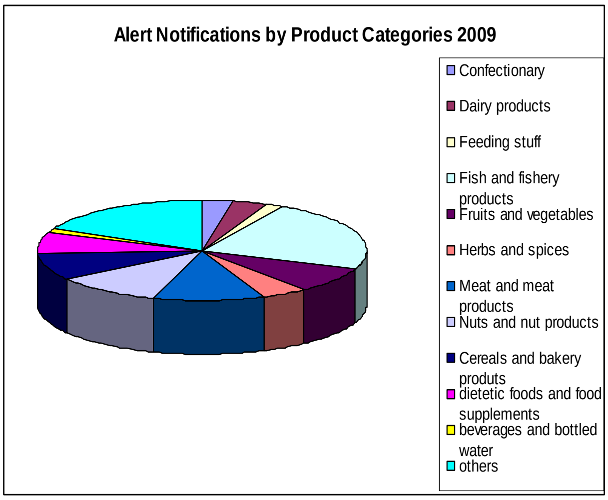
It is evident from Table 2.6 that there is a huge increase in the number of notifications since the late 1990s. Since 1997, the number of notifications has been increasing at a steady pace and this pattern continued till 2005. In the latter half of 2000, though it shows a slight decline, the number of notifications remains quite high. Table 2.7 presents the number of alert and information notifications pertaining to the fish and fishery products since 2000.

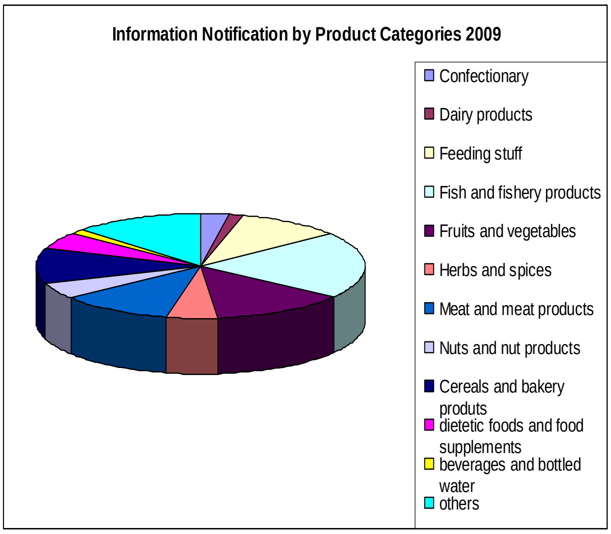
Table 2.7. Alert Notifications and Information Notifications on Fish and Fishery Products in the EU

Year	Alert notifications	A N on fish and fishery products	percent	Information notifications	I N on fish and fishery products	percent
2000	133	32	24	340	133	39
2001	302	87	29	406	145	36
2002	434	112	26	1092	368	34
2003	454	97	21	1856	448	24
2004	691	168	24	1897	373	20
2005	956	196	21	2202	363	16
2006	912	182	20	1962	353	18
2007	953	200	21	1972	355	18
2008	528	109	21	1138	188	17
2009	557	121	22	1191	244	20

Source: RASFF, 2000-2010

During the past ten years the percentage of alert notifications on fish and fishery products to the total alert notifications constituted a significant share. The percentage of alert notifications issued on fish and fishery products hovered around 20 percent to 24 percent and occasionally crossing over 25 percent mark. Similarly, the percentage of information notifications on fish and fishery products to the total information notifications issued comprised a substantial share especially in the early part of 2000, though its share has been steadily declining. Figure 2.1 presents the alert and information notifications in terms of product categories for the year 2009.





Source: Based on Table 2.7

Figure 2.1. Alert and Information Notifications on Fish and Fishery Products in the EU

In 2009, the alert notifications analyzed in terms of product categories reveal that about 24 percent is on fish and fishery products. Similarly the information notifications pertaining to fish and fishery products to total information notifications constituted 21 percent. Significantly higher number of notifications; both alert and information notifications pertaining to fish and fishery products in the EU market in the post WTO period suggest that trade in fish and fishery products are affected to a marked extent by stricter standards and regulations in the wake of the SPS Agreement of the WTO.

The EU has thus developed a harmonized regulation based on farm/net to fork principle applicable to imports of fishery products from third countries. The stringency of the EU regulations matters for the marine product exports of Kerala that primarily targets the EU. The excessive dependence on the EU compelled the marine product export units of Kerala to comply with the new regulations despite its stringency. The divergence of the EU standards from the standards insisted by the non EU importers is obvious from the existence of two types of marine product export units in the state; the EU approved and the non EU approved. The status of EU approval is granted only to those establishments that satisfy the rigorous requirements insisted by the EU. The EU specification that demanded the integrated pre processing and processing facilities in the EU approved units virtually altered the marine product supply chain in the state. Previously, the processing establishments sourced in the pre processed raw material from the outside pre processing centres that carried out pre processing activities such as cleaning, peeling and deshelling. The need for integrated pre processing and processing facilities in the establishment meant for export to the EU had a tremendous impact on the cost structure of the marine product export units of the state. The implementation of the HACCP insisted by the EU had ramifications for the marine product export units of Kerala owing to the discrepancies in the testing requirements and the MRLs set by the EU vis-à-vis the non EU importing countries. The standards set on heavy metals such as cadmium and mercury posed troubles for the marine product exports from the state in the post WTO period as most of the detentions reported at the EU ports were on the account of the heavy metal issue. The RASFF notifications issued at various ports in the EU prevented hassle free entry for the marine product exports from the state leading to inordinate delays and huge demurrage costs. A host of regulations that emerged in the EU in the post WTO phase definitely had significant implications for Kerala as bulks of our marine product exports in terms of quantity and value were directed to this particular market. Compliance with the EU regulations was essential to retain the market, the loss of which could not be easily made up, given the size of export to this market, coupled with better unit value received in US $ per kg.

2.3.2 The US

Until the mid to late 1990s, food safety controls on the imports of fish and fishery products to the US were based on physical examination at the border. These examinations were directed primarily towards the substances that would cause the consignment to be adulterated under the US law. While border inspection remains an integral element of the US safety controls, more recent rules require that importers be proactive in ensuring that consignments comply with the US regulatory requirements. FDA operates a mandatory safety programme for all fish and fishery products under the provisions of the Federal Food, Drug and Cosmetic Act, the Public Health Service Act and other related regulations. Imports into the US are regulated under the Federal Regulations, referred to as 21 CFR 123. These regulations apply to domestically produced products and imports. Since 1993, the USFDA requires processors of fish and fishery products to implement HACCP. The plants that implement HACCP must also put in place Good Manufacturing Practices (GMPs). The GMP addresses concerns within the food plant such as proper design and maintenance of the plant and its surrounding area, sanitation, including clean water source, equipment, ingredients, materials etc. Under the provisions of the US law contained in the US Federal Food, Drug and Cosmetic Act, importers of food products are responsible for ensuring that the imported products are safe and comply with the US requirements.

The regulations contained in the Public Health Security and Bioterrorism Preparedness Act 2002 also have to be complied with by the exporters of fishery products to the US. The purpose of the Bioterrorism Act (BTA) is to allow the FDA and other authorities to determine the source of any deliberate or accidental contamination of food. The section 305 of the act requires registration of food facilities. The owner, operator or agent in charge of a domestic or foreign food facility must register that facility with the FDA and provide necessary information as requested. Registration requirements apply to all the facilities that manufacture, process, pack or hold food regulated by the FDA. As per section 307 of the Act, a prior notice of the coming of shipments containing consignments of food products must be provided to the FDA. Imported food products are subject to the inspection of the FDA at the US port of entry. FDA may detain the shipment of imports, if they are found not to be in compliance with the US requirements.

Another major import regulation in the US that is applicable to fishery products is the Country of Origin Labeling (COOL). This law requires retailers such as the full line grocery stores, super markets, and club warehouse stores notify their customers with information regarding the source of certain foods such as fresh beef, pork and lamb. Later this law was extended to include fish and shellfish and other food products. Regulations for fish and shellfish became effective in 2005.

The USFDA has also set MRLs for substances such as metals, microorganisms, toxins and pharmacologically active substances for various categories of fish and fishery products. This can be presented in Table 2.8.

Table 2.8 MRLs set by the US

Type of residues	Type of fish products	Maximum Residue Limits Level part per million (ppm)*
Metals/toxic elements		
Cadmium	Bivalve mollusks	4
	Crustaceans	3
Chromium	Bivalve mollusks	13
	Crustaceans	12
Lead	Bivalve mollusks	1.7
	Crustaceans	1.5
Methyl mercury	All fish	1
Heptachlor	All fish	0.3
Mirex	All fish	0.1
Polychlorinated biphenyls	All fish	2
Deleterious substance		
Aldrin	All fish	0.3
Chlordane	All fish	0.3
Chlordecone	All fish	0.3
DDT, TDE, DDE	All fish	5.0
Diquat	All fish	0.1
Microorganism/ pathogenic substances		
E.coli	clams, oysters fresh and frozen	MPN of 230/100gms
Listeria monocytogenes	Ready to eat fishery products with minimal cooking by consumer	Presence of organism
Salmonella	All fish	Presence of organism
Staphylococcus aureus	All fish	Level greater than or equal to 10^4/g(MPN)
Vibriocholerae	Ready to eat fishery products with minimal cooking by consumer	Presence of toxigenic 01 or non -01
Vibrioparahaemolyticus	Ready to eat fishery products with minimal cooking by consumer	Level greater than or equal to 1x 10^4 /g
Vibrio vulnificus	Ready to eat fishery products with minimal cooking by consumer	Presence of pathogenic organism
Histamine	Tuna, mahi and related fish	500 ppm
Polychlorinated biphenyls	All fish	2

Source: USFDA, 2010
1 ppm=mg/kg

The integral part of the US requirements on food safety applied to imported fish and fishery products is the implementation of HACCP. The marine product export units of Kerala have to mandatorily implement the HACCP as demanded by its major traditional markets such as the EU and the US. Another requirement mandatorily followed by the marine product exporters of Kerala is the registration of the food processing facilities with the USFDA as per the provisions of the BTA, 2002 to ensure traceability in the event of accidental or purposeful intervention in the food supply chain causing health scare. However the MRLs set by the US on various deleterious substances are on par with the international standards and thus causing not much botheration to the marine product exporters. The adherence to the implementation of the HACCP and mandatory registration of food processing facility with the USFDA signify the efforts on the part of the marine product exporters of Kerala to comply with the regulations in the US for the fear of the loss of one of its lucrative markets. Despite compliance with the food safety standards and quality regulations prescribed by the US, the marine product exports from Kerala encounter a major NTM in the form of anti-dumping duties and enhanced bond requirements imposed on the imported shrimp. This is indeed a source of concern and it merits an analysis of the impact on the marine product exports from Kerala to the US in the post WTO period.

2.3.3 Japan

The imports of fish and fishery products into Japan are guided by the Food Sanitation Law, Quarantine Law and the Japanese Agricultural Standard. The Food Sanitation Law defines certain specifications and standards for all foods. The foods that fail to comply with these specifications and standards may not be imported into Japan. Importers are required to give prior notification of imports to the Food Sanitation Inspection Division of the

Quarantine station. Inspectors undertake the examination of documents and the inspections are risk based. It is also specified that certain species of marine products imported into Japan must carry a health certificate issued by the government agency of the exporting country. The Food Sanitation Law prohibits the sale of foods containing toxic or harmful substances and foods that are unsafe for human health. When selling shrimp without the shell inside container packaging, they must be labeled in accordance with provisions of the Food Sanitation Law.

As per the Quarantine Law, marine products from areas contaminated by cholera or from suspected areas shall be subject to inspection. These laws thus lay down general requirements that prohibit the import and sale of products that are rotten, decomposed or immature such that they are unfit for human consumption; the products that contain or are suspected to contain toxic or injurious substances; the products that are contaminated with or suspected to be contaminated with pathogenic microorganisms and products that may injure human health due to lack of cleanliness, addition of extraneous substances or any other cause.

Further, Japan has amended the Food Sanitation Law and passed the new Food Safety Basic Law that came into effect in 2003. This act recognizes the need for taking necessary measures to protect the health of the citizens. It recognizes the role of the state in formulating and implementing policies to ensure food safety. Food business operators are also entrusted with the responsibility of taking adequate steps to ensure food safety at each stage of the food supply process in accordance with the code of basic principles. The Act emphasizes on risk analysis and the newly established Food Safety Commission is required to evaluate toxicological residues in food stuffs as a part of its risk assessment. In addition, the revised Food Sanitation Law restricts substances without MRLs to zero tolerance and does not allow products with these substances to enter the Japanese market. Table 2.9 presents MRLs set on various substances by Japan.

Table 2.9. Standards set by Japan on Fish and Fishery products

Substances	**Standards**
Mercury	0.4ppm (Total Hg)
	0.3ppm(methyl Hg)
PCB	0.5ppm (offshore fish)
	3 ppm(inland seafish)
Dieldrin (including aldrin), Pesticide	0.1 ppm (hard shelled mussels only)
Salmonella	Not to be detected in 25 grams of fish
E.coli	<10 per gram
S.aureus	<1000 per gram
Faecal coliforms	None

Source: FAO, 2010

Japan too has been one of the traditional strongholds for the marine product exports of Kerala. Japanese market insists very stringent standards and rigorous testing requirements for heavy metals such as mercury and also for antibiotics especially applicable to the farmed fish products. The food safety standards in Japan do have implications for the marine product exports from the state.

It is evident that the developed country markets especially the EU, the US and Japan have formulated a host of rules and regulations to ensure the safety and quality of fish and fishery products that are imported. The sanitary measures implemented in these markets pertain to maintenance of hygiene conditions throughout the supply chain of the product. They have also set MRLs for various harmful and deleterious substances and these limits obviously vary among markets.

Though the strengthening of food safety standards and quality regulations applied on fish and fishery products has happened in these markets in the wake of the SPS stipulations of the WTO, these measures are found to hinder the marine product exports from Kerala posing a conflict with the free trade principle upheld by the Organization. The complexities in regulations and discrepancies in standards in these markets certainly reduce transparency, transforming them to NTMs. The explicit discrepancies in the food safety standards and quality regulations among the major importing nations have always caused troubles to the marine product export industry of the state owing to the need to achieve compliance with diverse standards. The divergences in the requirements in the markets are reflected in various respects such as the testing requirements for water and ice (EC Directive 98/83/EC for the EU and IS 4251 for the non EU importers), MRLs set on heavy metals, microbiological organisms, antibiotic residues etc. and the labeling requirements with the EU demanding the use of EC languages on labels besides English. The compliance with the divergent regulations in these markets could have implications for the marine product export sector of Kerala that primarily targets these major markets. In fact a major issue for the marine product export sector of Kerala is the continued hassles that come up in the EU in the form of inordinate delays and rising demurrage costs owing to RASFF notifications and the huge financial burden in the US due to anti-dumping duties imposed on the imported shrimp. The troubles in these markets in the form of RASFF notifications and anti-dumping duties arise despite compliance with the host of required regulations. This definitely is an issue for the marine product export sector of the state as these markets besides being the traditional strongholds are quite lucrative yielding a higher unit value in $ terms per kg compared to the emerging non-traditional markets. The loss of these major traditional markets cannot be easily compensated.

These are some of the pressing issues that have come up in the post WTO phase that merit an in-depth analysis. The chapters to come basically examine the implications of strengthening of standards and regulations for the marine product exports of Kerala and the responses of the government and the marine product export industry to cope with the new regulations and emerging issues in the major import markets.

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Chapter

3

MARKET WISE EXPORTS OF MARINE PRODUCTS FROM INDIA AND KERALA – A COMPARATIVE ANALYSIS OF PRE AND POST WTO PHASES

The post WTO phase has witnessed applications of sanitary standards and regulations on the imports of fish and fishery products by the developed nations. Chapter two has outlined the food safety standards and regulations framed by the major importers of the fish and fishery products such as the EU, the US and Japan. The developments in these markets have certain ramifications for India as the EU, the US and Japan had been major destinations for the marine product exports of India. The marine product export sector is a vital part of our economy earning a sizeable amount of foreign exchange and providing employment. In 1960-61, the value of marine products exported from India was just `3.92 crores. Since then, it has increased steadily to reach `12901.47 crores in 2010-11. Table 3.1 shows the quantity and value of marine products from India during the period 1960-2010.

Table 3.1. Quantity and Value of Marine Product Exports from India

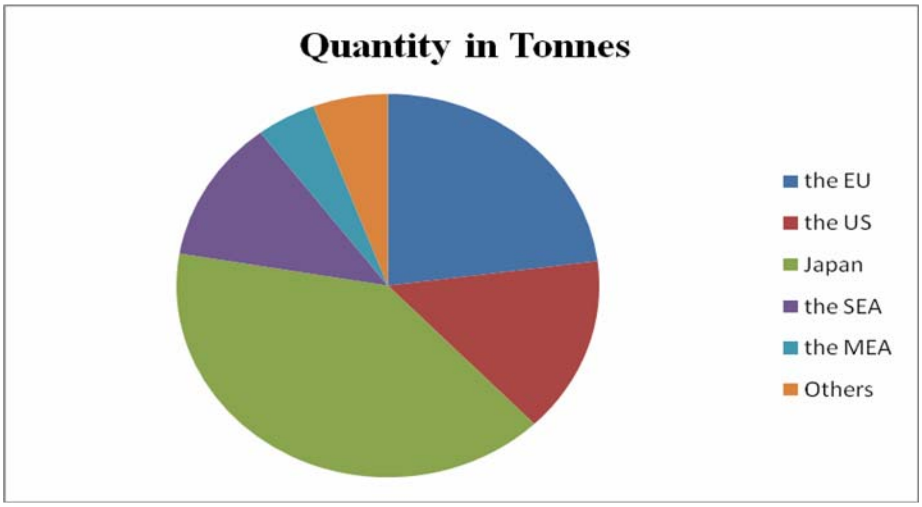
Year	Quantity in tonnes	Value in ` Crores	Value in US $ Million
1961-62	15732	3.92	NA*
1965-66	15295	7.06	NA*
1970-71	35883	35.07	46.4
1975-76	54463	124.53	143.43
1980-81	75591	234.84	296.92
1985-86	83651	398.00	325.30
1990-91	139419	893.37	497.9
1995-96	296277	3501.11	1111.46
2001-02	424470	5957.05	1253.35
2002-03	467297	6881.31	1424.91
2003-04	412017	6091.95	1330.76
2004-05	461329	6646.69	1478.48
2005-06	512164	7245.30	1644.21
2006-07	612641	8363.53	1852.93
2007-08	541701	7620.92	1899.09
2008-09	559231	7974.14	1906.17
2009-10	678436	10048.53	2132.85
2010-11	813091	12901.47	2856.93

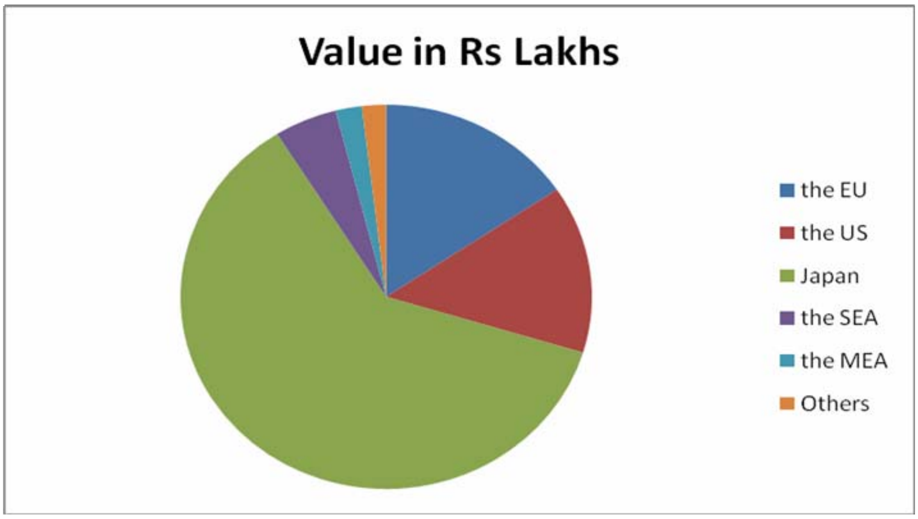
Source: MPEDA, 1962 to 2011
**NA Not Available*

Historically, the major markets of export of India had been Japan, the EU and the US. In the post WTO period, the food safety standards and hygiene requirements were tightened in these markets especially the EU, the US and Japan. In the light of these, a market wise analysis of flow of exports of marine products from India in the pre WTO and the post WTO period shall serve to indicate whether change has occurred in the direction of exports. The years stretching from 1987-88 to 1994-95 is taken as the pre WTO period. The period from 1995-96 to 2009-10 is taken as the post WTO period. This is followed by a gravity analysis to study the impact of the food safety standards on the exports of marine products from India to these markets.

3.1 Marine Product Exports from India in the Pre WTO Phase – An Empirical Analysis

The combined share of the traditional markets in the marine product exports of India in 1987-88 was 78 percent in terms of quantity giving a clear signal of high degree of market concentration. The share of Japan, the EU and the US stood at 40 percent, 23 percent and 15 percent respectively. With respect to the value of marine product exports in terms of ` Lakhs, about 91 percent has been directed to these markets with Japan accounting for about 61 percent of the total value of marine product exports of the country. The presence of other markets such as the SEA, the MEA and 'Others' was rather insignificant especially from the perspective of marine product exports in value terms. Figure 3.1 depicts the relative importance of various markets in the quantity and value of marine product exports of India.

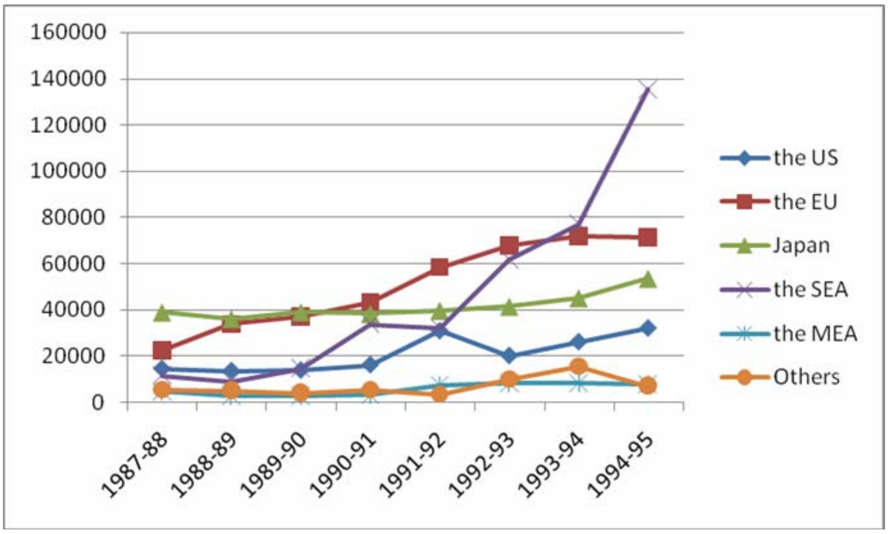




Source: Computed from MPEDA data, 1988

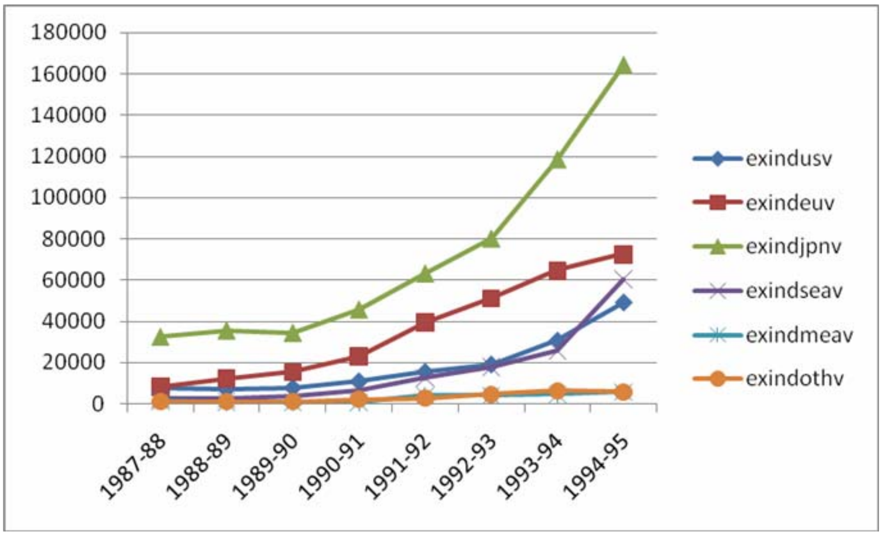
Figure 3.1. Market wise Exports of Marine Products from India in 1987-88

The trends in the marine product exports of India to various markets in the pre WTO phase from 1987-88 to 1994-95 are depicted in Figures 3.2a, 3.2b and 3.2c.



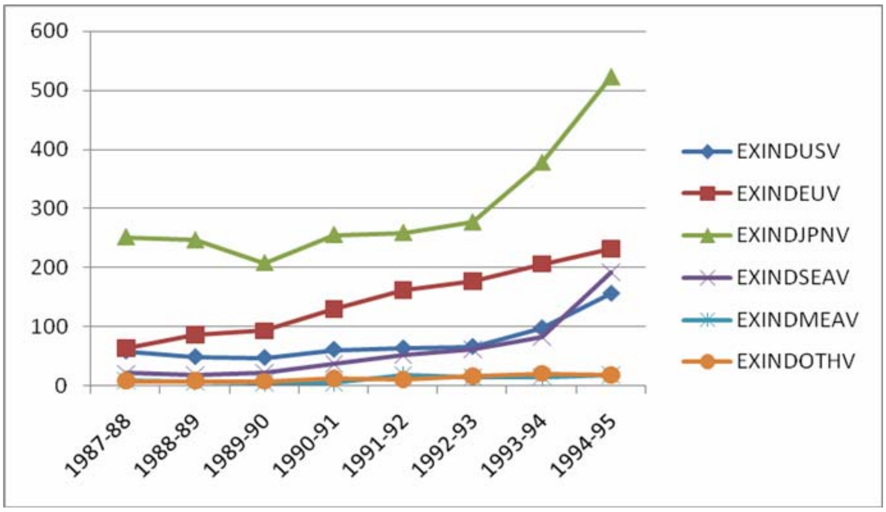
Source: MPEDA Data, 1988 to 1995

Figure 3.2a. Trends in the Marine Product Exports from India to Various Markets in the Pre WTO Phase (Quantity in tonnes)



Source: MPEDA Data, 1988 to 1995

Figure 3.2b. Trends in the Marine Product Exports from India to Various Markets in the Pre WTO Phase (Value in ` Lakhs)



Source: MPEDA Data, 1988 to 1995

Figure 3.2c. Trends in the Marine Product Exports from India to Various Markets in the Pre WTO Phase (Value in US $ Million)

An examination of trends in the quantity and value of marine product exports from India in the pre WTO period to various markets establishes the predominance of the traditional strongholds such as Japan, the EU and the US. The quantity and value (both in ` Lakhs and US $ million) of marine product exports from India to the traditional markets show a rising trend throughout the pre WTO period. Among the non-traditional markets, the SEA is the market that has registered a rising trend in terms of quantity and value of marine product exports from India.

The compound annual growth rate of marine product exports from India to these markets is computed for the pre WTO period (see Table 3.2).

$Y = a + bt$

$\log Y = \log a + b \log t$

Y is the quantity of marine product exports from India

t is the time period.

Compound Annual Growth Rate = [(antilog b)-1] 100

Table 3.2. Compound Annual Growth Rate of Marine Product Exports from India in the Pre WTO Period (1987-88 to 1994-95)

Markets	Quantity (in tonnes)	Value (in ₹ Lakhs)	Value (in US $ Million)
The EU	18.15	38.82	20.31
The US	13.5	32.29	14.65
Japan	4.41	27.15	10.18
The SEA	46.67	59.31	38.06
The MEA	18.73	36.47	18.26
Others	11.95	33.65	15.83

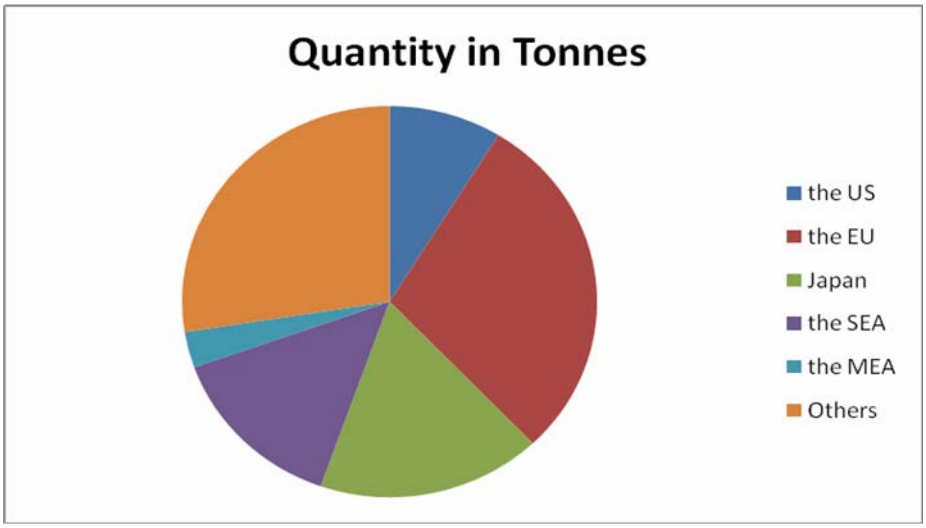
Source: Computed from MPEDA Data, 1988 to 1995

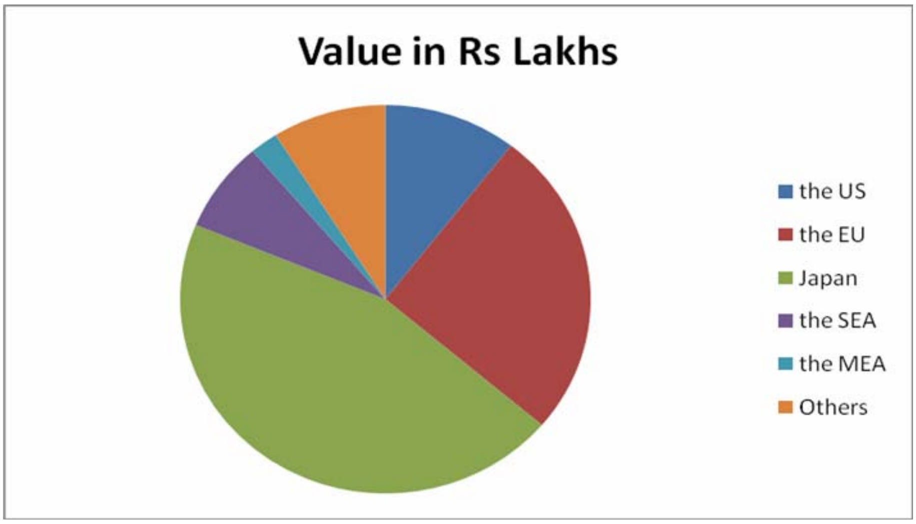
Japanese market has showed a definite sign of slow down especially in terms of quantity during the pre WTO phase. The compound annual growth rate of quantity of marine product exports to Japan was a low of 4.41 percent. Among the traditional strongholds, the EU predominates, registering 18.15 percent compound annual growth rate in terms of quantity. In terms of value in ` Lakhs and value in US $ million, the EU registered a relatively higher compound annual growth rate of 38.82 percent and 20.31 percent respectively. The US too performed reasonably well registering 32.29 percent and 14.65 percent in terms of value in ` Lakhs and in US $million respectively and 13.5 percent in terms of quantity. The compound annual growth rate of marine product exports from India to the SEA was quite high during this period indicating its emergence as a prominent market for our marine product exports. Though marine product exports from India to the MEA and 'Others' remained insignificant in absolute terms, the compound annual growth rate both in terms of quantity and value registered a rise.

3.2 Marine Product Exports from India in the Post WTO Phase – An Empirical Analysis

In the beginning of the post WTO phase, i.e. in 1995-96, the share of the traditional markets in the value of marine product exports though declined compared to 1987-88, it still accounted for about 81 percent of total value of marine product exports of India. The share of Japan, the EU and the US in the value of marine product exports of the country being 45 percent, 23 percent and 10 percent respectively in 1995-96. However, a drastic change has occurred in the relative shares of traditional and non-traditional markets in the quantity of marine product exports of India in 1995-96. The combined share of the traditional markets in the quantity of marine product exports of India stood at 56 percent in 1995-96 vis-à-vis 78 percent in 1987-88. There was a significant improvement in the shares of the market category 'Others' comprising mainly China, Turkey etc. This market accounted for 27 percent of the quantity of marine product exports from the country emerging as a major import market second only to the EU. The share of the SEA also was quite significant at 14 percent, while the MEA continued to remain an insignificant market for our marine product exports.

This is a clear indication that in the beginning of the post WTO phase, there has been erosion in the share of the traditional strongholds in the marine product export basket of the country especially in quantity terms. With respect to value, though the relative combined share of the traditional strongholds dropped, it remained substantially high giving signals of high degree of market concentration. This is presented in Figure 3.3.



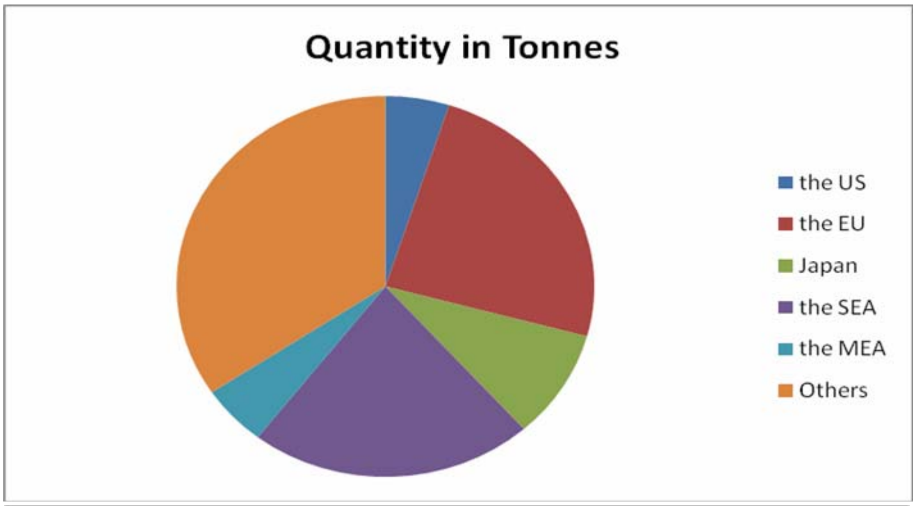


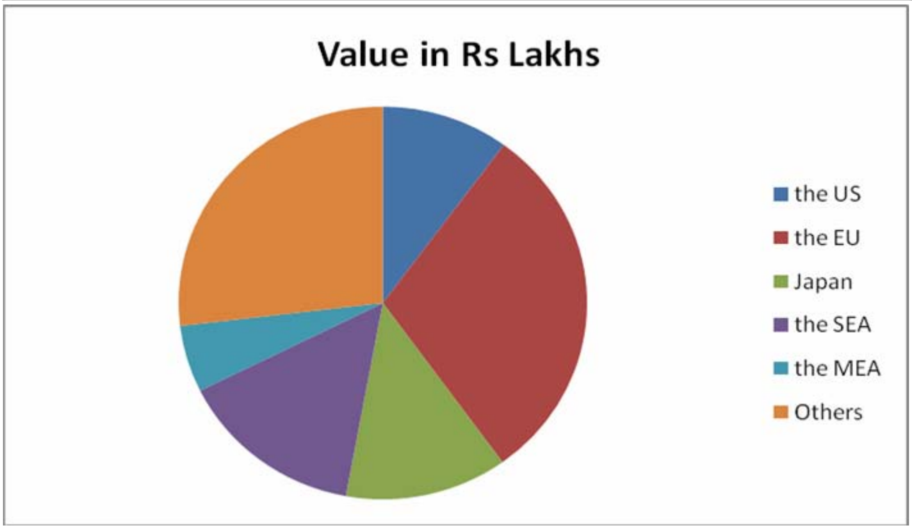
Source: Computed from MPEDA Data, 1996

Figure 3.3. Market wise Exports of Marine Products from India in 1995-96

In 2009-10, the combined share of traditional markets stood at 38 percent of the total quantity of marine product exports of India. The shares of the EU, Japan and the US in 2009-10 are 24 percent, 9 percent and 5 percent respectively. There has been a decline when compared to 1995-96, as the shares of the EU, Japan and the US then were 29 percent, 17 percent and 9 percent respectively. The non-traditional markets have improved their share in the marine product export basket of India in 2009-10 accounting for about 62 percent of the total surpassing the share of the traditional markets. The individual shares of the SEA, and ‘Others’ increased from 14 percent and 27 percent in 1995-96 to 22 percent and 34 percent respectively in 2009-10(see Figure 3.4).

In terms of value, the combined shares of the traditional markets have dropped from 81 percent in 1995-96 to 53 percent in 2009-10. Among the traditional markets, while the US has maintained its status quo, the EU improved its market share from 26 percent in 1995-96 to 30 percent in 2009-10. There has been huge erosion in the market share of Japan as it fell from a high of 45 percent in 1995-96 to 13 percent in 2009-10. The non-traditional markets of the SEA, the MEA and ‘Others’ improved their market share in 2009-10 vis-à-vis 1995-96. The major gainers have been the SEA and ‘Others as their respective shares increased from 8 percent and 9 percent in 1995-96 to 15 percent and 27 percent in 2009-10. This suggests the tendencies of market diversification as India has come a long way since the days of the excessive dependence on Japanese market for the exports of marine products (see Figure 3.4).

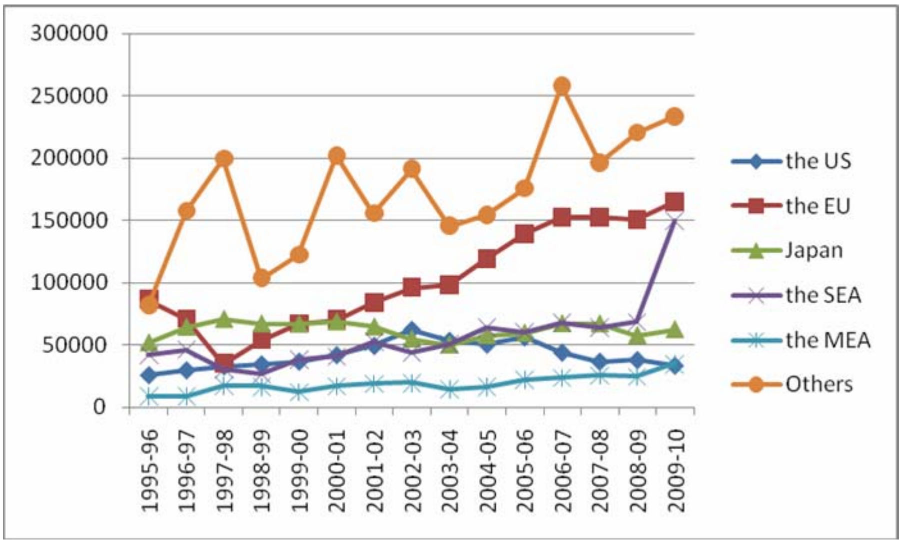




Source: Computed from MPEDA Data, 2010

Figure 3.4. Market wise Exports of Marine Products from India in 2009-10

The trends in the quantity of marine product exports from India to the aforementioned markets in the post WTO period from 1995-96 to 2009-10 is depicted in Figure 3.5.

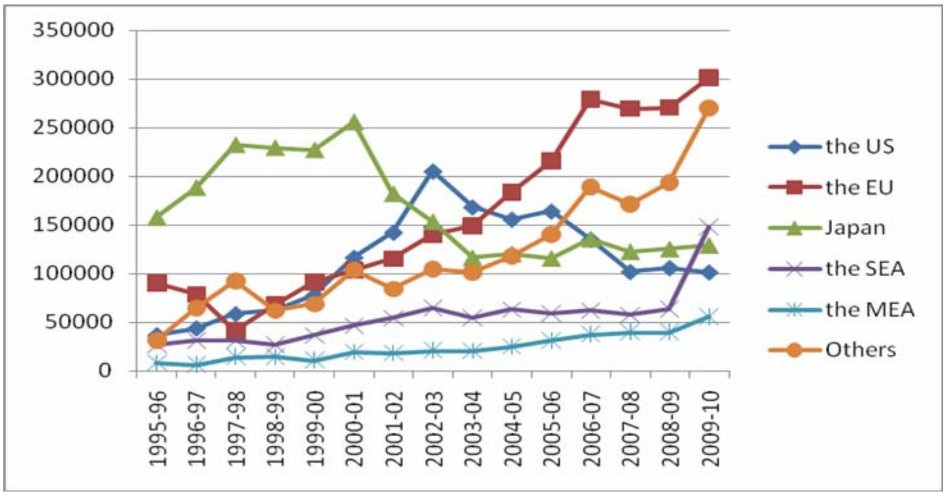


Source: Computed from MPEDA Data, 1996 to 2010

Figure 3.5. Trends in the Quantity of Marine Product Exports from India to Various Markets in the Post WTO Phase (Quantity in Tonnes)

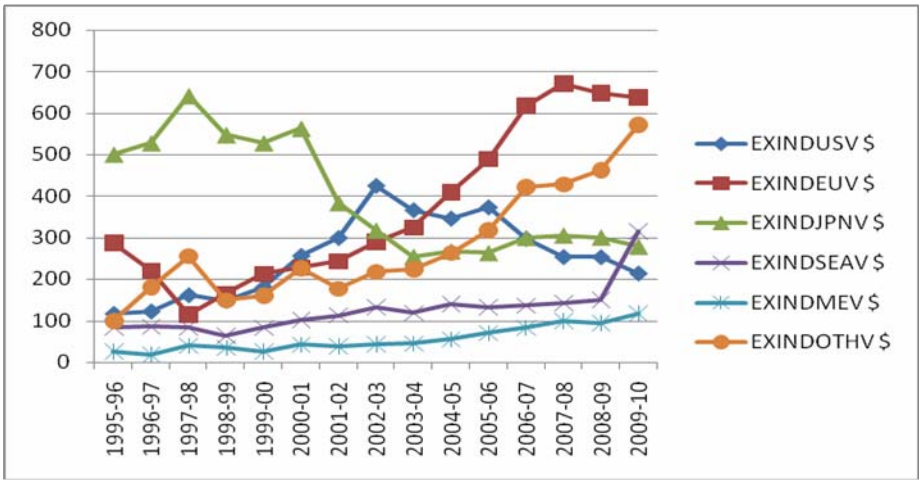
An interesting development in the post WTO period is the rising trend in the quantity of marine product exports to the market 'Others'. This is in stark contrast to the pre WTO phase when the quantity of marine product exports to this market was very low in absolute terms falling behind all the other markets. But in the post WTO phase, the quantity of marine products moving to the market category 'Others' remained over and above all the other markets. The quantity of marine product exports to these markets rose in absolute terms from a low of 81439 tonnes in 1995-96 to 233244 tonnes in 2009-10. Among the traditional markets, the EU continues to predominate with the quantity of marine product exports registering a rising trend throughout this phase except for a sharp decline in 1997-98 following the ban imposed by the EU on marine products from India owing to quality issues. On inspection of seafood export units of the country by the EC, serious non compliances were found out. The fall in the sanitary standards at the pre-processing and processing centres, inadequate hygiene at various points of supply chain and detection of salmonella in fish and fishery products meant for export resulted in the imposition of ban by the EU on marine product exports from India in 1997. However, the ban was lifted within a short span of 5 months in December 1997, following an inspection conducted by the EC in November 1997. The quantity of exports of marine products to the EU recovered slowly and it had since then increased moderately. The quantity of marine product exports from India to the US and Japan show a falling trend especially since the early part of 2000s.

The trends in the value (both in ` Lakhs and US $ million) of marine product exports to these markets more or less match with the trends observed for quantity in the post WTO period as is evidenced from Figures 3.6a and 3.6b. The value of exports (both in ` Lakhs and US $ million) to the US and Japan show a steady decline especially since 2000s. However, the EU has displayed its dominance throughout this phase as the value of marine product exports to the EU remained over and above all the other markets. The value of marine product exports from India to all the new markets registered a rise throughout this phase.



Source: Computed from MPEDA Data, 1996 to 2010

Figure 3.6a. Trends in the Value of Marine Product Exports from India to Various Markets in the Post WTO Period (Value in ` Lakhs)



Source: Computed from MPEDA Data, 1996 to 2010

Figure 3.6b. Trends in the Value of Marine Product Exports from India to Various Markets in the Post WTO Period (Value in US $ Million)

The post WTO phase has witnessed the emergence of the SEA, 'Others' and the MEA as major importers of marine product exports from India. Besides improving the individual shares over the period 1995-96 to 2009-10, there has also been a steady increase in the quantity and value of marine product exports to these markets during the post WTO period. The compound annual growth rate of quantity and value of marine product exports to various markets computed for the post WTO phase is given in Table 3.3.

Table 3.3. Compound Annual Growth Rate of Marine Product Exports from India in the Post WTO Period (1995-96 to 2009-10)

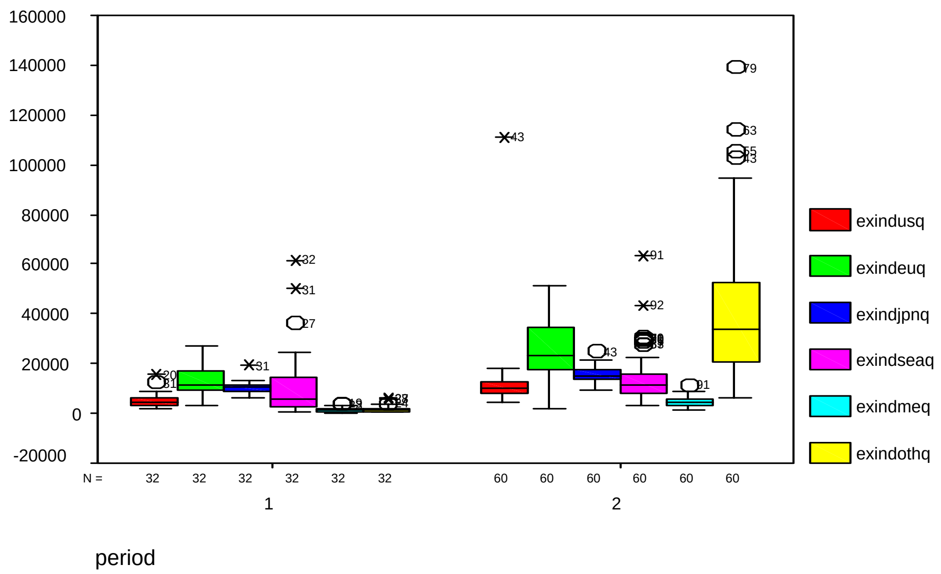
Markets	Quantity (in tonnes)	Value (in ` Lakhs)	Value (in US $ Million)
The EU	8.95	13.26	11.41
The US	2.31	7.91	6.13
Japan	-0.19	-4.59	-6.09
The SEA	7.696	9.29	7.51
The MEA	7.52	14.38	12.49
'Others'	4.92	12.017	10.19

Source: Computed from MPEDA Data, 1996 to 2010

Compared to the pre WTO period, the compound annual growth rate of quantity and value of marine product exports from India to all the above markets declined in the post WTO period. The compound annual growth rate of marine product exports from India to Japan has turned negative during this phase in terms of quantity and value (both in ` Lakhs and US $ million). The compound annual growth rate of quantity of marine product exports from India to the US was as low as 2.31 percent. Compared to the US and Japan, the newer markets of the SEA and the MEA registered higher compound annual growth rates in terms of quantity and value (both in ` Lakhs and US $ million).

3.3 Marine Product Exports from India – A Comparison of Pre and Post WTO Periods

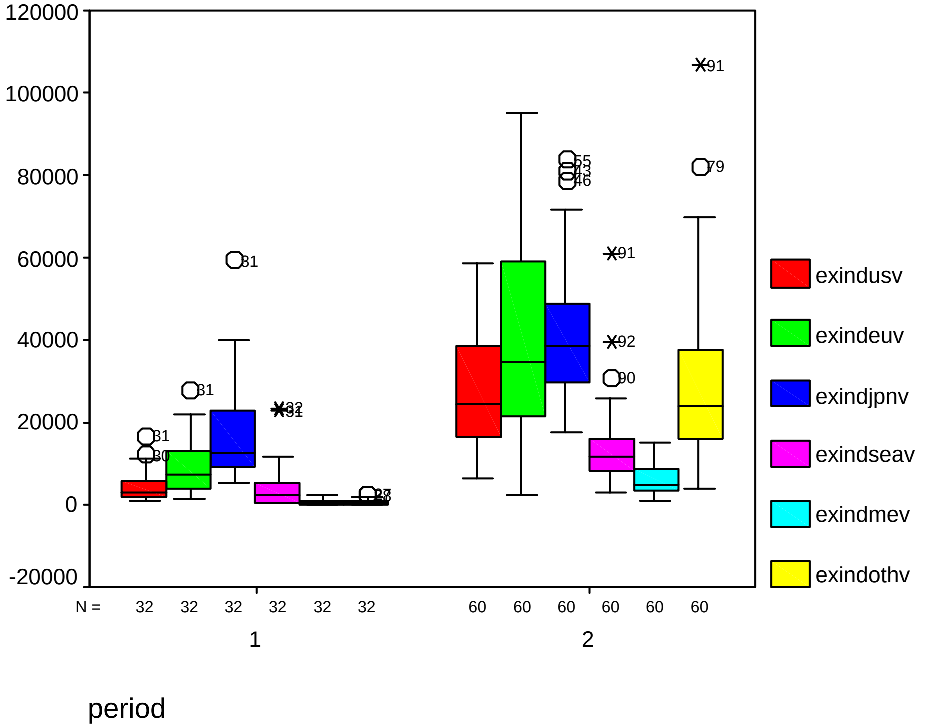
The behavior of marine product exports from India to various export markets in the pre WTO period and post WTO period is depicted in Figures 3.7 and 3.8 using box plots.



Source: MPEDA Data, 1988 to 2010

Figure 3.7. Marine Product Exports from India to the Export Markets in terms of Quantity in the Pre WTO Period (1) and the Post WTO Period (2) (Quantity in tonnes)

In the post WTO phase, the median quantity of exports to the markets of the MEA and 'Others' are significantly higher than in the pre WTO period. The quantity of exports to the EU and the SEA too show an improvement in the post WTO period vis-à-vis the pre WTO phase. The tails of the box plot show that the dispersion in the quantity of exports of marine products to all the markets is higher in the post WTO period than in the pre WTO period.



Source: MPEDA Data, 1988 to 2010

Figure 3.8. Marine Product Exports from India to the Export Markets in terms of Value in the Pre WTO Period (1) and the Post WTO Period (2) (Value in ₹ Lakhs)

The median value of exports of marine products to each market is higher in the post WTO period than in the pre WTO period. This is true even in the case of the US and the Japanese markets that have lost out in the post WTO period in quantity terms. This could be attributed to the higher unit value (UV) realization in terms of US $ per kg in these markets compared to the other markets. The tails of the box plot shows that the dispersion in the value of exports of marine products to all the markets is higher in the post WTO period than in the pre WTO period.

To identify the relative importance of various markets for the marine product exports of India, a comparison of the UV realized in terms of US $ per kg from different markets in the pre and the post WTO phase is made.

Table 3.4. Unit Value (UV) Realization in terms of US $ per kg in the Pre WTO Period - India

Year	the US	the EU	Japan	the SEA	the MEA	'Others'
1987-88	4.01	2.86	6.49	1.73	1.90	1.39
1988-89	3.58	2.54	6.88	1.91	2.66	1.59
1989-90	3.41	2.52	5.36	1.45	1.93	1.79
1990-91	3.77	3.01	6.70	1.07	1.45	2.20
1991-92	2.04	2.77	6.56	1.59	2.34	2.93
1992-93	3.27	2.61	6.71	0.99	1.75	1.55
1993-94	3.73	2.86	8.40	1.06	1.81	1.28
1994-95	4.86	3.25	9.79	1.41	2.32	2.48

Source: MPEDA Data, 1988 to 1995

In the pre WTO phase as given in Table 3.4, the highest UV realization in terms of US $ per kg is in the Japanese market followed by the US and the EU markets. The UV realization from the markets of the SEA, 'Others' and the MEA is very low throughout this phase.

The scenario in the post WTO phase shown in Table 3.5 is different as there is a successive decline in the UV realized in terms of US $ per kg in the Japanese market. The UV realized from the Japanese market fell from US $

9.66 per kg in 1995-96 to US $ 5.27 per kg in 2010-11. Throughout this phase, the UV realized is higher in the US compared to all other markets. The UV realization from the US market showed a rise from US $ 4.47 per kg in 1995-96 to US $ 8.75 per kg in 2010-11. Another significant change that occurred in the post WTO period is the improvement in the UV realized in terms of US $ per kg in all the new markets such as the SEA, the MEA and 'Others'. But despite these, the UV realized in the traditional markets is higher vis-à-vis the emerging markets indicating the loss, the marine product exports from India are likely to face in the event of loss of these markets.

Table 3.5. Unit Value Realization in terms of US $ per kg in the Post WTO Period - India

Year	the US	the EU	Japan	the SEA	the MEA	'Others'
1995-96	4.47	3.32	9.66	2.00	2.80	1.22
1996-97	4.09	3.10	8.16	1.86	1.84	1.15
1997-98	4.89	3.27	9.04	2.77	2.27	1.28
1998-99	4.28	3.02	8.14	2.38	2.04	1.45
1999-00	4.91	3.18	7.88	2.18	2.04	1.32
2000-01	6.13	3.24	8.16	2.5	2.40	1.127
2001-02	6.1	2.90	5.90	2.16	1.99	1.14
2002-03	6.88	3.02	5.78	3.02	2.16	1.14
2003-04	6.88	3.30	5.08	2.35	2.99	1.54
2004-05	6.90	3.44	4.62	2.19	3.29	1.71
2005-06	6.68	3.52	4.4	2.21	3.13	1.81
2006-07	6.79	4.05	4.44	2.02	3.5	1.63
2007-08	6.91	4.41	4.53	2.25	3.81	2.19
2008-09	6.67	4.31	5.19	2.20	3.78	2.097
2009-10	6.38	3.87	4.44	2.11	3.35	2.45
2010-11	8.75	4.48	5.27	2.01	3.37	2.72

Source: MPEDA Data, 1996 to 2011

3.4 Impact of Food Safety Standards on the Marine Product Exports of India – A Gravity Model Analysis

The gravity model analyzes the impact of the food safety standards and other NTMs on the marine product exports from India to the markets of the EU, the US and Japan. The EU has very stringent standards for the heavy metals such as cadmium and mercury. The EU standards on these heavy metals are rigorous than the international Codex standard. Japan applies a very stringent standard on mercury in fish products and is found to be tighter than the Codex standard. The standard set for salmonella in fish products is found to be stringent in the US. A comparison of standards set by these three markets on the aforementioned items reveals that they are not uniform in these markets. Table 3.6 presents the standards set by the EU, the US and Japan on cadmium, mercury and salmonella compared to the national standard based on international Codex standard.

Table 3.6. Maximum Residue Limits on Cadmium, Mercury and Salmonella in Import Markets

Substances	**Items**	**Standards in the Import Markets as well as National Standards**			
		The EU*	**The US#**	**Japan+**	**National^ standards based on Codex**
Cadmium	Cephalopods	1 mg/kg wet weight	3 ppm**	3ppm	3 ppm
Mercury	Fishery products including crustaceans	0.50 mg/kg wet weight	1ppm	0.4ppm	1ppm
Salmonella		Absence in 25 gm In cooked crustaceans, live bivalve mollusks etc.	Presence of organism in all fish	Not to be detected in 25 grams of fish	Absence in 25 gm Live bivalve mollusks

*Source: *Europa, #USFDA, +FAO, ^EIC, 2011*
***part per million*
Note: 1 ppm=mg/kg

It is interesting to observe that the standards set by the major importers on the aforementioned deleterious substances and microbiological organisms not only differ among themselves but also diverge significantly from the Codex standards. Hence it is necessary to quantify the effects of the standards on the marine product exports from India.

In addition to food safety standards, marine product exports from India are found to be subject to certain other restrictions in the markets of the developed countries. One prominent limiting factor has been the anti-dumping duties and enhanced bond requirement imposed on shrimp imports by the US. Despite satisfying the food safety standards and quality regulations required in the US, the shrimp exporters have to face additional hurdles in the form of high anti-dumping duties and enhanced bond requirements. It is essential to capture the effects of these measures on marine product exports from India as they may emerge as potential trade barriers. The following gravity equation is used.

$$\mathbf{Log\ X_{ij} = C + a\ log\ PCGDP_i + b\ log\ PC\ GDP_j + c\ log\ D_{ij} + d\ stdcad_j + e\ \ stdmer_j + f\ stdsal_j + gadd_j + u_{ij}}$$

Log X_{ij} = natural log of exports from i to j (i = India j= import markets)

C = constant

log $PCGDP_i$ = natural log of India’s real per capita GDP

log $PCGDP_j$ = natural log of importing markets’ real per capita GDP

log Dij = natural log of distance between exporting and importing nations

$stdcad_j$ = standard on cadmium set by importing countries

$stdmer_j$ = standard on mercury set by importing countries

$stdsal_j$ = standard on salmonella set by importing countries

add_j = anti-dumping duties by importing countries

u_{ij} = random error term

Panel data has been used for the gravity analysis. The data on per capita real GDP of the countries in the sample are taken for the period 1990 to 2010. The explanatory variable distance is invariant to time. The other explanatory variables such as standards and anti-dumping duties are treated as dummy variables.

The per capita real GDP of the exporting nation shows the stage of economic development reflecting its production capabilities. The coefficient of per capita real GDP of the exporting nation is expected to be positive or negative. A positive coefficient suggests that the home country will be able to export more provided that the per capita real GDP rises, signifying enhanced production capabilities of the nation. But a negative coefficient suggests a decline in the ability of the nation to export due to a rise in domestic absorption.

The per capita real GDP of the importing nations has a significant role as it represents the demand for the goods from the exporting nation. It shows the consumption capabilities of the importing nations. The expected sign of the coefficient of this variable can be either positive or negative. A positive sign for the coefficient of this variable implies that higher per capita real GDP reflects a larger market for the exports from the home country. On the contrary, its coefficient may be negative if higher per capita real GDP implies lesser demand for the export products of the home country. It is often observed that the demands for safer foods and tighter regulations arise in a nation with the rise in the per capita real GDP. A high per capita real GDP implies higher stage of economic development with rapid technological advances and greater public awareness on issues. Consumers of such countries are more demanding in terms of choice, quality, freshness, nutritional value, microbiological safety and other standards on the foods they consume. As import markets become more concerned with quality and safety issues of the imported food products, there is a pressing demand for imposition of stringent standards. Further, the rapid advancement of technologies facilitates the implementation of food safety standards through the detection of pathogens and other deleterious substances to the level of minute sensitivity. This could reduce the imports of food products which are subject to such safety standards and quality regulations (Wilson and Otsuki 2003).

Distance which is the actual physical distance between the capital cities of the trading nations can be used as proxy for trade cost between the nations. The geographical distance between the markets is expected to possess a negative coefficient. Countries with short distance are expected to trade more than far off nations. With regard to the EU, average of the distance between the EU capital cities and the capital of India is taken.

The impact of standards on trade can be captured either through the use of dummy variable or directly using the MRL set for each of these items in the import markets. The standards are regarded as dummy variables in the present context. The strength of food safety standards in each import market is ascertained on the basis of whether their standards are tighter than Codex standards. The standard on each of these substances assumes the value one for those markets in those years with standard stringent than the Codex standard. If the standard set by the importing nation equals Codex standard, it is assigned zero. This implies that the coefficient of standards will be negative if the applied standard is causing an adverse impact on the volume of exports from the home country.

Another factor that can limit trade is the anti-dumping duty imposed by the importing nations. Anti-dumping duty is treated as a dummy variable. The anti-dumping duty on the imported fish assumes the value one in a market where it is applied for those years when it is in vogue, while the markets that do not apply will be assigned zero. The expected sign for the coefficient of anti-dumping duty is negative as it is acknowledged as a non tariff barrier to imports. The gravity model is used to test whether the standards and other NTMs applied on marine products by the EU, the US and Japan are barriers to trade. The results of the gravity analysis are presented in Table 3.7.

Table 3.7 Results of the Gravity Model

Dependent Variable : Natural log of Marine Product Exports from i to j			
Independent variable	**Coefficient**	**Standard error**	**VIF**
Constant	16.71	1.873*	
log $PCGDP_i$	0.701	0.203*	7.31
log $PCGDP_j$	-6.76E-02	0.315****	10
log D_{ij}	-1.150	0.248*	6.085
$stdcad_j$	0.445	0.107*	2
$stdmer_j$	-0.314	0.140**	4.875
$stdsal_j$	0.276	0.148***	3.8
add_j	-0.373	0.154**	2.347
R^2 0.777, Adjusted R^2 0.748			

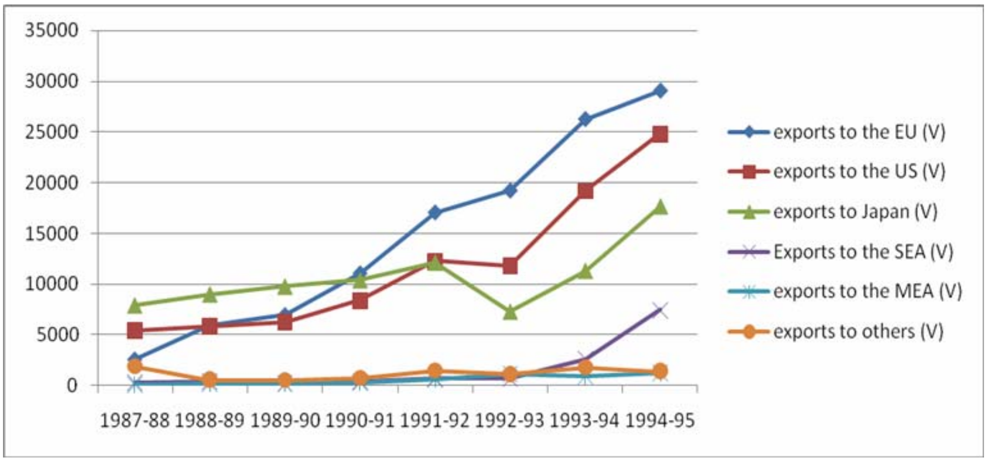
Source : Computed from MPEDA, World Bank Database, 1990-2010
Note : statistically significant at 1 percent*
*** Statistically significant at 5 percent level*
**** Statistically significant at 10 percent level*
***** Statistically insignificant*

As expected, the coefficient of the variable, per capita real GDP of exporting nation is positive implying that there is a direct relationship between the quantity of marine product exported and the improved production capabilities of the country. The per capita real GDP of importing countries play a significant role in the volume of food trade flows from the exporting nation. The coefficient obtained for this variable is negative. This suggests that higher levels of per capita real GDP of the importing nations have an adverse impact on the quantum of marine product flows from the exporting nation. There is a link between improvement in the levels of income and the demands for safer and healthy foods. This could lead to stringent standards and regulations on the imported foods adversely affecting the exports of marine products from India. However, the t value is not statistically significant forcing to accept that the per capita real GDP of the importing nations does not cause adverse implications on the volume of exports from India. The coefficient obtained for the explanatory variable, log of distance is negative and statistically significant validating the theoretical results. The coefficient of the standards on mercury is negative implying that a 1 percent increase in standard on mercury would decrease the marine product exports from India by 3.14 percent. But the result shows that standard on cadmium does not produce an adverse effect on the quantum of marine product exports from India to the importing markets with stringent standards. The standard on cadmium is not found to be limiting the quantum of exports to the EU, perhaps because this standard is applied only on the imports of cephalapods while the gravity model has used the data on marine product exports in general. Similarly the standard on salmonella too does not adversely affect the quantity of export of marine products to the US as the coefficient obtained is positive and statistically significant. The coefficient obtained for anti-dumping duty is negative and statistically significant as expected establishing the fact that the presence of the anti-dumping duty in the US has served to limit the marine product exports from India.

The gravity model has been used to prove the hypothesis that the stipulations in the import markets have an adverse impact on the quantum of marine product exports from India. The rise in the level of economic development has led to pressing demands for stringent food safety standards and regulations. This is reflected in the negative coefficient obtained for the explanatory variable per capita real GDP of the importing nations which can exert a downward bias on the quantum of marine product exports from India. The standard set on heavy metal such as mercury in the EU and Japan is tighter than the Codex standard and is hence capable of limiting exports of marine products from India to these markets. The model exposes the trade restricting impact of the anti-dumping duties present in the US. It establishes the fact that the anti-dumping duties can serve as non tariff barriers and these disguised trade barriers can limit the quantum of trade flows.

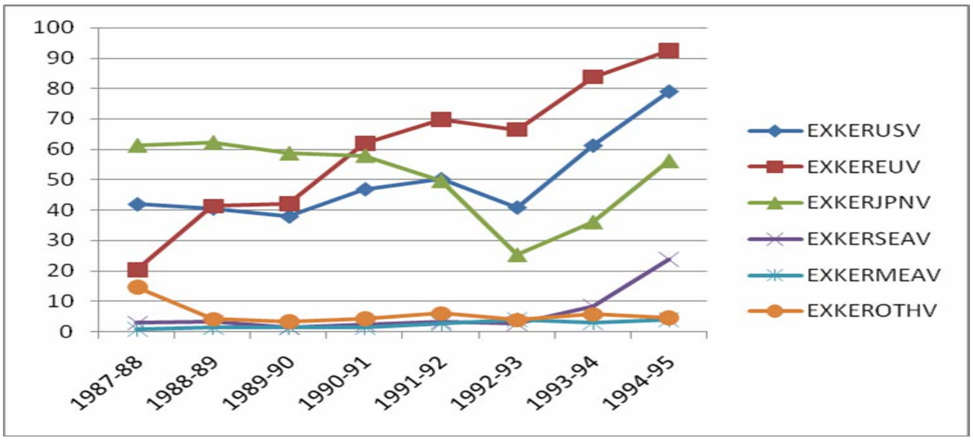
3.5 Marine Product Exports from Kerala – A Comparative Analysis of the Pre and the Post WTO Periods

The following section examines the implications for the marine product sector of Kerala. Marine product exports from Kerala comprise a significant share of total marine product exports from India both in terms of quantity and value. In 2009-10, the marine product exports from the state accounted for 16 percent and 17 percent of total marine product exports from India in terms of quantity and value respectively. The quantity of marine products exported from Kerala during 2009-10 was 107183 tonnes and the value of the marine product exports from the state during the same period was ` 1668.49 crores. The major markets of exports of marine product from Kerala in terms of value during 2009-10 were the EU (53 percent), 'Others' (15 percent), the US (9 percent), Japan (9 percent), the SEA (8 percent) and the MEA (5 percent). In the wake of the SPS Agreement and the consequent tightening of standards and regulations, there is a need to undertake an in-depth analysis of market wise flow of marine product exports from the state. The market wise exports of marine products from Kerala during the period stretching from 1987-88 to 2009-10 is made. The time period is split into two phases: the pre WTO period from 1987-88 to 1994-95 and the post WTO period from 1995-96 to 2009-10. Quarterly data are used for analyzing market wise flow of marine product exports from Kerala during this period. Historically, the major markets of exports of marine products from Kerala were the EU, the US and Japan. In 1987-88, about 87 percent of marine product exports in terms of value from Kerala went to these above markets.



Source: Computed from MPEDA Data, 1988 to 1995

Figure 3.9a. Trends in the Marine Product Exports from Kerala to Various Markets in terms of Value in the Pre WTO Phase. (Value in ₹ Lakhs)



Source: Computed from MPEDA Data, 1988 to 1995

Figure 3.9b. Trends in the Marine Product Exports from Kerala to Various Markets in terms of Value in the Pre WTO Phase. (Value in US $ Million)

It is very evident from Figures 3.9a and 3.9b that the value (both in ` Lakhs and US $ million) of marine product exports from the state to the markets of the EU, the US and Japan increased throughout the pre WTO phase. The value of marine product exports to the markets such as the MEA, the SEA and 'Others' consisting of China, Turkey etc. were quite insignificant throughout this phase.

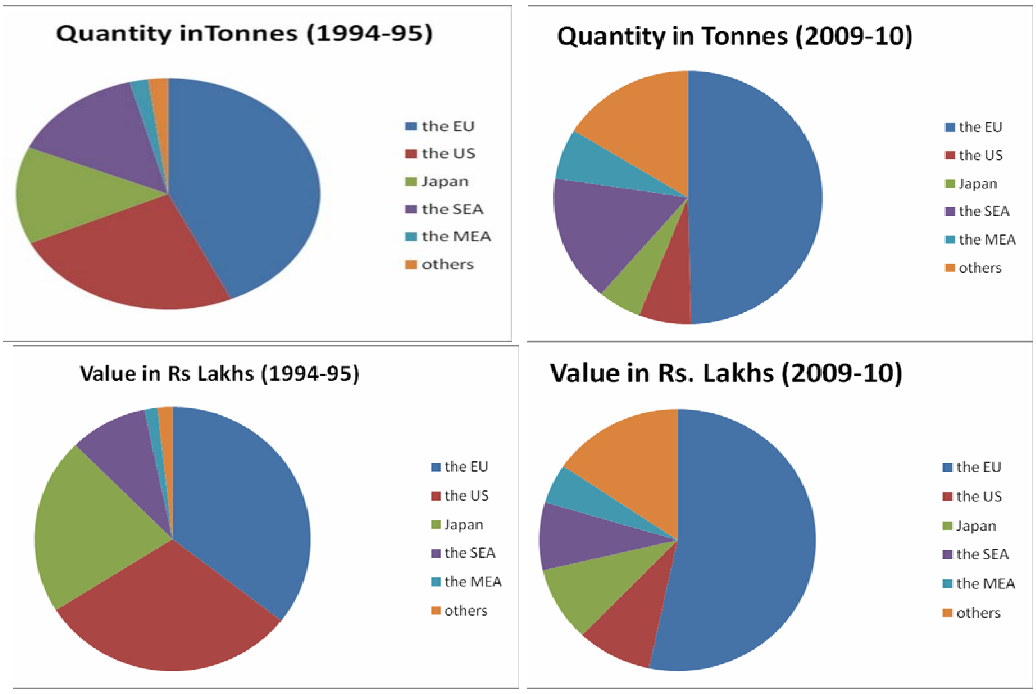
The compound annual growth rate of exports to these markets computed for the pre WTO period is given in Table 3.8. Among the traditional markets, the EU registered the highest rate of growth, both in terms of quantity and value. While the compound annual growth rate of the marine product exports in terms of quantity to the US was moderate at 6.38 percent, it was negative for Japan during the pre WTO period. A reasonably higher compound annual growth rate could be observed in the US market especially in terms of value in ` Lakhs. But the performance of Japan is not laudable even in value terms during the pre WTO period. Among the non-traditional markets, the MEA and the SEA emerged as promising markets, both in terms of quantity and value. Though the quantity and value of marine product exports to these markets remained low in absolute terms compared to the traditional markets during this phase, these two markets registered fairly higher compound annual growth rates.

Table 3.8. Compound Annual Growth Rate of Marine Product Exports from Kerala – Pre WTO Phase

Markets	Quantity in tonnes	Value in ` Lakhs	Value in US $ million
The EU	18.21	39.1	20.54
The US	6.38	25.11	8.42
Japan	-6.69	7.42	-6.91
The SEA	23.92	49.86	29.85
The MEA	28.75	45.32	25.83
Others	2.93	7.78	-6.6

Source: Computed from MPEDA Data, 1988 to 1995

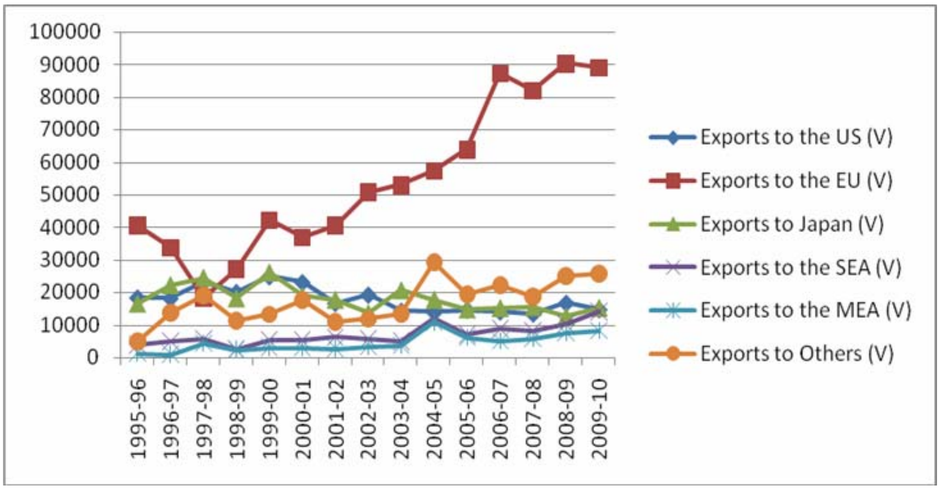
The combined share of the traditional markets of the EU, the US and Japan in the marine product exports of Kerala in 1994-95 was fairly high both in terms of quantity (82 percent) and value (88 percent) indicating high degree of market concentration. The share of new markets such as the SEA, the MEA and 'Others' remained quite low both in terms of quantity and value in 1994-95. But in 2009-10, the combined share of these new markets increased to 39 percent and 29 percent in terms of quantity and value respectively. The new markets of the SEA, the MEA and 'Others' have gained at the expense of the US and Japan which experienced a considerable dent in their shares. This signals that the share of non-traditional markets in the marine product exports of Kerala has increased considerably both in terms of quantity and value. The relative shares of various markets in the marine product exports of Kerala in 1994-95 and 2009-10 are shown in Figure 3.10.



Source: MPEDA Data, 1995, 2010

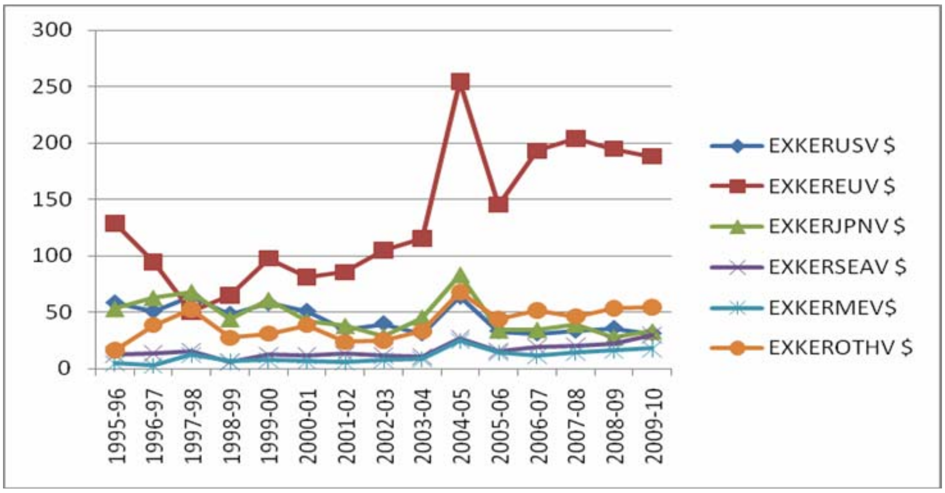
Figure 3.10. Market Wise Exports of Marine Products from Kerala in 1994-95 and 2009-10

The trends in the value of marine product exports from the state to these markets in the post WTO period stretching from 1995-96 to 2009-10 are depicted in Figures 3.11a and 3.11b.



Source: MPEDA Data, 1996 to 2010

Figure 3.11a. Trends in the Marine Product Exports from Kerala to Various Markets in terms of Value in the Post WTO Phase. (Value in ₹ Lakhs)



Source: MPEDA Data, 1996 to 2010

Figure 3.11b. Trends in the Marine Product Exports from Kerala to Various Markets in terms of Value in the Post WTO Phase. (Value in US $ Million)

The value of marine product exports from Kerala to the EU continues to rise throughout the post WTO period except for the year 1997-98 following the ban imposed by the EU. The EU continues to be the dominant market for the marine product exports from Kerala in the post WTO period just as in the pre WTO period. Among the traditional markets, the US and Japan began to lose their prominence since the early 2000. This is in sharp contrast to the pre WTO period when the value of marine product exports from Kerala to both these markets showed a rise throughout. The value of marine product exports from Kerala to the non-traditional markets however, shows a rising trend throughout the post WTO period unlike the pre WTO period. Among the non-traditional markets, the value of exports to ‘Others’ comprising China, Turkey, and Tunisia etc. has increased significantly during the post WTO period. The value of marine product exports from Kerala to the SEA and the MEA too show a rising trend in the post WTO period. The compound annual growth rates of exports of marine products from Kerala to these aforementioned markets computed for the post WTO period are depicted in Table 3.9.

Table 3.9. Compound Annual Growth Rate of Marine Product Exports from Kerala to Various Markets in the Post WTO Phase (1995-96 to 2009-10)

Markets	Quantity (in tonnes)	Value (in ` Lakhs)	Value (in US $ Million)
The EU	5.698	9.73	8.22
The US	-5.87	-3.176	-4.51
Japan	-5.52	-2.991	-4.3
The SEA	8.69	8.38	6.4
The MEA	8.853	13.31	11.17
Others	0.81	7.34	5.49

Source: MPEDA Data, 1996 to 2010

In the post WTO period, the compound annual growth rate of marine product exports from Kerala in terms of quantity and value registered a decline in all the above markets compared to the pre WTO period. The traditional markets such as the US and Japan experienced negative growth rates during this period. Further it can be observed that, the compound annual growth rate of marine product exports from Kerala to the EU in quantity terms is lower than that in the newer markets of the SEA and the MEA during the post WTO period. This also indicates that a greater degree of market diversification has happened in the marine product export basket of Kerala.

The relative importance of various markets for the marine product exports of Kerala can be judged from the U V realized in terms of US $ per kg in the traditional as well as non-traditional markets. The UV realized in terms of US $ per kg in various markets in the pre WTO phase is presented in Table 3.10. In the pre WTO phase, the Japanese market fetched the highest UV in terms of US $ per kg for the marine product exports from the state. Next to Japan, the highest UV realization came from the US market during the Pre WTO period. The UV realized from the EU, the SEA, the MEA and 'Others' was more or less the same and low throughout the phase.

Table 3.10. Unit Value Realization in terms of US $ per kg in the Pre WTO Phase - Kerala

Year	the US	the EU	Japan	the SEA	the MEA	Others
1987-88	3.59	2.57	4.79	1.33	3.23	18.04
1988-89	3.35	2.31	5.29	1.68	3.24	2.59
1989-90	3.18	2.28	4.38	2.35	1.94	1.5
1990-91	3.71	2.7	5.36	1.79	2.04	1.67
1991-92	2.95	2.67	4.56	1.77	3.43	2.87
1992-93	3.21	2.6	4.06	1.72	2.68	2.43
1993-94	3.76	2.54	4.48	2.17	2.14	4.38

1994-95	4.27	2.87	5.54	2.22	2.69	2.91

Source: MPEDA Data, 1988 to 1995

In the post WTO period, the UV realized from the Japanese market continued to remain high vis-à-vis the other markets. Next to Japan, the US contributed significantly in terms of UV realization for the marine product exports of Kerala. The UV realized in terms of the US $ per kg improved slightly in the markets of the EU, the SEA, the MEA and ‘Others’. This is presented in Table 3.11.

Table 3.11. Unit Value Realization in terms of US $ per kg in the Post WTO Period – Kerala

Year	the US	the EU	Japan	the SEA	the MEA	Others
1995-96	4.29	3.05	5.6	2.41	2.74	2.28
1996-97	3.75	2.82	4.59	1.84	2.03	1.67
1997-98	4.10	3.04	5.12	2.33	2.73	1.59
1998-99	3.49	2.73	4.18	1.66	2.61	1.62
1999-00	3.73	2.72	4.57	2.20	2.79	1.58
2000-01	3.79	2.75	4.46	1.78	3.12	1.37
2001-02	3.35	2.62	4.19	1.48	2.6	2.4
2002-03	3.74	2.76	4.87	1.46	2.70	1.52
2003-04	4.01	2.98	4.99	1.76	2.99	2.6
2004-05	7.79	5.73	9.82	1.49	3.45	2.59
2005-06	3.91	3.069	4.81	1.45	3.87	2.20
2006-07	3.93	3.49	4.61	1.47	3.36	2.38
2007-08	4.35	3.8	5.33	1.63	3.43	3.02
2008-09	4.43	3.63	5.31	1.89	3.39	2.91
2009-10	4.61	3.53	5.79	1.7	2.51	3.14

2010-11	4.7	4.09	6.1	1.85	2.73	3.23

Source: MPEDA Data, 1996 to 2011

3.6 Market Wise Exports of Marine Products from Kerala in the Pre and the Post WTO Periods – A Time Series Analysis

The time series analysis of market wise flow of marine products from the state in the pre WTO period and the post WTO period permits to develop mathematical models that provides plausible descriptions for the sample data. A statistical setting is created for describing the character of the data that seemingly fluctuate in random fashion overtime. ARIMA models are suitable to handle time correlated modeling and forecasting. Time series data are correlated and hence each observation is partially predictable from previous observations, or from previous random shocks or from both. The time series modeler is used for building models for explaining the behavior of the flow of marine product exports from Kerala to various markets in the pre WTO and the post WTO period. Time series modeler procedure includes an expert modeler that automatically identifies the best fitting model and produces estimates based on which forecast is made.

The study identifies the best fitting models to explain the quantity and value of marine product exports from Kerala to the traditional and non-traditional markets in the pre WTO period and the post WTO period. This permits the comparison of the behavior of the quantity and value of marine product exports from Kerala to various markets in these two distinct time periods.

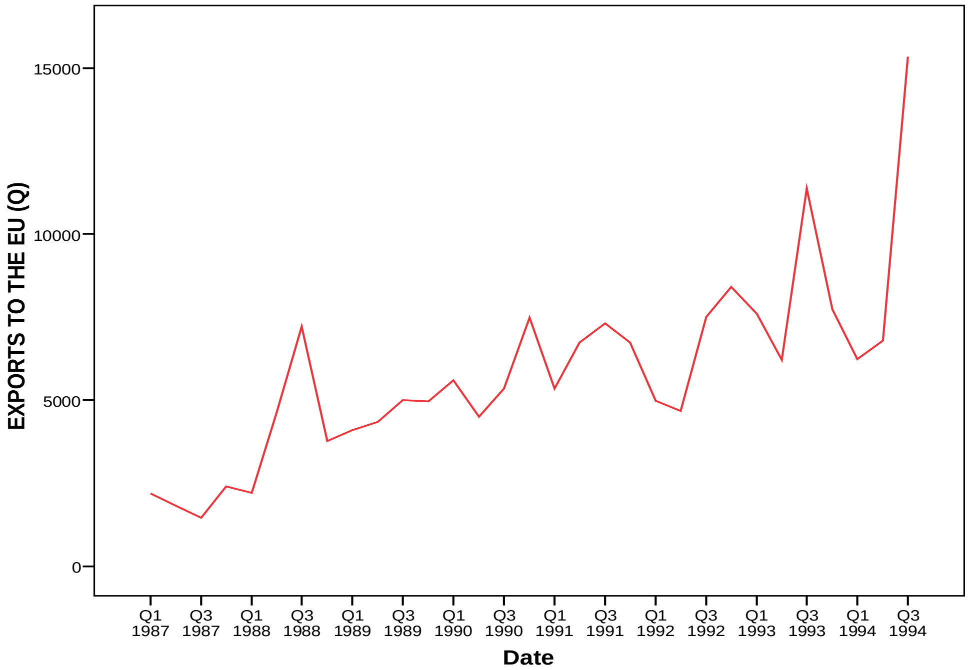
3.6.1 Marine Product Exports from Kerala to the EU - A Comparison of Pre and Post WTO Periods

European market has always been important for the marine product exports of Kerala both in terms of quantity and value. For the sake of comparison, the data on marine product exports from Kerala to all the current member nations of the EU that comprise a market for the marine products of the state for both the pre and the post WTO phase are used. This serves to give a clear picture regarding the share of the EU in the marine product export basket of the state in the pre and the post WTO periods. In the pre WTO period, from 1987-88 to 1994-95, the compound annual growth rate of exports to the EU market was 18.21 percent and 39.1 percent in terms of quantity and value respectively. In 1994-95, the share of the EU in the marine product exports from the state stood at 43 percent in terms of quantity and 36 percent in terms of value. In the post WTO phase, the compound annual growth rate of marine product exports from Kerala to the EU in terms of quantity and value were 5.7 percent and 9.73 percent respectively. The share of the EU in the marine product export basket of Kerala in 2009-10 stood at 50 percent and 53 percent respectively reflecting the importance of European market for the marine product exports of Kerala.

The best fitting models have been identified for explaining the quantity and value of marine product exports from Kerala to the EU in the pre WTO and the post WTO period. This helps to identify the specific patterns displayed by the data on marine product exports to the EU in the pre and post WTO periods.

3.6.1.1 Marine Product Exports to the EU – Pre WTO Period.

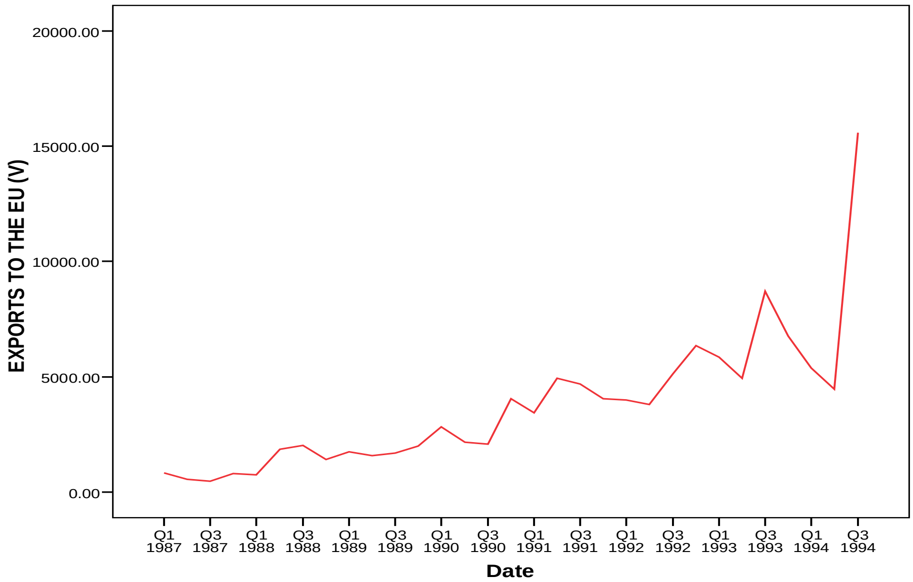
The quantity of marine product exports from Kerala to the EU in the period 1987 Q1 (Quarter I) to 1994 Q3 (Quarter 3) is shown in Figure 3.12.



Source: MPEDA Data, 1988 to 1995

Figure 3.12. Quarter wise Exports of Marine Products from Kerala to the EU in terms of Quantity – Pre WTO Phase (Quantity in tonnes)

The model of best fit generated for explaining the quantity of exports to the EU in the Pre WTO phase is ARIMA (0,1,0) (0,0,0). As this model does not generate a constant term, it does not serve the purpose of describing the underlying structure of the series. Hence the value of marine product exports from the state to the EU is analyzed. Figure 3.13 depicts the quarter wise exports of marine products from Kerala to the EU in terms of value in the pre WTO phase.



Source: MPEDA Data, 1988 to1995

Figure 3.13. Quarter wise Exports of Marine Products from Kerala to the EU in terms of Value – Pre WTO Phase (Value in ₹ Lakhs)

Table 3.12. Model Description – Exports to the EU (Value) in the Pre WTO Period

			Model Type
Model Id	Exports to the EU (V)		Winters' Additive

Source: Computed from MPEDA Data, 1988 to 1995

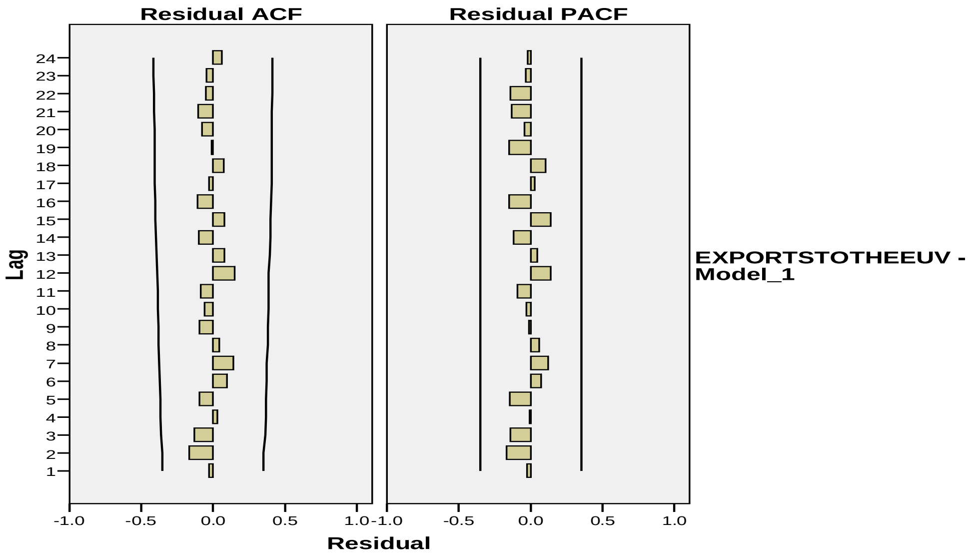
The best fitting model identified for the data series by time series modeler is winters’ additive (see Table 3.12). This model is appropriate for series without trend but has a seasonal effect that is independent of the level of the series. The smoothing parameters are level, trend and season as seen in Table 3.13. The estimates for level and trend are statistically insignificant. The estimate for season is one which suggests that the observations in the recent seasons have been used for the purpose of smoothing. The estimate of the season is statistically significant at 0.002 level. Hence it is possible to conclude that the value of marine product exports from Kerala to the EU in the pre WTO phase is influenced by seasonal effects.

Table 3.13. Exponential Smoothing Model Parameters –Exports to the EU (Value)

Model			Estimate	SE	t	Sig.
Exports to the EU (V)	No Transformation	Alpha (Level)	4.26E-006	0.149	2.86E-005	1.000
		Gamma (Trend)	0.000	702.158	1.51E-007	1.000
		Delta (Season)	1.000	0.285	3.511	0.002

Source: Computed from MPEDA Data, 1988 to 1995

The adequacy of the model can be ascertained on the basis of the pattern of residual ACF and residual PACF.



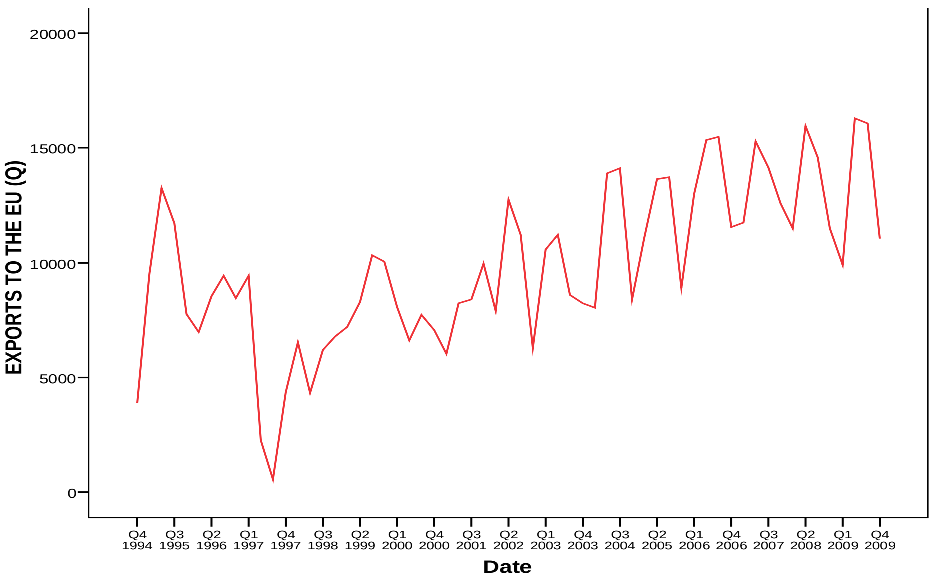
Source: Computed from MPEDA Data, 1988 to 1995

Figure 3.14. Patterns of Residual ACF and Residual PACF

The residual ACF and residual PACF are not significantly different from zero at lags 1 to 24 as seen in Figure 3.14 indicating that the model is adequate. The Ljung Box Q statistics obtained is 8.274 at level of significance 0.912 which suggests zero auto correlation of residuals.

3.6.1.2 Marine Product Exports from Kerala to the EU – Post WTO Phase

In the post WTO phase, the quantity and value of marine product exports from Kerala to the EU shows an increase except for the year 1997-98, when there was a huge fall. This huge fall was due to the ban imposed by the EU on the marine product exports from India. On inspection of seafood export units of the country by the EC, serious non compliances were found out. The fall in the sanitary standards at the pre-processing and processing centers, inadequate hygiene at various points of supply chain and detection of salmonella in fish and fishery products meant for export resulted in the imposition of ban by the EU on marine product exports from India in 1997. However, the ban was lifted within a short span of 5 months in December 1997, following an inspection conducted by the EC in November 1997. The quantity and value of exports of marine products to the EU recovered slowly and it had since then increased moderately. Figure 3.15 presents the quantity of marine product exports from Kerala to the EU in the period 1994-95 Q4 (Quarter IV) to 2009-10 Q4.



Source: MPEDA Data, 1995 to 2010

Figure 3.15. Quarter wise Exports of Marine Products from Kerala to the EU in terms of Quantity – Post WTO Phase (Quantity in tonnes)

The model that best explains the quantity of marine product exports from Kerala to the EU in the post WTO period is ARIMA (0, 1, 1) (0, 1, 1) (see Table 3.14).

Table 3.14. Model Description – Exports to the EU (Quantity) in the Post WTO Period

			Model Type
Model Id	Exports to the EU (Q)		ARIMA(0,1,1)(0,1,1)

Source: Computed from MPEDA Data, 1995 to 2010

The model can be described as

$$(1-B)(1-B^4)\, y_t = (1-\theta_1 B)\,(1-\Theta_1 B^4)e_t$$

B is the backward shift operator. B operating on y_t has the effect of shifting the data back one period.

$By_t = y_{t-1}$

For quarterly data, to shift attention to the same quarter last year, B^4 is used.

$B^4 y_t = y_{t-4}$

The process of differencing can be represented through backward shift operator.

$y_t' = y_t - y_{t-1} = y_t - By_t = (1-B)\, y_t$. This is a case of non seasonal differencing of one.

The case of seasonal differencing of one can be written as follows

$y_t' = y_t - y_{t-4} = y_t - B^4 y_t = (1-B^4)\, y_t$

The above ARIMA model (0,1,1)(0,1,1) popularly known as airline model can be described as $(1-B)(1-B^4)\, y_t = (1-\theta_1 B)\,(1-\Theta_1 B^4)e_t$.

$(1-B)(1-B^4)\, y_t$ is the non seasonal and seasonal difference of one respectively

$(1-\theta_1 B)\,(1-\Theta_1 B^4)e_t$ is the non seasonal and seasonal MA(1) respectively.

The model has 2 parameters: a non seasonal MA component and a seasonal MA component. The series is subject to non seasonal differencing and seasonal differencing once and through that the trend and the seasonal components are removed. A moving average model is used to describe the irregular component of the time series.

Table 3.15. ARIMA Model Parameters – Exports to the EU (Quantity) in the Post WTO Period

				Estimate	SE	t	Sig.
Exports to the EU (Q)	**No Transformation**	**Difference**		**1**			
		MA	Lag 1	0.704	0.113	6.219	0.000
		Seasonal Difference		1			
		MA, Seasonal	Lag 1	0.712	0.134	5.316	0.000

Source: Computed from MPEDA Data, 1995 to 2010

Table 3.15 shows that the estimated values of the non seasonal MA component and the seasonal MA component are 0.704 and 0.712 respectively. The calculated t values are higher in both the cases at level of significance 0.000. This suggests that the estimated coefficients of non seasonal MA component and seasonal MA component are statistically significant. This reveals that the quantity of marine product exports to the EU is not independent of current and lagged values of seasonal and non seasonal random error terms. In the post WTO period, the quantity of marine product exports from Kerala is influenced by irregular components. This points to the possibilities of interference of factors other than harvest conditions and raw material availability affecting the marine product exports from the state. Equation in expanded form

$$y_t = y_{t-1} + y_{t-4} - y_{t-5} + e_t - \theta_1 e_{t-1} - \Theta_1 e_{t-4} + \theta_1 \Theta_1 e_{t-5}$$

Hence

$$y_t = y_{t-1} + y_{t-4} - y_{t-5} + e_t - 0.704\ e_{t-1} - 0.712\ e_{t-4} + 0.501\ e_{t-5}$$

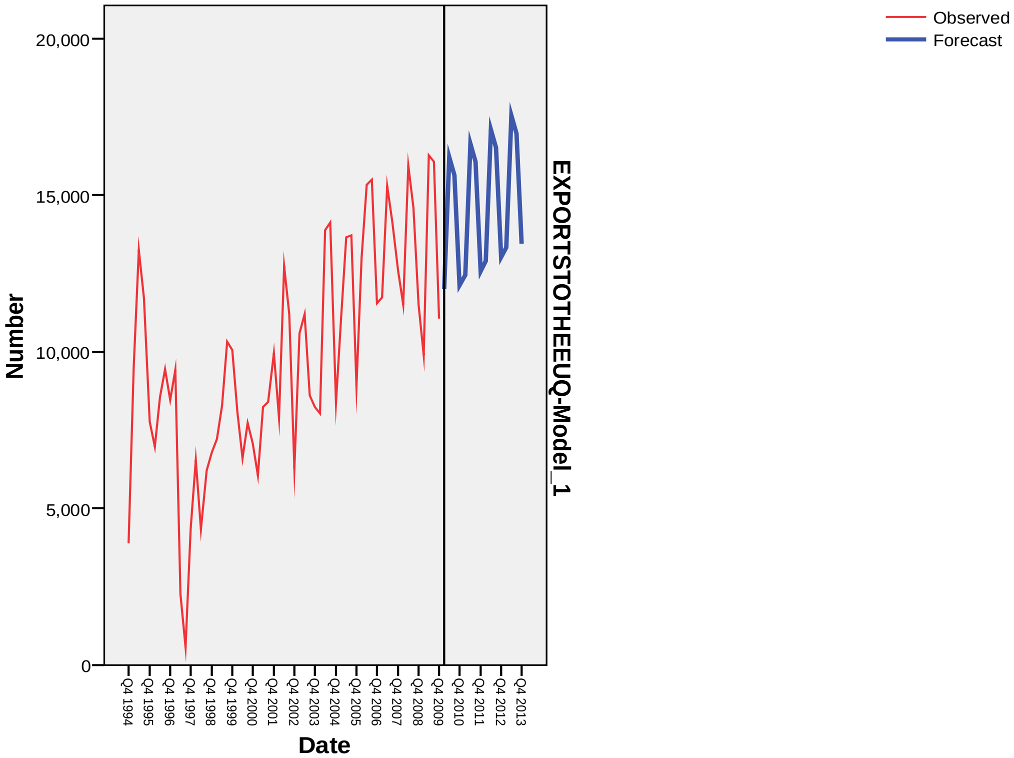
The model has made a forecast of the quantity of exports from Kerala to the EU market for the period 2010-11 to 2013-14 (see Table 3.16 and Figure 3.16).

Table 3.16. Forecasts of the Marine Product Exports to the EU (Quantity in tonnes)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted Values	Actual Values*			
Q1	12004	9582	12447	12891	13335
Q2	16205	16403	16649	17093	17536
Q3	15637	18061	16081	16525	16968
Q4	12130	12955	12574	13017	13461

*Source: Computed from the Table 3.15, *MPEDA Data, 2011*

The forecasts as given in Table 3.16 suggest that the EU shall continue to be a major market for the marine product exports from Kerala in the coming years. This is the case despite the rising number of NTMs encountered by the marine product exports from Kerala in the EU market. The quantity of marine product exports to the EU in every year reaches the highest in the quarters of Q2 (Quarter II) and Q3 which happen to be the peak harvest season. There is a plentiful availability of raw material during these quarters in the state.



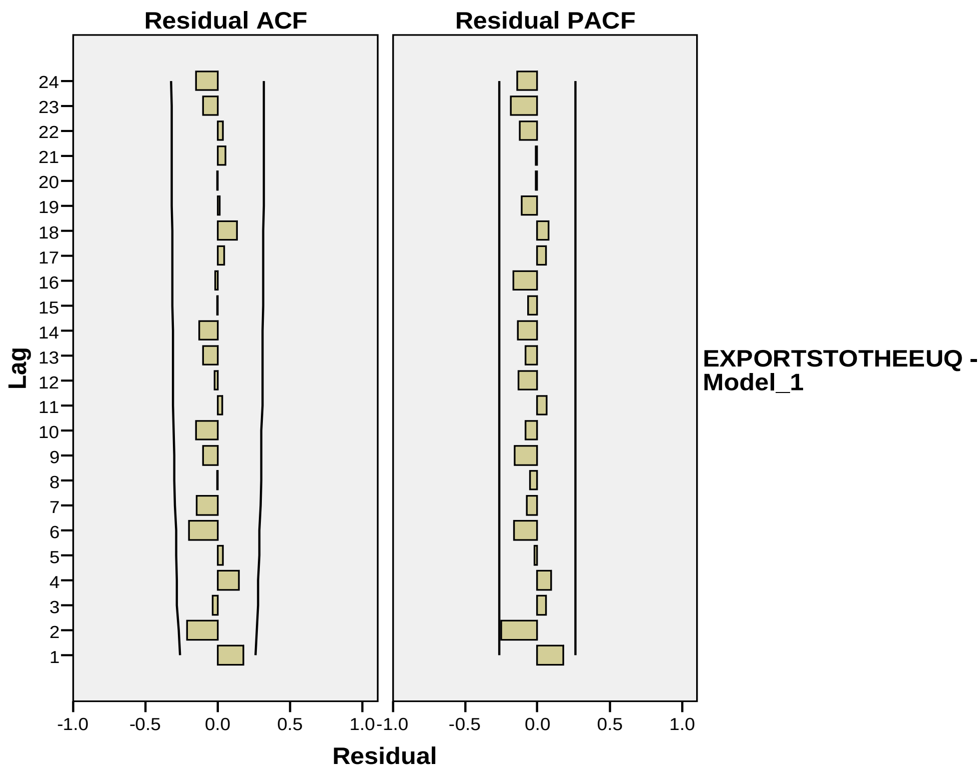
Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.16

Figure 3.16 Forecasts of Marine Product Exports to the EU (Quantity in tonnes)

During Q4 and Q1, there is a decline in the availability of raw materials in the state. This is reflected in the forecast which points to a slight decline in the quantity of marine product exports from Kerala to the EU in Q4 and Q1. But the presence of irregular components suggests the possibilities of standards and other NTMs interfering with the quantity of marine product exports from the state.

The forecast accuracy is examined using the measure; the Mean Absolute Percentage Error (MAPE). The MAPE computed for the forecast of quantity of exports to the EU is 11.57 percent. This suggests that the forecast quantities are reasonably accurate. The divergence between the forecast and actual quantities could be attributed to factors such as rising unit value realization in terms of US $ per kg in this market and improved supply response normally observed during the third quarter which coincides with the peak period in the marine sector of the state.

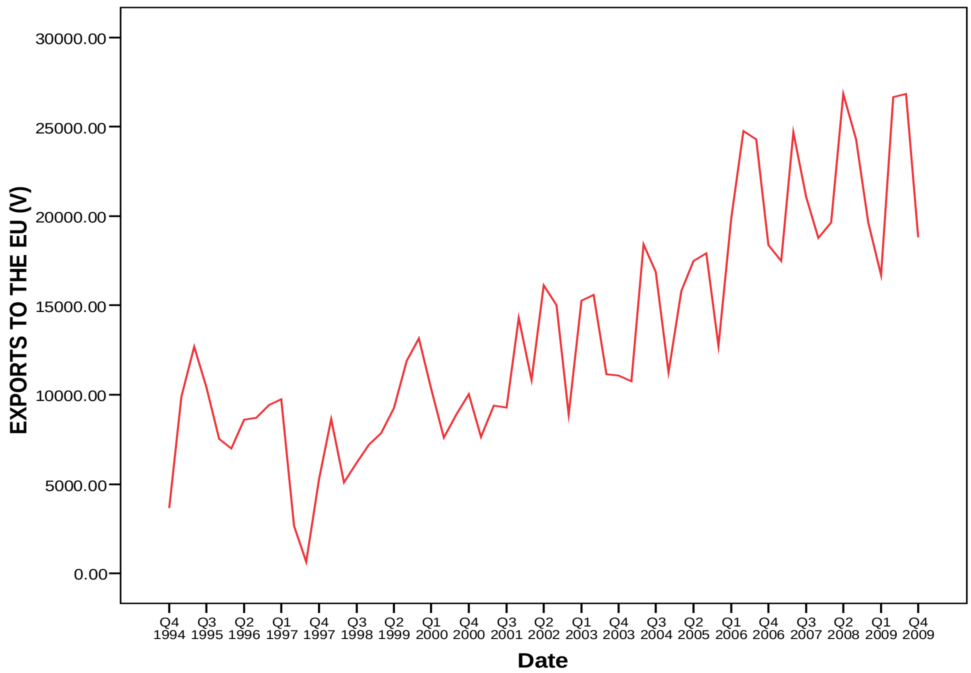
The adequacy of the model employed to generate the forecast is confirmed with the aid of the model fit statistics such as stationary R^2 and the R^2. The stationary R^2 is 0.420 and hence the model is better than the baseline model. The R^2 is higher at 0.542 indicating a fairly adequate explanatory power. The model adequacy can be judged on the basis of the pattern of residual ACF and residual PACF presented in Figure 3.17.



Source: Computed from MPEDA Data, 1995 to 2010

Figure 3.17. Patterns of Residual ACF and Residual PACF

The pattern of the residual ACF and residual PACF shows that they are not significantly different from zero and are within the defined limits. Based on that it is possible to conclude that there is remote possibility for non zero auto correlations in the forecast errors at lags 1 to 24. The Ljung Box Q statistics obtained is 16.002 at 0.453 level of significance. As Q statistics is not statistically significant, it confirms that the residual errors are not auto correlated. Value of marine product export from Kerala to the EU during the period 1995-96 to 2009-10 is depicted in Figure 3.18.



Source: MPEDA Data, 1995 to 2010

Figure 3.18. Quarter wise Exports of Marine Products from Kerala to the EU in terms of Value – Post WTO Phase (Value in ` Lakhs)

The value of marine product exports from Kerala to the EU in the post WTO period also exhibits a similar pattern as the quantity of marine product exports. The marine product exports from Kerala to the EU in terms of value exhibited a rise throughout the period except for the year 1997-98 when the

EU imposed a ban on the marine product exports from India on grounds of serious non compliances.

The model that explains the value of exports to the EU is ARIMA (0, 0, 0) (0, 1, 1) (see Table 3.17). The series is subject to seasonal differencing once and the seasonality is removed. It has a seasonal MA component.

Table 3.17. Model Description- Exports to the EU (Value) in the Post WTO Period

			Model Type
Model Id	Exports to the EU (Value)		ARIMA(0,0,0)(0,1,1)

Source: Computed from MPEDA Data, 1995-2010

The model can be described using the backward shift operator.

$(1\text{-}B^4)y_t = \mu + (1\text{-}\Theta_1 B_4)e_t$

$(1\text{-}B^4)y_t$ is the seasonal difference of one.

μ is the constant.

$(1\text{-}\Theta_1 B_4)e_t$ is the seasonal MA (1).

Table 3.18. ARIMA Model Parameters – Exports to the EU (Value) in the Post WTO Period

				Estimate	SE	t	Sig.
Exports to the EU (V)	No Transformation	Constant		1539.498	166.651	9.238	0.000
		Seasonal Difference		1			
		MA, Seasonal	Lag 1	0.671	0.127	5.286	0.000

Source: Computed from MPEDA Data, 1995 to 2010

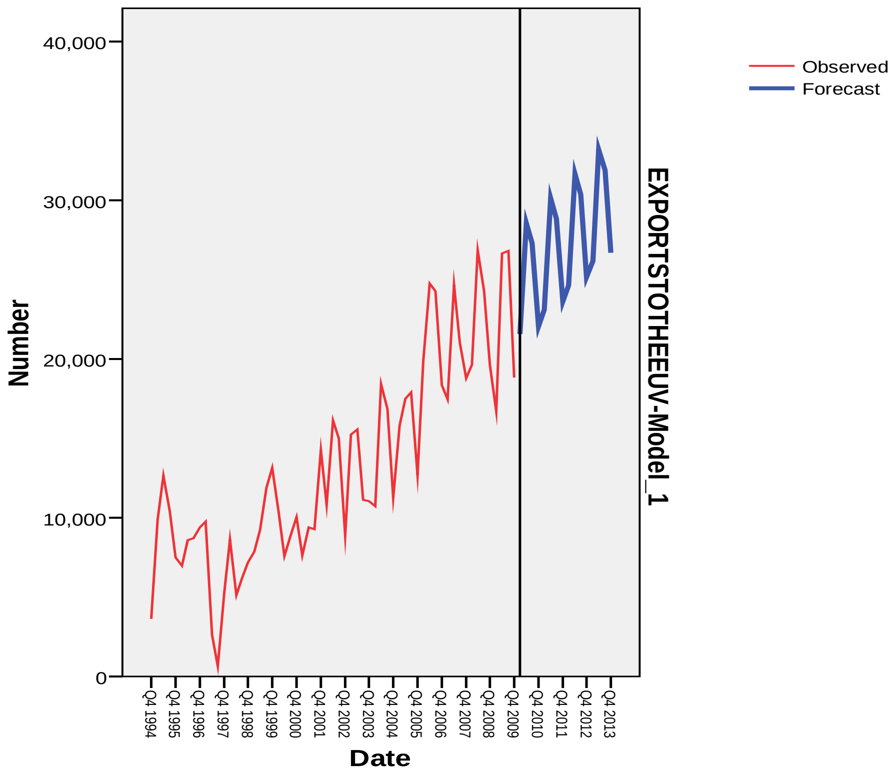
As given in Table 3.18, the coefficient for the seasonal MA component is 0.671. The calculated t value is higher than the table value at 0.000 levels of significance which states that the estimate for seasonal MA is statistically significant. It can be concluded that the value of marine product exports from Kerala to the EU in the post WTO phase is dependent upon the current and lagged values of the seasonal random error terms. The value of marine product exports from Kerala to the EU in the current time period is dependent upon the error terms that repeat over every quarter of a year. Based on the estimated value of the seasonal MA component, a forecast of the value of marine product exports from Kerala to the EU for the period 2010-11 to 2013-14 is made (see Table 3.19).

Table 3.19. Forecasts of Marine Product Exports to the EU (Value in ` Lakhs)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	21570.28	17619.76	23109.78	24649.28	26188.78
Q2	28568.44	30730.07	30107.94	31647.44	33186.94
Q3	27299.35	32355.54	28838.85	30378.35	31917.85
Q4	22077.30	24844.14	23616.8	25156.30	26695.8

*Source: Computed from Table 3.18, * MPEDA Data, 2011*

This shows that the value of marine product exports from Kerala to the EU continues to increase in the coming years. The forecast obtained for the value of marine product exports to the EU is similar to the forecast generated for the quantity of marine product exports to the EU. The highest value of exports happens in the peak quarters of a year; i.e. Q2 and Q3. The value of marine product exports show a decline in the quarters Q1 and Q4, when the harvest is on the decline and owing to the rising prices of raw materials, the seafood export units of the state are forced to work at less than full capacity. There is a steady increase in the value of exports of marine products to the EU in the coming years as per the forecast (see Figure 3.19).

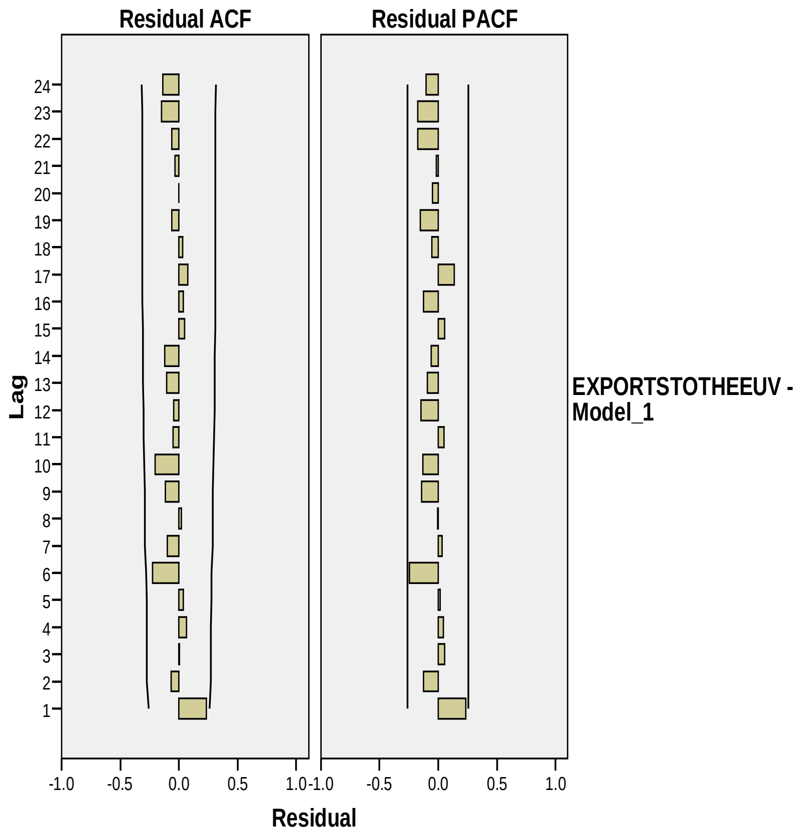


Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.19

Figure 3.19. Forecasts of Marine Product Exports to the EU (Value in ` Lakhs)

The MAPE computed for measuring forecast accuracy is 14.05 percent which can be used to acknowledge the accuracy of the forecast made using the ARIMA(0,0,0)(0,1,1) model. The deviation of actual values from the estimated values can be attributed to rising UV realization in terms of US $ per kg in this market. Despite appreciation of Indian ₹ vis-à-vis the US $ in 2010-11, there has been an increase in the value of marine product exports to the EU in terms of ₹ Lakhs. The exports of India during 2010-11 increased by 37.3

percent compared to the previous year (Economic Survey, 2011-12). The improved export performance can also be attributed to the support policies offered by the government such as technology up gradation schemes, Export Promotion Capital Goods Scheme at zero duty, Focus Product Scheme etc., the benefits of which were extended to the marine product export sector. These perhaps could explain the divergence between the estimated and actual values.



Source: Computed from MPEDA Data, 1995 to 2010

Figure 3.20. Pattern of Residual ACF and Residual PACF

The adequacy of the model is judged on the basis of the patterns of the residual ACF and residual PACF presented in Figure 3.20. The residual ACF and residual PACF are within the defined limits and are not significantly different from zero. The level of significance of the Ljung Box Q statistics is 0.603 indicating that there is little chance for the presence of non zero auto correlations of forecast errors at lags 1 to 24. This confirms the adequacy of the predictive model used. A comparison of the best fitting models obtained for the EU market in the pre WTO and the post WTO period is presented in Table 3.20.

Table 3.20. Pre WTO and Post WTO Models for the EU – A Comparison

Markets	**Pre WTO model**			**Post WTO model**		
	Model	**Result**	**Adequacy**	**Model**	**Result**	**Adequacy**
The EU(Q)	ARIMA (0,1,0) (0,0,0)	Fails to serve the purpose of exposing the underlying character of the series as it does not yield any parameter		ARIMA (0,1,1) (0,1,1)	The quantity of marine product exports to the EU is not independent of current and lagged values of seasonal and non seasonal random error terms.	Adequate. Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (16.002) not significant at level 0.453
The EU (V)	Winters' additive	Influenced by seasonal effects	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (8.2) not significant at level 0.912	ARIMA (0,0,0) (0,1,1)	Influenced by the current and lagged values of seasonal random error terms	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (14.9) not significant at the level 0.603

Source: Based on Tables 3.12 to 3.15, 3.17 and 3.18; Figures 3.14, 3.17, 3.20

A comparison of the models generated reveals that in the pre WTO period, the value of marine product exports from the state to the EU has been largely influenced by the seasonal effects. But in the post WTO period, the seasonal random shocks have exerted a significant influence on the quantity and value of marine product exports from the state. Though the EU continues to be a major market for the marine product exports from the state in the post WTO phase, it is not possible to overlook the influence of irregular components in the data series on the quantity as well as the value of marine product exports from the state to the EU market. This points to the new issues encountered by the marine product exports of the state in the EU markets. It is possible to conclude that the rising NTMs have affected the marine product exports to the EU. In this context the specific NTMs faced by the marine product exporters of India in the EU in the post WTO period are highlighted in Table 3.21.

Table 3.21. Non Tariff Measures in the EU

Type of NTMs	Details on reasons for rejection
Standards	Non harmonization of standards on testing procedures
	The UK rejects consignments with chloramphenicol/nitrofuran and destroys it
	Rejection in Italy and France due to presence of vibrio-parahaemolyticus without judging the virulence factors
	Rejection of Indian sea caught marine products due to the presence of bacterial inhibitors/antibiotic residues without specifying the residue through confirmatory tests
	Non harmonization of procedure for lifting rapid alerts (eg. Consecutive checks for the same company exports are France – 3, Spain – 10, Belgium -5, Italy – 10 etc.)
	Despite harmonization of microbiological criteria, under EC Reg 2073/2005, members are not using internationally acceptable test methods
Regulations	Health certificates in EC language rather than English

Source: Ministry of Commerce, Govt. of India, 2011

The extent of NTMs faced by the marine product exporters of Kerala in the EU member states can be illustrated using specific cases. Consignments of fishery products have been rejected by Italy and Ireland on the grounds of presence of cadmium above the prescribed limits. But the samplings followed by these countries were not in line with the Commission Directive 2001/22/EC of 2001 which prescribes drawal of 2 samples and the result to be reported as a mean of 2. But in these countries, only one sample was tested. Despite reporting the matter to the EC, their response was lukewarm. They held the view that the application of the EC law was the responsibility of each member state and that they have no evidence of incorrect application of the EC law by Italy or Ireland.

Yet another issue in the EC is the absence of harmonization of norms for microbial standards and methods of inspection, sampling and tests. Consignments of fishery products have been rejected by Italy, France and Spain due to the detection of Vibrio parahaemolyticus and Vibrio cholera. The importing member states of the EC do not have specified limits for Vibrio parahaemolyticus in raw products. Though they have standards for Vibrio parahaemolyticus with respect to the ready to eat cooked products, the limits prescribed range from 1000 to 10000 per gram. Though the problem was brought to the notice of the EC, the response to this issue too was passive. The EC maintained that the EC regulation EC no. 2073/2005 on microbiological criteria for food stuffs harmonizes the norms. However the member states may under article 14 of the General Food Law, Regulation (EC) no 178/2002, impose appropriate regulation on grounds of unsafe foods.

Spain has been known to ban imports of squid and other marine products on the grounds of heavy metal contamination due to presence of mercury. However, there is a curious coincidence between the time when this ban is imposed and excessive landings of these products by Spanish fishermen. The ban is removed when their landings are low (Deodhar 2001).

Despite adhering to the food safety standards and quality regulations enforced by the EC, the rise in the number of detentions and rejections of consignments from Kerala in various EU countries on grounds of aforementioned issues certainly establishes the fact that these measures have emerged as NTMs to the marine product exports from the state. The measures though implemented with the objective of protecting the life and health of human beings, they have the potential to become disguised trade barriers. The time series modeler though forecasts an increase in the quantity and value of marine product exports from the state to the EU, the overriding influence of the random error terms on the quantity and value of exports to the EU reiterates the presence of NTMs in the EU. This is indeed a reason for worry for the seafood exporters of Kerala as their major market which is also the traditional stronghold is likely to pose challenges in the coming years in the form of NTMs.

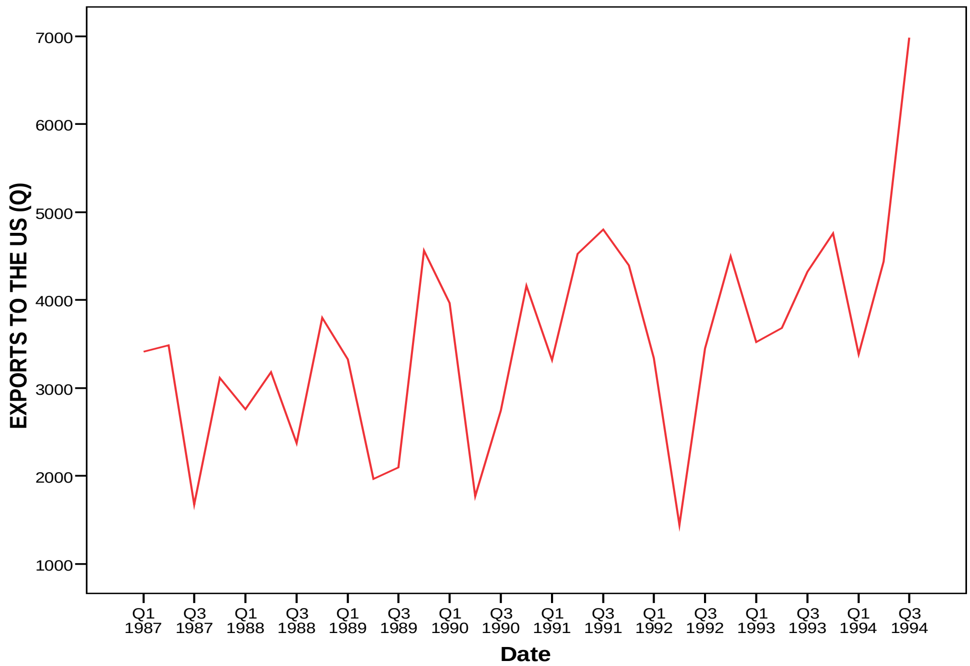
3.6.2 Marine Product Exports from Kerala to the US - A Comparison of Pre and Post WTO Periods

The US was a major importer of marine products from Kerala especially in the pre WTO phase. The US accounted for 25 percent and 30 percent of the marine product exports of Kerala in terms of quantity and value respectively in 1994-95. Besides that, during the period 1987-88 to 1994-95, the compound annual growth rate of marine product exports to the US in terms of quantity was 6.38 percent and in terms of value was 25.11 percent indicating the importance of this market in the marine product export basket of Kerala.

In 2009-10, the share of the US in the marine product export basket of Kerala stood at merely 6 percent and 9 percent in terms of quantity and value respectively. Further during the post WTO period, the compound annual growth rate of marine product exports from Kerala to the US market turned negative in terms of quantity and value. The compound annual growth rate of quantity and value of marine product exports to the US during this period was -5.87 percent and -3.176 percent respectively. The time series modeler has identified the models of best fit to explain the quantity and value of marine product exports from Kerala to the US in the pre WTO and the post WTO periods.

3.6.2.1 Marine Product Exports from Kerala to the US – Pre WTO Phase

Figure 3.21 presents the quantity of marine product exports from Kerala to the US in the pre WTO period.



Source: MPEDA Data, 1988 to 1995

Figure 3.21. Quarter wise Exports of Marine Products from Kerala to the US in terms of Quantity – Pre WTO Phase (Quantity in tonnes)

Table 3.22. Model Description – Exports to the US (Quantity) in the Pre WTO Period

			Model Type
Model Id	Exports to the US (Q)		Winters' Additive

Source: Computed from MPEDA Data, 1988 to 1995

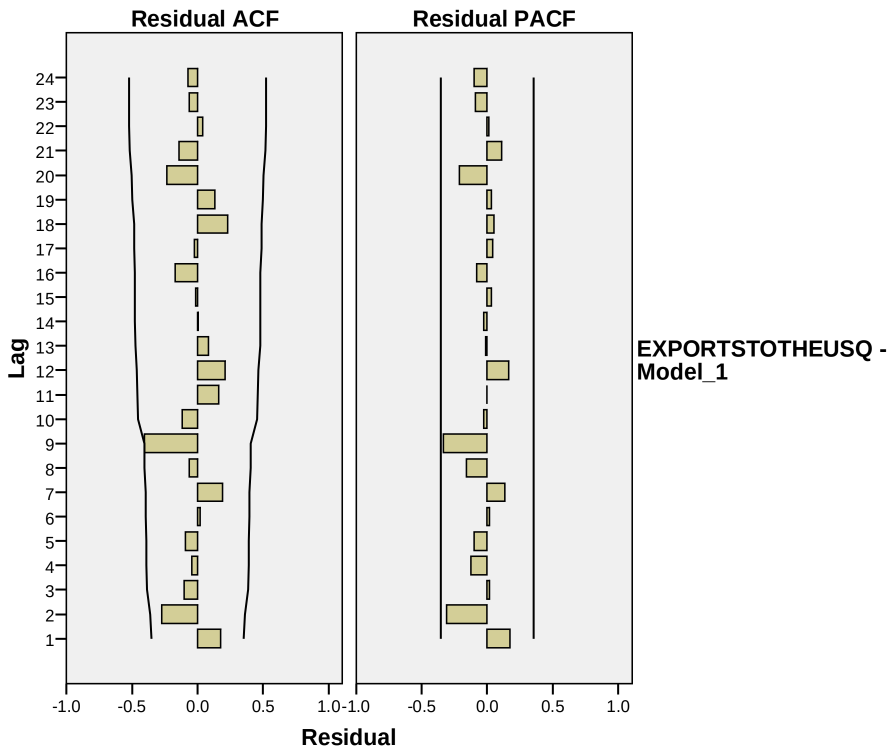
The winters' additive model is the best fitting model obtained for explaining the quantity of marine product exports from Kerala to the US in the pre WTO phase (see Table 3.22). From Table 3.23 it is clear that the estimates for level, trend and season are statistically insignificant. It can be concluded that the quantity of marine product exports to the US in the pre WTO phase is influenced by irregular components. This is despite the fact that the US market had maintained dominance in the marine product export basket of Kerala throughout the pre WTO period.

Table 3.23. Exponential Smoothing Model Parameters – Exports to the US (Quantity) in the Pre WTO Period

Model			Estimate	SE	t	Sig.
Exports to the US (Q)	No Transformation	Alpha (Level)	0.090	0.096	0.934	0.358
		Gamma (Trend)	2.09E-006	0.015	0.000	1.000
		Delta (Season)	9.88E-005	0.095	0.001	0.999

Source: Computed from MPEDA Data, 1988 to 1995

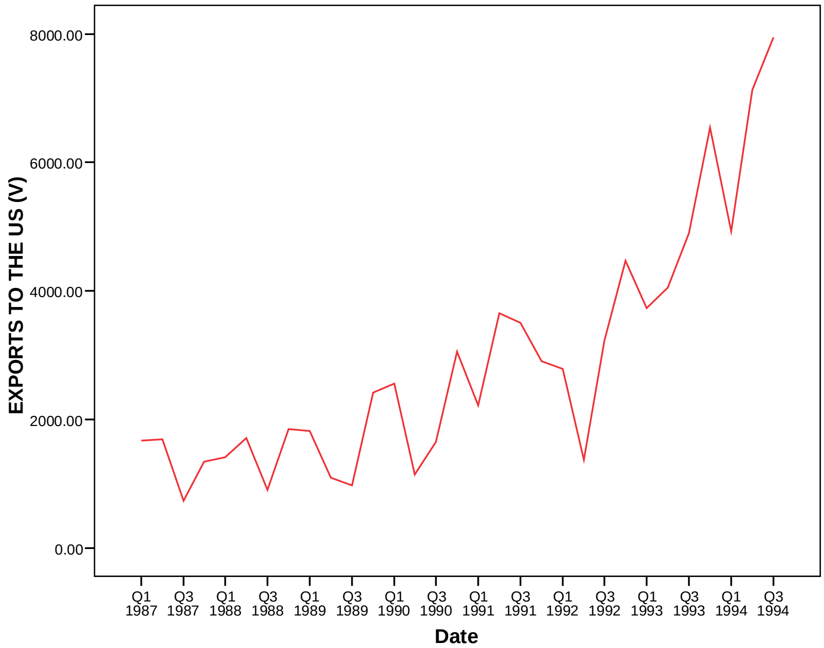
It is possible to show that the model obtained is adequate on the basis of the residual ACF and residual PACF. Figure 3.22 shows that the residual ACF and the residual PACF are within the defined limits at all lags from 1 to 24.



Source: Computed from MPEDA Data, 1988 to 1995

Figure 3.22. Patterns of Residual ACF and Residual PACF

The value of marine product exports to the US in the pre WTO phase is exhibiting the same pattern as the quantity of marine product exports. Figure 3.23 shows a rise in the value of the marine product export to the US throughout the pre WTO phase.



Source: MPEDA Data, 1988 to 1995

Figure 3.23. Quarter wise Exports of Marine Products from Kerala to the US in terms of Value – Pre WTO Phase (Value in ` Lakhs)

The model obtained in this case is winters' additive just as the one obtained for explaining the quantity of marine product exports from Kerala to the US in the pre WTO period (see Table 3.24).

Table 3.24. Model Description-Exports to the US (Value) in the Pre WTO Period

		Model Type
Model Id	Exports to the US (V)	Winters' Additive

Source: Computed from MPEDA Data, 1988 to 1995

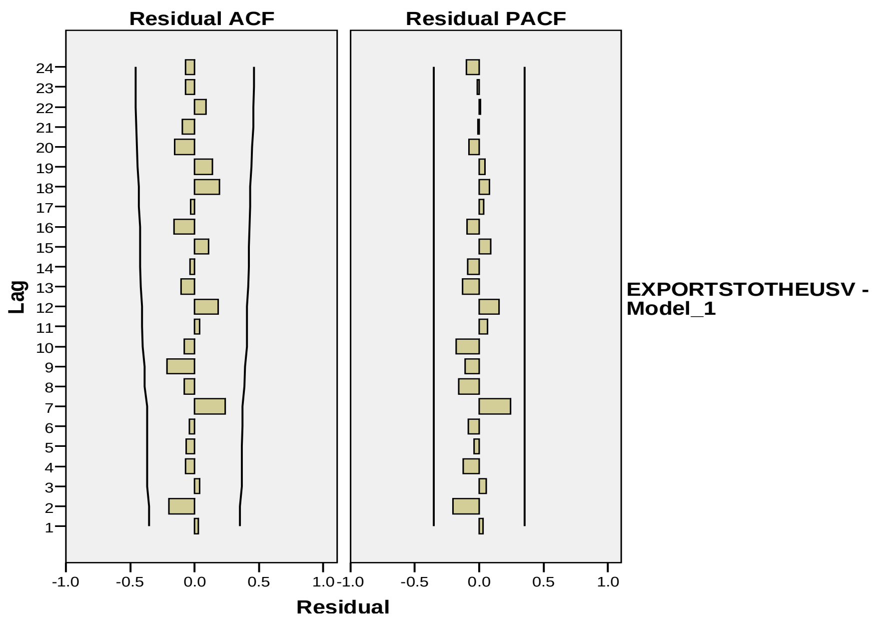
The estimates for the smoothing parameters of trend and season are statistically insignificant as is evident from Table 3.25. Hence it can be concluded that the value of marine product exports from Kerala to the US in the pre WTO phase is independent of trend and seasonal effects. As coefficient of level of the series is statistically significant at 5 percent level, it can be concluded that the value of marine product exports from Kerala to the US in the pre WTO phase is influenced by the mean value of exports during the period. As the marine products from Kerala fetched relatively higher unit value in the US market, this validates the dominance of the US market for our marine products in terms of value.

Table 3.25. Model Parameters – Exports to the US (Value) in the Pre WTO Period

Model			Estimate	SE	t	Sig.
Exports to the US (V)	No Transformation	Alpha (Level)	0.409	0.181	2.256	0.032
		Gamma (Trend)	0.260	0.280	0.929	0.361
		Delta (Season)	0.001	0.114	0.009	0.993

Source: Computed from MPEDA Data, 1988 to 1995

The explanatory power of the model is ascertained using stationary R^2 and R^2. The stationary R^2 is 0.504 and R^2 is 0.796 which is fairly adequate for the model.



Source: Computed from MPEDA Data, 1988 to 1995

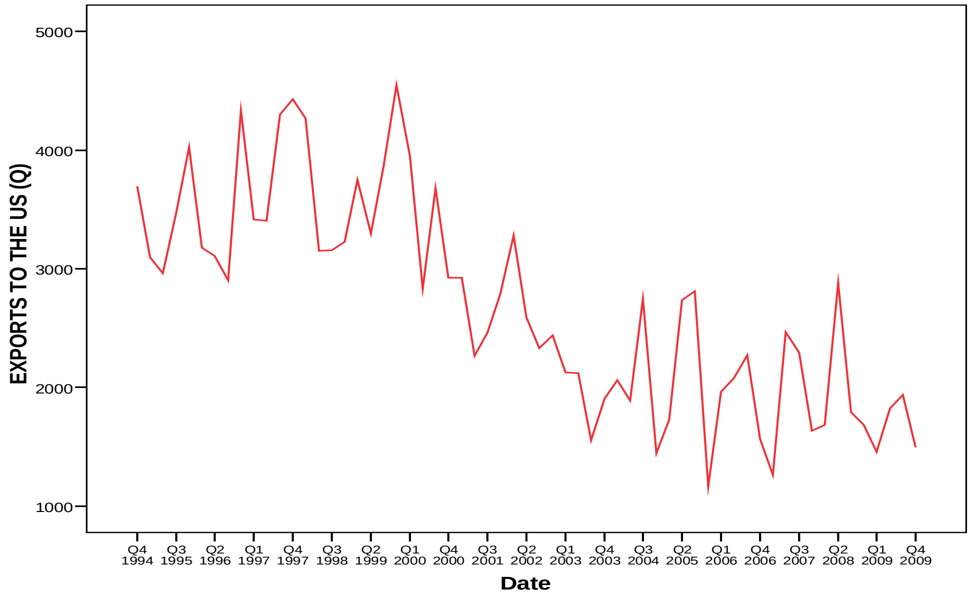
Figure 3.24. Pattern of Residual ACF and Residual PACF

The adequacy of the model is judged on the basis of the patterns of residual ACF and residual PACF given in Figure 3.24. The pattern of residual ACF and residual PACF show that they are within the defined limits and hence the model is adequate. The Ljung Box Q statistics is 15.195 at level of significance 0.437. The Q statistics is statistically insignificant and thus confirms that there is no significant non zero auto correlation of the residual errors.

3.6.2.2 Marine Product Exports from Kerala to the US – Post WTO Phase

During the post WTO period, there has happened a significant fall in the quantity and value of marine product exports from Kerala to the US. This is reflected in the fall in share of the US in the marine product export basket of the state in 2009-10 vis-a-vis 1995-96. The share of the US in the beginning of the post WTO phase in the marine product exports of Kerala was 17 percent in terms of quantity and 21 percent in terms of value. But its share dropped to a low of 6 percent and 9 percent in terms of quantity and value respectively in 2009-10. This is accompanied by a negative compound annual growth rate of quantity (-5.87 percent) and value (-3.176 percent) of marine product exports to the US during this phase.

The quantity of marine product exports from Kerala to the US fell from 13552 tonnes in 1995-96 to 6714 tonnes in 2009-10. Figure 3.25 presents the quantity of marine product exports from Kerala to the US in the period Q4 1994-95 to Q4 2009-10. It is very obvious that the marine product exports to the US have been falling drastically in the post WTO period especially since the early 2000s.



Source: MPEDA Data, 1995 to 2010

Figure 3.25. Quarter wise Exports of Marine Products from Kerala to the US in terms of Quantity – Post WTO Phase (Quantity in tonnes)

Table 3.26. Model Description-Exports to the US (Quantity) in the Post WTO Period

		Model Type
Model Id	Exports to the US (Q)	Simple Seasonal

Source: Computed from MPEDA Data, 1995 to 2010

The model that explains the quantity of exports of marine products from Kerala to the US in the post WTO period is the simple seasonal model which is appropriate for those series without trend but with a seasonal effect that is constant over time (see Table 3.26). Its smoothing parameters are level and season. The exponential smoothing is used to make short term forecasts for the time series data. The estimates of the smoothing parameters are given in Table 3.27.

Table 3.27. Exponential Smoothing Model Parameters – Exports to the US (Quantity) in the Post WTO Period

Model			Estimate	SE	t	Sig.
Exports to the US (Q)	No Transformation	Alpha (Level)	0.279	0.092	3.020	0.004
		Delta (Season)	0.507	0.142	3.575	0.001

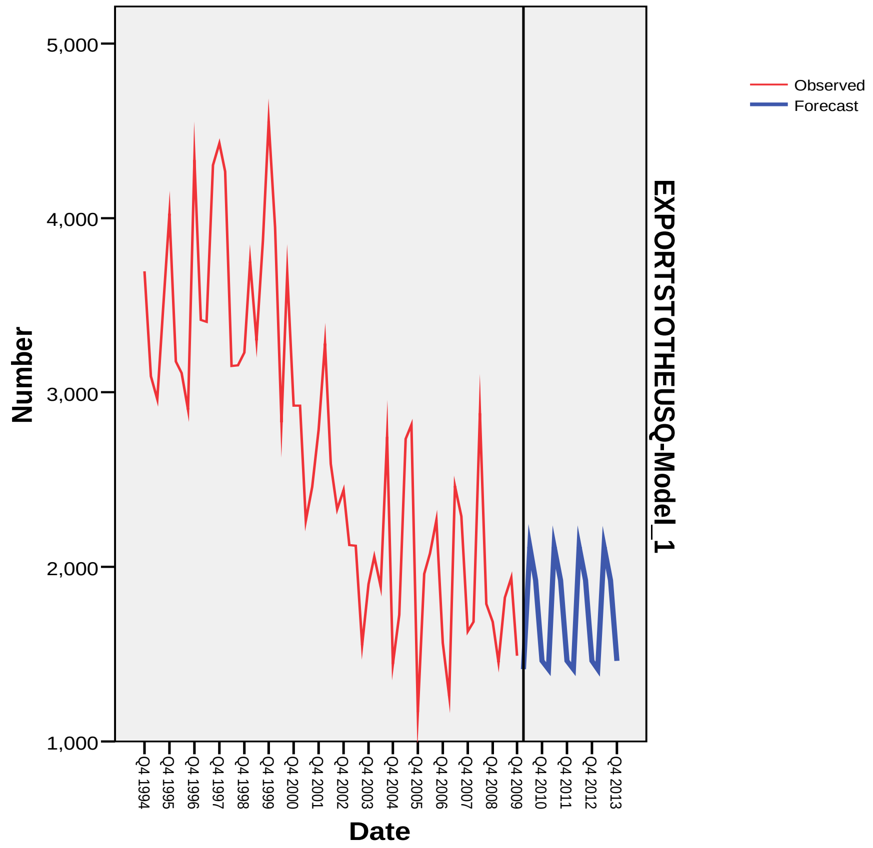
Source: Computed from MPEDA Data, 1995 to 2010

The estimate of the exponential smoothing parameter α which is the estimate of the level at the current period is 0.279. The value of α is close to zero indicating that the estimate of the level at the current time point is obtained by placing little weight on most recent observations for making forecasts of values of future period. The estimate of δ which is the estimate of the seasonal component at the current time period is 0.507. This indicates that more or less equal weights are placed on recent as well as distant observations. The t value in either case is higher with levels of significance 0.004 and 0.001 respectively. This indicates that the estimates of level and season are statistically significant. It can be concluded that the quantity of marine product exports from Kerala to the US in the post WTO period is dependent on the mean quantity of exports as well as on seasonal effects. A forecast of the quantity of marine product exports from Kerala to the US markets for the coming years is made in Table 3.28 and Figure 3.26.

Table 3.28. Forecasts of the Quantity of Marine Product Exports to the US (Quantity in tonnes)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	1417	1497	1417	1417	1417
Q2	2113	1822	2113	2113	2113
Q3	1925	2095	1925	1925	1925
Q4	1462	2127	1462	1462	1462

*Source: Computed from Table 3.27, * MPEDA, 2011*



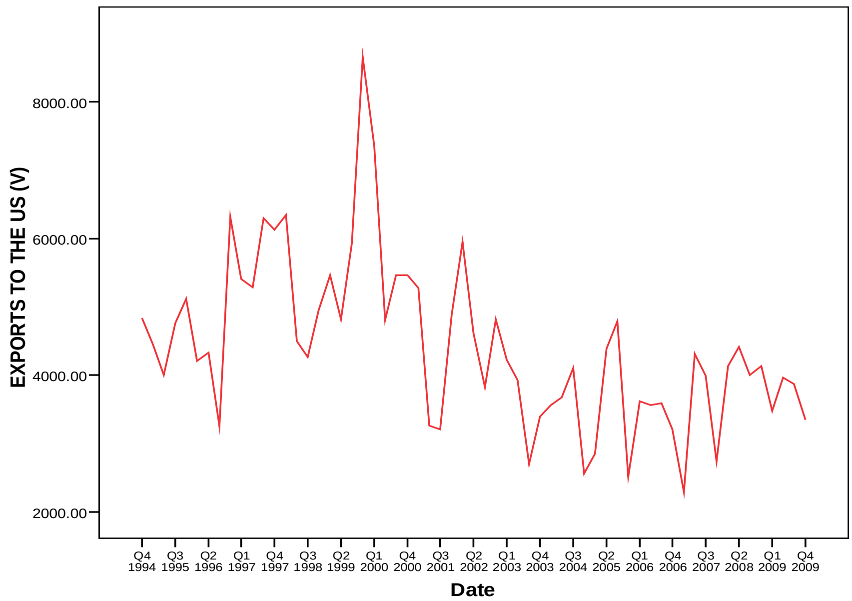
Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.28

Figure 3.26. Forecasts of the Quantity of Marine Product Exports to the US (Quantity in tonnes)

The estimated quantities obtained for quarters Q1, Q2, Q3 and Q4 are the same for each year. The highest and the lowest forecast quantities are for Q2 and Q1 respectively. The quarters Q2 and Q1 are respectively the peak and the trough seasons of the marine product sector of the state. The quantity of marine product exports from the state to the US is very low even during the peak quarters compared to the EU, one of the traditional strongholds of Kerala’s marine product exports. It is even lower than the quantity of marine product exports from the state to some of the new markets such as the SEA, and Others. This signals the losing importance of the US for the marine product exports of Kerala.

The MAPE computed as a measure to judge forecast accuracy of the quantity of exports to the US market is 15.17 percent. This divergence between the actual and estimated values can be attributed to factors such as rise in unit value realization in terms of US $ per kg and improved supply response in the third quarter that coincides with the peak period of activity in the marine sector of the state. Stationary R^2 is 0.497, so that the model is better than the baseline model. R^2 is 0.665 indicating fairly higher explanatory power.

The analysis of the value of marine product exports to the US in the post WTO period supplements the quantity wise analysis of marine product exports to the US in the same time period. The value of marine product exports from Kerala to the US market has been declining throughout the post WTO period especially since the early 2000s. This is similar to the one obtained for quantity of marine product exports to the US. Figure 3.27 shows the value of marine product exports from Kerala to the US in the post WTO period.



Source: MPEDA Data, 1995 to 2010

Figure 3.27. Quarter wise Exports of Marine Products from Kerala to the US in terms of Value – Post WTO Phase (Value in ` Lakhs)

The model that best explains the value of marine product exports from Kerala to the US is simple (see Table 3.29). This model is appropriate for series without trend or seasonality. Its smoothing parameter is level, the estimate of which is given in Table 3.30.

Table 3.29. Model Description-Exports to the US (Value) in the Post WTO Period

		Model Type
Model Id	Exports to the US (V)	Simple

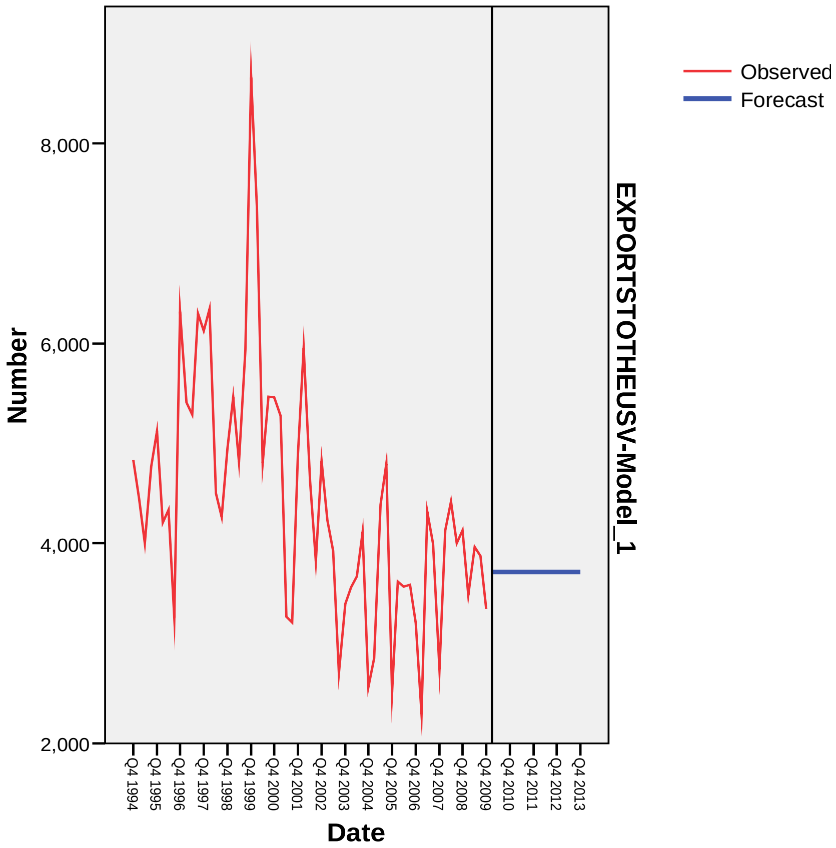
Source: Computed from MPEDA Data, 1995 to 2010

Table 3.30. Exponential Smoothing Model Parameters - Exports to the US (Value) in the Post WTO Period

Model			Estimate	SE	t	Sig.
Exports to the US (V)	No Transformation	Alpha (Level)	0.291	0.091	3.202	0.002

Source: Computed from MPEDA Data, 1995 to 2010

The estimate of the exponential smoothing parameter α which is the estimate of the level at the current period is 0.291. The value of α is low and hence the forecasts are based on both the recent observations and distant observations. As the t value calculated is higher, the estimate obtained for level is statistically significant. It can be concluded that value of marine product exports from Kerala to the US in the current time period is dependent upon the level of the series. Figure 3.28 depicts the forecast for the US market for the period 2010-11 to 2013-14.



Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.30

Figure 3.28. Forecasts of the Value of Marine Product Exports to the US (Value in ₹ Lakhs)

The best fitting model obtained for explaining the value of marine product exports from Kerala to the US is simple model that is devoid of trend and seasonality. The estimate for the smoothing parameter level is statistically significant. Hence, the value of marine product exports from the state to the US in the post WTO phase is dependent upon the mean value of the data series. The forecast generated for the value of marine product exports in the forthcoming years is based on the estimate for level. The value of marine product export forecast by the model for each quarter of every coming year is ` 3710.63 Lakhs. As the model is devoid of trend and seasonality, it is not possible to read much from the forecast figure obtained. However the mean value of marine product exports to the US in the post WTO period is higher than the pre WTO phase. This can be attributed to higher UV realization in the US market in the post WTO period. But the forecast figure obtained for the US market for the period 2010-11 to 2013-14 is much lower than those obtained for the markets of the EU, the SEA, the MEA and 'Others'. The forecast accuracy with respect to the value of marine product exports from the state to the US is fairly high indicated by the MAPE which is 8.1 percent.

The adequacy of this model is doubtful from the patterns of residual ACF and residual PACF. The residual ACF and residual PACF at lag 2 are found to be non zero as they have crossed the defined limits. However, as the stationary R^2 is positive, despite being low, the model is better than the baseline model. A comparison of the models obtained for the quantity and value of marine product exports from Kerala to the US in the pre WTO and post WTO period is made (see Table 3.31).

Table 3.31. Pre WTO and Post WTO Models for the US – A Comparison

Markets	Pre WTO model			Post WTO model		
	Model	Result	Adequacy	Model	Result	Adequacy
The US(Q)	Winters additive	Independent of level, trend and season	Adequate. Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (24.82) significant at 10percent level casting doubts about the adequacy of the model used	Simple seasonal	Influenced by seasonal effect and mean quantity of exports	Adequate. Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (26.651) at level of significance 0.046 indicating possibilities of non zero auto correlation of residuals
The US (V)	Winters' additive	Independent of seasonal effect but influenced by the mean of the data series	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics(15.1) at level of significance 0.437	Simple	Influenced by mean value of the exports.	The residual ACF and residual PACF at lag 2 are found to be non zero as they have crossed the defined limits.

Source: Based on Tables 3.22 to 3.27, 3.29 and 3.30; Figures 3.22 and 3.24

In the pre WTO period, the quantity of marine product exports to the US market is under the influence of the irregular variations. But in the post

WTO phase, there is an influence of seasonality in explaining the quantity of exports to the US market. The figures of forecast generated for the period 2010-11 to 2013-14 show that the highest quantities of marine product exports from Kerala to the US are in the peak quarters of the year and the lowest quantities of marine product exports from the state coincide with the trough quarters of the year. Despite the seasonal effect, the actual quantity of exports from Kerala to the US is low in all the quarters compared to the other markets of Kerala such as the EU, the SEA, the MEA and 'Others'. The mean too plays a significant part in determining the quantity of exports from Kerala to the US. The mean quantity of exports from the state to the US is higher in the pre WTO period than in the post WTO period. The mean quantity of exports to the US fell from 14114.88 tonnes in the pre WTO period to 10727.53 tonnes in the post WTO phase. This gives a clear signal as to the dwindling importance of the US market for marine product exports from the state. This conclusion is validated by the forecast result obtained. In the case of value of exports too, the mean has a tremendous influence on the value of marine product exports from the state to the US in the post WTO period. But unlike the mean quantity of exports, the mean value of exports to the US from Kerala is higher in the post WTO period compared to the pre WTO period. But there is no reason to cheer about as the forecast obtained for the value of marine product exports to the US is lower than the forecast figures obtained for the markets of the EU, the SEA, the MEA and 'Others'. It is obvious that the marine product exports from Kerala to the US have been falling both in terms of quantity and value during the post WTO period especially since the early 2000s. Several reasons can be attributed to this decline.

One major issue the marine product exports from the state faced in the US market in the first half of 2000 was the imposition of anti-dumping (AD) duties on the shrimp exports. As per the AD petition filed by the Southern US shrimp fishermen and processors against shrimp imports from China, Viet Nam, Thailand, India, Ecuador and Brazil, the US government in 2004 imposed AD duty on shrimps from these countries. The AD duty imposed on Indian shrimp initially was 10.17 percent. India raised the matter at the WTO and on the basis of the first administrative review conducted by the US Department of Commerce (US DOC), the AD duties on shrimps was brought down to 7.22 percent for the period August 2004 to January 2006. The US DOC initiated five rounds of administrative review of AD duty imposed on shrimp imports from India. In the preliminary result of fifth administrative review on AD duty for the period 1-2-09 to 31-01-10, the review specific average rate was brought down to 1.69 percent from 2.67 percent arrived at after the fourth review. Earlier the gravity analysis carried out has validated that the AD duty in the US has emerged as a barrier to the exports of marine products from India.

In addition to the AD duties, the US customs introduced a requirement in 2004 that the importers subject to the AD duties had to comply with enhanced bonding requirement. Under the amended Customs Bond Directive (CBD), the importers of shrimp are required to provide continuous customs bonds in excess of amounts established under the 1991 CBD and in addition to cash deposits of estimated AD duty per entry. Under the amended CBD, in addition to customs bond equal to the greater of $50,000 or 10 percent of duties, taxes and fees paid during the preceding year, the importers are required to secure a bond for an amount equal to the US DOC cash deposit rate in effect on the date of entry of the merchandise multiplied by the value of imports in the previous year as well as pay cash deposits equal to the amount of AD duty per entry. This sum of money would be under the hold of the US government for a year. According to the US, the enhanced bonding requirement in combination with cash deposits is imposed to ensure the payment of AD or countervailing duties under its retrospective duty assessment system. India and Thailand had raised the issue at the WTO and following the ruling by Appellate Body of the WTO, the US has terminated the enhanced bonding requirement in 2009. But during the period, 2004 to 2009, the exports of shrimp from India to the US were adversely hit.

Another NTM in the US market is the one pertaining to labeling requirement applicable for fish and fishery products to signal their country of origin as well as to indicate whether they are wild or farmed. Indian export consignments are rejected under Country of Origin Labeling (COOL) norms. The other NTMs that marine product exports face in the US market are those pertaining to Turtle Excluder Devices and dolphin safe catching procedure labeling.

The US Public Health Security and Bio-Terrorism Preparedness and Response Act 2002 were formulated to address security risk surrounding the supply of food stuffs. The imposition of Bio Terrorism Act (BTA) necessitates the registration of all foreign facilities that supply food to the US, prior notification of all shipments to the US, record-keeping by foreign enterprises to allow traceability of goods and procedures for the administrative detention of suspect foods. The marine product exporters had to face market access problems on account of this regulation. This Act has been a sort of indirect barrier for marine product exports from the state as number of inspections has increased.

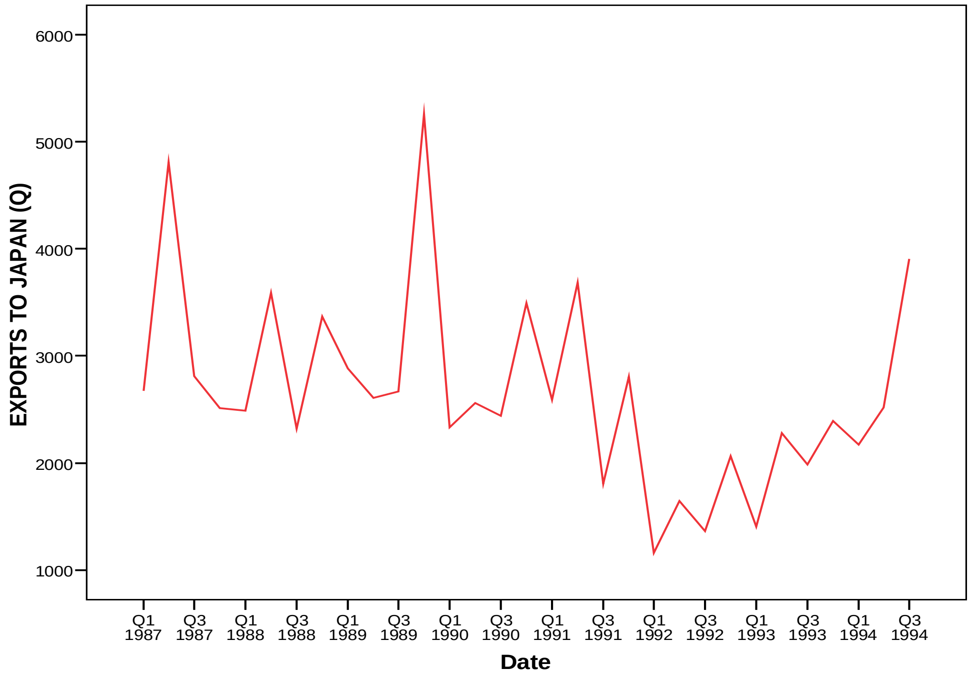
All the aforementioned factors explain the decline in the quantity as well as value of exports of marine products from Kerala to the US. Indeed the significant erosion of the US market in the marine product export basket of the state establishes the trade restricting role played by the NTMs in the US. The marine product exports from the state have been able to comply with the stringent standards and quality regulations demanded in the US market. However, despite that marine product exports encounter several problems in the US. It is the presence of these hidden barriers rather than strengthening of standards per se that has adversely affected marine product exports from the state to the US. The declining importance of the US in the marine product exports of Kerala is established by the forecasts obtained for this market in the coming years. The AD duties, the high cash deposits and enhanced bond requirements imposed on the shrimp imports by the US have forced the shrimp exports from the state to abandon the US market.

3.6.3 Marine Product Exports to Japan- A Comparison of Pre and Post WTO Periods

Japan was a major market for the marine product exports of the state in the pre WTO phase accounting for a sizeable share in terms of quantity and value. Shrimp was the major item of export from the state to Japanese market. In the mid 1980s, the share of Japan in the marine product export basket of Kerala was 36 percent and 43 percent in terms of quantity and value respectively. But in the pre WTO period itself, the compound annual growth rate of marine product exports from the state to the Japanese market in terms of quantity registered negative (-6.69 percent). Besides that value of marine product exports from Kerala to the Japanese market registered a rather slow compound annual growth rate (7.42 percent) unlike the other traditional markets of the EU and the US. This trend continued in the post WTO period too. During this phase, the value (-2.99 percent) and quantity (-5.52 percent) of marine product exports from the state to Japan registered negative compound annual growth rates. The shift away from Japan in the post WTO phase gives a clear signal of market diversification in favour of new non-traditional markets and product diversification in favour of new items of export such as squid, cuttlefish, etc. which has takers in non Japanese markets.

3.6.3.1 Marine Product Exports to Japan – Pre WTO Phase

Figure 3.29 captures the falling tendency of quantity of marine product exports from Kerala to Japan in the Pre WTO period. The model that best explains the quantity of marine product exports from Kerala to Japan in the pre WTO period is the simple seasonal model (see Table 3.32).



Source: MPEDA Data, 1988 to 1995

Figure 3.29. Quarter wise Exports of Marine Products from Kerala to Japan in terms of Quantity – Pre WTO Phase (Quantity in tonnes)

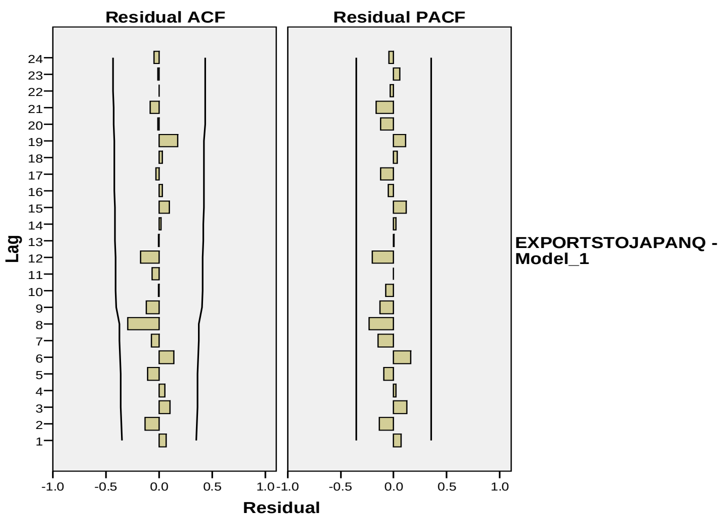
Table 3.32. Model Description-Exports to Japan (Quantity) in the Pre WTO Period

Model Description		Model Type
Model Id		Simple Seasonal

Exponential Smoothing Model Parameters			Estimate	SE	t	Sig.
	No Transformation	Alpha (Level)	0.300	0.149	2.008	0.054
		Delta (Season)	1.61E-005	0.160	0.000	1.000

Source: Computed from MPEDA Data, 1988 to 1995

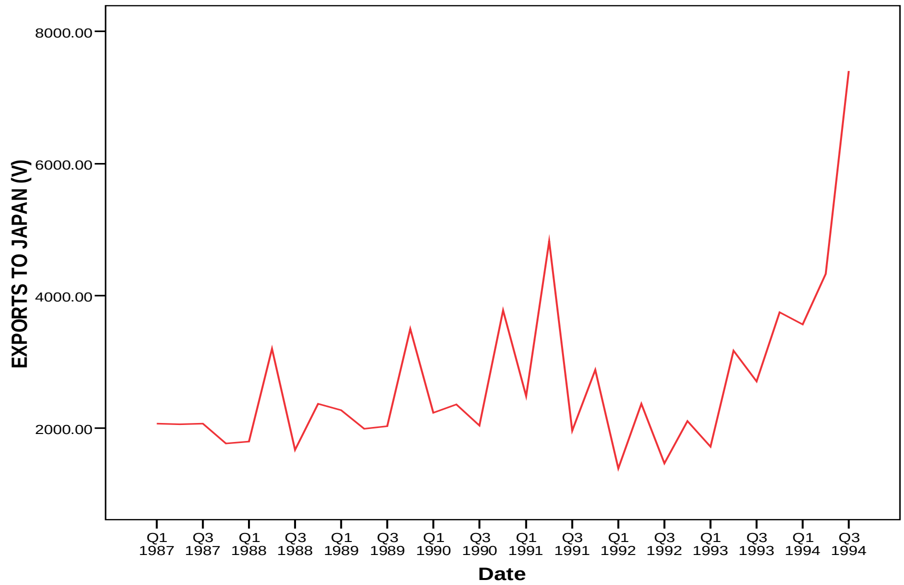
The estimates of the exponential smoothing parameters are given in Table 3.32. The estimate for the season is statistically insignificant. It can be concluded that the quantity of marine product exports from Kerala to Japan in the pre WTO period is not dependent upon seasonal effects. But the coefficient for level is statistically significant at 0.054 level suggesting that the marine product exports from the state to Japan in the pre WTO phase is influenced by mean quantity.



Source: Computed from MPEDA Data, 1988 to 1995

Figure 3.30. Pattern of Residual ACF and Residual PACF

As the residual ACF and residual PACF in Figure 3.30 are within the defined limits, the model is adequate. Ljung Q statistics is 10.003 and it is statistically insignificant at level 0.866 indicating that there is no significant auto correlation between the residuals. Other model fit parameters such as stationary R^2 and R^2 are 0.573 and 0.260 respectively.



Source: MPEDA Data, 1988 to 1995

Figure 3.31. Quarter wise Exports of Marine Products from Kerala to Japan in terms of Value – Pre WTO Phase Value in ` Lakhs

Figure 3.31 shows the value of marine product exports from Kerala to Japan in the pre WTO phase. The best fitting model identified by time series modeler for explaining the value of marine product exports to Japan in the pre WTO phase is ARIMA(0,0,0)(0,0,0) (see Table 3.33).

Table 3.33. Model Description-Exports to Japan (Value) in the Pre WTO Period

Model Description	**Model Type**
Model Id	ARIMA(0,0,0)(0,0,0)

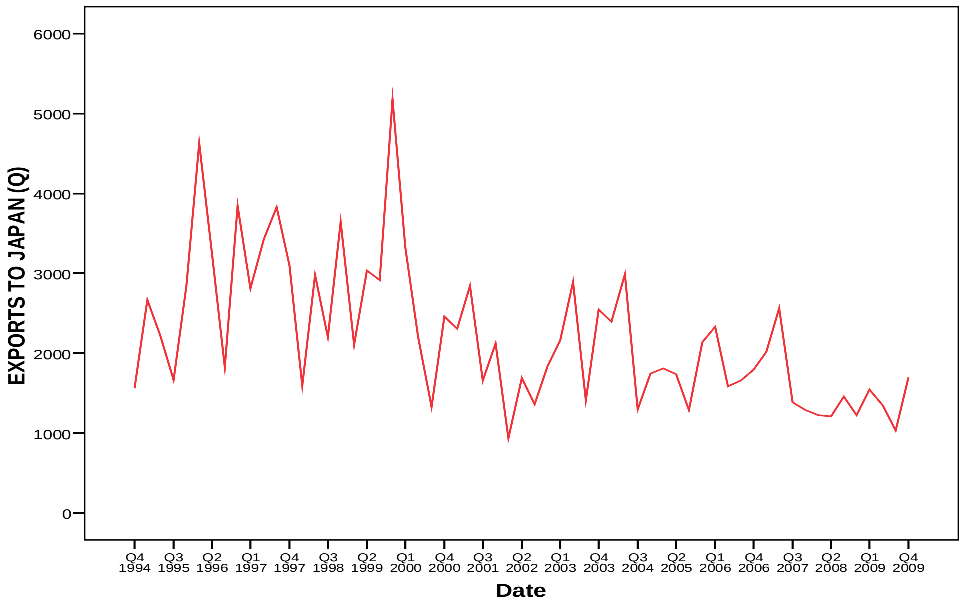
ARIMA Model Parameters		**Estimate**	**SE**	**t**	**Sig.**
Natural Log	Constant	7.785	0.058	133.749	0.000

Source: Computed from MPEDA Data, 1988 to 1995

The model is without a trend and seasonality. It does not have AR and MA parameters. The estimate obtained for the constant is statistically significant. This implies that the value of exports of marine products from Kerala to Japan is dependent on autonomous factors.

3.6.3.2 Marine Product Exports to Japan – Post WTO period

The post WTO period witnessed a substantial decline of Japan as a market for the marine product exports of Kerala. It is obvious from the negative compound annual growth rate registered in the quantity (-5.52 percent) and value (-2.991 percent) of marine product exports from the state to the Japanese market in the post WTO phase. Further the share of Japan in the marine product export basket of Kerala stood at a low of 5 percent and 9 percent in terms of quantity and value respectively in 2009-10.



Source: MPEDA Data, 1995 to 2010

Figure 3.32. Quarter wise Exports of Marine Products from Kerala to Japan in terms of Quantity – Post WTO Phase Quantity in tonnes

Figure 3.32 shows the quantity of marine product exports from Kerala to Japan in the post WTO period. It fell from a high of 9403 tonnes in 1995-96 to 5631 tonnes in 2009-10. The decline in marine product exports to the Japanese market is very pronounced since the early 2000s.

Table 3.34. Model Description-Exports to Japan (Quantity) in the Post WTO Period

Model Description			Model Type			
Model Id			**Simple Seasonal**			
Exponential Smoothing Model Parameters			**Estimate**	**SE**	**t**	**Sig.**
	No Transformation	Alpha (Level)	0.300	0.091	3.285	0.002
		Delta (Season)	5.94E-007	0.111	5.33E-006	1.000

Source: Computed from MPEDA Data, 1995 to 2010

The model that explains the quantity of marine product exports from Kerala to Japan is simple seasonal (see Table 3.34). An exponential smoothing model is used to ease the seasonality. The smoothing parameters are α and δ; the estimates for level and season respectively. The forecast of the quantity of marine product exports from Kerala to Japan is generated based on the estimates of level and season. The estimate for the level as given in Table 3.34 is significant at 0.002 level. But the estimate for season is statistically insignificant. It can be concluded that the quantity of marine product exports from Kerala to Japan in the post WTO phase is not dependent on seasonality, but is influenced by the level of the series.

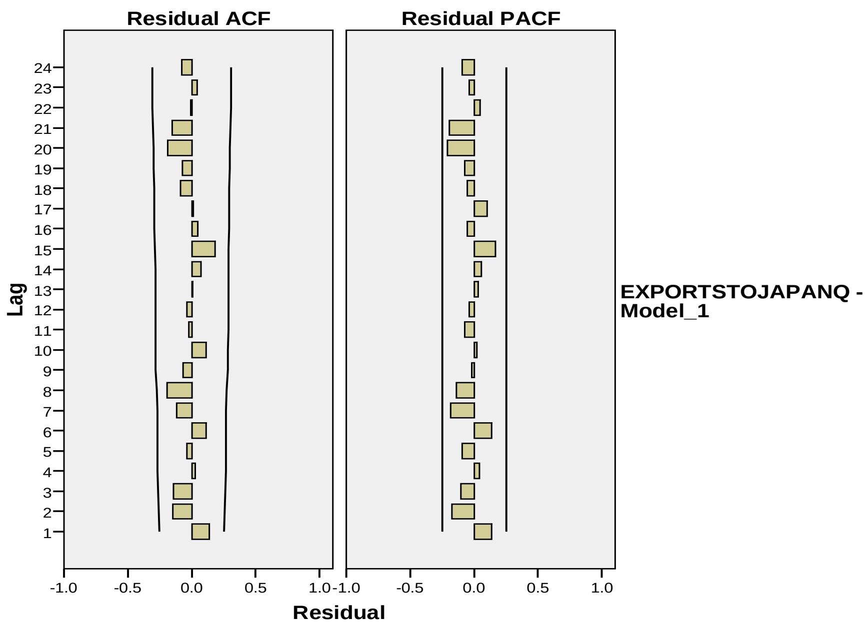
Table 3.35 Forecast of the Quantity of Marine Product Exports from Kerala to Japan (Quantity in tonnes)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted value	Actual value*			
Q1	1457	1245	1457	1457	1457
Q2	1597	2008	1597	1597	1597
Q3	955	1424	955	955	955
Q4	1639	1749	1639	1639	1639

*Source: Computed from Table 3.34; * MPEDA, 2011*

It is worth mentioning that the estimated quantity of marine product exports from Kerala to Japan is the lowest in the third quarter of the year which happens to be the peak period of activity in the marine product sector of Kerala. During this quarter, the forecast quantity of marine product exports from the state to most of the markets is high. Besides, the quantity of exports of marine products from Kerala to Japan is low even in the other quarters. This is because the model states that the quantity of marine product exports to Japan in the forthcoming years is influenced by the mean of the series. The mean quantity of exports from Kerala to Japan has declined from 10520.25 tonnes in the pre WTO period to 8908.33 tonnes in the post WTO period. This gives a clear signal that there is a decline in the importance of Japan in the marine product exports of the state (see Table 3.35).

The MAPE computed as a measure of forecast accuracy with respect to quantity of marine product exports to Japan is 19.18 percent. The deviations between the actual and estimated figures in this market can be attributed to increase in the unit value realization in terms of the US $ per kg, improved supply response and the government support to the sector in the form of Focus Market Scheme and Focus Product Scheme. The thrust placed on the export of value added tuna fish as a part of Market-Linked Focus Product Scheme to target market such as Japan where there is a huge demand for tuna could also explain the variation between the predicted and actual values.

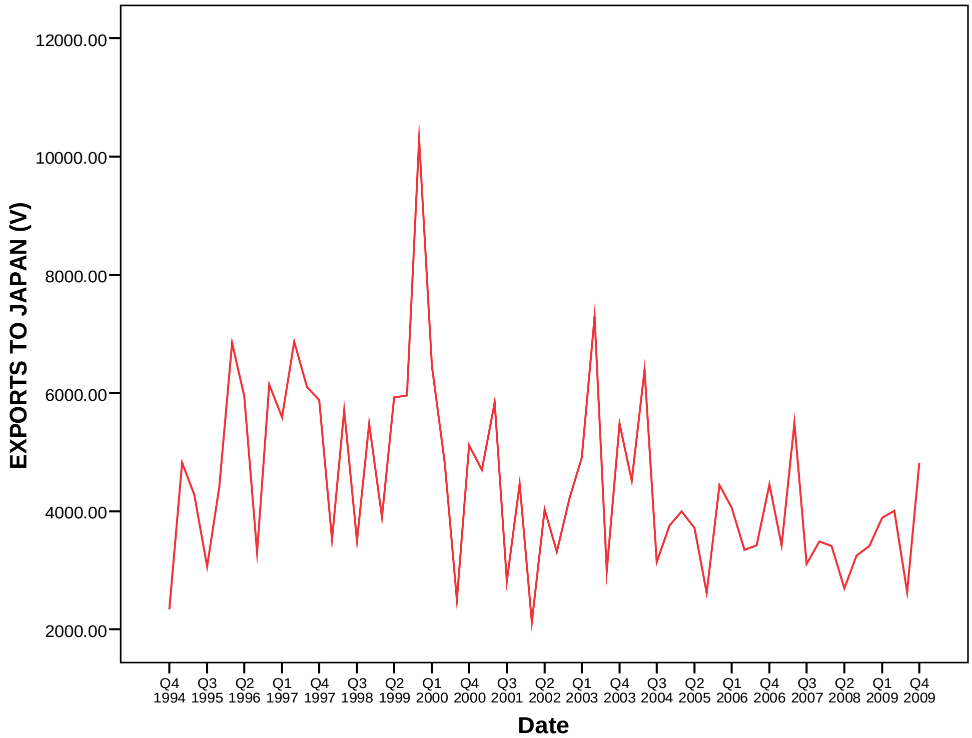


Source: Computed from MPEDA Data, 1995 to 2010

Figure 3.33 Pattern of Residual ACF and Residual PACF

Based on the pattern of residual ACF and residual PACF in Figure 3.33, it is possible to confirm the adequacy of the model. Besides that the Ljung Box Q statistics (14.353) is insignificant at the level 0.573 testifying the adequacy of the model.

The value of marine product exports to Japan in the post WTO period is also analyzed. The value of marine product exports to Japan too fell sharply in the post WTO period especially since the early 2000s as seen in Figure 3.34.



Source: MPEDA Data, 1995 to 2010

Figure 3.34 Quarter wise Exports of Marine Products from Kerala to Japan in terms of Value – Post WTO Phase Value in ` Lakhs

Table 3.36. Model Description- Exports to Japan (Value) in the Post WTO Period

Model Description		**Model Type**
Model Id		ARIMA(0,0,0)(0,1,1)

ARIMA Model Parameters			**Estimate**	**SE**	**t**	**Sig.**
	No Transformation	Seasonal Difference	1			
		MA, Seasonal Lag 1	0.754	0.128	5.908	0.000

Source: Computed from MPEDA Data 1995 to 2010

The model that explains the value of exports to Japan is ARIMA (0,0,0) (0,1,1) (see Table 3.36). The model can be described as

$(1-B^4)y_t = (1-\Theta_1 B^4)e_t$

$(1-B^4)y_t$ is seasonal difference of one

$(1-\Theta_1 B^4)e_t$ is seasonal MA (1)

The series is subject to seasonal differencing once and the seasonality has been removed. The model has the advantage of being parsimonious with just 1 parameter. The model possesses one seasonal MA component. The estimate of the seasonal MA component is 0.754 which is high and close to one indicating that the forecasts are based on the larger number of observations. The t value is significant and it can be concluded that the value of marine product exports from Kerala to Japan is not independent of current and lagged values of seasonal random error terms at lag 1 (see Table 3.36).

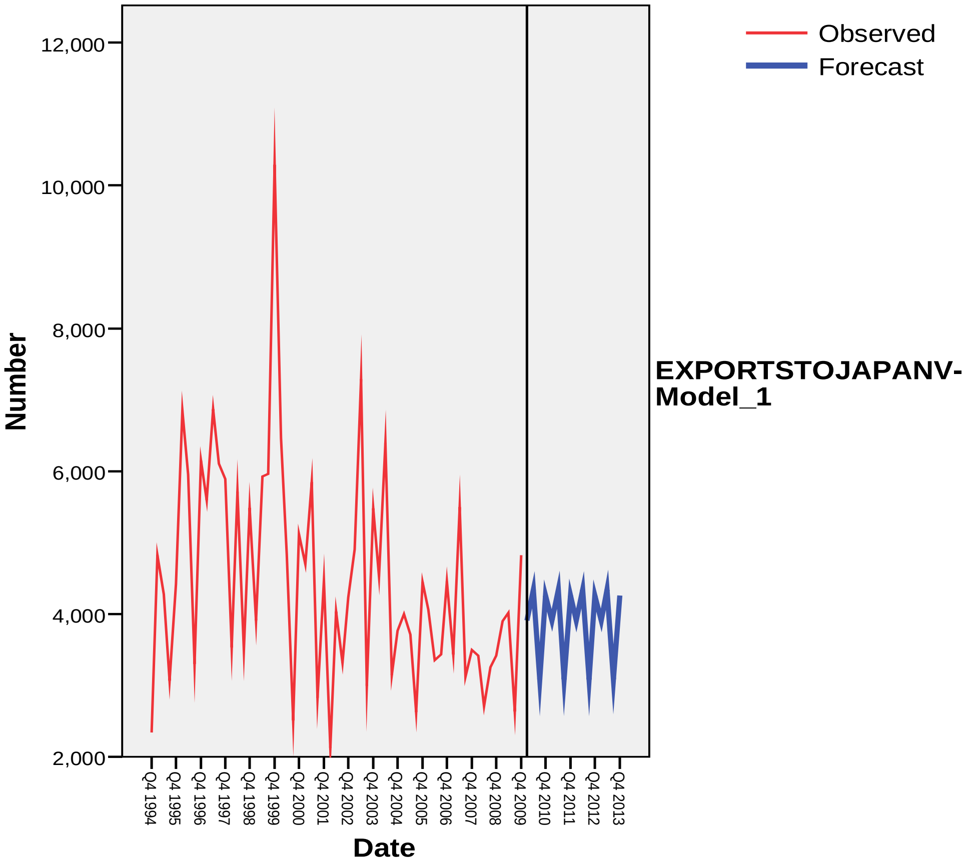
Table 3.37. Forecast of Value of Marine Product Exports from Kerala to Japan (Value: in ` Lakhs)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	3908.66	3146.79	3908.66	3908.66	3908.66
Q2	4340.26	5697.92	4340.26	4340.26	4340.26
Q3	3081.68	4190.82	3081.68	3081.68	3081.68
Q4	4257.24	4744.15	4257.24	4257.24	4257.24

*Source: Computed from Table 3.36, * MPEDA, 2011*

The estimated seasonal values of marine product exports for various quarters given in Table 3.37 and Figure 3.35 suggest that they are the same for each year. This forecast is justified as the best fitting model identified states that the value of marine product exports from Kerala to Japan in the post WTO period is devoid of trend. The peak season for the value of marine product exports to Japan is Q2 while it is the lowest in Q3. This matches with the forecast result obtained for Japan with respect to marine product export quantity from Kerala in the post WTO phase. It is worth mentioning that the Q2 and Q3 are the peak periods of harvest of marine fish and fishery products. During these quarters, the raw materials are available in plenty and the seafood export companies are found to work at their highest possible capacity. Despite that, the forecast data show that value of marine product exports from Kerala to Japan in Q3 is at its lowest. Though the value of the marine product exports from Kerala to Japan shows a peak in the second quarter of the forthcoming years, it is lower compared to the markets of the EU, the SEA, the MEA and ‘Others’. This indicates that the importance of Japan as a market for the marine product exports of Kerala is on the decline.

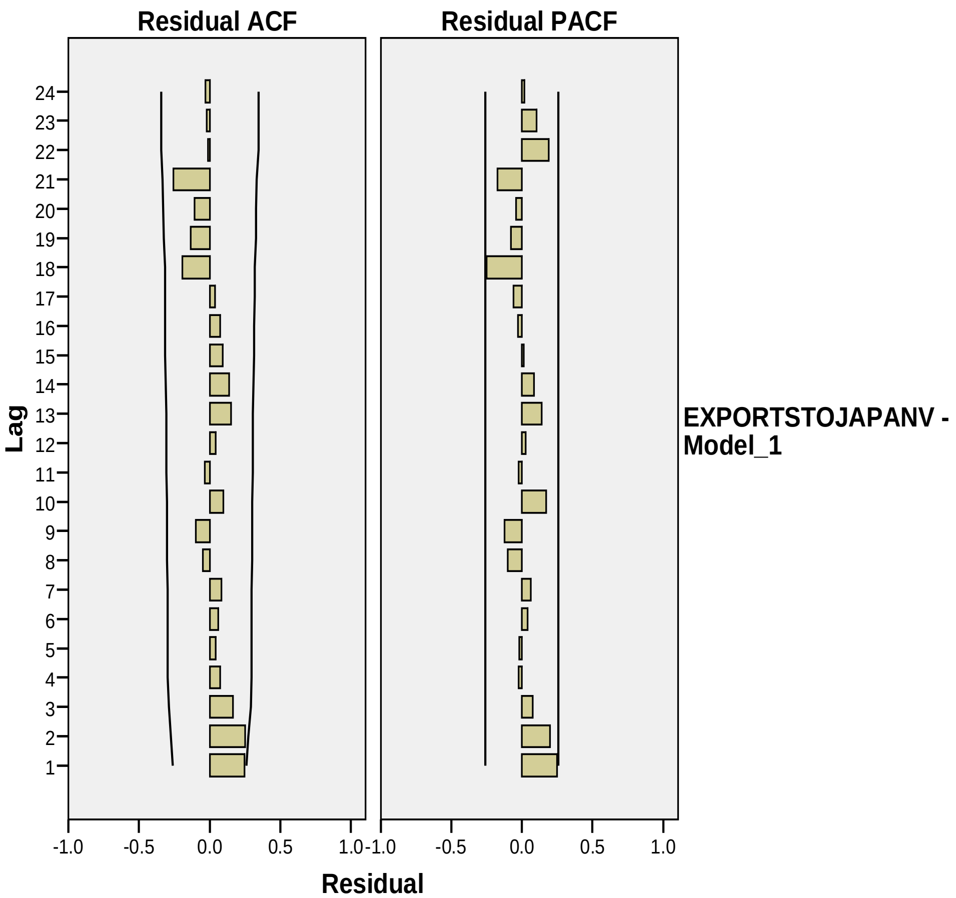
The MAPE computed as a measure of forecast accuracy for value of marine product exports to the Japanese market is fairly high at 21.19 percent. This can be attributed to reasons cited earlier such as the rise in unit value realized in terms of the US$ per kg in the Japanese market, government support measures such as the Focus Market Scheme coupled with Market Linked Focus Product Scheme. These schemes could have improved the value of marine product exports to Japan as Japan figured in the focus market list and high valued tuna fish figured in the focus product list designed to target Japanese market with huge demand potential. Besides, during this year, Indian ` depreciated by 8.7 per cent vis-à-vis Japanese Yen which could have driven up the exports to this market.



Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.37

Figure 3.35. Forecast of Marine Product Exports to Japan in terms of Value (Value in ` Lakhs)

The adequacy of the model is judged on the basis of the patterns of residual ACF and residual PACF.



Source: Computed from MPEDA Data, 1995 to 2010

Figure 3.36. Patterns of Residual ACF and Residual PACF

The residual ACF and residual PACF in Figure 3.36 are within the defined limits and not statistically different from zero. The Ljung Box Q statistics is 19.841 at 0.282 level of significance confirming the adequacy of the model. The model fit statistics such as stationary R^2 and R^2 are 0.481 and 0.265 respectively. The lower R squared can be accepted for the model explaining the value of marine product exports from Kerala to Japan, a market which is entangled with problems such as specific buyer preferences and a population demanding quality specifications for the exported marine products over and above those stipulated by the official agencies. The difficulties encountered for the export of marine products from the state to Japan is less explicit. This is identified as one of the characteristics of NTMs which are covert and emerge as disguised barriers to trade.

Table 3.38 Comparison of Models Obtained for Japan – Pre WTO and Post WTO

Markets	Pre WTO model			Post WTO model		
	Model	Result	Adequacy	Model	Result	Adequacy
Japan (Q)	Simple seasonal	Independent of seasonal effect but influenced by mean of the series	Adequate. Residual ACF and residual PACF within defined limits. Ljung Box Q statistics is 10.003 at level of significance 0.866. Not statistically significant	Simple seasonal	Independent of seasonal effect, but influenced by the mean of the series.	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics is 14.345 at significance level 0.573. Q statistics is not significant.
Japan (V)	ARIMA (0,0,0) (0,0,0)	Influenced by autonomous factors	Inadequate	ARIMA (0,0,0) (0,1,1)	Influenced by the current and lagged values of seasonal error terms	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (19.841) not significant at level 0.282

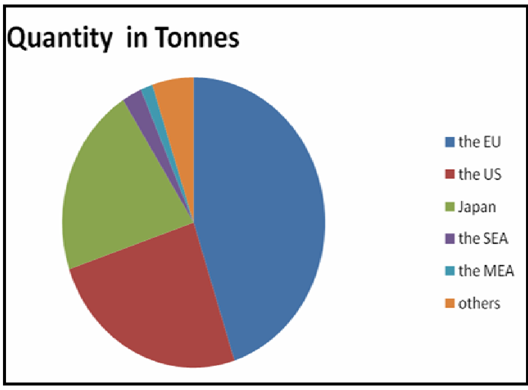
Source: Based on Tables 3.32 to 3.34 and 3.36; Figures 3.30, 3.33 and 3.36

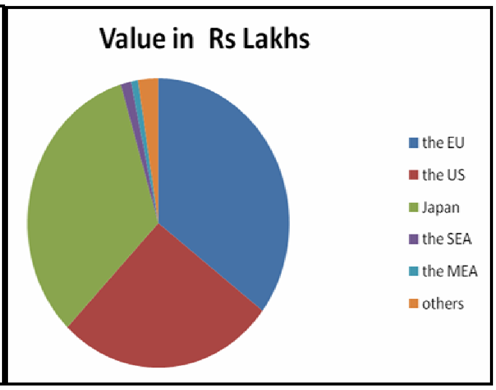
A comparison of the models obtained for explaining the quantity and value of marine product exports from Kerala to Japan brings out certain facts (see Table 3.38). In the post WTO phase, the quantity of marine product exports though independent of seasonality is influenced by the mean of the series. It is very obvious that there is a decline in the mean quantity of exports in the post WTO period compared to the pre WTO phase. This lowers the prospect of Japan as a market for the quantity of marine product exports from the state. With respect to the value of marine product exports from Kerala to Japan in the post WTO period, there is a visible influence exerted by irregular components pointing towards the problems encountered by the exporters in the Japanese market that have been mentioned earlier. In addition to aforementioned problems, there are certain other factors affecting the quantity and value of marine product exports from Kerala to Japan.

Though the sanitary standards enforced in Japan are less stringent compared to the EU, there are certain issues the marine product exports from Kerala encounter in the Japanese markets. On grounds of certification issues, the marine product exports from Kerala had faced problems in the Japanese market. Another major issue that the marine product exports from Kerala encounters in the Japanese market is that they are subject to unbound tariff lines. Unbound tariff lines relate mainly to fish and crustaceans. As far as the Japanese market is concerned, the unit value decline is because the Indian product is losing out to competition from other South East Asian countries, which provide better quality. The share of shrimp in the marine exports to Japan has been more or less around 90 percent, but with a declining unit value. The unit value of the non-shrimp marine exports has declined more significantly, again due to competition (Raghuram and Asopa 2008).

3.7 Marine Product Exports to Newer Markets - A Comparison of Pre and Post WTO Periods

The marine product exports from the state are increasingly moving to the so called non-traditional markets especially the markets of the SEA, the MEA and 'Others' that consist mainly of China, Turkey, and Tunisia etc. In the pre WTO phase, the quantity and value of marine product exports to these markets were quite insignificant. This is evident from the respective shares of the SEA, the MEA and 'Others' in the marine product exports of Kerala in the mid 1980s. The combined share of these non-traditional markets in 1987-88 accounted for a low of 9 percent in terms of quantity and 13 percent in terms of value. In terms of quantity, the shares of the SEA, the MEA and 'Others' in the marine product exports of Kerala in 1987-88 were 6 percent, 1 percent and 2 percent respectively. Similarly the shares of the SEA and the MEA in the marine product exports of Kerala in terms of value in 1987-88 were 2 percent and 1 percent respectively. With respect to the market 'Others', there is an outlier in the Q2 of 1987 due to which the share is found to be higher at 10 percent. Hence to facilitate comparison, the share of the SEA, the MEA and 'Others' in the marine product exports of the state in terms of quantity and value in 1990-91 is examined. The shares of the SEA, the MEA and 'Others' in 1990-91 were just 2 percent, 1 percent and 5 percent respectively accounting for a combined share of 8 percent in terms of quantity. Similarly in terms of value, these markets accounted for a combined share of 4 percent. This can be presented through Figure 3.37.

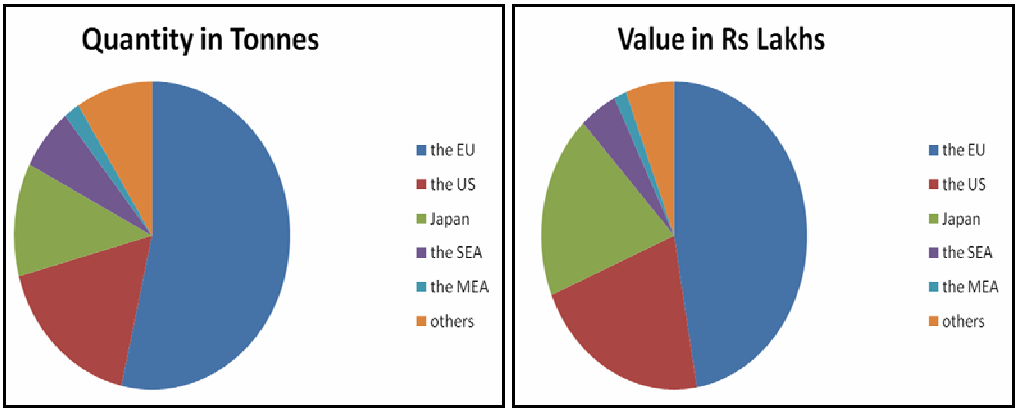




Source: MPEDA Data, 1991

Figure 3.37 Market wise Exports of Marine Products from Kerala in 1990-91

Though in absolute terms, the quantity and value of marine product exports from Kerala to these markets remained insignificant, the compound annual growth rate computed for the quantity and value of marine product exports to the SEA and the MEA for the entire pre WTO phase showed a very high rate of growth. At the beginning of the post WTO period, i.e. in 1995-96, the combined share of the non-traditional markets in the marine product exports of Kerala did show some improvement in terms of quantity and value and rose to 18 percent and 13 percent respectively. But even at the beginning of the WTO period, there has been visible market concentration as about 82 percent of quantity of marine product exports and 87 percent of value of marine product exports are directed to the traditional markets of the EU, the US and Japan. This is depicted in Figure 3.38.



Source: MPEDA Data, 1996

Figure 3.38. Market wise Exports of Marine Products from Kerala in 1995-96

However, an examination of the shares of these markets in the quantity and value of marine product exports of Kerala in 2009-10 show visible signs of an end of market concentration. The shares of the SEA, the MEA and 'Others' in the marine product exports of Kerala in terms of quantity in 2009-10 stood at 16 percent, 6 percent and 16 percent respectively. These markets together accounted for about 38 percent of the marine product exports from the state. Similarly in terms of value too, these markets together accounted for about 28 percent of the marine product exports of the state. This shows the rising prominence of new markets for the marine product exports of Kerala. This conclusion is supplemented by the figures on the compound annual growth rate of quantity and value of marine product exports for the markets of the SEA, the MEA and Others for the post WTO period.

In the following section, models are used to explain the behavior of quantity and value of marine product exports from Kerala to each of these new markets in the pre WTO and the post WTO period.

3.7.1 Marine Product Exports to the SEA – A comparison of Pre WTO and Post WTO Phase

3.7.1.1 Marine Product Exports from Kerala to the SEA – Pre WTO Phase

The quantity and value of marine product exports from the state to the SEA in the pre WTO period have shown a rise. The model that best explains the quantity of exports from Kerala to the SEA in the pre WTO phase is ARIMA(0,1,0)(0,1,0) (see Table 3.39) . The estimate for the constant is statistically insignificant. It can be concluded that the quantity of marine product exports from Kerala to the SEA is independent of intercept implying that less influence is exerted on the series by the autonomous factors. This happens in cases where the market is insignificant for our exports. This is true in the case of the SEA market as the quantity of marine product exports from the state to this market remained quite insignificant throughout this phase.

Table 3.39. Model Description-Exports to the SEA (Quantity) in the Pre WTO Period

Model Description	Model Type
Model Id	ARIMA(0,1,0)(0,1,0)

ARIMA Model Parameters				Estimate	SE	t	Sig.
		Square Root	Constant	0.974	1.873	0.520	0.608
			Difference	1			
			Seasonal Difference	1			

Source: Computed from MPEDA Data, 1988 to 1995

Table 3.40. Model Description- Exports to the SEA (Value) in the Pre WTO Period

Model Description		**Model Type**
Model Id		Winters' Additive

Exponential Smoothing Model Parameters			**Estimate**	**SE**	**t**	**Sig.**
	No Transformation	Alpha (Level)	0.135	0.130	1.032	0.311
		Gamma (Trend)	1.000	1.395	0.717	0.479
		Delta (Season)	1.000	0.549	1.820	0.079

Source: Computed from MPEDA Data, 1988 to 1995

The model that explains the value of marine product exports from Kerala to the SEA in the pre WTO period is winters' additive (see Table 3.40). The estimates for level and trend are statistically insignificant. But the estimate for season is statistically significant at 10 percent level. It can be concluded that the value of marine product exports from Kerala to the SEA in the pre WTO period is independent of level and trend but influenced by seasonal effects. The R^2 obtained as model fit statistics is fairly high at 0.737 which points to the explanatory power of the model employed.

3.7.1.2 Marine Product Exports from Kerala to the SEA – Post WTO Phase

It has already been stated that the SEA emerged as an important market for the marine product exports of Kerala in the post WTO period. It is substantiated by the compound annual growth rate obtained for quantity (8.69 percent) and value (8.38 percent) of marine product exports to this market in the post WTO phase. The compound annual growth rate for quantity of marine product exports to the SEA surpassed that of the traditional strongholds such as the EU. The quantity of marine product exports from Kerala to the SEA increased from 5163 tonnes in 1995-96 to a high of 17425 tonnes in 2009-10.

Table 3.41. Model Description - Exports to the SEA (Quantity) in the Post WTO Period

Model Description	Model Type
Model Id	Simple Seasonal

Exponential Smoothing Model Parameters			Estimate	SE	t	Sig.
	No Transformation	Alpha (Level)	0.085	0.077	1.114	0.270
		Delta (Season)	0.433	0.125	3.477	0.001

Source: Computed from MPEDA Data, 1995 to 2010

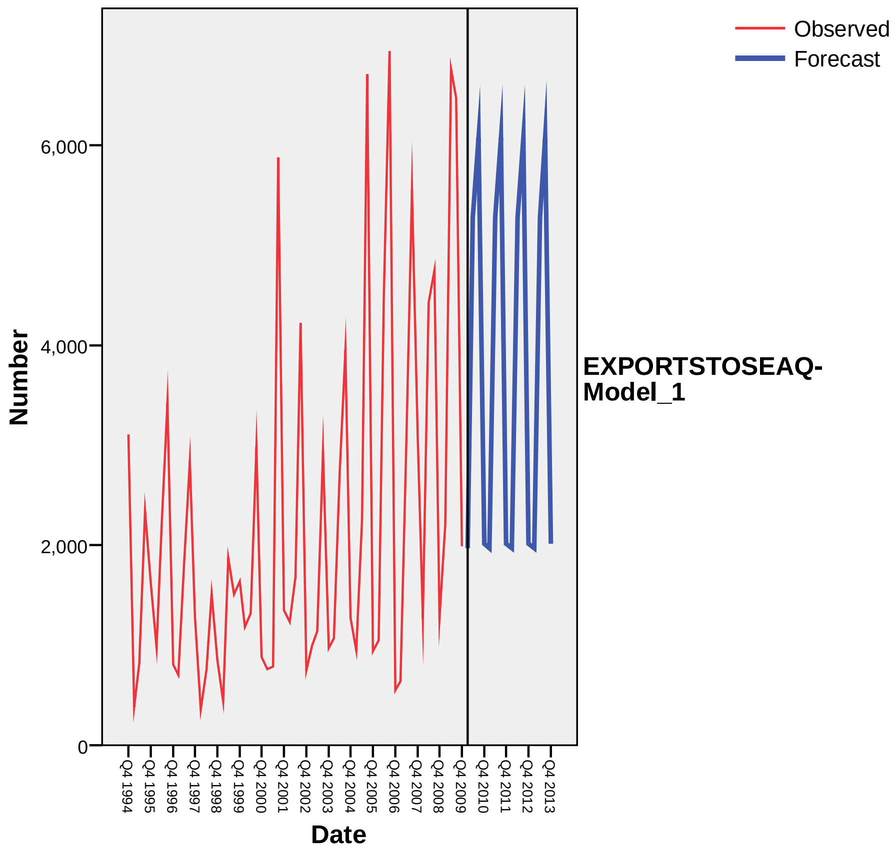
The model that best explains the quantity of marine product exports from Kerala to the SEA in the post WTO period is simple seasonal (see Table 3.41). The value of α which is the estimate of the level at the current time point is 0.085. As it is close to zero, the forecast quantities are based on both recent observations and distant observations. The value of δ which is the estimate of season at the current time point is 0.433. The t value for season is statistically significant at 0.001 levels. This suggests that the quantity of marine product exports from Kerala to the SEA is influenced by seasonality.

Table 3.42. Forecast of Marine Product Exports from Kerala to the SEA (Quantity in tonnes)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	1969	3991	1969	1969	1969
Q2	5276	5328	5276	5276	5276
Q3	6071	10581	6071	6071	6071
Q4	2012	5791	2012	2012	2012

*Source: Computed from Table 3.41, * MPEDA Data, 2011*

The highest quantity of exports from Kerala to the SEA is in the third quarter as given in Table 3.42. The third quarter stretching from October to December is the period of peak activity in the marine sector of Kerala. This shows that a significant quantity of marine product exports from Kerala is moving to the SEA Market. The lowest quantity of marine product exports from Kerala to the SEA is in the first quarter which is the dull phase of harvest in the marine sector of Kerala. This indicates that the fall in the quantity of marine product exports from Kerala to the SEA in the first quarter is due to decline in the availability of the raw material for export. As the series is devoid of trend, the forecast generated highlights the seasonal effects. When the harvest season comes and the seafood export units are working to their optimal capacity, the quantity of marine product exports moving to the SEA definitely picks up. This points to the fact that the SEA stores good prospects in the forthcoming years.



Source: Computed from MPEDA Data, 1995 to 2010 and Table 3.42

Figure 3.39. Forecast of Marine Product Exports from Kerala to the SEA Quantity (in tonnes)

The MAPE computed for judging the forecast accuracy of marine product exports in terms of quantity to the SEA is 39.88 raising concerns about the accuracy of the forecasts made (see Figure 3.39). However, a host of possible reasons can be cited for this discrepancy between the actual and forecast figures. In the post WTO phase, the SEA market has gained momentum in the marine product exports of the state. This is reflected in the high compound annual growth rate of quantity of marine product exports registered in this market even surpassing the rates registered by the traditional markets such as the EU, the US and Japan. But specific reason responsible for greater dependence on the SEA market during the year 2010-11 could be the problems of crisis and low demand in the developed markets. Besides, the SEA was a target market in the Focus Market Scheme of the government which could explain the increased flow of marine products to this market. The improved supply response especially in the peak quarter coupled with the other support and incentives extended by the government serve to explain the divergence between the actual and the forecast figure for this market.

The model fit statistics such as stationary R^2 and R^2 support the acceptance of this model. Stationary R^2 is positive at 0.486 indicating this model is better than the baseline model. Stationary R^2 is a preferred measure when there is a trend or a seasonal pattern. R^2 is also higher at 0.647.

The value of marine product exports from Kerala to the SEA too increased from ` 3920.74 lakhs in 1995-96 to ` 14030.69 lakhs in 2009-10. The model that explains the value of exports of seafood products to the SEA from Kerala is ARIMA (0, 0, 0) (0, 1, 1) with one seasonal difference and a seasonal MA component (see Table 3.43). The model has just one parameter and is having the quality of being parsimonious. The estimate of the seasonal

MA component is 0.475. The t value is significant at 0.001 level. This suggests that the value of marine product exports from Kerala to the SEA is not independent of current and lagged values of seasonal random shocks.

Table 3.43. Model Description-Exports to the SEA (Value) in the Post WTO Period

Model Description	Model Type
Model Id	ARIMA(0,0,0)(0,1,1)

ARIMA Model Parameters			**Estimate**	**SE**	**t**	**Sig.**
	No Transformation	Seasonal Difference	1			
		MA, Seasonal Lag 1	0.475	0.140	3.398	0.001

Source: Computed from MPEDA Data, 1995 to 2010

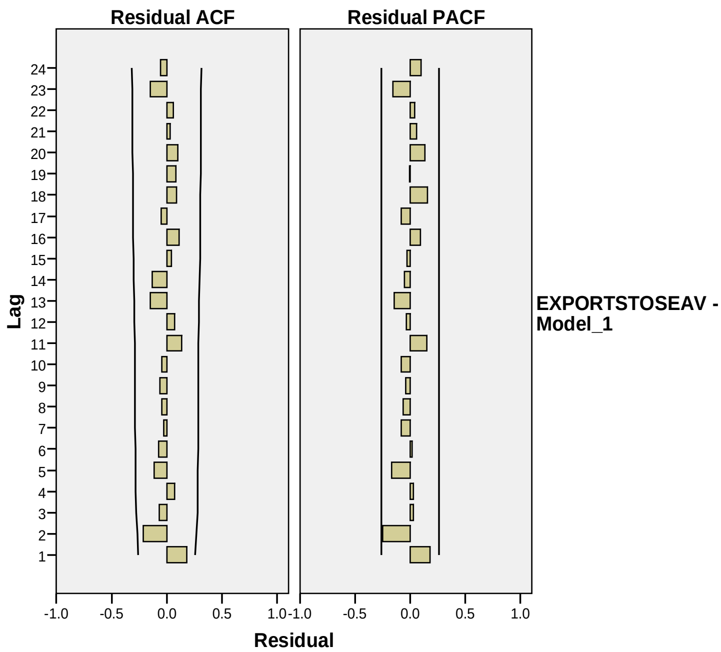
Table 3.44. Forecast of Value of Marine Product Exports from Kerala to the SEA (Value in ₹ Lakhs)

Period	**2010-11**		**2011-12**	**2012-13**	**2013-14**
	Predicted values	**Actual values***			
Q1	1761.16	3349.69	1761.16	1761.16	1761.16
Q2	4356.31	5179.45	4356.31	4356.31	4356.31
Q3	4806.61	9051.54	4806.61	4806.61	4806.61
Q4	1760.11	3947.29	1760.11	1760.11	1760.11

*Source: Computed from Table 3.43, *MPEDA Data, 2011*

The forecast result obtained using this model given in Table 3.44 matches the result obtained for the quantity of marine product exports from Kerala to the SEA. The seasonal values obtained as forecast for the years 2010 to 2013 suggest that the value of exports of marine products from Kerala to the SEA is the highest during the third quarter when the period of activity in the marine sector of Kerala is at its peak. The value of exports of marine products from Kerala to the SEA falls in the first and fourth quarter when the harvest in the marine sector of Kerala is on the decline. This indicates that in terms of value too, the SEA has acquired prominence as a significant portion of the marine product of the state is directed towards them.

As the MAPE is quite high at 41.41 percent, the forecast accuracy is indeed doubtful. But this is the forecast generated with the best fit model yielding the lowest possible MAPE. The factors cited while discussing the reasons for divergence between actual and predicted quantity of marine product exports to the SEA are applicable in this context too. Further, it is clear from Figure 3.40 that the residual ACF and residual PACF are within the defined limits and not significantly different from zero which indicates model adequacy. Ljung – Box Q statistics of 14.118 with a significance level of 0.659 confirms model adequacy. The ARIMA model (0,0,0) (0,1,1) is acceptable for explaining the behavior of marine product exports from Kerala to the SEA.



Source: Computed from MPEDA Data, 1995 to 2010

Figure 3.40. Pattern of Residual ACF and Residual PACF

Table 3.45 A Comparison of Models Obtained for the SEA – Pre WTO and Post WTO

Markets	**Pre WTO model**			**Post WTO model**		
	Model	**Result**	**Adequacy**	**Model**	**Result**	**Adequacy**
The SEA (Q)	ARIMA (0,1,0) (0,1,0)	Independent of intercept.	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (9.648) not significant at the level 0.943	Simple seasonal	Influenced by seasonal effect	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (18.368) not significant at the level 0.303
The SEA (V)	Winters' additive	Influenced by seasonal effects	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (8.851) not significant at the level 0.885	ARIMA (0,0,0) (0,1,1)	Influenced by current and lagged values of seasonal random errors.	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (14.118) not significant at the level 0.659

Source: Based on Tables 3.39 to 3.41and 3.43; Figure 3.40

As shown in Table 3.45, the quantity of marine product exports to the SEA in the pre WTO phase is independent of autonomous factors while during the post WTO phase it comes under the influence of seasonal forces. But with regard to the value of marine product exports, the seasonal random error terms come to exert a profound influence in the post WTO period unlike the pre

WTO period when it was subject mainly to seasonal factors. Parvathy and Rajasenan (2012) observe that the SEA offers bright prospects for marine product exports in quantity terms as it is influenced by seasonal factors. This suggests that the bulk of our marine product exports move to this market in the peak seasons, reflecting the importance of this market. This is validated by the forecasts for the SEA. However, the value of marine product exports is subject to the influence of random error terms suggesting the influence of factors other than the availability of raw materials on the series.

3.7.2 Marine Product Exports to the MEA – A comparison of Pre WTO and Post WTO Phase

Next to the SEA, another important market for the marine product exports of the state is the market of the Middle East Asia. The marine product exports from Kerala to this market grew both in terms of quantity and value in the post WTO period. The compound annual growth rate registered to this market in the post WTO period in quantity terms was 8.853 and in value terms was 13.31. This was higher compared to the rates registered in the case of traditional markets of the EU, the US and Japan.

Models have been used to explain the quantity and value of marine product exports from Kerala to the MEA in the pre WTO and post WTO period.

3.7.2.1 Marine Product Exports to the MEA – Pre WTO Period

Table 3.46 Model Description- Exports to the MEA (Quantity) in the Pre WTO Period

Model Description	Model Type
Model Id	ARIMA(0,0,0)(0,1,0)

ARIMA Model Parameters			Estimate	SE	t	Sig.
	No Transformation	Constant	42.269	14.994	2.819	.009
		Seasonal Difference	1			

Source: Computed from MPEDA Data, 1988 to 1995

As presented in Table 3.46, the estimate of the constant is statistically significant at 0.009 level. This implies that the quantity of marine product exports from Kerala in the pre WTO period is dependent on the constant. Thus it is influenced by autonomous factors.

Table 3.47. Model Description-Exports to the MEA (Value) in the Pre WTO Period

Model Description		**Model Type**
Model Id	Exports to the MEA (V)	ARIMA(2,1,0)(0,1,0)

ARIMA Model Parameters				**Estimate**	**SE**	**t**	**Sig.**
Exports to the MEA (V)	Natural Log	AR	Lag 1	-0.568	0.201	2.829	0.010
			Lag 2	-0.465	0.193	2.412	0.025
		Difference		1			
		Seasonal Difference		1			

Source: Computed from MPEDA Data, 1988 to 1995

The estimates of the AR at lag 1 and lag 2 given in Table 3.47 are statistically significant at 0.01 and 0.025 levels respectively. It is possible to conclude that the value of exports of marine products from Kerala to the MEA in the pre WTO period is influenced by the lagged values of the variable in the previous periods. An AR model is usually applied to those time series which shows long term dependencies between successive observations. In this case the value in a particular year can affect those in much later years. The values of marine product export to the MEA are very low during the pre WTO period and this had a significant adverse impact on the series which is established by the presence of the AR components.

3.7.2.2 Marine Product Exports to the MEA- Post WTO Period

The quantity of marine product exports rose from 1488 tonnes in 1995-96 to 6920 tonnes in 2009-10. The marine product exports to the MEA have been increasing steadily throughout the post WTO phase. The quantity of exports to the MEA from Kerala was significantly high in 1997 when the EU placed ban on the marine products from India. This suggests that whenever problems arose in the traditional markets, the marine product exports from Kerala moved towards newer markets.

Table 3.48. Exports to the MEA (Quantity) in the Post WTO Period

Model Description			**Model Type**			
Model Id			Simple			
Exponential Smoothing Model Parameters			**Estimate**	**SE**	**t**	**Sig.**
	No Transformation	Alpha (Level)	0.880	0.128	6.866	0.000

Source: Computed from MPEDA Data, 1995 to 2010

The model that best explains the quantity of marine product exports to the MEA is the simple model (see Table 3.48). The estimate of the level is 0.880 indicating that forecast is based more on recent observations. The estimate of level is statistically significant. Hence it can be concluded that the quantity of marine product exports from Kerala to the MEA is influenced by the level of the series.

The short term forecast generated for the coming years suggest that the quantity of marine product exports is 1981 in every quarter of the forthcoming years. This is because the series does not possess trend and seasonality. The quantity of marine product exports is higher in the forthcoming years compared to the previous years because it is influenced by the mean of the series. The mean quantity of the series in the post WTO phase is higher than that in the pre WTO period. The mean quantity of marine product exports from

Kerala to the MEA increased from 894.625 tonnes in the pre WTO phase to 3413.27 tonnes in the post WTO period.

As the MAPE computed for the quantity of marine product exports to the MEA is fairly high at 29.12 percent, there is a need to examine the reasons for the departure of the actual quantities from the predicted quantities. Despite the MEA being an emerging market for the marine product exports from the state, there is a decline in the actual quantity of marine product exports to the MEA. This could be attributed to a decline in the unit value realized in terms of the US $ per kg in this market in 2010-11 vis-à-vis the latter half of the 2000s. Another possible reason could be the falling demand linked to the economic crisis in the region. Despite the influence exerted by the level of the series which shows a higher mean quantity of exports in the post rather than the pre WTO period to the MEA market, the decline in actual quantity of marine product exports to this market can be attributed to general economic crisis that engulfed the region.

The value of marine product exports from Kerala to the MEA has increased steadily throughout the post WTO phase. The value of marine product exports from the state to the MEA has increased from ` 1286.11 Lakhs in 1995-96 to a high of ` 8194.7 Lakhs in 2009-10. The estimates of the model parameters are given in Table 3.49.

Table 3.49. ARIMA Model Parameters – Exports to the MEA (Value) in the Post WTO Period

ARIMA Model Parameters				Estimate	SE	t	Sig.
Exports to the MEA (V)	Natural Log	Constant		0.148	0.050	2.956	0.005
		MA	Lag 1	-0.384	0.128	3.015	0.004
		AR, Seasonal	Lag 1	-0.656	0.102	6.410	0.000
		Seasonal Difference		1			

Source: Computed from MPEDA Data, 1995 to 2010

The estimates for MA component and Seasonal AR component are -0.384 and -0.656 respectively. The t values are statistically significant at levels of significance 0.004 and 0.000. Hence it can be concluded that the value of marine product exports from Kerala to the MEA are influenced by non seasonal random factors as well as by the lagged values of the variable with lag being 1 seasonal time period. The value of marine product exports to this market continues to be under the adverse influence of autoregressive elements. Based on this model, a forecast of the value of marine product exports from the state to the MEA in the coming years is made (see Table 3.50).

Table 3.50 Forecasts of Exports to the MEA (V) Value in ` Lakhs

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	2328.16	1556.96	2696.53	3334.91	3932.96
Q2	3064.91	2613.23	3495.32	4361.90	5111.29
Q3	2576.55	1722.22	3179.25	3767.61	4567.18
Q4	2598.02	2181.48	2906.91	3673.27	4269.17

*Source: Computed from Table 3.49, *MPEDA Data, 2011*

The value of marine product exports from Kerala to the MEA is the highest in the Q2 for all the forthcoming years. The fall in the value of marine product exports from Kerala to the MEA in the Q1 coincides with the decline in the harvest in the marine sector of the state. This estimate is in line with the seasonality inherent in the marine sector of the state. Further the value of exports to the MEA from Kerala is showing an increase as we move from year to year. This certainly suggests the growing importance of the MEA in the marine product export basket of Kerala.

The MAPE computed for judging the forecast accuracy of the value of marine product exports to the MEA is high at 33.88 raising concern about the accuracy of the figures obtained. But in this case too, the model used to generate the forecast is the model of the best fit that gives the lowest possible MAPE. All the factors explained while discussing the concerns about the accuracy of figures obtained for quantity of marine product exports from Kerala to the MEA are relevant in this context. As these issues are linked to the crisis in the MEA region in the given year, the value of marine product exports from the state to this market shall pick up as predicted in the coming years as the gravity of the crisis wanes away. The MEA shall continue to retain the prominence it has acquired in the marine product export basket of the state in the post WTO phase.

Table 3.51. A Comparison of Models Obtained for the MEA – Pre WTO and Post WTO Phase

Markets	Pre WTO model			Post WTO model		
	Model	**Result**	**Adequacy**	**Model**	**Result**	**Adequacy**
The MEA (Q)	ARIMA (0,0,0) (0,1,0)	The estimate of the constant is statistically significant at 1 percent level. The quantity of exports to the MEA influenced by autonomous factors.	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (16.271) not significant at the level 0.574	Simple	Influenced by level	Adequate. Residual ACF and residual PACF outside the defined limit at lag 2. But Q statistics (22.123) not statistically significant at the level 0.180.
The MEA (V)	ARIMA (2,1,0) (0,1,0)	Influenced by the lagged values of the variable in the previous period	Adequate Residual ACF and residual PACF within defined limits except at lag 4.	ARIMA (0, 0, 1) (1, 1, 0)	influenced by non seasonal random factors as well as by the lagged values of the variable with lag being	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics

			Ljung Box Q statistics (23.484) not significant at the level 0.101		1seasonal time period	(11.99) not significant at the level 0.745

Source: Based on Tables 3.46 to 3.49

Table 3.51 gives a comparison of the models obtained for the MEA in the pre and the post WTO periods. In the pre WTO period, the intercept term has exerted a greater influence on the marine product export quantity to the MEA. But the value of the marine product exports to the MEA in the pre WTO period has been dependent upon the lagged values of the variable two time periods back. In the post WTO phase, the quantity of the marine product exports from the state to the MEA is influenced by the mean of the series. The mean quantity of exports to the MEA being higher in the post WTO period vis-à-vis the pre WTO period, it is a clear indication that this market can be an important market for the exports from Kerala in future. The value of exports to the MEA is influenced mainly by non seasonal random factors as well as by the lagged values of the variable with lag being one seasonal time period. The marine product sector has a visible seasonal pattern which is reflected in the value of marine product exports to the MEA. The forecasts underline the growing prospects of this market for the marine product exports of the state in the coming years.

3.7.3 Marine Product Exports to 'Others'

Marine product exports from Kerala to the category 'Others' signify the exports to the rest of the world barring the markets that have already been discussed. The prominent importers in the category 'Others' are China, Turkey and Tunisia. The share of this group in the marine product exports of the state was quite insignificant in terms of quantity and value in the pre WTO period.

In the early 1990s, the share of 'Others' in the marine product exports of Kerala stood at 5 percent and 2 percent in terms of quantity and value respectively. But the share of this market began to improve gradually and in 2009-10, the share in terms of quantity and value are 16 percent and 15 percent respectively. The share of this category improved considerably in the post WTO period due to the emergence of China as a major importer of marine products from the state. In 2010-11, China alone accounted for about 9.15 percent of marine product exports of Kerala in terms of quantity. China being the hub of reprocessing of fish and fishery products has been importing bulkily from Kerala for the purpose of value addition and re-exports. This indicates the growing importance of these markets in the marine product exports of the state in the post WTO period. Models of best fit are used to explain the quantity and value wise flow of marine product exports from Kerala to 'Others' in the pre and post WTO periods.

3.7.3.1 Marine Product Exports to 'Others' - Pre WTO period

Table 3.52. Model Description-Exports to 'Others' (Quantity) in the Pre WTO Period

Model Description		Model Type
Model Id	Exports to Others (Q)	ARIMA(0,0,0)(1,0,0)

ARIMA Model Parameters				Estimate	SE	t	Sig.
Exports to Others (Q)	Natural Log	Constant		5.720	0.229	24.960	0.000
		AR, Seasonal	Lag 1	0.553	0.168	3.285	0.003

Source: Computed from MPEDA Data, 1988 to 1995

The estimate for the constant and the AR component given in Table 3.52 is statistically significant showing that the quantity of marine product exports from Kerala to these markets in the pre WTO period is influenced by autonomous factors and lagged values of the variable with the lag being one seasonal time period. The low values of marine product exports to the market throughout the pre WTO period are established by the presence of the seasonal AR component.

Table 3.53. Model Description- Exports to 'Others' (Value) in the Pre WTO Period

Model Description	Model Type
Model Id	ARIMA(0,0,0)(0,1,1)

ARIMA Model Parameters				Estimate	SE	t	Sig.
Exports to Others (V)	Natural Log	Constant		0.208	0.060	3.440	0.002
		Seasonal Difference		1			
		MA, Seasonal	Lag 1	0.556	0.233	2.386	0.025

Source: Computed from MPEDA Data, 1988 to 1995

The estimates for constant and seasonal MA component given in Table 3.53 are statistically significant. It can be concluded that the value of marine product exports from Kerala to 'Others' is influenced by irregular component of the time series.

3.7.3.2 Marine Product Exports from Kerala to 'Others' – Post WTO Phase

It has been stated that this market assumed importance in the post WTO period especially in terms of quantity. The quantity of marine product exports from Kerala to others increased from 7047 tonnes in 1995-96 to 17300 tonnes in 2009-10. This can be mainly attributed to the rise of China as a major importer of marine products from the state for the purpose of value addition and re – exports. The best fitting model that explains the quantity of exports to 'Others' in the post WTO phase is winters' multiplicative model which is suitable for those series with linear trend and a seasonal effect that depends on the level of series (see Table 3.54). Its smoothing parameters are level, trend and season.

Table 3.54. Model Description-Exports to 'Others' (Quantity) in the Post WTO Period

Model Description	Model Type
Model Id	Winters' Multiplicative

Exponential Smoothing Model Parameters			Estimate	SE	t	Sig.
	No Transformation	Alpha (Level)	0.566	0.084	6.749	0.000
		Gamma (Trend)	0.376	0.157	2.396	0.020
		Delta (Season)	0.701	0.188	3.733	0.000

Source: Computed from MPEDA Data, 1995 to 2010

The estimates obtained for level, trend and season are 0.566, 0.376 and 0.701 respectively. The coefficients for level, trend and season are statistically significant. The estimate for level is moderately high showing that equal weight is placed on both recent and past observations. The estimate for season is quite high showing that the forecast depends more on the recent observations in the series. This shows that the quantity of marine product exports to these markets from Kerala is influenced by level, trend and season.

Table 3.55 Forecasts to 'Others' Quantity in tonnes

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	3445	2872	3041	2636	2231
Q2	3681	4296	3236	2790	2345
Q3	5049	10109	4419	3789	3159
Q4	3042	4151	2650	2258	1867

*Source: Computed from Table 3.54, * MPEDA Data, 2011*

The model predicts a declining trend in the quantity of marine product exports from Kerala to the 'Others' in the coming years for all the quarters. The seasonal values show that the quantity of marine product exports from Kerala to 'Others' is the highest in all the years during the third quarter which is the peak season of the marine fish sector of Kerala. It is the lowest in the fourth quarter when the harvest begins to decline (see Table 3.55). In this context, it is worth mentioning that as the bulk of the exports directed to China are meant for further processing and value addition, the fall in quantity of marine product exports to China in the coming years suggests the possibilities of greater value addition of fish and fishery products within the state so as to gain in terms of value from newer as well as the traditional markets.

The MAPE used as a measure of forecast accuracy is quite high at 27.76 percent. The model predicts a declining trend in the quantity of marine product exports from the state to the 'Others' in the period 2010-11 to 2013-14. Contrary to the forecast, the actual quantity of marine product exports from the state to 'Others' surpassed the predicted quantity. The explanation for this can be rise in unit value in terms of US $ per kg in this market segment, the intentional diversion to markets other than the developed country markets with ailing demands, the support schemes of the government such as the Focus Market Scheme specifically targeting the markets of Asia, Africa and Latin America, and other incentives offered to the export sector in general such as EPCGS, technology upgradation scheme etc. being expanded to cover the marine sector. The statistics on model fit show that stationary R^2 is 0.728 and hence it is possible to conclude that the model is better than the baseline model. Besides R^2 is higher at 0.627 indicating higher explanatory power.

In terms of value, the marine product exports from Kerala to this market segment increased from ` 5053.85 lakhs in 1995-96 to ` 25746.9 lakhs in 2009-10.

Table 3.56. Exponential Smoothing Model Parameters- Exports to ‘Others’ (Value) in the Post WTO Period

Model			Estimate	SE	t	Sig.
Exports to Others (V)	No Transformation	Alpha (Level)	0.700	0.124	5.631	0.000
		Delta (Season)	1.27E-005	0.154	8.24E-005	1.000

Source: Computed from MPEDA Data, 1995 to 2010

The model obtained for explaining the value of marine product exports from Kerala to ‘Others’ is simple seasonal. The estimate of the level given in Table 3.56 is statistically significant. But the estimate for season is highly insignificant. So it can be concluded that the value of marine product exports from Kerala to these markets is independent of seasonal effect. The model generates the forecasts shown in Table 3.57.

Table 3.57. Forecasts to ‘Others’ (Value in ` Lakhs)

Period	2010-11		2011-12	2012-13	2013-14
	Predicted values	Actual values*			
Q1	5243.8	5240.41	5243.8	5243.8	5243.8
Q2	6228.4	7399.05	6228.4	6228.4	6228.4
Q3	7116.6	12925.48	7116.6	7116.6	7116.6
Q4	5502.5	5685.14	5502.5	5502.5	5502.5

*Source: Computed from Table 3.56, *MPEDA Data, 2011*

The forecast based on this model shows that the value of exports to 'Others' is the highest in the third quarter and the lowest in the first quarter. This coincides with the peak and the trough phase of the harvest in the marine sector of Kerala. The mean is exerting a tremendous influence on the value of marine product exports from the state to 'Others' in the post WTO period. The mean value of marine product exports from the state to 'Others' increased from ` 1208.82 lakhs in the pre WTO period to ` 17112.7 lakhs in the post WTO period. This gives an indication that these markets are likely to emerge as an important destination for the marine product exports from the state in terms of value. This market is showing a shift from being a prominent importer of marine products in bulk quantities to that of buying value added products. This brightens the prospects for the marine product exporters of the state as they have to be no longer dependent upon the EU as the sole market for value added exports.

The MAPE computed to judge the accuracy of forecast of value of marine product exports from the state to the market category 'Others' is 16.01 percent which is fairly acceptable. The deviation of actual figures from the estimated ones can be due to the host of reasons cited earlier while discussing the forecast accuracy of the quantity of marine product exports from the state to the same market category.

Table 3.58. A Comparison of Models Obtained for 'Others' – Pre WTO and Post WTO Phase

Markets	Pre WTO model			Post WTO model		
	Model	**Result**	**Adequacy**	**Model**	**Result**	**Adequacy**
Others Q	ARIMA (0,0,0) (1,0,0)	Influenced by the lagged values of the previous seasonal time period	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (16) not significant at the level 0.4	Winters' multiplicative	Influenced by level, trend and seasonality	Adequate. Residual ACF and residual PACF outside the defined limit at lag 2. But Q statistics (13.894) not statistically significant at the level 0.534
Others V	ARIMA (0,0,0) (0,1,1)	Influenced by seasonal random error terms	Adequate Residual ACF and residual PACF within defined limits. Ljung Box Q statistics (14.652) not significant at the level 0.621	Simple seasonal	Independent of seasonal effects, but is mainly influenced by level of the series	Adequate Residual ACF and residual PACF within defined limits except at 2nd lag. Ljung Box Q statistics (27.253) significant at the level 0.039 raising doubts about model adequacy

Source: Based on Tables 3.52 to 3.54 and 3.56

A comparison of pre WTO and post WTO models given in Table 3.58 brings out certain findings. In the pre WTO period, the quantity of marine product exports to this market is influenced by the lagged values of the variable, while the value of marine product exports are influenced by seasonal random error terms. In the post WTO period, it is the mean of the series that influenced the quantity and value of marine product exports to this market. The mean quantity and the mean value of marine product exports from the state to 'Others' are higher in the post WTO period than in the pre WTO period. This clearly shows the emergence of this market category as one of the primary destinations for the marine product exports of the state.

The time series analysis of marine product exports from Kerala to various markets in the pre and post WTO periods has brought out certain facts. There is clear evidence that the quantity and value of marine product exports from Kerala to the market of the EU are influenced by irregular components in the post WTO period. But in the pre WTO phase, the seasonal component exerted pronounced effects on value of marine product exports. This shows that in the post WTO phase, the marine product exports from Kerala to the EU are not just a function of availability of raw material in the peak quarters but also depends on various other economic and non economic factors prevalent in the domestic and foreign markets. The influence exerted by the random shocks on the quantity and value of marine product exports from the state to the EU can be attributed to several issues that have come up in this market in recent times. Despite complying with the stipulations in the EU, the marine product exports from the state face problems owing to non harmonization of norms for microbial standards and methods of inspection, sampling and tests. This has led to detentions of consignments from Kerala. It is evident that food safety standards and regulations though are implemented with the objective of ensuring the health of the consumers; they are also applied as barriers to trade. Compliance with the food safety standards and quality regulations alone does not ensure hassle free entry of consignment to the EU. In other words, these stipulations in the EU are disguised barriers to trade possessing the capability to restrict the flow of marine product exports from the state. This revelation is a big blow to the marine product exports from the state which is excessively dependent on the EU as about 50 percent of the value of marine product exports still flow to the EU.

The other traditional markets for marine products of Kerala are the US and Japan. In the post WTO phase, both these markets witnessed a substantial fall in share in the marine product exports of the state. The quantity and value of marine product exports from the state to the US in the post WTO phase is devoid of trend. It is mainly influenced by the mean of the series. The forecast obtained for the US market clearly signals the declining importance of this market. Even during peak periods of the year, the quantity of marine products moving to the US market is much lower than that is observed even in the new markets of the SEA, the MEA and 'Others'. The declining importance of the US for the marine product exports of the state can be attributed to various issues confronted by the marine product exporters in the US market such as the imposition of anti-dumping duties on shrimp, the enhanced bond requirements, and the application of COOL norms and the implementation of Bio Terrorism Act. They have served to limit the exports of marine products from the state to the US. In fact, the most pressing issue that the shrimp exports from the state faced in the US was the imposition of anti-dumping duties and the enhanced bond requirements on the shrimp imports into the US. This inflicted a huge financial burden on the exporters and this had a very adverse impact on the marine product exports from Kerala to the US. The marine product exports from the state to the US fell substantially in the period

2004-2009 when the EBR along with the anti-dumping duty caused huge financial burden to the exporters from the state.

Time series analysis presents a very bleak prospect for Japanese market too. The quantity of the marine product exports from the state to Japan is influenced by seasonal effect and mean of the series. The forecast obtained for Japanese market shows that the quantity of marine product exported from the state to Japan is the lowest in the Q3 which is the peak period in the marine sector of the state. The same is observed in the case of value of marine product exports to Japan which is influenced by seasonal random error terms. Though the value of the marine product exports from Kerala to Japan shows a peak in the second quarter of the forthcoming years, it is lower compared to the markets of the EU, the SEA, the MEA and 'Others'. This indicates that the importance of Japan as a market for the marine product exports of Kerala is on the decline. Japanese market is riddled with cryptic barriers where the specifications demanded by the buyers are stringent than the stipulations by the public authority. This has resulted in diversion away from the Japanese markets especially in the post WTO period.

However the non-traditional markets such as the SEA, the MEA and 'Others' emerged as major destinations for the marine product exports of the state in the post WTO phase. This is quite clear from the models and the forecasts generated on quantity and value of marine product exports to these markets. Whenever issues have come up in the traditional markets, the new markets have emerged as shock absorbers with bulk of our marine products being directed to them. For instance, when the EU banned the marine product exports from India owing to quality issues, bulk of our exports were redirected to the markets of the MEA and 'Others'. In 1997, the quantity and value of marine product exports to these markets are quite high vis-à-vis the immediate preceding and succeeding years (see Table 3.59).

Table 3.59. New Markets as Shock Absorbers in the Times of Crisis

Year	The MEA		'Others'	
	Quantity in Tonnes	Value in ` Lakhs	Quantity in Tonnes	Value in ₹ Lakhs
1996	1223	886.89	23146	13793.61
1997	4377	4331.59	33029	18988.09
1998	2241	2397.64	16840	11416.39

Source: MPEDA Data, 1996 to 1998

This is further supplemented by the evidence on the quantity and value of marine product exports to these markets since 2004-05 since when issues began to emerge in the markets of the US and Japan. Compared to the previous years a significant increase occurred in the quantity and value of marine product exports from the state to the markets of the SEA, the MEA and 'Others' validating that they are assuming importance in the marine product exports of the state.

The present chapter clearly brings out the tendencies of market diversification that has occurred in the post WTO phase vis-à-vis the pre WTO period. Marine product exports from India and Kerala are no longer excessively dependent upon the traditional markets of the EU, the US and Japan. In the post WTO phase, a major issue in these traditional markets had been the presence of the NTMs. The food safety standards and quality regulations appear in the first instance as measures to ensure hygiene and thereby protect the life and health of the consumers. But they are used as disguised barriers to trade in all the aforementioned markets. The results of the gravity model suggest that there has been a pressing demand for stringent food standards in the import markets of the EU, the US and Japan. The PC real GDP of the importing nations exert a significant downward bias on the quantity of marine products from the country. The MRLs set on mercury in the markets of the EU and Japan have served to limit the quantum of marine product exports from India. Further the anti-dumping duties imposed on the imported shrimp in the US also have adversely affected the marine product exports from India. This is a clear indication that the marine product exports from India to the markets of the EU, the US and Japan are encountering issues in the form of stringent standards and other non tariff measures such as the anti-dumping duties. They have the potential to limit the volume of trade from the country.

In the backdrop of such developments, the marine product exports from Kerala have gone in for market diversification by moving into nontraditional markets such as the SEA, the MEA and 'Others'. Though the dominance of the EU continues in the post WTO phase, the time series analysis brings out the influence of irregular components in the data pointing to the role played by the NTMs. The prospects of markets such as the US and Japan are very bleak in the coming periods as is evidenced by the forecast results. It is possible to conclude that there have occurred changes in the direction of the marine product exports from Kerala in the post WTO period vis-a-vis the pre WTO period (Parvathy and Rajasenan 2012).

This necessitates an examination of the response of the government and the seafood export sector to the new developments happening in the major import markets. An attempt is made to examine whether they have been able to overcome the challenges that have emerged in the foreign markets. Just as Jaffee and Henson (2004) put it, have the standards become a catalyst to promote the growth of the marine product export sector rather than becoming barrier to growth.

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Chapter

4

INSTITUTIONAL SUPPORTS TO MARINE PRODUCT EXPORT SECTOR IN INDIA

Chapter III brings out the signals of shifts in the market wise flow of marine products from Kerala in the post WTO period vis-à-vis the pre WTO period in the backdrop of issues and challenges encountered in the traditional markets of the EU, the US and Japan. The trio besides being the traditional market base for the marine product exports of Kerala is remunerative too. Hence it is essential to take up proactive steps to retain this market base despite the tightening of standards and regulations. Chapter IV attempts to explore the measures taken by the Government of India to conform to the new requirements in the above markets.

The Export Inspection Council (EIC) and the Marine Products Exports Development Authority (MPEDA) are the two agencies that offer institutional support to the marine product export sector of India. The Export Inspection Council (EIC) is entrusted with the responsibility of approving, monitoring and supervising the fish and fishery product export units in the country. The Marine Product Exports Development Authority established in 1972 is entrusted with the responsibility of discharging functions to promote the exports of fish and fishery products from India. In this context, it is essential to assess the role played by these two institutions in enabling the marine product export sector of the country to respond to the new challenges in the wake of strengthening of standards and regulations in the major import markets. The study traces out the evolution of institutional arrangements and quality control systems in India to ensure the safety of the fish and fishery product exports from India.

4.1 Role of the EIC – An Assessment

The EIC, the official certifying body of the Govt. of India for export was set up in 1963. It was entrusted with the responsibility to ensure quality of export products through quality control and inspection. Inspection functions are performed by five regional Export Inspection Agencies (EIAs). A voluntary scheme of certification has been developed to ensure the quality of exports from India. This scheme allows for two systems of inspection and certification. They are Consignment–wise Inspection (CWI) and In-Process Quality Control (IPQC).

4.1.1 Consignment-wise Inspection System

Under the CWI, the export consignments shall be inspected by the EIA prior to the dispatch. Samples drawn are inspected for verifying the conformity of the consignments to the standard of the importing country or the Codex standard or the standard required by the buyer subject to these being not lower than those of the importing country. An assessment of the hygienic practices implemented at the stages of processing, packing and storage are also made. Besides, the sample will be subject to laboratory tests for various parameters. If consignments have passed these tests, the EIA will issue the Certificate of Inspection which is valid for 45 days.

4.1.2 In-Process Quality Control

Plants should implement a certified system of IPQC. This system required that these plants have prescribed quality control procedures in place. But these controls were liberalized in 1991 with a view to reduce regulatory burden on exports units. Subsequently, since 1991, inspection and certification by the EIC became voluntary, if the export units could submit written confirmation from the foreign buyer that this was not necessary. This led to an obvious decline in the inspection and certification of consignments under the CWI and IPQC. But this was a period that witnessed tightening of safety standards and hygiene requirements in the major markets. This compelled the EIC to strengthen the regulatory standards placed on the marine product export units. Initially in 1995, the EIC invoked the existing IPQC system causing an increase in the number of certified processing facilities. With a view to enhance quality, there were certain other initiatives such as setting up of a "HACCP Cell" by the Marine Products Exports Development Authority in 1996. In 1999, a new and a more comprehensive Food Safety Management Systems-Based Certification were introduced for fish and fishery products.

4.1.3 Food Safety Management Based Certification System (FSMSC)

FSMSC is for specific products or specific country. Under this system, the unit applying for approval will be given certification based on the conformity of the processing unit to the standards set by the importing country, Codex or the buyer.

A unit seeking approval has to go through certain procedures. The unit should submit an application for getting approval along with documents such as the HACCP manual including Sanitation Standard Operating Procedures (SSOP), certified copy of the test report issued not later than 6 months in respect of water used for processing, lay out plan of the establishment, process flow chart, plumbing diagram, list of machineries involved in manufacturing, testing facilities in the plant, bio-data of the technologists working in the plant etc. Those units that have forwarded the application, complete in all respects will be assessed by the Assessment Panel (AP) within 15 days of receipt of their application.

The AP submits its report within 3 days of completion of visit to the unit. Based on the recommendation of the AP, the EIA takes the decision to assign approval to the units. If the AP does not recommend for approval, the EIA shall intimate the rejection as well as the reasons for rejection. When an approved plant decides to suspend its processing activities temporarily for a period exceeding 30 days due to general repairs or routine maintenance, major alterations or construction work, etc., it has to intimate to the EIA, the date from which it intends to suspend its operation and the probable date by which it intends to resume production. The validity of Certificate of Approval shall be for a period of 2 years from the date of issue of the letter of approval by the EIA. The approved plant seeking renewal of approval shall submit an application at least 60 days before expiry of the earlier approval to the concerned EIA.

4.1.4 Monitoring and Control

It is the primary responsibility of the processor to ensure compliance to the requirements and to ensure the safety and wholesomeness of the product based on Hazard Analysis and Critical Control Point (HACCP), principles of Good Manufacturing Practices (GMP) and Good Hygienic Practices (GHP).

EIA shall carry out monitoring by deputing an officer at a frequency of minimum once in 3 months depending upon the performance of the unit. EIA has to undertake the verification of records, process control, sanitation and hygienic practices, parameters as specified in the importing country and of test results conducted in the approved lab. Based on that, frequency of monitoring may be reduced to once in 6 months. If performance is satisfactory, the frequency of monitoring can be further reduced to once in a year. The deficiencies observed during the assessment visit to the establishment shall be conveyed to the processor through the Corrective Action Report. In case of minor deficiencies, the corrective action will be verified by the officer conducting the next visit and duly reflected in his report. But in the case of major deficiency, the processor may be advised to suspend production and export until rectification is done and the same is verified by the officer. The EIA shall issue health certificate based on the continuous satisfactory performance of the unit.

The fish and fishery product export units can be classified into EU approved units and the non-EU approved units. EIC is the competent authority for approving the establishments processing fish and fishery products meant for export to the EU; while the establishments meant for exports to the non EU countries should get the approval from the EIAs. Besides, the units seeking approval for exporting to the EU should meet certain additional requirements vis-à-vis the non EU establishments. It is mandatory for the EU units to have integrated pre processing and processing facilities while the non EU units can source in pre processed raw material from external registered centres. Though the EU and the non EU units have to implement the HACCP in the processing establishment, there are divergences in requirements such as testing requirements for water and ice, labeling requirements, the number of technologists to be appointed and the certificates required to be produced. All the units seeking approval shall submit the application in the prescribed format along with the application fee and all the relevant documents. In the case of the EU units, water and ice tested as per the EC directive No 98/83/EEC must be submitted while in the case of the non-EU establishments the reports of water and ice tested as per IS:4251 are to be submitted.

Application complete in all respect along with the HACCP documentation shall be forwarded by the Agency to the convenor of the Inter Departmental Panel (IDP) for arranging the assessment of the establishment. The assessment of applicant must be carried out within 15 days of receipt of complete application. In the case of initial approval, the Inter Departmental Panel assesses the units in 2 stages. During the first visit, IDP shall assess infrastructural facilities and compliance with specified regulatory requirements. If satisfied with the inspection, the IDP recommends for conditional approval.

The units meant for exports to the non – EU units will be allowed to process and export fishery products after receiving conditional approval from the Competent Authority. The IDP visits the unit again during the period of processing to assess the processing methods adopted by the unit and to conduct HACCP auditing. The final approval is given based on this assessment. In case of the non EU export units, the in-charge of the Agency shall grant the full approval of the establishment for a period of 2 years from the date of the conditional approval. But in the case of the EU establishments, the agency will send the recommendation for approval to the Director of I&QC along with the IDP report. For the EU establishments, certificate of approval shall be issued by the EIC and this certificate will be valid for a period of 2 years from the date of conditional approval by the Director of I&QC.

There is a difference in the composition of IDP in the case of the EU and the non-EU units. For the EU establishments, the IDP is composed of the representatives from the EIA, the Central Institute of Fisheries Technology (CIFT) and MPEDA. But for the non-EU establishments, the IDP is composed of the representatives of the EIA, the CIFT and Seafood Exporters Association of India (SEAI). If the IDP does not recommend approval, the establishment must be intimated about the reasons for which the applicant has not been considered fit for approval. Following the rectification of identified deficiencies, the establishment will be subject to assessment and verification by the IDP. If verified and found satisfactory, then conditional or full approval is given.

Once conditionally or fully approved, the establishment or factory vessel shall be allowed to process and export fish and fishery products to the non-EU countries. But in the case of establishments meant for export to the EU, though they are allowed to process fishery products, the actual exports to the EU shall commence effective from the date, the EC notification is issued. From that date, EIA concerned on the behalf of the EIC shall issue health certificate to the establishment.

An establishment seeking renewal of approval shall submit application in duplicate along with relevant documents and fees at least 60 days before the expiry of the earlier approval. Application complete in all respects shall be forwarded to the In-charge of the Agency for arranging assessment of the establishment. All the formalities for the renewal of the approval are completed before the expiry of the approval. In the case of the EU approved units, if the IDP does not recommend for the renewal of approval, the in-charge of the concerned EIA shall recommend to the Director (I&QC) for the withdrawal of the approval to the establishment. In the case of the non EU establishments, the decision for withdrawal of approval lies with the in-charge of the Agency.

In case the IDP recommends the renewal of approval for the EU establishment, the in-charge of the agency shall send recommendations for renewal of approval to the Director (I&QC) within 3 days of receipt of the IDP report. After proper examination, the EIC shall issue the Certificate of Approval and sent to the processing unit through the concerned EIA. The certificate is valid for 2 years. For non-EU establishments, the in-charge of the Agency shall grant the renewal of the approval for a period of 2 years.

4.1.5 Responsibilities of the Approved Establishments

4.1.5.1 General

- Develop and implement HACCP based ‘own check’ system.
- Maintain all the approved facilities of the unit in good repair.
- All the controls and sampling procedures adopted to be addressed in the HACCP manual. Proper identification and control of Critical Control Points (CCPs) must be ensured by the processor.
- Traceability of the raw material to be maintained right from the source of production.
- Cleaning and disinfection programme to be implemented.
- Personal hygiene of employees should be ensured. Health cards should be issued to each worker.
- Proper control should be exercised to avoid cross contamination of the processed product.
- Adoption of pest control measures.
- Establishment should not purchase pre-processed products from unauthorized centres.
- Change in the technologists should be informed to the concerned EIA.

4.1.5.2 Storage and Transportation

- Proper temperature control should be exercised at all stages of processing.
- Frozen fishery products should be kept at a temperature of not more than -18° Celsius.

4.1.5.3 Quality Control

Proper quality control measures shall be established by the processor. They should be documented and implemented to ensure the wholesomeness of the product processed. Following are the quality control measures to be adopted.

4.1.5.4 Organoleptic checks

A sample of one kg subject to a minimum of 10 pieces shall be tested from every 500 kg of the raw material received, variety wise and source wise for conducting the organoleptic evaluation as per HACCP plan. For the analysis of finished products, type wise and variety wise sample shall be drawn from the day's production at random as per the sampling scale.

4.1.5.5 Microbiological checks

Raw materials and finished products shall be tested for microbiological factors like, E coli, staphylococcus, salmonella, vibrio cholera, and vibrio parahaemolyticus in the in-house lab by the approved technologists.

4.1.5.6 Water and Ice

Micro biological parameters of water and ice should be tested in the in-house lab at least once in a fortnight. EU approved units should test water and ice for all the parameters as per EC Directive 98/83/EC at least once in a year. Further certain parameters such as ammonium, E.coli, coliform bacteria etc. as specified in the EC directive should be tested once in four months.

Non EU units should test water and ice as per IS 4251 on a yearly basis.

4.1.5.7 Residual parameters

The establishments should test antibiotic residues, cadmium, pesticides at least once in 2 months.

The approved establishments shall test all consignments of shrimp meant for the export to the EU prior to shipment for antibiotic residues at EIA lab, CIFT lab or EIC approved labs. All consignments of cephalopods meant for export to the EU shall be tested for cadmium at EIA labs, CIFT labs or EIC approved labs prior to shipment.

4.1.5.8 Records

Proper records shall be maintained by the processor at all stages of production, storage and transportation of fish and fishery products. These records should be made available to the EIA/EIC officials for verification.

4.1.6 Official control by the Competent Authority

4.1.6.1 Monitoring by EIA Officials

The monitoring officials shall verify ‘own checks’ system adopted by the unit at all stages of production starting from raw material reception to final dispatch of cargo.

On initial approval of the unit, monitoring visits shall be carried out once in a month. If the functioning of the unit is satisfactory, monitoring shall be reduced to once in 2 months. If satisfactory performance is exhibited by the unit for one year, the frequency of monitoring shall be reduced to once in 3 months. In case any non-satisfactory performance is observed, frequency of monitoring shall be increased to once in a month

4.1.6.2 The areas of monitoring by the EIA officials involve the following

- Facility checks
- Verification of HACCP implementation
- Verification of testing and lab practices
- Verification of records
- Detailed HACCP auditing may be done at least once in 6 months
- Besides these there are some additional checks such as testing the chlorination levels of water used for processing, glazing, ice manufacturing, hand sanitization dip, washing of tables, equipments etc. and washing of floors.
- Temperature of products during receipt, processing, storage, etc.
- Parasite checks

On receiving a complaint from the importing country, the unit is placed 'on alert' by the EIA. In that case, the frequency of monitoring visit will be increased to 4 visits per month.

It is very evident that the Govt. of India has placed institutional measures to ensure quality control. Since the late 1990s, there has been a strengthening of safety standards and quality control measures so as to fall in line with the requirements of the importing nations. The implementation of these measures has served to enhance the quality controls and the hygiene standards implemented in these seafood export units.

4.2 Government of India Financial Support to Marine Product Export Sector

The Marine Product Exports Development Authority (MPEDA) established in 1972 is entrusted with the responsibility of discharging functions to increase the exports of fish and fishery products from India. The MPEDA functions under the Ministry of Commerce, Government of India. Along with the EIC, the MPEDA too has supported the seafood export industry of the country to meet the new challenges in the wake of tightening of standards and regulations in the major import markets of India. The MPEDA has also been promoting the implementation of the HACCP system in the marine product export sector of India since the mid 1990s. MPEDA constituted HACCP Cell in 1996 to assist the Indian seafood industry for the effective implementation of HACCP. The major activities of the HACCP Cell are:

- Organizing training programmes in HACCP basic principles, audit etc. for the benefit of technical personnel in the seafood industry and related departments.
- Assisting the seafood establishments in the preparation of HACCP manual, certification of such manuals, and certification of HACCP compliance etc.
- Inviting Consultants from US FDA, National Marine Fisheries Services (NMFS), FAO / INFOFISH etc. from time to time which facilitates in updating knowledge on HACCP and strengthen the technical base of MPEDA and the industry.
- Technical personnel of MPEDA are trained in India and abroad on various aspects of HACCP including HACCP Audit. (www.mpeda. com /overview/quality.htm)

4.2.1 Technology Upgradation Schemes for Marine Products (TUSMP)

Under the scheme, financial assistance is offered to processors for setting up new units, expansion of the existing production capacity of value added products and for diversifying into value addition by installing required machinery and equipments. The rate of assistance in the case of capital subsidy will be at 25 percent of the expenditure incurred for value addition subject to a maximum of ` 100 lakh for new units and ` 85 lakh for the existing units going in for value addition. The interest subsidy assistance proposed is 5 percent of the term loan availed from financial institutions for value addition subject to a maximum of ` 150 lakh in the case of new units and ` 125 lakh in the case of existing units. The beneficiary can avail anyone of the above schemes. Minimum investment is ` 100 lakh for capital subsidy and ` 200 lakh for Interest Subsidy.

4.2.2 Subsidy for acquisition of refrigerated trucks or containers.

Under the scheme, 25 percent of the cost of refrigerated truck/ container, subject to a maximum of ` 3.50 lakh is offered.

4.2.3 Financial assistance for setting up large cold storages.

Under the scheme, 25 percent of the cost of cold storage subject to the maximum of ` 60 lakh will be provided.

4.2.4 Subsidized distribution of insulated fish boxes.

Under the scheme, moulded synthetic insulated fish boxes of various capacities are distributed at 50 percent subsidy.

4.2.5 Subsidy for acquisition of generator, setting up of water purification systems and effluent treatment plants.

4.2.6 Subsidy for setting up of new modern ice plant or renovation of the existing ice plant.

Under the scheme, ` 31 lakh at 25 percent of the cost for a new block ice unit, ` 26 lakh at 50 percent of the cost of renovation for existing unit and ` 14 lakh at 25 percent of the cost for flake / chip / tube ice unit shall be provided.

4.2.7 Subsidy for setting up mini laboratory.

Under this scheme, 25 percent of the cost of mini laboratory subject to a maximum of ` 1, 50,000/- per unit will be granted.

4.2.8 Subsidy for captive pre-processing centre (PPC) and independent PPC.

Upgradation of PPCs is very essential to meet the EU/HACCP regulations. In the case of upgradation of captive PPCs, 50 percent of the cost of eligible expenditure subject to a maximum of ` 15 lakh shall be provided for new construction and 45 percent of the cost subject to a maximum of ` 13.50 lakh for renovation. In the case of independent PPCs, 50 percent of the cost of eligible expenditure subject to a maximum of ` 22 lakh for new construction and 45 percent of the cost subject to a maximum of ` 19.8 lakh for renovation shall be granted. The subsidy is further restricted to maximum limits fixed for individual items.

4.2.9 Interest Subsidy Scheme

Most of the seafood export units had to avail loans from banks and financial institutions for the purpose of modernization and upgradation of facilities to comply with the new requirements. The subsidy eligibility will be restricted to a maximum of 7 percent of the interest charged by the bank/financial institutions over and above the international interest of 7 percent or actual rate of interest over and above the international interest i.e. 7 percent whichever is less subject to a maximum of ` 15 lakh. The developmental financial assistance given by the MPEDA is very essential for the seafood export units which had to incur a huge amount to of capital expenditure to comply with the new requirements.

Table 4.1 examines the financial assistance offered by the MPEDA under the development assistance scheme since 1997, the year during which the marine product exports from India had to face a ban in the major import market of the EU.

Table 4.1 Financial Assistance by the MPEDA under the Development Assistance Schemes – India

Amount: ₹ Lakhs

Year	Processing Machine and equipment	Flake ice making machine	Upgradation of cold storage	Insulated Fish boxes	Chill room	Refrigerated truck container	New Cold storage	Generator	Water purifier	ETP	Mini lab	PPC	Interest subsidy
1997-98	15	8	3.75	-	-	-	-	12.3	-	-	8.15	73.45	-
1998-99	57.05	34.66	3.69	-	P*	-	-	11.12	P*	P*	5.75	65.74	7.53
1999-00	71.78	49.26	1.50	24.87	-	-	-	18.81	-	-	8.99	199.56	24.87
2000-01	42.51	50.34	3	18.83	36.8	3.5 **	-	35.38	19.75	51.8	7	304.28	181.71
2001-02	137.16	95.3	4.25	28.35	38.52	45.86	-	45.97	49.05	78.21	14.65	413.46	225.14
2002-03	153.55	46.16	6.49	29.35	42.48	38.85	-	41.97	26.49	262.85	8.31	576.65	137.13
2003-04	335.19	56.14	17.66	40.28	38.3	11.67	-	23.16	19.22	47.1	10.84	369.14	120.29
2004-05	273.35	32.87	28.06	54	32.75	13.4	167.22	10.71	16.94	28.5	-	-	78.01
2005-06	203.21	35.47	25.15	33.71	7	25.47	63.08	25.41	155.07	24.25	4.51	930.69	10.09
2006-07	323.53	40.64	8.1	41.2	25.32	17.5	232.36	11.9	19.4	11.75	4.43	680.83	83.86
2007-08	374.24	74.05	13.66	38.54	94.48	10.5	236.31	58.05	58.01	73	10	593.76	90
2008-09	659.26	50.07	51.70	48.84	76.09	4.52	225.90	58.85	53.79	91.01	13.59	510.62	54.35
2009-10	252.86	11.83	15.30	27.74	12.12	17.07	225.70	27.64	8.25	30.07	-	-	-
2010-11	394.77	-	-	57.19	-	9.79	74.93	5	-	9.15	4.73	106.8	97.04

Source: MPEDA, 1998 to 2011

**Proposed as a new scheme*

***Launched*

Table 4.2 presents the amount of financial assistance received by the seafood export units of Kerala during the period 1997-98 to 2010-11.

Table 4.2 Financial Assistance by the MPEDA under the Development Assistance Schemes – Kerala

Amount: ₹ Lakhs

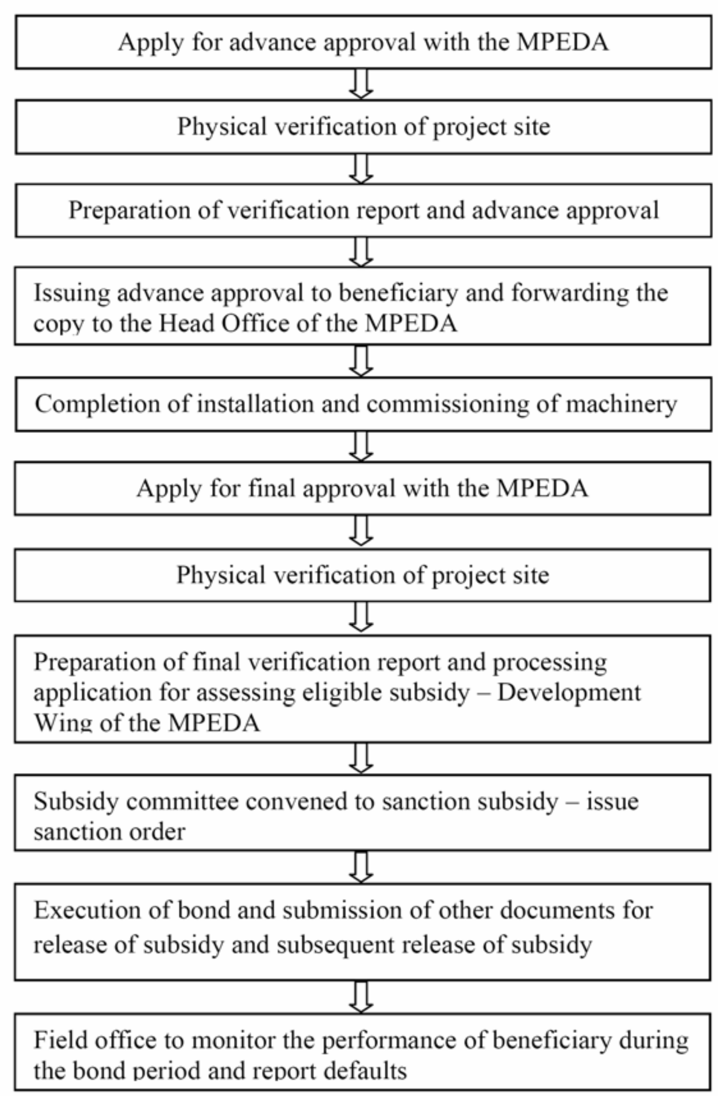
Year	Processing Machine and equipment	Flake ice making machine	Upgradationof cold storage	Insulated Fish boxes	Chill room	Refrigerated truck container	New Cold storage	Generator	Water purifier	ETP	Interest subsidy
1997-98	-	1	1.5	-	-	-	-	2.31	-	-	-
1998-99	46.77	17.59	2.19	-	P*	-	-	0.4	P*	P*	-
1999-00	42.34	26.71	-	-	-	-	-	4.7	-	-	21.61
2000-01	13.48	10	0.75	2.83	4.3	-	-	1.8	-	1.74	61.82
2001-02	25.16	9.38	-	5.82	-	0.66	-	4.96	1.37	0.77	53.35
2002-03	15.76	9.01	4.73	5.78	10.72	10.5	-	12.62	4.51	35.46	15.36
2003-04	36.10	8.93	9.30	6.08	1.76	3.5	-	8.14	1.75	2.41	9.85
2004-05	37.53	4.5	1.75	6.7	6.69	-	114.62	-	4.14	4.93	11.37
2005-06	19.98	6.41	11.9	3.57	5.73	3.5	45.78	2.18	0.62	4.29	9.16
2006-07**	-	-	-	-	-	-	-	2.5	1.16	4.67	20.86
2007-08	84.06	7.48	3.16	5.54	14.64	7	58.94	14.56	8.96	31.44	-
2008-09	110.63	3.06	8.23	8.97	6.89	-	19	8.14	40	29.35	-
2009-10	107.28	-	-	3.05	-	6.84	87.55	3.49	-	5.99	-
2010-11	255.5	-	-	8.09	-	3.5	49.43	-	-	-	-

Source: MPEDA, 1998 to 2011

**Proposed as a new scheme*

*** During 2006-07, financial assistance was given to new schemes such as setting up of tuna cannery and ice plants*

A number of marine product export units in the country availed financial assistance offered by the MPEDA under various schemes. There is a transparent mechanism in place for selecting the units eligible for subsidies. The unit in need of subsidies shall submit an application which is duly processed and the final decision on the award of subsidy to the unit is taken. The procedure for processing applications for subsidy assistance is given in Figure 4.1.



Source: MPEDA, 2012

Figure 4.1. Procedures for Processing Applications for Subsidy Assistance

Table 4.3 Statement of the Number of Seafood Companies that Availed the Financial Assistance of the Government – India and Kerala

Year	Processing Machine And equipment		Flake ice making machine		Upgradation of cold storage		Insulated Fish boxes		Chill room		Refrigerated truck container		New Cold storage		Generator		Water purifier		ETP		Mini lab		PPC		Interest subsidy	
	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K	AI	K
1997-98	1	-	8	1	5	2	-	-	-	-	-	-	-	-	13	3	-	-	-	-	17	NA	7	NA	2	NA
1998-99	5	4	21	11	5	3	2	NA	P		-	-	-	-	9	1	-	-	-	-	12	NA	6	NA	2	NA
1999-00	8	5	27	15	2	-	11	NA	-	-	-	-	-	-	10	2	-	-	-	-	18	NA	24	NA	11	8
2000-01	4	1	27	5	4	1	57	9	-	-	P	-	-	-	17	1	14	-	15	1	14	NA	36	NA	25	11
2001-02	13	3	52	5	2	-	72	12	20	-	14	1	-	-	23	2	48	3	23	2	-	-	-	-	56	25
2002-03	15	3	23	5	4	2	84	13	20	6	12	3	-	-	23	7	24	3	61	10	-	-	-	-	38	12
2003-04	30	5	24	4	7	4	118	10	17	2	4	1	5	-	14	5	16	1	14	2	-	-	-	-	38	10
2004-05	29	6	14	2	8	1	239	8	15	4	4	3	8	3	5	-	14	5	9	3	-	-	-	-	17	6
2005-06	20	5	16	3	10	5	NA	NA	14	4	5	2	11	3	11	1	8	2	9	2	8	NA	60	NA	NA	NA
2006-07	29	7	19	4	4	3	390	9	15	1	5	2	13	2	5	1	12	1	6	1	8	NA	54	NA	15	3
2007-08	35	8	26	4	4	1	322	11	33	8	3	2	14	1	24	6	28	5	16	7	13	NA	52	NA	17	NA
2008-09	63	14	18	2	20	6	515	10	30	4	2	-	14	1	27	4	23	1	29	13	16	NA	67	NA	12	NA
2009-10	10	3	4	-	4	-	91	4	7	-	5	2	12	3	13	2	4	0	7	1	-	-	-	-	-	-
2010-11	13	4	-	-	-	-	1706	10	-	-	3	1	13	2	2	-	3	-	-	-	6	NA	22	NA	15	NA

Source: MPEDA, 1998 to 2011
AI-All India
K- Kerala
P- Proposed as a new scheme
NA-not available

The Government of India has played a very critical role in enabling the marine product export units of the country to comply with the stipulations in the major import markets. In the late 1990s several new development assistance schemes were launched to assist the marine product exporters (see Table 4.3). They include the subsidy for the setting up of chill rooms, water purification systems, effluent treatment plant and acquisition of refrigerated truck. The other schemes are provision of financial assistance either for setting up of new ice plant or renovation of the existing one, financial assistance for the creation of basic facilities for chilled fish or chilled tuna fish and financial assistance for tuna cannery. TUSMP is also a new scheme that began operational from 1-04-08 onwards specially designed to offer financial assistance for the firms moving into value added products.

Apart from launching new schemes, the government has also increased the amount of financial assistance offered under various heads. For instance, the amount of subsidy offered for the purchase of processing machinery and equipment was a meager of ` 15 lakhs in 1997-98. But in 2010- 11, the amount of subsidy offered under this head stood at ` 394.77 lakhs. Over this period, substantial amounts have been disbursed under other heads such as the upgradation of cold storages and interest subsidy.

A number of marine product export companies spread across the country have been the beneficiaries of these various schemes of the government. Several seafood companies of Kerala availed the financial benefits under various heads to upgrade and modernize their facilities so as to become compliant with the requirements in the import markets. The upgradation of lab facilities was critical to ensure compliance with the HACCP and the guidelines of the EU. The response of the government in this area was quite positive. MPEDA has set up 3 quality control labs and 16 ELISA screening labs in the country. The MPEDA quality control labs at Kochi, Nellore and Bhimavaram obtained certification status under ISO 9001 in 2006 by certification agency Det Norske Veritas Netherlands. These labs obtained NABL accreditation under ISO/IEC 17025: 2005 in the field of chemical testing on August 30, 2006.

The MPEDA has also focused on enhancing the quality and hygiene at the primary stages of fish production. Network for Fish Quality Management and Sustainable Fishing (NETFISH) is a registered society formed in 2007 under the aegis of the MPEDA to organize training and capacity building programmes at the grass root level to achieve quality management, post-harvest handling and conservation of fishery resources. Table 4.4 shows the role of NETFISH to improve the hygiene at the harbours and landing centres through various awareness programmes, continuous monitoring and clean up drives. The unhygienic practices observed at certain landing centres such as handling fish without using gloves or handling with legs, carrying fish in bamboo basket etc. were stopped through their initiatives. Further they are also addressing the problems commonly found at the harbours such as lack of infrastructural facilities, absence of proper drainage facilities, lack of drinking water etc.

Table 4.4. Total Number of Programmes Conducted by the NETFISH

Programmes	India			Kerala		
	2008-09	2009-10	2010-11	2008-09	2009-10	2010-11
Landing Centre Quality	1264	825	880	386	223	160
Conservation	513	858	763	139	121	58
On Board	108	206	204	17	27	21
Pre Processing	281	238	273	103	109	118
Aqua Farms	33	90	131	-	-	-
Dry Fish	92	112	110	-	-	-

Source: NETFISH, 2009 to 2011

In addition to the developmental schemes, the MPEDA has also several market promotion schemes to boost the marine product exports of the country.

The main activities are

- Dissemination of trade enquiries from the potential buyers to the business companies and provision of the list of leading exporters of queried items to the respective buyers to enable direct business negotiation.
- Registration of brand names: Brand names were allotted for seafood export companies to facilitate marketing of products abroad.
- Settlement of trade and quality disputes: The MPEDA took steps to settle the trade and quality disputes to smooth the process of marine product exports.
- Registration of logo in the overseas countries: The quality logo of MPEDA was registered in the markets of the EU, the US and Japan to promote the Indian seafood in these markets. The quality logo of the MPEDA was expected to boost the exports of value added sea products in the major markets. The quality logo serves to enhance the buyer's perception of the quality of Indian seafood.

All these serve to indicate that the marine product export sector of India has got good support from the government to meet the new challenges that emerged in the import markets in the post WTO phase. The institutional and financial supported extended by the government agencies such as the EIC and the MPEDA to a great extent enabled the marine product exports of India to regain the confidence of the foreign markets. This assistance also helped the marine product exports of our country to compete on a global scale in the area of quality, standards and hygiene.

Since 1997, there has been a steady increase in the total number of marine product units in the country as well as in the state. Besides, there has also been a rise in the number of EU approved units in the country indicating that despite tightening of the standards and regulations in the EU, more units are able to achieve compliance with the EU norms. In 1997-98, during the year of ban, only 10 units in the country could get approval for export to the EU. But in the following years, there was a steady increase in the number of units being able to get the approval for the export to the EU. This shows the ability of the units to modernize and conform to internationally accepted standards. This will help them to compete internationally without falling behind other major foreign seafood exporters in the areas of food safety and quality.

Table 4.5. Number of Marine Product Export Units – India and Kerala

Year	India			Kerala		
	EU Units	Non EU Units	Total	EU Units	Non EU Units	Total
1997-98	10	111	121	2	NA	NA
1998-99	59	70	129	24	NA	NA
1999-00	86	49	135	NA	NA	NA
2000-01	93	54	147	NA	NA	NA
2001-02	115	45	160	19	28	47
2002-03	124	79	203	39	33	72
2003-04	138	103	241	49	17	66
2004-05	143	116	259	52	10	62
2005-06	153	160	313	54	22	76
2006-07	178	175	353	61	21	82
2007-08	203	173	376	67	23	90
2008-09	208	177	385	72	23	95
2009-10	221	182	403	73	29	102
2010-11	236	190	426	77	35	112
2011-12	241	225	466	78	42	120

Source: EIA, 1998 to 2012

The rise in the total number of marine product export units in India and Kerala during the period when the food safety standards and quality regulations got strengthened in the import markets is a clear indication of the ability of our seafood export sector to cope with new challenges and thrive against all adversities (see Table 4.5). It is interesting to observe that there has also been a rise in the number of the EU approved units demonstrating the capability of seafood export units to become compliant with even the most stringent requirements put in place by the EU. In this context it is possible to presume that the marine product export sector could overcome the stringent regulatory regime in the import markets and thrive in the challenging environment mainly due to the institutional and financial support received from the Governmental agencies.

In the backdrop of institutional and financial support received by the marine product export sector of India, an examination of the rejections faced by the consignments of seafood exports from Kerala especially in the EU, one of the most stringent markets is made.

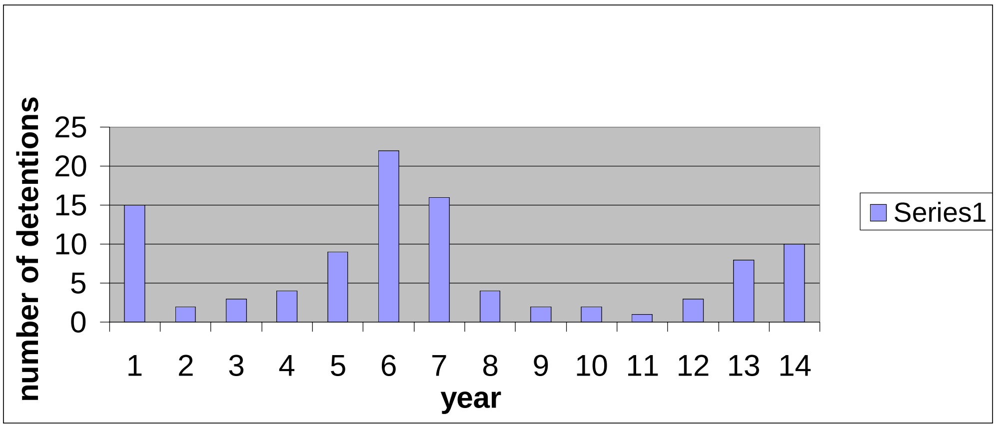
Table 4.6. Data on Detentions of Consignments of Fish and Fishery Products from the Seafood Export Units of Kerala to the EU

Year	Causes of detentions										
	salmonella	Vibrio Cholerae	Vibrio Parahaemol - yticus	s.aureus	Antibiotic residues	Bacterial inhibitors	Heavy metals	Aerobic mesophiles	Histamine	others	total
1997	10	3	1	0	0	0	0	1	0	0	15
1998	0	1	1	0	0	0	0	0	0	0	2
1999	3	0	0	0	0	0	0	0	0	0	3
2000	2	1	0	1	0	0	0	0	0	0	4
2001	3	1	2	0	0	0	0	3	0	0	9
2002	4	2	1	0	5	9	0	1	0	0	22
2003	1	2	1	0	6	4	1	1	0	0	16
2004	0	0	0	0	2	1	1	0	0	0	4
2005	0	0	0	0	1	0	1	0	0	0	2
2006	0	0	0	0	0	1	0	0	0	1	2
2007	0	0	0	0	0	0	0	0	0	1	1
2008	0	0	0	0	0	0	2	0	1	0	3
2009	0	0	0	0	0	0	3	0	3	2	8
2010	1	0	0	0	0	0	4	0	0	5	10

Source: EIA, 2010

Table 4.6 presents the number of detentions of fish and fishery products exported from Kerala to the EU. Despite the institutional measures put in place by the Government of India to upgrade the quality of fish and fishery products, the marine product export industry of the country faced a severe crisis in 1997. During the visit of the EC in April 1997, it observed that the hygiene standards maintained in the processing facilities approved by the EIC were inadequate. Besides, the fish and fishery product exports from India were tested positive for salmonella, vibrio cholerae and vibrio parahaemolyticus. In the light of these above developments, the fish and fishery product exports from India to the EU were banned in August 1997. However, the Government of India as well as the seafood export industry of the country was quick to respond positively to this crisis. The EIC strengthened the regulatory requirements and monitoring while the seafood export units upgraded its facilities so as to comply with quality standards and hygiene requirements. Hence, within a span of five months, things improved significantly resulting in the lifting of the ban in December 1997.

During the year 1997, the number of detentions of fish and fishery products exported from Kerala to the EU was as high as 15. Most of these detentions were on the account of salmonella. But in the next few years, the number of detentions due to quality issues dropped drastically. However, in 2001, the number of detentions picked up and stood at 9. In 2002 and 2003, the number of detentions of fish and fishery product exports from Kerala to the EU remained at a high of 22 and 16 respectively as shown in Figure 4.2. But once again, there was a fall in the number of detentions during the next 5 years. But this was followed by a rise in the number of detentions towards the fag end of 2000s.



Source: Computed from EIA data, 2010

Figure 4.2. Data on the Detentions of Fish and Fishery Product Exports from Kerala

It can be concluded that since 1997, the Government of India through its support agencies such as the EIC and the MPEDA has been taking adequate steps to ensure that the marine product export sector of the country is able to comply with the requirements that are emerging in the import markets. This has paid off, as India was able to get the ban on the marine product exports to the EU lifted within 5 months. With the strengthening of food safety standards and regulations in the import markets, the marine product export units in the country have been forced to modernize and upgrade. This has imposed on them the pressures of higher investment cost and rising recurring costs of compliance. Despite these adversities, there has been an increase in the number of marine product export units in the country since 1997. Further, there has also been a rise in the number of units getting approval for the export to the EU. This can be attributed largely to the efforts of the EIC and the MPEDA. The role of a regulator performed by the EIC during this period has ensured quality control and improved hygiene practices. Since 1997, there has been a decline in the number of detentions to the foreign markets on account of quality issues. Even a sudden spurt in detentions due to the presence of antibiotic residues and bacterial inhibitors as it occurred during 2002 and 2003, did not let the situation go out of control. The institutional set up in place for ensuring quality and safety could quickly rectify the issues and bring down the number of detentions. The MPEDA has played the role of a facilitator to enable the marine product export units to comply with the standards and regulations in the import markets. The subsidies offered by the MPEDA under various development assistance schemes served to build up and modernize the infrastructure in the marine product export sector of the country. Through these schemes, the MPEDA has shared the excessive cost burden that has fallen on the marine product exporters in the wake of stringent standards. Further the activities of NETFISH demonstrate an attempt on the part of the institutional agencies to focus on quality enhancements even at the primary stages of production to implement in spirit the principle of net to fork promoted by the overseas market.

In the light of the above findings, it is possible to prove the second hypothesis that the institutional set up in the county helps in overcoming the stipulations based on sanitary and phyto sanitary measures imposed by the importing nations.

The above analysis has to be supplemented with an in-depth study of the performance of the marine product export units of Kerala. Any complacency in conforming to the quality controls and safety standards insisted by the traditional markets results in rise in the detentions of fish and fishery product exports. Thus compliance with the stringent regulatory requirements in these import markets is mandatory for the seafood export units of Kerala to retain its traditional markets. This serves to point that the marine product export units have to constantly upgrade infrastructural facilities and implement the required quality controls and safety standards. This definitely has a bearing on the fixed costs as well as the recurring compliance costs of the company. This necessitates an examination of the costs and benefits of implementation of standards for the marine product exporters of Kerala.

Chapter

5

THE SPS MEASURES IN THE IMPORT MARKETS – RESPONSES OF MARINE PRODUCT EXPORT INDUSTRY OF KERALA

Chapter IV outlines the responses and initiatives of the government and its support agencies in the country to comply with the SPS stipulations in the major import markets. Their efforts seem to be largely successful as evidenced by the quick withdrawal of the EU ban on our marine product exports within a short span of five months since its imposition. The EU has been a market notorious for its stringency of the SPS stipulations. Despite that, bulk of our marine product exports move to the EU both in terms of quantity and value reflecting the trust reposed in the marine products of India by the EU. This would have been impossible without the proactive intervention of the government providing physical and financial resource support to the sector at the needed hour. The role of the government as a regulator and facilitator has played a critical part in guiding the fortunes of this sector.

However, the efforts of the government could prove futile unless they are supplemented through the efforts of the stakeholders in this sector. The marine product exporters figuring at the higher end of the supply chain have a critical stake and hence their responses to the SPS measures in the import markets merit an in-depth analysis.

A host of literature examines the possible effects of the strengthening of standards in the import markets on the food export companies of the developing countries. There is a voluminous literature pointing to the challenges and adversities that are to be encountered by the food product export companies of the developing nations as these standards and regulations turn out to be barriers limiting their exports. Henson et al., (2001); Jha (2002); Athukorala et al., (2003); and Doherty (2004); highlight the concerns of the developing countries in the wake of implementation of the SPS standards by the developed countries. The main problems encountered by the developing nations are the inability to participate in setting of standards, insufficient access to technical and scientific expertise, financial constraints, absence of institutional capacity building and the complexity of the SPS standards in the export markets.

Oyejide et al., (2000); Donovan et al.,(2001); Loc (2003); Greenhalgh et al.,(2004); Henson et al., (2004); Kulkarni (2005); Sawhney(2005); Deb (2006); Ponte (2006); and Gebrehiwet et al., (2007); observe that the strengthening of sanitary standards and regulations had adverse implications for developing nations as they served to limit the exports of agricultural products from the Less Developed Countries in which they had a comparative advantage. It also adversely affected the food processing units as the tightened standards enhanced the cost of compliance and imposed additional financial liabilities. It was observed that these regulations imposed severe constraints on the small capacity firms. These standards have emerged as disguised barriers to trade for the developing countries.

But there are a few studies that suggest the possibilities of these standards emerging as a catalyst rather than a barrier shaping the future prospects of this sector. Jaffee et al., (2004); and Fredriksson et al., (2005) highlight standards as catalyst view where the strengthening of sanitary standards and quality regulations have the potential to improve the capabilities of the food processing companies.

In this context, we try to analyse the responses of the marine product export industry of Kerala to the SPS requirements in the major import markets of the EU, the US and Japan.

5.1 Marine Product Export Industry of Kerala – An Overview

Kerala is one of the coastal states in India with a sizeable marine product export sector. Out of the 466 marine product export units in India, 120 are located in the state (EIA, 2011). The share of the state in the marine product exports of India is significant accounting for 15.33 percent and 15.52 percent in terms of quantity and value respectively in 2010-11(MPEDA, 2011). The state has about 11.52 lakh fisher population of which 8.81 lakh is active in the marine sector (Economic Review, 2011). In addition to this, the marine product export sector of the state supports a significant segment of the population to earn livelihood. Kerala has 14 fishing harbors and 20 fish landing centers to support the marine product export sector. In stark contrast to the rest of India, the marine product export sector of Kerala relies heavily on marine capture production. The capture fisheries sector in the state has switched to modernization in the pre harvest and post harvest levels. The harvesting activities in the marine capture fishery sector have been modernized with the induction of the mechanized fleet (mechanized trawlers, mechanized gillnetter, mechanized purse seiner, mechanized liner) and motorized crafts (outboard motors, ring seiner, OBM gillnetter, OBM boat seiner). The post harvesting technologies have also improved remarkably with the creation of capacities for processing and storage. The processed forms of fish include chilled, frozen, canned, smoked, dried and cooked varieties.

The critical post harvest activities of processing, value adding and storing of fish and fishery products are carried out at the export units. Figure 5.1gives an outline of the supply chain of capture fisheries from the source point to the final point of export.

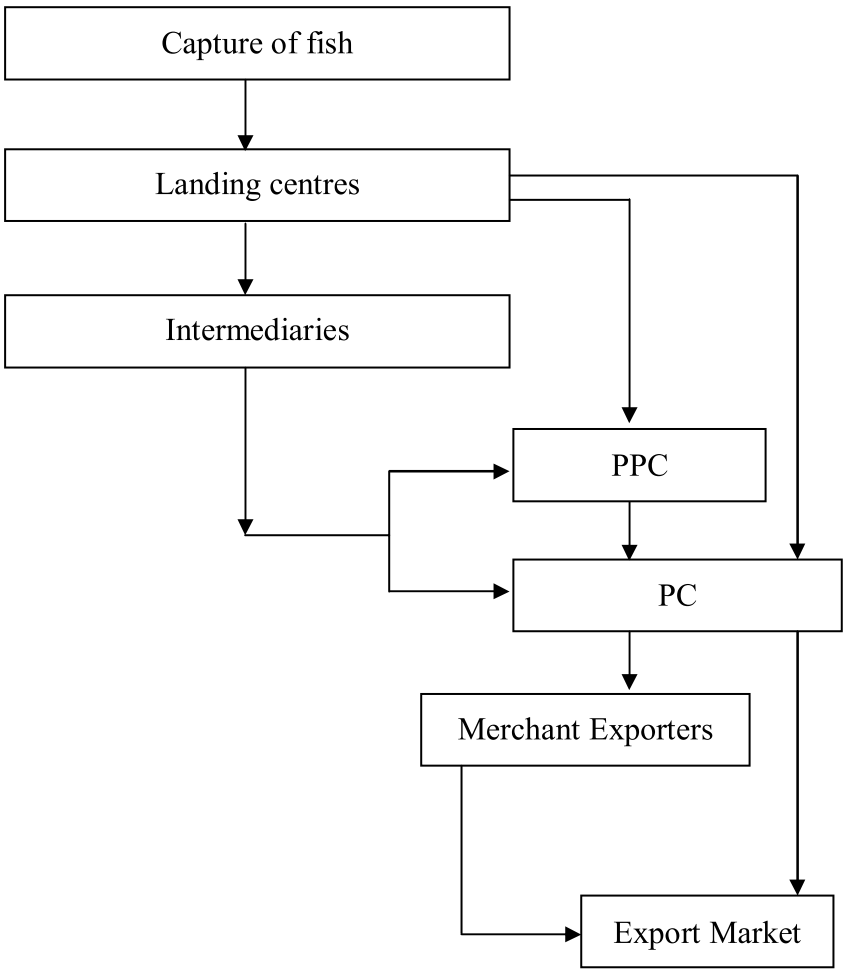


Figure 5.1. Marine Product Supply Chain - Kerala

One of the distinguishing features of the supply chain of capture fisheries in the state was the existence of disintegrated pre processing and processing centres. The pre processing centres performed the functions such as peeling, de shelling and cleaning the sourced in raw material. These activities were mainly performed by women workers. But one of the changes that occurred in the late 1990s was the integration of PPC and PC under one unit. It became mandatory for every unit to have an integrated PPC and PC for getting approval for export to the EU countries. This altered the supply chain of capture fisheries in the state.

In response to the tightened food safety standards, quality regulations and hygiene requirements in the import markets, India had to strengthen institutional mechanism and upgrade facilities to ensure food safety. As a part of this, the seafood export units had to implement the HACCP for getting approval for export to the EU and the non EU market. This necessitated the marine product export sector of the state to upgrade and modernize to comply with the new requirements.

A survey of 24 marine product export units is made to examine the responses of this category of stakeholders to the emerging issues in the import markets. The units were selected through purposive sampling from the districts of Ernakulam, Alappuzha and Kollam as these being the districts with highest concentration of marine product export units in the state. Out of 102 units in Kerala, 73 were the EU approved units and 29 were in the list of non EU approved. Considering the preponderance of the EU approved units in the state, the sample consisted 18 EU approved units and 6 non EU units. The inclusion of these 2 categories of units in the sample permitted to compare the investments made by the EU and the non EU units to comply with the new requirements and their consequent cost structures, the specific issues they face in import markets and possible benefits they derive from implementing the standards and regulations.

5.2 A Profile of the Surveyed Units

The surveyed units are classified on the basis of various criteria such as the type of approval obtained, their production capacities measured in terms of tonnes per day, the measures of quality control implemented, the various forms of fish products exported, the main markets targeted and annual turnover generated.

Table 5.1. Type of Approval

		No. of Firms	Percent	Valid Percent	Cumulative Percent
Valid	Non EU Approved	6	25.0	25.0	25.0
	EU Approved	18	75.0	75.0	100.0
	Total	24	100.0	100.0	

Source: Survey data, 2010-11

As has been stated earlier, the surveyed units are composed of the EU approved and the non EU approved units. As the EU firms outnumber the non EU firms in the marine product export sector of Kerala, a purposive sampling was done so as to include 75 percent EU approved units and the remaining non EU units as given in Table 5.1.

The units selected are classified on the basis of their size measured in terms of the approved capacity which is given as tonnes per day (TPD). The distribution of the firms on the basis of the size is presented in Table 5.2.

Table 5.2. Production Capacity of the Marine Product Export Units (in Tonnes Per Day)

Size of the firm	Number of firms	Percent of firms
Less than 20	4	16.67
20-40	9	37.5
40 and above	11	45.83
Total	24	100

Source: Survey data, 2010-11

A majority of marine product export companies surveyed possesses production capacity 40 and above TPD. About 37.5 percent firms belong to the category 20-40 TPD. There are 4 firms with production capacity less than 20 TPD

Irrespective of the type of approval obtained, the marine product export units of the state have to implement the HACCP to ensure quality control. HACCP is the basic mandatory requirement that every unit in the sample had to implement. Besides HACCP, there are other systems of quality control that can be implemented by the marine product export units to receive greater acceptance in the foreign markets. The quality control systems developed by British Retail Consortium (BRC), ISO 22000, International Food Standard Certification (IFC) etc. are those that serve to enhance the buyers' perception on the quality of the marine product exports of the companies that choose to implement them in addition to the mandatory HACCP. It is evident from Table 5.3 that among the surveyed units, a few have chosen to implement quality control systems such as BRC, ISO 22000 and IFC in addition to the mandatory HACCP. None of the non EU units has implemented any of these optional quality control systems.

Table 5.3. Measures of Quality Control

		No. of Firms	Percent	Valid Percent	Cumulative Percent
Valid	HACCP	19	79.2	79.2	79.2
	HACCP &BRC	1	4.2	4.2	83.3
	HACCP, BRC & ISO	3	12.5	12.5	95.8
	HACCP, BRC, ISO and IFC	1	4.2	4.2	100.0
	Total	24	100.0	100.0	

Source: Survey data, 2010-11

The surveyed firms are found to export different varieties of marine products depending on their availability across the seasons. Most of the surveyed units exported a wide range of marine products such as shrimp, squid, cuttlefish, tuna, mackerel, sardine, etc. These items are exported in varied forms such as chilled, frozen and cooked. The marine product exports from the state are mainly in frozen form. The frozen products can be block frozen (BF), individual frozen (IF) or individual quick frozen (IQF). Table 5.4 gives the distribution of the firms based on their product portfolio.

Table 5.4. Forms of Frozen Export

		No. of Firms	Percent	Valid Percent	Cumulative Percent
Valid	BF	7	29.2	29.2	29.2
	IF	4	16.7	16.7	45.8
	IQF	1	4.2	4.2	50.0
	BF & IF	8	33.3	33.3	83.3
	BF & IQF	1	4.2	4.2	87.5
	All the above	3	12.5	12.5	100.0
	Total	24	100.0	100.0	

Source: Survey data, 2010-11

The markets targeted by the firms to an extent depend upon the type of approval obtained. The European market is accessible only to those units that have secured the EU approval. In this context, it is worth mentioning that historically, the EU, the US, and Japan had been the major markets for the marine product exports of Kerala. These traditional markets especially the US and Japan fetched comparatively higher unit value in terms of US $ per kg. The new markets that have risen to prominence especially since the mid 1990s are the markets of the SEA, the MEA and 'Others' comprising mainly China, Turkey and Tunisia. However, these markets yield lesser unit value vis-à-vis the traditional markets. The target markets of a firm are identified on the basis of value of exports of marine products moving to various markets. The markets those figure in the first, second and third places in terms of average value of marine product exports for the past 3 consecutive years are accepted as the target markets of the firm. The target markets can be broadly classified into traditional and non-traditional markets. The traditional markets comprise the EU, the US and Japan while the non-traditional markets comprise the SEA, the MEA and 'Others'. The firms are classified into different groups based on the target markets they serve (see Table 5.5).

Group 1 consists of firms that focus on the markets of the EU, the US and Japan. These traditional markets are their target markets.

Group 2 consists of firms that primarily target traditional markets but also has in its market portfolio the dominant presence of a non-traditional market. That is traditional markets occupy I and II places followed by a non - traditional market.

Group 3 consists of firms with traditional market in the I place followed by a non - traditional and a traditional market in the II and III places respectively

Group 4 consists of firms with traditional markets in the I place followed by non-traditional markets in the II and III positions

Group 5 consists of firms with non-traditional markets in the I and II places, followed by the traditional market in the III position.

Group 6 consists of firms that primarily focus only the non-traditional markets.

A move from Group 1 to Group 6 signifies the declining significance of traditional markets in the market portfolio of the marine product export units of the state.

Table 5.5. Target Markets of the Marine Product Export Units

		No. of firms	Percent	Valid Percent	Cumulative Percent
Valid	Group 1	5	20.83	20.83	20.8
	Group 2	6	25	25	45.8
	Group 3	3	12.5	12.5	58.3
	Group 4	3	12.5	12.5	70.8
	Group 5	1	4.2	4.2	75
	Group 6	6	25	25	100
	Total	24	100	100	

Source: Survey data, 2010-11

The distribution of firms on the basis of annual turnover as given in Table 5.6 suggests that 62.5 Percent of the units reported an annual turnover of less than ₹ 30 crores.

Table 5.6. Annual Turnover of the Marine Product Export Units (Value: in ` Crores)

		No. of Firms	Percent	Valid Percent	Cumulative Percent
Valid	< 30	15	62.5	62.5	62.5
	30-60	4	16.7	16.7	79.2
	>60	5	20.83	20.83	100
	Total	24	100	100	100

Source: Survey data, 2010-11

5.3 Responses of the Marine Product Export Industry – Costs and Benefits

Responses and initiatives of these firms to comply with the requirements in the import markets receive focus in this segment. Henson et al., (2007) use the conceptual framework of exit, loyalty and voice developed by Hirschman (1970) as strategic responses to food safety standards (see Table 5.7).

Table 5.7. Strategic Responses to Food Safety Standards

Strategies	Reactive	Proactive
Exit	Wait for standards and give up	Anticipate standards, leave particular markets or market segments, and make other commercial shifts
Loyalty	Wait for standards and then adopt measures to comply	Anticipate standards and comply ahead of time
Voice	Complain when existing standards are applied or new measures are adopted	Participate in standard creation and/or negotiate before standards are applied

Source: Henson and Jaffee (2007)

The marine product export sector of the state largely pursued a strategic response of loyalty as they had to fall in line with the standards and regulations evolving in the import markets. The reactive responses on the part of marine product export sector of Kerala were essential for them to acquire the eligibility to remain in business. They had to upgrade and modernize to be a part of global marine product supply chain. These mandatory upgradation measures undertaken by the units imposed huge financial liabilities on them. But the quantification of the costs incurred as a part of complying with the requirements in the import markets involves certain conceptual issues. In many cases, efforts to achieve compliance with standards are undertaken within the context of prevailing competitive challenges. The costs faced by individual entrepreneurs may be very different according to their competitive positioning and historic efforts to improve food safety, making it difficult to attribute costs specifically to a particular standard (World Bank Report, 2005)

The costs of compliance with the new requirements can be classified into non recurring or fixed cost of compliance and recurring cost of compliance. The fixed cost of compliance includes the expenditures incurred by the marine product export units on general construction, renovation and alteration of existing production facilities, purchase or replacement of equipments as well as installation and expansion of capacities. The recurring costs of compliance on the other hand are those expenses a marine product export unit has to incur as a part of implementation of the quality control systems such as the HACCP.

The extent of upgradation and renovation carried out by the marine product exporters of the state varied widely. The firms that possessed integrated PPCs were saved from the trouble of constructing a new one. But in certain cases, the firms that had integrated PPCs had to change the entire lay out to avoid cross contamination. The alteration of the entire lay out of the processing establishments along with the installation of chill rooms and changing rooms was required in several firms. The other upgradation tasks involved changing the flooring, installation of ice plants, upgradation of the lab facilities, air conditioning, setting up of water treatment plants etc. Table 5.8 presents the upgradation measures carried out by the surveyed marine product export units belonging to various size categories measured in terms of tonnes per day.

Table 5.8. Major Upgradation Measures Carried out by the Surveyed Units of the State (Size: in tonnes per day)

Upgradation of facilities / Size of the firms	Less than 20	20-40	40 and above
Pre Processing facility	3	8	8
General Construction or alteration of Processing centre	3	6	9
Chill rooms	3	8	8
Changing rooms	3	6	8
Ice plants	3	5	9
Upgradation of labs	4	9	7
Air conditioning	2	4	6
Wash rooms	2	6	6
Water tanks	3	8	4
Water treatment plants	3	6	10
Others (replacement of tables, utensils, purchase of thermographs etc.)	4	9	11

Source: Survey data, 2010-11

A significant majority of the surveyed firms had to upgrade the facilities to comply with the requirements in the foreign markets. The total non recurring expenses incurred by the surveyed units in the state to upgrade the aforementioned facilities can be presented in Table 5.9.

Table 5.9. Non-Recurring Costs of Compliance with Requirements for EU and non EU Firms (Non Recurring Costs: in ` Crore)

Type of approval	Less than 1crore	1crore – 2crore	2 crore – 3crore	Greater than 3 crore	Total
EU firms	5	8	3	2	18
Non EU firms	6	0	0	0	6
Total	11	8	3	2	24

Source: Survey data, 2010-11

Among the surveyed units, more than 50 Percent of the firms had to incur non recurring expenses above ₹ 1 crore. Of the 11 firms with fixed cost of compliance below ₹ 1 crore, 6 of them belong to the category of the non EU units that have comparatively less stringent specifications to be met.

The following hypothesis is formulated.

There is no significant difference in the mean non recurring cost of compliance between the EU and the non EU firms.

The results of the Mann Whitney U test are presented in Table 5.10.

Table 5.10. Non Recurring Cost of Compliance based on Status of Approval – Mann Whitney U test

	Type of Approval	N	Mean Rank	Sum of Ranks
Total Fixed Cost in Crores	Non EU Approved	6	3.50	21.00
	EU Approved	18	15.50	279.00
	Total	24		

Test statistics	Total Fixed Cost in Crores
Mann-Whitney U	0.000
Wilcoxon W	21.000
Z	-3.600
Asymp. Sig. (2-tailed)	0.000
Exact Sig. [2(1-tailed Sig.)]	0.000

Source: Computed from Survey data, 2010-11

As the result is statistically significant at 0.000 level, it is possible to reject the null hypothesis. It can be concluded that the mean total fixed cost varies significantly for the EU and the non EU firms. The result could be justified as the EU approval for a firm was subject to compliance with rigorous specifications as demanded by the EC law vividly described earlier. This necessitated huge investments on the part of the EU units.

In the backdrop of the above finding, one way ANOVA was performed to examine whether there exists significant difference in the non recurring cost of compliance with regulations within the EU firms belonging to various production capacities. As non recurring cost failed to satisfy the condition of normality, a log transformation was done. The result of one way ANOVA given in Table 5.11 suggests that there is no significant difference in the non recurring cost of compliance with the regulations for the EU firms despite differences in their production capacities measured in terms of tonnes per day. The non recurring costs of upgradation depended upon the prevailing state of facilities and the levels of hygiene in the unit.

Table 5.11. Non Recurring Cost of Compliance among the EU firms based on Production Capacities - ANOVA (Non Recurring Costs: in ` Crore; Production Capacity: in Tonnes Per Day)

Non Recurring Costs / Production capacity	< 1crore	1crore – 2crore	2 crore – 3crore	> 3 crore	Total
<20	0	0	2	0	2
20-40	2	3	1	0	6
40 and above	3	4	1	2	10
Total	5	7	4	2	18
LN TFC	**Sum of squares**	**df**	**Mean square**	**F**	**Sig.**
Between Groups	1.098	2	0.549	1.111	0.355
Within Groups	7.416	15	0.494		
Total	8.514	17			

Source: Computed from the Survey data, 2010-11

The tightening of the SPS stipulations in the import markets demanded from these firms not just a one- time non recurring cost to conform to the requirements; they had to meet certain recurring expenses exclusively for complying with the standards and regulations. The important elements of the recurring cost of compliance to be borne by a firm consists of costs of maintaining hygiene, training of staff, increased labour expenses, lab testing charges, monitoring charges, documentation expenses and renewal of quality control systems such as the HACCP, the BRC, the ISO 22000 etc. These are the additional expenses a firm has to bear over and above the normal production cost. These expenses are exclusively meant for ensuring quality control and meeting the standards and regulations in the import markets. Table 5.12 presents the details of annual recurring expenses to be incurred by marine product export units for complying with the standards.

Table 5.12. Details of Annual Recurring Expenses to be Incurred by Marine Product Export Units for Complying with the Standards. (Recurring Costs: in ` Lakhs)

Elements of recurring expenses	Less than 2 lakhs	2 -4 lakhs	4-6 lakhs	Greater than 6 lakhs	Total
Maintenance of hygiene (expenses on disinfectants, pest control, painting, polishing etc.)	4(16.67)	7(29.17)	8(33.33)	5(20.83)	24
Increased labour expenses (additional labour, health cards, uniforms, training)	10 (41.67)	8(33.33)	2(8.3)	4(16.67)	24
Lab testing charges	7(29.17)	7(29.17)	2(8.3)	8(33.33)	24
Monitoring charges	7(29.17)	7(29.17)	1(4.17)	9(37.5)	24
Others(inclusive of Documentation expenses and Renewal of HACCP, BRC, ISO etc.)	15(62.5)	3(12.5)	4(16.67)	2(8.3)	24

Source: Survey data, 2010-11

Note: Figures in the parentheses show the percentage of firms falling in various categories of recurring cost of compliance with standards.

The main elements of recurring costs of compliance of the firms are costs of maintaining hygiene, additional costs on labour, the charges of lab testing, the monitoring fee to be paid to the EIA, costs of renewal of HACCP and other quality control systems. The maintenance of hygiene throughout the pre processing and processing stages demanded expenses on disinfectants such as chlorine and regular pest control measures. The units have to regularly perform other routine tasks such as painting of the plant and polishing of tables and utensils to ensure hygiene. Another major item of expenditure incurred by the firms as a part of the implementation of standards is the additional labour charges. There was an increase in the number of labourers employed in certain units especially the EU units owing to the integration of pre processing and processing facilities. There were additional expenses to be incurred on labour on regular medical check ups and provision of health cards, provision of uniforms, and periodic training in HACCP. But this item of expenditure on an average amounted to less than ` 4 lakhs per year for a majority of the surveyed firms. The single major item of recurring expenses of complying with standards is the lab testing charges. The raw material as well as the end product had to be tested for various micro biological parameters, heavy metals and also for antibiotics in the case of farmed products. They also had to undertake periodic testing of water and ice as per the specifications in the import markets. The external lab testing expenses accounted for more than ` 6 lakhs for about 33 percent of the surveyed units; all of them being the EU units. Among the non EU units, 83 percent of them had this expenditure below ` 2 lakhs of rupees exposing the severity of food safety standards and testing requirements insisted by the EU. Another important element of the recurring expenses of these firms is the monitoring fee to be paid to the EIA which is fixed as 0.2 percent of the FOB value per annum. These expenses remained below ` 2 lakhs on an average per year for more than 50 percent of the surveyed firms. The other expenses mainly involved expenses on the documentation work and those incurred to renew HACCP and other quality control programmes. The annual average expenses under this category were higher for those firms that adopted additional quality control programmes such as the BRC, ISO 22000 and IFC.

Though all the units are expected to implement HACCP irrespective of the type of approval, the non EU units faced annual recurring cost of compliance below ` 25 lakhs. In fact majority (61.1 percent) of the EU units too faced an annual recurring cost of compliance with the standards below ` 25 lakhs. Recurring cost of compliance with standards for the marine product export units of the state based on the status of approval is presented in Table 5.13.

Table 5.13. Recurring Cost of Compliance with Quality Control based on Type of Approval (Recurring Cost: in ` Lakhs)

Type of approval	Less than 25 lakhs	25 lakhs – 50 lakhs	50 lakhs- 75 lakhs	Greater than 75 lakhs	Total
EU Units	11	4	1	2	18
Non EU Units	6	0	0	0	6
Total	17	4	1	2	24

Source: Survey data, 2010-11

In this context, the following hypothesis is formulated. There is no significant difference in the mean recurring cost of complying with the standards for the EU and the non EU firms.

The results of the Mann Whitney U test are presented in Table 5.14.

Table 5.14. Recurring Cost of Compliance - Mann-Whitney Test

	Type of Approval	N	Mean Rank	Sum of Ranks
Total Recurring Costs in Crores	Non EU Approved	6	4.33	26.00
	EU Approved	18	15.22	274.00
	Total	24		

Test Statistics	Total Recurring Costs in ` Lakhs
Mann-Whitney U	5.000
Wilcoxon W	26.000
Z	-3.267
Asymp. Sig. (2-tailed)	0.001
Exact Sig. [2(1-tailed Sig.)]	0.000

Source: Computed from Survey Data, 2010-11

The Mann Whitney U value is statistically significant at 0.001 level implying that there exists significant difference in the recurring costs of compliance with standards and regulations between the EU and the non EU firms. This can be attributed to the severity of testing requirements and the documentation requirements in the EU vis-à-vis the non EU markets. The HACCP being the basic control system to be implemented by the EU and the non EU units, the difference in these mean recurring expenses of ensuring quality between these two categories of firms observed is due to stringent requirements in the EU. The EU regulations on testing of heavy metals especially cadmium are very stringent as the maximum residue limit is not only tighter than the international standard, but also severe compared to all the other markets. Besides, the testing requirements of water and ice are as per the specifications of the EU rather than international standards as required for the other markets, making it stringent both with regard to the frequency of test and the number of parameters to be tested. The documentation expenses are also cumbersome for the EU as they demand additional certificates such as the catch certificate to ensure the traceability and sustainability of the catch. The labeling requirements too demand the use of the EC languages on the label rather than English. All these could have caused divergence in the mean recurring cost of compliance with standards between the EU and the non EU firms.

An attempt was made to examine whether the firms have been able to internalize the recurring cost of compliance based on the production capacities. Recurring cost of compliance among the surveyed firms based on the production capacities are presented in Table 5.15a.

Table 5.15a. Recurring Cost of Compliance among Firms based on Production Capacities(Recurring Costs: in ` Lakhs; Production Capacities: Tonnes Per Day)

Production capacity \ Recurring Costs	< 25	25– 50	50 -75	> 75	Total
<20	4	0	0	0	4
20-40	8	1	0	0	9
40 and above	5	3	1	2	11
Total	17	4	1	2	24

Source: Survey data, 2010-11

The recurring cost of compliance of the firms was subject to log transformation to make it normal for the purpose of using one way ANOVA. The result presented in Table 5.15b suggests that the size of operations has definitely enabled the firms to internalize the recurring expenses of quality control as there exists significant variance in the log recurring cost of compliance among firms with various production capacities.

Table 5.15b. Recurring Cost of Compliance among Firms based on Production Capacities - ANOVA

Log RC	Sum of squares	df	Mean square	F	Sig.
Between Groups	8.594	2	4.297	6.719	0.006
Within Groups	13.429	21	0.639		
Total	22.023	23			

Source: Computed from Survey Data, 2010-11

The recurring cost of compliance with standards among the EU approved firms based on the production capacities is presented in Table 5.16a.

Table 5.16a. Recurring Cost of Compliance among EU Firms based on Production Capacities (Recurring Costs: in ` Lakhs; Production Capacities: Tonnes Per Day)

Recurring Costs / Production capacity	< 25	25– 50	50 -75	> 75	Total
<20	2	0	0	0	2
20-40	5	1	0	0	6
40 and above	4	3	1	2	10
Total	11	4	1	2	18

Source: Survey data, 2010-11

With respect to the EU firms too, it is found that there is significant difference in the mean recurring cost of compliance based on production capacities. This suggests the ability of firms with large scale operations to internalize the recurring cost of compliance with standards. The result of ANOVA is presented in Table 5.16b.

Table 5.16b. Recurring Cost of Compliance among the EU Firms based on Production Capacities - ANOVA

LN RC	Sum of squares	df	Mean square	F	Sig.
Between groups	4.723	2	2.362	4.039	0.040
Within groups	8.770	15	0.585		

Total	13.493	17			

Source: Computed from Survey Data, 2010-11

The recurring expenses to be incurred by a firm for complying with the standards and regulations are a part of its total costs. Hence to capture the financial liability imposed by this cost on the shoulders of a firm, the recurring cost as a percentage of total cost is computed for the firms based on the type of approval and production capacities. Table 5.17 presents the recurring costs as a percentage of total costs for the firms based on their status of approval.

Table 5.17. Recurring Cost of Compliance as a Percent of Total Cost for EU and non EU Units

Type of approval	Less than 0.5	0.5-1	1-1.5	Greater than 1.5
EU Units	1	9	6	2
Non EU units	2	2	1	1
Total	3	11	7	3

Source: Survey data, 2010-11

The hypothesis formulated in this case is the recurring cost of compliance as a percent of total cost is not significantly different for the EU and the non EU firms. Considering the normality in the distribution of the variable, a parametric t test is conducted, the results of which presented in Table 5.18 are statistically insignificant confirming that there is no significant difference in the recurring costs as a percentage of total costs for the EU and the non EU firms.

Table 5.18. Recurring Cost as a Percent to Total Cost based on the Status of Approval -t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Recurring Cost as a Percent to Total Cost	Non EU Approved Units	6	1.2919	1.50235	0.840	22	0.410

	EU Approved units	18	0.9715	0.42760			

Source: Computed from Survey Data, 2010-11

This implies that these extra costs, the firms are mandatorily required to bear exclusively for the purpose of complying with the requirements is the same for all the firms irrespective of the type of approval. Though the recurring cost of compliance in absolute terms differ for the EU and the non EU firms, the recurring expenses as a percent of total expenses are found to be the same for the marine product export sector irrespective of the status of approval. This suggests that the implementation of the HACCP and the consequent expenses that have come up exclusively as a part of ensuring quality and hygiene have imposed additional financial liabilities on all the units. It can be concluded that the recurring costs of compliance are indeed a financial burden to these firms.

The additional recurring expenses of meeting standards and regulations as a percentage of total costs are analyzed based on the production capacities of the surveyed units. Table 5.19a presents the recurring cost as a percentage of total costs for the firms belonging to various production capacities. This serves to examine whether the firms with enhanced production capacities have been able to internalize these costs vis-à-vis the smaller sized firms.

Table 5.19a. Recurring Cost as a Percent of Total Cost for Firms Based on the Production Capacities (Production Capacities: Tonnes Per Day)

Production Capacities \ Recurring cost as a percent of total cost	Less than 0.5	0.5-1	1-1.5	Greater than 1.5	Total
<20	1	2	0	1	4
20-40	1	4	4	0	9
40 and above	1	5	3	2	11

Total	3	11	7	3	24

Source: Survey data, 2010-11

The results of ANOVA depicted in Table 5.19b suggest that the recurring cost as a percentage of total cost is not significantly different based on the production capacities thereby posing a financial burden to firms irrespective of their size.

Table 5.19b. Recurring Cost as a Percent of Total Cost among Firms belonging to various Production Capacities - ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Recurring Cost as a Percent to Total Cost	Between Groups	1.323	2	0.661	1.026	0.376
	Within Groups	13.533	21	0.644		
	Total	14.855	23			

Source: Computed from Survey Data, 2010-11

This is further corroborated by the result obtained for the parametric tests performed to examine whether there exists significant difference in the recurring cost of compliance as a percentage of annual turnover for firms based on the type of approval and production capacities. Table 5.20 presents recurring cost as a percentage of turnover for the firms based on their status of approval.

Table 5.20. Recurring Cost of Compliance as a Percentage of Turnover for EU and non EU Firms

Type of approval	Less than 0.5	0.5-1	1-1.5	Greater than 1.5	Total
EU Units	2	7	4	5	18
Non EU Units	1	3	1	1	6
Total	3	10	5	6	24

Source: Survey data, 2010-11

It is found in Table 5.21 that the results for the parametric t test are statistically insignificant implying that the brunt of this cost is borne by all the marine product exporters irrespective of the type of approval they get.

Table 5.21. Recurring Cost as a Percentage of Turnover based on the Status of Approval t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Recurring Cost as a Percentage of Turnover	Non EU Approved Units	6	1.0974	0.93887	0.117	22	0.908
	EU Approved Units	18	1.0624	0.51067			

Source: Computed from Survey Data, 2010-11

Recurring cost of compliance as a percent of turnover for the firms based on their production capacities is given in Table 5.22a.

Table 5.22a. Recurring Cost as a Percent of Turnover for Firms Based on Production Capacities (Production Capacities: Tonnes Per Day)

Recurring Cost as a Percent of Turnover / Production Capacities	< 0.5	0.5-1	1-1.5	> 1.5	Total
<20	1	1	1	1	4
20-40	0	6	2	1	9
40 and above	2	3	2	4	11
Total	3	10	5	6	24

Source: Survey data, 2010-11

The variances in the recurring cost as a percentage of annual turnovers of these firms based on the production capacities are found to be statistically insignificant as seen in the table 5.22b pointing to the inability of the large firms to internalize these additional expenses forced upon them.

Table 5.22b. Recurring Cost as a Percent of Total Turnover among Firms belonging to various Production Capacities – ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Recurring Cost as a Percentage of Turnover	Between Groups	0.452	2	0.226	0.565	0.577
	Within Groups	8.394	21	0.400		
	Total	8.846	23			

Source: Computed from Survey Data, 2010-11

The above analysis clearly establishes the extent of financial burden, the annual recurring expenses to be incurred as a part of complying with quality standards and regulations in the import markets imposes upon the marine product export units irrespective of their approval status and the production capabilities. The additional expenses exclusively for the purpose of meeting requirements in the import markets since the late 1990s have come to stay on the shoulders of all the marine product export units cutting across the approval status and their production capabilities implying that the recurring expenses of compliance are indeed posing a financial burden on them.

Besides the recurring cost of maintaining quality and hygiene, the firm has to incur expenses on raw materials, labour, electricity, packing, freight, transportation, etc. which is categorized as direct cost of production. These costs form a significant part of the total expenses of a firm. Table 5.23a presents the production costs incurred by the firm based on the status of approval.

Table 5.23a. Production Costs of the Firms Based on the Status of Approval (Production costs: in ₹ Crores)

Production Cost / Type of approval	< 25	25-50	>50	Total

EU approved Units	10	6	2	18
Non EU approved Units	5	1	0	6
Total	15	7	2	24

Source: Survey data, 2010-11

The hypothesis put forward is that there is no significant difference in the production costs for the EU and the non EU units. In this case, the results of the non parametric Mann Whitney U test given in Table 5.23b are statistically significant suggesting that the type of approval does have an impact on the production costs incurred by a firm.

Table 5.23b. Production Cost – Mann Whitney U Test

	Type of Approval	**N**	**Mean Rank**	**Sum of Ranks**
Total Production Cost in Crores	Non EU Approved	6	6.17	37.00
	EU Approved	18	14.61	263.00
	Total	24		

Test Statistics	**Total Production Cost in ` Crores**
Mann-Whitney U	16.000
Wilcoxon W	37.000
Z	-2.533
Asymp. Sig. (2-tailed)	0.011
Exact Sig. [2(1-tailed Sig.)]	0.009

Source: Computed from Survey Data, 2010-11

The value of Mann Whitney U is statistically significant at 0.011 level, indicating that there is a significant difference in the mean production cost of the EU and the non EU firms.

The production costs considered here comprise the direct cost on raw materials, labour, packing materials, electricity, transportation and freight etc.

that are found to be directly related to the quantity of output produced and exported. Table 5.24a presents the mean quantities of exports of the firms based on the status of approval.

Table 5.24a. Export Quantity of the Firms Based on their Status of Approval (Quantity: in Tonnes)

Type of Approval \ Export Quantity	<2000	2000-4000	>4000	Total
EU Approved Units	10	4	4	18
Non EU Approved Units	5	1	0	6
Total	15	5	4	24

Source: Survey data, 2010

As the concerned variable satisfies the test of normality (based on Kolmogorov- Smirnov test), t test is performed to examine whether the mean quantities of exports of the EU and the non EU firms are the same. The t value given in the table 5.24b is statistically significant at the level 0.085 implying that the mean quantity of exports of the EU approved firms are different from the non EU firms. That explains the significant difference in the mean production cost between the EU and the non EU units.

Table 5.24b. Total Quantity of Output Exported based on the Status of Approval - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Total quantity of output produced and exported	Non EU Approved Units	6	1019.53	757.52	1.804	22	0.085
	EU Approved Units	18	2418.26	1825.65			

Source: Computed from Survey Data, 2010-11

The total cost of a firm consists of both the direct costs of production and the recurring cost of complying with standards. Table 5.25a shows the total costs incurred by the marine product export units based on their status of approval.

Table 5.25a. Total Costs of the Firms Based on the Status of Approval (Cost: in ` Crores)

Total Cost / Status of Approval	< 25	25-50	>50	Total
EU approved Units	10	6	2	18
Non EU approved Units	5	1	0	6
Total	15	7	2	24

Source: Survey data, 2010-11

The hypothesis formulated is that the total costs do not differ significantly between the EU and the non EU firms. The results of the non parametric test given in Table 5.25b suggest that the mean total costs differ significantly between the EU and the non EU firms.

Table 5.25b). Total Costs – Mann Whitney U Test

	Type of Approval	N	Mean Rank	Sum of Ranks
Total Cost in Crores	Non EU Approved	6	6.17	37.00
	EU Approved	18	14.61	263.00
	Total	24		

Test Statistics	Total Cost in ` Crores
Mann-Whitney U	16.000
Wilcoxon W	37.000
Z	-2.533
Asymp. Sig. (2-tailed)	0.011
Exact Sig. [2(1-tailed Sig.)]	0.009

Source: Computed from Survey Data, 2010-11

This could be attributed to the fact that the mean production costs and the mean recurring costs of compliance are significantly different between the EU and the non EU units.

Table 5.26a shows the total cost of firms based on their production capacities. Of course, the scale of operations does influence total cost. The result of ANOVA given in Table 5.26b confirms this as there are significant differences in the mean total cost (subject to log transformation) of firms based on their production capacities.

5.26a. Total Costs of the Firms Based on the Production Capacity (Total Costs: in ₹ Crores; Production Capacity: in Tonnes Per Day)

Production Capacity \ Total Cost	< 25	25-50	>50	Total
<20	3	1	0	4
20-40	8	1	0	9
40 and above	4	5	2	11
Total	15	7	2	24

Source: Survey data, 2010-11

Table 5.26b. Total Cost of Compliance among firms based on the Production Capacities – ANOVA

Log TC	Sum of squares	df	Mean square	F	Sig.
Between Groups	7.737	2	3.868	6.121	0.008
Within Groups	13.272	21	0.632		
Total	21.009	23			

Source: Computed from Survey Data, 2010-11

The study analysed total cost as a percentage of turnover for the firms based on the status of approval. The null hypothesis formulated is that there is no significant difference in the total cost as a percentage of turnover for the EU and the non EU firms. The result of the t test presented in Table 5.27

confirms the above conclusion that there is no significant difference in it between the EU and the non EU firms.

Table 5.27. Total Cost as a Percentage of Turnover - t-Test

	Type of Approval	**N**	**Mean**	**Std. Deviation**	**t**	**df**	**Sig. (2-tailed)**
Total Cost as a Percentage of Turnover	Non EU Approved Units	6	104.2194	32.53294	0.666	22	0.512
	EU Approved Units	18	128.3626	85.66315			

Source: Computed from Survey Data, 2010-11

These analyses give a picture of scaled up cost conditions for the marine product export units in the state. The bifurcation of the marine product export units in the state permits to compare the specific costs to be borne by these units as a part of complying with the requirements in the import markets. There has been a significant difference in the mean fixed and mean recurring cost of compliance between the EU and the non EU units. This certainly points to the severity of the standards and regulations enforced on the units to get approval for the export to the EU. Further, the enhanced production capacities have failed to internalize the non recurring costs of compliance as there are no significant differences in these expenses across the firms belonging to various sizes. Though the firms seem to internalize the recurring expenses on the implementation of standards with the enhancement in the scale of operations, there does not exist significant difference in the recurring expenses as a percent of total cost and as a percent of turnover across the firms belonging to various production capacities.

Based on the cost structures of the firms surveyed, a cost function is fitted. Cost function expresses the relationship between cost and its determinants such as the level of output, input prices, technology, managerial efficiency, etc. $C = f(Q, X_1, X_2, \ldots\ldots\ldots X_n)$ where C refers to the variable cost, Q is the output and $X_1, X_2, \ldots\ldots\ldots X_n$ are other main determinants of costs.

Theoretically, costs in the short run are composed of fixed and variable costs. Due to the problems associated with apportioning of fixed costs to various elements, it is not taken into consideration during the estimation of short run cost function. The normal procedure is to estimate the total variable costs (TVC) and later add the fixed cost component to it.

There are 3 common functional forms of a cost function. They are

a) Linear cost function: $TVC = a_1 + b_1Q$

b) Quadratic cost function: $TVC = a_2 + b_2Q + c_2Q^2$

c) Cubic cost function: $TVC = a_3 + b_3Q + c_3Q^2 + d_3Q^3$

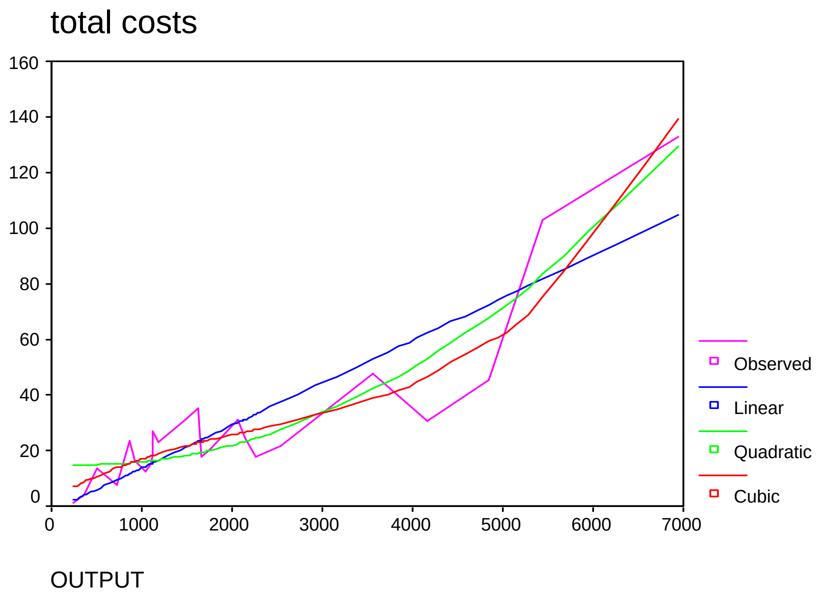
Where, a_1, a_2, a_3, b_1, b_2, b_3, c_2, c_3, d_3 are constants.

The general equation applicable among these is

$$TVC = a_3 + b_3Q + c_3Q^2 + d_3Q^3$$

The empirical estimates of cost function suggest that in the short run, a linear total variable cost function with constant marginal cost is the relationship that appears to describe best the actual cost conditions over the "normal" range of production. The empirical estimate of cost functions for the industries such as furniture, leather belts, hosiery, department store, food processing units show constant marginal cost curves implying the existence of a linear total variable cost curves for all these industries (Dean, 1936; Dean,1941; Dean 1942; Johnston, 1960).

Supported by the empirical findings, the marine product export industries being food processing industries are expected to possess linear total variable cost functions. The total cost data for the surveyed firms when fitted is approximated to linearity (see Figure 5.2).



Source: Computed from Survey data, 2010-11

Figure 5.2. Total Costs of the Surveyed Firms

The functional form of the total variable cost function chosen for the surveyed marine product export units is linear.

$$TVC = a_1 + b_1 Q$$

Table 5.28. Cost Function of the Marine Product Export Units

Independent variable	Estimate	Standard error
Constant	-1.562	4.495*
Output level	1.532E-02	0.002**
R^2 is 0.790, adjusted R^2 is 0.780		

Source: Computed from Survey data, 2010-11
*Note: * Statistically insignificant at all levels*
*** Statistically significant at all levels.*

Total cost is found to vary directly with the level of output (see Table 5.28). The cost function can be extended to incorporate determinants of cost other than output. In the present context, per unit cost of various inputs can also be incorporated along with the level of output as explanatory variables. The per unit cost on raw materials, labour, electricity, freight, packing and transportation, lab testing, monitoring, are incorporated in the cost function along with the level of output. The lab testing charges and monitoring charges form a part of the variable cost exclusively undertaken by a firm to comply with regulations and standards.

Despite the upgradation of facilities and implementation of standards to conform to the requirements in the import markets, these firms fail to secure a hassle free entry to these markets. A significant percent of the surveyed units complained of various hassles which fall in the category of identified NTMs especially in the markets of the EU and the US. The NTMs for this purpose have been classified into technical barriers, food safety standards, environmental regulations, regulatory controls and others based on the listing given by the negotiating group on NAMA (see Table 5.29). Each of these NTMs is sub categorized to identify the genuine issues that each exporter faces in each of these markets.

Table 5.29. Classifications of NTMs

Technical standards	Food safety standards	Environmental regulations	Regulatory controls	Others
Labeling requirements	Limits on antibiotics	Turtle Excluder Devices	Customs formalities	'Others' such as safeguard actions, Quantitative Restrictions, and Others
Marking and packaging requirements	Limits on heavy metals	Traceability / Catch Certificate/ Bio Terrorism Act	Border inspection	
Certification	Limits on microbiological organisms	Others	Anti dumping duties	
Testing requirements	Others	-	Others	

A market wise analysis of the aforementioned NTMs was undertaken to examine the gravity of the problem (see Table 5.30). The objective was to identify the specific issues encountered by the marine product exporters of the state in these markets.

Table 5.30. Data on the firms that reported the following NTMs as problematic in the EU, the US and Japan.

NTMs	The EU	The US	Japan
Technical standards	16 (66.7)	6 (25)	6 (25)
Food safety standards	17 (70.8)	4 (16.7)	12 (50)
Environmental regulations	7 (29.2)	7 (29.2)	0
Regulatory controls	7 (29.2)	16 (66.7)	3 (12.5)
Others	1 (4.2)	5 (20.8)	0

Source: Survey data, 2010-11

Note: The figures in parentheses show the percentage of firms in the sample that reported these NTMs as a genuine problem in the markets of the EU, the US and Japan.

Among the import markets, the EU is the one ridden with various kinds of NTMs. A whooping majority of the surveyed firms reported technical standards and food safety standards as the major issues in the EU. A few of them complained about the stringency of the environmental regulations as well as the regulatory standards in the EU causing hassles for the marine product exporters of Kerala. In the US, the major concern for the marine product exporters has been the application of the regulatory controls. About 66.67 percent exporters complained about this issue in the US. The other main problems in the US were those relating to environmental regulations and technical standards. The main issue in the Japanese market for the exporters is the food safety stipulations. About 50 percent reported this problem in the Japanese market.

The NTMs encountered by the marine product exporters in the EU are assessed based on the status of their approval. The twin problems that majority of the marine product exporters reported in the European market were technical standards and food safety standards. Among the surveyed units, the gravity of these problems is keenly felt by the EU units that deal with the EU buyers on a regular basis rather than the non EU units (see Table 5.31 and Table 5.32).

Table 5.31. Technical Standards in the EU and Type of Approval - Cross Tabulation

			Type of Approval		Total
			Non EU Approved	EU Approved	
Technical Standards in the EU	Not a Problem	Count	3	5	8
		Percent within Type of Approval	50.0 Percent	27.8 Percent	33.3Percent
	Is a Problem	Count	3	13	16
		Percent within Type of Approval	50.0 Percent	72.2 Percent	66.7 Percent
Total		Count	6	18	24
		Percent within Type of Approval	100 Percent	100 Percent	100 Percent

Source: Computed from Survey Data, 2010-11

Table 5.32. Food Safety Standards in the EU and Type of Approval Cross tabulation

			Type of Approval		Total
			Non EU Approved	EU Approved	
Food Safety Standards in the EU	Not a Problem	Count	3	4	7
		Percent within Type of Approval	50 Percent	22.2 Percent	29.2 Percent
	Is a Problem	Count	3	14	17
		Percent within Type of Approval	50 Percent	77.8 Percent	70.8 Percent
Total		Count	6	18	24
		Percent within Type of Approval	100 Percent	100 Percent	100 Percent

Source: Computed from Survey Data, 2010-11

As technical standards posed serious challenges to the marine product exporters of Kerala in the import markets, the study attempted to identify the specific problems falling in this category. The number of surveyed units that complained about technical standards is 16 in the EU and 6 each in the US and Japan (see Table 5.33).

Table 5.33. Technical Standards encountered by the Marine Product Exporters in the Import Markets

Technical standards	Markets		
	The EU	The US	Japan
Labeling requirements	7 (29.2)**	5(20.8)	2(8.3)
Marking and packaging requirements	3 (12.5)	4(16.7)	3(12.5)
Certification	7 (29.2)	4(16.7)	2(8.3)
Testing requirements	13 (54.2)	6(25)	5(20.8)
Total *	30	19	12

Source: survey data, 2010-11

*Note: * Total exceeds the size of the sample due to multiple responses.*
***The figures in parentheses show the percentage of firms in the sample that reported various technical requirements as a genuine problem in the markets of the EU, the US and Japan.*

It is quite evident from the stated responses that the single major issue causing troubles to the exporters in the EU is the testing requirements. The testing requirements of the EU are stringent than the rest of the markets. The EU demands testing of water and ice as per the EC requirements, while the non EU markets permit testing based on IS. Further the limits placed on various heavy metals and microbiological parameters in the EU are stringent than those in the non EU markets. The US and Japanese markets too are not completely free from troubles as a few of the exporters have reported testing requirements in these markets as a problem. Labeling and certification requirements also have caused difficulties for about 29 percent of the surveyed exporters in the EU.

The food safety standards in the import markets of the EU, the US and Japan have also caused serious difficulties for the marine product exporters in the state as given in Table 5.34. This was a major issue in the EU for about 70 percent exporters while the same issue caused hassles for about 50 percent exporters in the Japanese market.

Table 5.34. Food Safety Standards Encountered by the Marine Product Exporters in the Import Markets

Food safety standards	Markets		
	The EU	**The US**	**Japan**
Limits on antibiotics	6 (25)	0	11(45.8)
Limits on heavy metals	17 (70.8)	3(12.5)	2(8.3)
Limits on microbiological organisms	7(29.2)	2(8.3)	2(8.3)
Others (limits on food additives, decomposition parameters, filth)	2(8.33)	2(8.3)	0

Source: Survey data, 2010-11

Note: The figures in parentheses show the percentage of firms in the sample that reported various food safety standards as a genuine problem in the import markets.

The limits on heavy metals especially cadmium and mercury caused a grave problem for the marine product exporters of Kerala in the EU. An overwhelming majority stated this as a big issue in the EU. The limits on antibiotic residues in Japan emerged as a major issue especially to those units that source farmed shrimps. The US appears to be free of problems as far as food safety standards are concerned.

Environmental regulations seem to be a concern for limited number of respondents. In the EU, the need for catch certificate to ensure the sustainability of the catch was regarded as another hurdle by the respondents to get access to the market. About 29 percent of the respondents shared this view. The matter of concern in the US is the requirement on TEDs and the traceability insisted from source to end through the BTA.

The real trouble in the US was the issues pertaining to the application of regulatory controls. About 66.67 percent of the respondents cited this as a grave issue in the US (see Table 5.35). A limited number of respondents feel this as an issue in the EU too.

Table 5.35. Regulatory Controls Encountered by the Marine Product Exporters in the Import Markets

Regulatory controls	Markets		
	The EU	The US	Japan
Customs formalities	4(16.7)	3(12.5)	1(4.2)
Border inspection	7(29.2)	6(25)	3(12.5)
Anti dumping duties	0	12(50)	0
Others (bond requirements, cash deposits, other duties)	2(8.3)	3(12.5)	1(4.2)
Total	13	24	5

Source: Survey data, 2010-11

*Note: *figures in the parentheses show the percentage of firms encountering regulatory controls in the import markets.*

The most pressing issue in the US market especially for the shrimp exporters from the state is the AD duty and the enhanced bond requirement. About 50 percent of the surveyed units reported AD duty imposed by the US on shrimp as a limiting factor on the exports to the US. In the EU, border inspection and the failure on the part of member nations to adhere to a standard norm in the drawal of samples for the purpose of testing created hassles to most of the respondents. Japan is largely free of these regulations as relatively limited number of respondents stated these as issues.

It was to capture the severity of the problems in the above markets that the data on the rejection of consignments of the surveyed units at various markets were sought. The data on this were not forthcoming easily as the respondents showed reluctance to reveal these details fearing that this would cast a stigma on their company. Despite such hesitations, of the surveyed units, 45.83 percent reported rejection of consignments in various markets. Interestingly 9 out of 11 units that reported rejections faced it in the EU. The reasons cited for rejection fell in the category of food safety standards and technical requirements.

Though the data on rejection of consignments were not forthcoming, the seafood export units were unanimous about the huge demurrage costs they had to bear at the ports of various EU member nations. The RASFF unique to the EU ensures that a firm whose consignment that fails to clear any of the required parameters at any of the ports of the EU member states, automatically falls in the list of 'on alert' in all the 27 member states of the EU. The firm can come off the list of 'on alert' only after clearing the test for the said parameter not just in the country where the problem is detected, but in all the member states of the EU. This necessitates drawal of further samples and testing imposing financial burden and causing inordinate delays. Even if they escape the trouble of rejection per se, the demurrage costs they are forced to bear at the various ports of the EU are so huge. The respondents were almost unanimous about this particular issue causing grave problems for them in the EU.

The weighted mean rank method used to highlight the pressing problems in each market supplements the earlier analysis. The weighted mean rank is computed from the ranks assigned by the respondents to various issues in the markets of the EU, the US and Japan.

The formula used for ranking the issues in various markets is ∑wx/∑w (w is the weight assigned. In this case, w stands for number of respondents. x stands for the number of observations. x takes the value depending on the rank assigned by the respondent to a particular issue. The values assigned to ranks are in descending order, i.e. as we move from rank 1 to rank 5, the value assigned falls from 5 to 1). Table 5.36 shows ranking of the NTMs in the import markets as reported by seafood export units.

Table 5.36. Ranking of the NTMs in the Import Markets

Standards	The EU		The US	
	Mean	Rank	Mean	Rank
Rank assigned to technical standards	4.1250	2	3.5833	2
Rank assigned to food safety standards	4.4583	1	2.2917	4
Rank assigned to environmental regulations	2.1667	4	3.5000	3
Rank assigned to regulatory controls	3.0833	3	4.5000	1
Rank assigned to others standards	1.1667	5	1.1250	5

Source: Computed from Survey data, 2010-11

The most pressing problem in the EU is the stringency of the food safety standards, followed by technical regulations. But in the US market, the single most dominant issue has been the regulatory controls due to the presence of AD duties on shrimps and other hurdles such as enhanced bond requirements and cash deposits.

In the backdrop of the above responses, the study examined the market base of the surveyed units before and after the strengthening of requirements in the EU, the US and Japan. The firms can be grouped into various categories based on the markets they served. Group 1 consists of the firms that served primarily the traditional markets of the EU, the US and Japan. This category consists of firms that either serves all the traditional markets or any one or two of the traditional markets. But their market base is restricted to the traditional markets alone. Group 2 consists of the firms that served both the traditional markets of the EU, the US and Japan as well as the non-traditional markets such as the SEA, the MEA and 'Others'. This category consists of firms that serve any of the traditional and non-traditional markets. Group 3 consists of the firms that served only the non-traditional markets. This category consists of firms that either have market presence in all the non-traditional markets or in any two of them. The market base of the firms in the time periods before and after strengthening of standards and regulations in the EU, the US and Japan can be presented in Table 5.37.

Table 5.37. Market Base of the Marine Product Export Units – Pre and Post WTO Periods

Categories of firms	Market base before strengthening of standards	Market base after strengthening of standards
Group 1	16 (66.7)	1(4.2)
Group 2	4(16.7)	17(70.8)
Group 3	4(16.7)	6(25)

Source: Survey data, 2010-11

Note: Figure in the parentheses show the percentage of firms falling in various groups

The rise in the number of firms in Group 2 is a clear indication of a shift that has occurred in the target markets of the marine product export units in the state. The exporters are no longer excessively dependent on the EU, the US and Japan unlike in the past. They have diversified their exports so as to target the emerging markets such as the SEA, the MEA and 'Others' along with the traditional trio of the EU, the US and Japan. There has been a slight increase in the firms in the group 3 indicating the rise in the number of firms exclusively dependent upon the non-traditional markets. Interestingly these are the non EU approved units that have failed to gain access to the markets of the US and Japan despite possessing the eligibility to export. It is possible to conclude that market diversification has been an inevitable consequence of the tightening of regulations and standards in the traditional markets of the EU, the US and Japan. Despite incurring huge financial costs to comply with the stipulations in these markets, owing to the hassles these firms had to encounter in the forms of NTMs of various kinds, they have been forced to move into new markets which have comparatively less stringent regulations.

There are some conceptual issues associated with quantifying benefits of compliance with the standards. The benefits from complying with the standards can be non recurring and recurring. The non recurring benefit is the general improvement in the efficiency and the hygiene of the supply chain of the unit. The HACCP and other quality control programmes ensure traceability and helps to detect the source point of the problem before it blows out of proportion to become a full-fledged crisis. Thus crisis containment is the non recurring benefit of complying with the standards. There are certain recurring benefits which are easily observable such as increased market access, higher price premium, few wastage, scope for introduction of value added products etc. (World Bank Report, 2005)

There has been unanimity among the surveyed exporters regarding the improvement in the hygiene conditions since the adoption of HACCP and other quality control programmes. They have gained in terms of non recurring benefit of compliance. The recurring benefits are observable and flow from the improved efficiency and hygiene of the production units. Table 5.38 presents the recurring benefits appropriated by the firms owing to compliance with the standards.

Table 5.38. Recurring Benefits of Compliance with Standards

Recurring Benefits of compliance	No. of Firms	Percent	Valid Percent	Cumulative Percent
Increased Market Access	12	50.0	50.0	50.0
High Price Premium	3	12.5	12.5	62.5
Few Wastage	2	8.3	8.3	70.8
Increased Market Access & Few Wastage	3	12.5	12.5	83.3
Increased Market Access & Others	1	4.2	4.2	87.5
All	3	12.5	12.5	100.0
Total	24	100.0	100.0	

Source: Survey data, 2010-11

The most important benefit of adopting quality control programmes and complying with the SPS stipulations is definitely increased market access. The compliance with the EU norms is a green card not only to the sizeable EU market, but also to the remunerative markets of the US and Japan. This is evident from the fact that none of the non EU units could get access to the markets of the US and Japan despite their eligibility to export. The non EU units have to be contended with the emerging markets of the SEA, the MEA and 'Others'. The increase in market access claimed by the surveyed units is validated by the increase in the number of markets catered to by these firms since the strengthening of the standards. This is perhaps due to the market diversification as the marine product exporters are in a race to acquire markets other than the EU, the US and Japan as havens for their products, should some troubles arises in these traditional markets. These emerging markets have become shock absorbers for the marine product exporters of the state.

Despite the increase in market access, the marine products from the state fail to fetch higher price premium in the import markets. The implementation of the quality control programmes are mandatory and are perceived to be basic minimum requirement to be fulfilled by the exporters and hence fails to command any price advantage. Besides the stiff competition offered by the marine product exports from the SEA, China and other South Asian nations eliminate the possibilities of getting a price premium in the markets. Only a few of the surveyed exporters reported higher price premium as a benefit of complying with standards. Even these exporters could at best gain a price advantage of only 15-20 cents per kg. The quality enhancements in the supply chain and the end product by themselves have failed to translate into better prices. The minimization of wastage in the process of production is the inevitable consequence of the improvement in the efficiency and hygiene in the supply chain. This is reflected in the falling number of rejections of end product for having failed to meet the specifications.

The recurring benefits of compliance with standards and regulations in the import markets are also analyzed on the basis of the type of approval obtained. There is an obvious concentration of responses in favour of increased market access for both the EU and the non EU units. The non parametric Mann – Whitney U test is performed to examine whether the recurring benefits of compliance is the same between the EU and the non EU units. The results of the test as given in Table 5.39 are statistically insignificant implying that the status of approval fails to affect the recurring benefits received by the compliant firms.

Table 5.39. Recurring Benefits of Compliance with Standards – Mann Whitney U Test

Recurring Benefits of Compliance	Type of Approval	N	Mean Rank	Sum of Ranks
	Non EU Approved	**6**	**11.50**	**69.00**
	EU Approved	**18**	**12.83**	**231.00**
	Total	**24**		

Test statistics	Recurring Benefits of Compliance
Mann Whitney U	48.000
Wilcoxon W	69.000
Z	-0.429
Asymp. Sig. (2 tailed)	0.668
Exact Sig. [2(1 tailed sig.)]	0.721

Source: Computed from Survey data, 2010-11

The benefits of complying with standards and regulations based on the type of approval are analyzed on the basis of various parameters such as the annual turnover generated, the performance in the value of the exports to markets since the implementation of standards, the market strength of the firms, the installed production capacity of the firms, the actual capacity utilization, the extent of product diversification of the firms, the earning position of the firms etc.

Table 5.40. Annual Turnover of the Units based on the Type of Approval (` Crores)

Type of approval \ Annual turnover	< 30	30-60	>60	Total
EU approved Units	9	4	5	18
Non EU approved Units	6	0	0	6
Total	15	4	5	24

Source: Survey data, 2010-11

As the Kolmogorov- Smirnov test of normality reveals that annual turnover of the firm satisfies the condition of normality, the parametric t test is done (see Tables 5.40 and 5.41). The null hypothesis formulated is that there does not exist a significant difference in the mean annual turnover between the EU and the non EU firms.

Table 5.41. Average Annual Turnover t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Average Annual Turnover	Non EU Approved	6	10.4667	7.23921	1.990	22	0.059
	EU Approved Units	18	38.9733	34.34412			

Source: Computed from Survey Data, 2010

The t value obtained is statistically significant at 0.059 levels indicating the significant difference in the mean turnover of the EU and the non EU firms. This could be attributed to the ability of the EU firms to access the comparatively remunerative markets of the EU, the US and Japan.

Table 5.42 presents the performance of the firms with respect to the total value of the exports since initiation of quality control programmes based on the type of approval.

Table 5.42. Total Value of Exports since Compliance with Standards based on the Status of Approval

Type of Approval / Total value of exports since compliance with standards	EU Units	Non EU Units	Total
Increased	10 (55.56)*	1(16.67)	11 (45.83)
Remained constant	8 (44.44)	3 (50)	11(45.83)
Decreased	0	2 (33.33)	2 (8.33)
Total	18 (100)	6 (100)	24 (100)

Source: Survey data, 2010-11

*Note: *Figures in parentheses show percent of firms with total value of exports increased, decreased and constant since the implementation of standards.*

The non parametric Mann Whitney U test was performed to examine the effect of type of approval on the value of exports of the firm since compliance with the standards. The result obtained for the test as depicted in Table 5.43 is statistically significant implying that the type of approval does influence the performance of the firms with regard to total value of exports.

Table 5.43. Total Value of Exports since Compliance with Standards based on the Status of Approval - Mann-Whitney Test

Total Revenue Since Implementation of Quality Control Programmes	Type of Approval	N	Mean Rank	Sum of Ranks
	Non EU Approved Units	6	7.67	46.00
	EU Approved Units	18	14.11	254.00
	Total	24		

Test statistics	Total Revenue Since Implementation of Quality Control Programmes
Mann Whitney U	25.000
Wilcoxon W	46.000
Z	-2.150
Asymp. Sig. (2 tailed)	0.032
Exact Sig. [2(1 tailed sig.)]	0.056

Source: Computed from Survey data, 2010-11

The results given in Table 5.43 can be justified on the basis of the ability of the EU units to target more remunerative markets of the EU, the US and Japan. These markets are the traditional strongholds for the marine product exports of Kerala. Further the EU approval gives the exporters access to the wide market of the EU consisting of 27 member countries offering possibilities of reaping marketing economies of scale. The US and Japan too offer a huge market as they are the major buyers of marine products in the world. The marketing strength displayed by the firms could be dependent upon the status of approval. This can be validated using the following analysis.

Table 5.44. Target Markets of the Firms based on the Type of Approval

Type of approval	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Total
EU Units	5	6	3	3	1	0	18
Non EU Units	0	0	0	0	0	6	6
Total	5	6	3	3	1	6	24

Source: Survey data, 2010-11

Classification of the firms into different groups based on the target markets served has been described earlier in Table 5.5. All the non EU units belong to the Group 6 which mainly target only the non-traditional markets of the SEA, the MEA and 'Others' as given in Table 5.44. The results for the t test obtained for analyzing the relation between the type of approval and marketing strength of the firms is statistically significant at 0.000 level (see Table 5.45). This implies that the ability of the firms to move to the groups displaying the strong presence of traditional markets is influenced by the type of approval they get. This is important because the marketing strength of the firms is demonstrated if they have a strong market base in the traditional strongholds of the EU, the US and Japan which are the major importers of fish products. Besides, they are the most remunerative markets. The EU approval is a green card to these markets. The units that have failed to secure the EU approval could not access the US and Japanese markets despite being eligible to export.

Table 5.45. Market Strength based on the Status of Approval - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Market Strength	Non EU Approved	6	0.0000	0.0000	7.009	22	0.000
	EU Approved	18	3.6111	1.2433			

Source: Computed from Survey Data, 2010-11

The better performance put up by the EU firms in the front of annual turnover generated cannot be solely attributed to the marketing economies alone. The study examines the role of production economies reaped by the firms based on the status of approval. The production economies do depend on the size of the plant or its production capacity measured in terms of tonnes per day.

Table 5.46a presents the installed production capacities of the firms based on their status of approval.

Table 5.46a. Production Capacities of the Firms based on the Type of Approval (Production Capacity: in Tonnes Per Day)

Production Capacity / Type of Approval	<20	20-40	>40	Total
EU Approved Units	2	6	10	18
Non EU Approved Units	2	3	1	6
Total	4	9	11	24

Source: Survey data, 2010-11

The approval status does influence the installed production capacities as evidenced by the result of the parametric test given in Table 5.46b. The production capacities are found to vary between the EU and the non EU units. The EU units have an incentive to install enhanced production capacities to take advantage of the production and marketing economies of scale. This is confirmed by the results of the t test as the t value is statistically significant at 0.029 level.

Table 5.46b. Production Capacity based on the Status of Approval - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Production Capacity	Non EU Approved Units	6	22.5833	9.15651	2.338	22	0.029
	EU Approved Units	18	38.3333	15.47959			

Source: Computed from Survey Data, 2010-11

As the t value is statistically significant, it can be concluded that the mean production capacities are significantly different between the EU and the non EU firms. This is further reflected in the quantity of output produced and exported and the actual capacity utilization for the EU and the non EU firms. The result of t test shows that there is a significant difference in the mean quantity of output produced and exported by the EU and the non EU firms.

Table 5.47. Total Quantity of Exports - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Total Quantity of Exports	Non EU Approved Units	6	1019.53	757.52	1.804	22	0.085
	EU Approved Units	18	2418.26	1825.65			

Source: Computed from Survey Data, 2010-11

The mean quantities of exports of the EU firms are higher than the mean quantities of exports of the non EU firms. This suggests that the enhanced production capacities have enabled the EU firms to switch to increased scale of operations (see Table 5.47). This has enabled them to enjoy better capacity utilization rates vis-à-vis the non EU units. The mean capacity utilization of the EU firms is significantly different from that of the non EU units. This is validated by the test results of the t test given in Table 5.48.

Table 5.48. Actual Capacity Utilisation - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Actual Capacity Utilization	Non EU Approved	6	2.8263	2.07271	1.988	22	0.059
	EU Approved	18	7.0851	5.04722			

Source: Computed from Survey Data, 2010-11

The above analyses establish that the EU firms have an increased incentive to go for large scale operations and are able to maintain better capacity utilizations vis-à-vis the non EU firms. This gives them the prospects of realizing production economies of scale in the future. Further, the access to the European, the US and Japanese markets enable them to realize marketing economies, given the sheer size of these markets. Though these findings give an impression that the EU units have an edge over the non EU firms, there are certain areas that fail to offer a very robust picture.

This is evident in the earning position reported by the marine product export units. The earning position serves to reflect the economic viability of a firm in the new and competitive environment. The earning position of the firm based on the type of approval is shown in Table 5.49.

Table 5.49. Earning Position based on the Status of Approval – Cross Tabulation

			Type of Approval		
			Non EU Approved	**EU Approved**	**Total**
Earning Position	Loss	Count	1	8	9
		% within type of approval	16.7%	44.4%	37.5%
	Break even	Count	5	3	8
		% within type of approval	83.3%	16.7%	33.3%
	Profit	Count		7	7
		% within type of approval		38.9%	29.2%
Total		Count	6	18	24
		% within type of approval	100.0%	100.0%	100.0%

Source: Computed from Survey Data, 2010-11

The hypothesis put forward is that the type of approval does not affect the earning position of a firm. The results of the t test given in Table 5.50 are statistically insignificant implying that the type of approval does not influence the earning position of a firm.

Table 5.50. Earning Position Based on the Status of Approval - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Earning position	Non EU Approved Units	6	-0.1667	0.4082	0.278	22	0.783
	EU Approved Units	18	-5.56E-02	0.9376			

Source: Computed from Survey Data, 2010-11

The EU approval has failed to improve the profit prospects of these firms. Despite a rise in the annual turnover, the profits have failed to rise commensurately owing to the rising tendencies of costs.

The other important aspect examined was whether the approval status of the firm influences the product portfolio of exports (see Table 5.51). The marine product export units in the state are primarily the exporters of the frozen products falling in various categories such as block frozen, individual frozen and individual quick frozen.

Table 5.51. Product Portfolio based on the Status of Approval – Cross Tabulation

			Type of Approval		
			Non EU Approved	**EU Approved**	**Total**
From of Frozen Export	BF	Count	2	5	7
		% within type of approval	33.3%	27.8%	29.2%
	IF	Count	2	2	4
		% within type of approval	33.3%	11.1%	16.7%
	IQF	Count		1	1
		% within type of approval		5.6%	4.2%
	BF& IF	Count	2	6	8
		% within type of approval	33.3%	33.3%	33.3%
	BF& IF	Count		1	1
		% within type of approval		5.6%	4.2%
	All the three	Count		3	3
		% within type of approval		16.7%	12.5%
Total		Count	6	18	24
		% within type of approval	100.0%	100.0%	100.0%

Source: Computed from Survey data, 2010-11

The type of approval has failed to produce any impact on the product portfolio of the firms. This has been validated by the result of the t test.

Table 5.52. Product Portfolio - t-Test

	Type of Approval	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Product Portfolio	Non EU Approved Units	6	1.3333	1.3663	1.149	22	0.263
	EU Approved Units	18	2.2778	1.8409			

Source: Computed from Survey data, 2010-11

The approval status has failed to incentivize the firms to go for product diversification and inclusion of value added products in their product portfolio (see Table 5.52). Very few firms have been found to export high valued IQF. Apart from the frozen products, a few firms also exported chilled fish. However, among the surveyed units, just one respondent firm exported cooked fish along with chilled and frozen forms. This shows that the extent of product diversification and value addition are very limited in the marine product export units of Kerala.

The above analyses with its focus on the responses and initiatives of the marine product export units of the state to the new requirements in the import markets could bring out the specific costs of implementation of standards and their consequent benefits. The analyses also permitted to identify the specific NTMs encountered by these units in the markets of the EU, the US and Japan. However, it is a fact that strengthening of standards and regulations is not the sole problem faced by the marine product exporters.

In an attempt to find out the severity of the problem of tight standards and regulations in the import markets amidst the other problems faced by the marine product exporters of the state, a weighted mean rank was computed for each problem based on the rank assigned by the respondents to various problems. Marine product export sector in the state is afflicted with several challenges. These issues are not merely those encountered in the foreign markets. A few of them arise due to the domestic factors. Each respondent was made to assign a rank to each problem in the order of its severity. A weighted mean rank computed enabled to identify the pressing problems faced by the marine product export sector of the state.

The formula used for ranking the problems is Weighted Mean = $\sum wx/\sum w$

w is the weight assigned. In this case, w stands for number of respondents

x stands for the number of observations. x takes the value assigned depending on the rank stated by the respondent. The values assigned to ranks are in descending order, i.e. as we move from rank 1 to rank 7, the value assigned falls from 7 to 1(see Table 5.53).

Table 5.53. Major Problems Encountered by the Marine Product Exporters

Major Problems	Mean	Rank
Strict standards	5.0870	3
Lack of market information	1.1739	7
Low price premium in the markets	4.6522	4
High competition from other foreign exporters	5.9565	1
Lack of govt. support	2.7391	6
High duties/AD duties	3.1304	5
Rise in raw material prices	5.2609	2

Source: Survey data, 2010-11

Among the seven grave problems identified, interestingly 5 of them are related to the conditions in the foreign markets. The most important problem faced by the marine product exporters of the state in the foreign markets are the stiff competition from the other foreign exporters. The major foreign competitors are the SEA and China. These competitors are able to offer value added products that are qualitatively superior to the products from Kerala. They have superior pre and post harvesting technologies and infrastructural facilities enabling them to supply products with impeccable quality that are compliant with stipulations. This gives their products a price advantage in the markets of the EU, the US and Japan. In fact, the analysis of problems based on the status of approval suggests that this is the problem that tops the list of both the EU and non EU units. The stringent standards and stipulations encountered in the foreign markets are ranked as the third major problem afflicting the marine product export sector of Kerala. Though pushed to the third place, the stringency of standards and regulations still remains as one of the gravest problems for our marine product exporters. After more than a decade of the standards regime, the marine product exporters seem to have learned to live with it accepting it as a stark reality to be able to remain in the field. The fact that these seafood exporters seem to be more concerned with the enhanced foreign competition in the import markets reflect an attitudinal change emanating from the realization that the retention of the traditional markets of the EU, the US and Japan depends upon their ability to conform to the evolving requirements. Though they complain about the hassles in these markets due to the strengthening of standards and regulations, the seafood exporters in the state are persistently striving to match the set standards hoping to reap gains from their traditional markets. This shows that the marine product export industry has accepted a reactive strategic response of loyalty to retain the markets of the EU, the US and Japan at any cost. Another major problem faced by the marine product exporters are the low price premium they fetch in these markets. The improvement in quality has failed to translate into better prices. The quality initiatives of the marine product units of the state are perceived to be mandatory and the foreign buyers refuse to pay extra for higher quality. The comparatively low price premium could also be the inevitable consequence of the stiff competition from the rival foreign suppliers offering value added products with superior quality. The AD duties on shrimp seemed to be an issue only for the exporters of shrimp to the US and hence figured as a less significant problem. In fact a single dominant problem affecting all the marine product exporters alike is the rising prices of raw materials. The stiff competition in the domestic market coupled with reduced availability of raw material shoots up the prices scaling up the cost of production reducing the profit margins. This seems to be the main problem affecting the entire sector. The marine product exporters seem to be contended with the government support especially in the post standards regime. Most of the surveyed units have availed the financial assistance of the government.

It can be concluded that there has been a scaling up of the cost structures of the marine product export units of the state in the post standards era. This observation is true for all the units irrespective of their status of approval. The EU and the non EU units had to upgrade their facilities to comply with the stipulations in the import markets causing an upward shift in their cost curves. But the brunt of the non recurring cost of compliance fell heavily on the EU firms as they had to fall in line with stringent requirements vis-à-vis the non EU units. This is evident from the non parametric test results that confirm a significant difference in the mean non recurring cost of compliance with regulations and standards between the EU and the non EU firms. But the task of ensuring quality and hygiene from the receiving point to the final point rests with all the units as the EU and the non EU units have to implement HACCP as the basic minimum requirement of quality control in their respective units. Despite the uniformity in the requirements, the non parametric test results suggest a significant difference in the mean recurring expenses of compliance. This exposes the severity of testing requirement and food safety standards set in the EU vis-à-vis the non EU countries. However, the result of the statistical test confirms that there is no significant difference in the recurring expenses as a percent of total costs and recurring expenses as a percent of turnovers for the EU and the non EU firms indicating that the extra costs to be incurred exclusively for complying with the regulations have to shouldered by the EU and the non EU units alike.

The benefits of the units too have been analyzed on the basis of the recurring and non recurring benefits of compliance. While the non recurring benefits of compliance are not observable, there has been unanimity among the units regarding definite improvement in the hygiene levels in the establishments. The marine product exporters of the state by accepting the improvement in hygiene and quality as a consequent benefit of compliance with standards demonstrate the thrust they place on these aspects. This is indeed a positive development of the post standards era.

However, among the easily observable recurring benefits, increased market access has been the most important benefit stated by all the units. The other recurring benefits included few wastage implying improved efficiencies, better though narrower price premium, etc. But there has not been significant difference in the receipt of recurring benefits of compliance between the EU and the non EU units as confirmed by the result of the non parametric Mann Whitney U test. The status of EU approval also failed to bring about diversification of product portfolio as only a few of the surveyed firms had fish exported in forms other than frozen. Among the frozen varieties, only a few firms exported high valued IQF implying lesser thrust placed on value addition. The earning position of these units in the post standards regime too does not offer much prospects. The EU tag has failed to deliver in this front as well because the result of the t test confirms that the status of approval does not influence the earning position of the units. This could be attributed to a host of factors such as rising costs, stiff competition in the foreign markets pulling down the price margins, presence of hidden barriers restricting access to the remunerative markets etc. But the status of the EU approval does offer certain positive signals. This is reflected in the improved performance of the EU units compared to the non EU units in terms of various parameters such as the annual turnover generated, the market strength demonstrated, the production capacities installed, the quantity exported and extent of capacity utilized. This suggests the possibilities of realization of economies of scale at least in the long run for the EU units.

It is quite obvious that in the present competitive environment characterized by rising costs, falling price premium and numerous issues hindering free access to foreign markets, the only option for the marine product export units is to fall in line with the stipulations insisted by the buyers. The compliance with the standards and regulations symbolizes their struggle for existence as the inability to meet the stipulations would mean exit from the field. The persistent efforts on the part of the marine product exporters of the state to comply with the requirements in the foreign markets to a certain extent helped to overcome these barriers and retain the traditional markets. But the real barrier lies in the inability to gain a hassle free access to these markets despite complying with the standards. The numerous issues encountered in these markets such as detentions, inordinate delays in granting entry to the markets, demanding enhanced bond requirements and cash deposits, the imposition of AD duties could have a debilitating impact on the marine product export sector. Thus the standards as barrier rather than catalyst continue to have relevance in the marine product export sector of Kerala.

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Chapter

6

CONCLUSION AND POLICY OPTIONS

The post WTO period ushered in a series of changes in the marine product export sector of Kerala. The change was all pervasive and found reflection in the structure of the marine product supply chain in the state, in the very make up of the marine product export units of Kerala and in the direction of marine product exports from the state.

The alteration in the structure of the marine product supply chain in the state was the consequence of the evolving requirements in the import markets. Till the late 1990s, pre processing centres formed an integral part of the supply chain in the state. The post harvest activities of deshelling and cleaning were basically carried out in these centres especially by women workers. But the EC regulations made it mandatory for the export units to have integrated PPCs and PCs for securing eligibility to export to the EU. This led to a decline in the pre processing sector in the state. The stringency of EU regulations and its divergence from the norms followed by other importing countries necessitated the marine product export units to secure EU approval to become eligible to export to the EU. Since 1997, marine product export sector of India consists of two types of units based on the status of approval, i.e., the EU approved and the non EU approved. Kerala has a preponderance of the EU approved units, their number being 78 out of a total of 120 in 2011-12.

The strengthening of requirements in the import markets caused an upward shift in cost curves of the marine product export units of the state irrespective of their status of approval. But the mean fixed cost of compliance with the standards and regulations differed significantly for the EU and the non EU units. The implementation of HACCP to ensure quality control imposed on the marine product export units additional recurring expenses exclusively for the purpose of maintaining quality and hygiene over and above the direct cost of production. Though the recurring expenses of compliance with standards in absolute terms diverged significantly for the EU and the non EU units, these expenses as a percentage of total costs and as a percentage of total turnovers did not differ significantly between these categories of units implying that the brunt of this new cost has fallen on all the units alike. This shows that the marine product export units in the state in the post standards regime are forced to operate with escalated cost structures.

The standards regime opened to the marine product export units in the state, opportunities to imbibe and implement better quality practices, to retain the traditional market base and also to gain access to newer markets. The real benefit in the post standards era lies in the improvement in the level of hygiene at various stages of post harvest activities such as pre processing, processing, storing and transporting the final product to its destination. This has enabled each unit to avert crisis as the quality control systems in place facilitate early detection of problems and its rectification. It is noteworthy that since 1997, no other major crisis emanating from quality issues has hit this sector.

The most visible benefit of graduating to the new standards and regulations was the retention of the traditional markets of the EU, the US and Japan that are comparatively remunerative in terms of the unit value realized in $ terms per kg. This benefit is mainly open to those units that could secure the EU approval. The markets of the US and Japan seem to be shut to the non EU units despite their eligibility to export.

In the context of trade barriers in the traditional markets, forecasts based on the model estimates give a very bleak picture especially for the markets of the US and Japan. Even during the peak periods of activity in the marine sector in the state, the quantity of exports moving to these markets declined testifying the waning importance of these markets for the marine product exports of Kerala. The forecast figures in terms of value for these markets fare better, as the US and Japan yield higher unit value in terms of US $ per kg. The EU continues to hold its sway in the marine product exports of Kerala which is evident from the forecast figures. But the quantity and value of marine product exports to the EU in the post WTO period is subject to the pronounced influence of the current and lagged values of random error terms unlike the pre WTO phase when the exports to the EU were determined by seasonality. This can be cited as evidence for the presence of trade limiting factors in the EU.

Among the emerging markets, the SEA is quite formidable as projected in forecasts based on model estimates. The SEA offers bright prospects for our marine product exports especially in terms of quantity as it is under the influence of seasonal factors. This suggests that the bulk of our marine product exports move to this market in the peak seasons, reflecting the importance of this market. Though the model generates robust forecast figures for this market in value terms, it is not possible to ignore the marked influence of random error terms. The MEA can also be counted as a market with good prospects especially for marine product exports in quantity terms as in the post WTO period it is influenced by level of the series. The mean quantity of exports to the MEA is higher in the post rather than the pre WTO phase. However the value of exports to this market is still under the adverse influence of autoregressive elements which is a source of concern. The market segment ‘Others’ came to occupy a dominant place in the marine product exports of Kerala in terms of quantity in the post WTO period. Despite the series being influenced by level, trend and season, the forecast quantity for this market shows a decline. But value of exports to this market is influenced by level of the series which is higher for the post WTO period vis-à-vis pre WTO period. This is indeed a welcome signal as this market segment is getting transformed from being a market for low end value product to high value added products.

The post WTO period gives clear signals of market diversification as marine products from the state are increasingly targeting the new markets of the SEA, the MEA and ‘Others’. The marine product exports of Kerala are no longer dependent excessively on the traditional markets of the EU, the US and Japan. The non traditional markets have in the post WTO period acted as shock absorbers for the marine product exports of the state whenever problems arise in the traditional strongholds. This was the case during the EU ban of 1997 and also since 2004 when the issue of anti-dumping duty on shrimps in the US created hassles for our marine product exports. The market diversification trends in the post standards regime has certainly helped the marine product exporters of the state to avert risk as they are assured of emerging markets, should some troubles spring up in the traditional markets.

There are still several handicaps debilitating the marine product exports sector in the post WTO period. The presence of non tariff barriers in the traditional markets continue to cause troubles for the marine product exporters of the state. The EU is the market so ridden with non tariff barriers such as technical standards, food safety standards and other regulatory standards. Despite complying with the EU norms, the marine product exports from Kerala continue to face hassles in the EU. This is mainly attributed to non harmonization of standards on testing procedures and non harmonization of procedure for lifting rapid alerts. The RASFF unique to the EU ensures that a firm whose consignment that fails to clear any of the required parameters at any of the ports of the EU member states, automatically falls in the list of ‘on alert’ in all the 27 member states of the EU. The firm can come off the list of ‘on alert’ only after clearing the test for the said parameter not just in the country where the problem is detected, but in all the member states of the EU. This necessitates drawal of further samples and testing imposing financial burden and causing inordinate delays. Even if they escape the trouble of rejection per se, the demurrage costs they are forced to bear at the various ports of the EU are so huge. These are some of the genuine issues affecting the marine product exports from Kerala to the EU.

The single pressing issue relevant for the marine product exporters of the state in the US has been the imposition of anti-dumping duties and the enhanced bond requirements on the shrimp. This had severely affected the shrimp exports from the state to the US. This was one of the reasons for a fall in the value of marine product exports from Kerala to the US since 2004. Japan is rather free from such explicit non tariff barriers, though they are very particular about the freshness of the products they consume. The fall in the share of Japan in the marine product export basket of Kerala seems to be largely explained by their domestic economic conditions.

Apart from the issue of non tariff barriers, the marine product exports from the state face stiff competition in these markets from the rival foreign producers such as the SEA and China. These nations have well advanced pre and post harvest technologies facilitating the production of value added products with impeccable qualities. The marine product exports from Kerala find it hard to compete with the products from these markets both in price and quality terms. The stiff competition failed to fetch better prices for the marine product exports from Kerala despite quality enhancements. Further the foreign buyers refused to pay extra for better quality as it was perceived to be a part of mandatory requirements. Hence, the compliance with standards could not improve the profit prospects of these marine product export units. However, improved market access, increasing volumes of exports, rising turnovers, enhanced production capacities, better capacity utilization rates etc. especially observed with respect to the EU units suggest the possibilities of reaping economies of scale.

The marine product export units of the state are functioning in a new environment characterized by intense competition, rising costs of production, unattractive prices, uncertainties in the foreign markets entangled with regulations and standards, unanticipated volatilities in exchange rate movements, etc. In this context, their efforts to abide by the evolving requirements in the foreign markets symbolize their struggle for survival. Their inability to comply with the standards would mean exit from the field. That explains the reactive strategic response of loyalty exhibited by the marine product export sector of the state.

The government of India has offered institutional and resource support to the sector that is a major foreign exchange earner for the nation. The critical roles of regulator and facilitator played by the agencies of the government such as the EIC and the MPEDA are indeed commendable and have gone a long way in averting another crisis in this sector. The government has also taken pains to address the issue of anti dumping-duties on shrimp in the US. But a still more proactive role is expected on the part of the government as it has not been able to exercise a voice strategic response to the challenges and issues in the import markets. The government has to voice the concerns of the industry and take steps to put an end to the countless ordeals, the exporters suffer in the foreign markets. It has to deal effectively with the hidden barriers such as inordinate delays in granting entry to consignments due to non harmonization of standards on testing procedures and non harmonization of procedure for lifting rapid alerts in the EU causing huge demurrage costs, the issues of anti-dumping duty and enhanced bond requirements on shrimp imports in the US etc. The government also has to play an active part in the process of setting standards and regulations.

6.1 Policy Options

- Given the resilience demonstrated by the marine product export sector in complying with the emerging requirements, the government can adopt a proactive strategic response of voice. The government is expected to voice the genuine issues faced by the sector and actively participate in the formulation of regulations and standards rather than meekly implementing them. This would enable the sector to effectively deal with the hidden barriers applied by the importing nations in the guise of safety standards and quality regulations.
- An intensely competitive environment in which the marine product export units are forced to operate, their struggle for survival will

pay off only if they could materialize higher unit value in $ terms per kg in the export markets. In the presence of stiff competition from the rival foreign suppliers of the SEA and China, the possibilities for fetching better prices lies in going for value added products of superior quality. Thrust should be placed on building up infrastructure facilitating value addition. Measures to incentivize the exporters to include value added products in their product portfolio would also be a positive step.

- As the non EU approved units are found to be contended with the markets of the SEA, the MEA and 'Others' despite their eligibility to export to the US and Japan, incentivize these units to make forays into these comparatively remunerative markets through better marketing schemes that focus on these two markets.
- Though market diversification is observed in the post WTO period, the emerging markets of the SEA and China are mainly markets for low end value exports and failing to fetch higher unit value. Hence place thrust on value addition and target these markets so as to transform them from being importers of low valued products to high end value products.

Marine product export sector, an integral part of the fish economy of Kerala has undergone drastic transformations in the post WTO period to cope with the new issues and challenges that have come up in the traditional markets. In their efforts to meet the requirements in the import markets, they have moved to higher levels of quality and standards creating escalated cost structures. Despite compliance with prescribed standards and quality regulations in the traditional markets, the post standards regime witnessed greater degree of market diversification. As obvious from the forecast results obtained, the marine product export sector of the state was forced to target new markets of the SEA, the MEA and ‘Others’ basically to minimize risks associated with excessive dependence on the traditional markets intensely riddled with non tariff measures. The upgraded cost structures and forced diversion to comparatively less remunerative markets observed in the post WTO phase demonstrates a decline in the producers’ surplus. Given that the marine product export units in the state have to operate with higher costs to ensure compliance with new requirements in the traditional markets in the wake of non tariff measures in the guise of standards and quality regulations, further questions to be addressed are whether there exist possibilities of shifting the cost burden on to the consumers in these markets. This is inextricably linked to the elasticities of demand for these high valued quality products that in turn depend on the extent of market segmentation. The segmented market consists of two types of buyers; one with specific preferences to higher quality products and the other quite indifferent to quality products. The possibilities of passing the cost burden on to the shoulders of the consumers in the traditional markets materialize only if the proportion of quality sensitive consumers in the segmented market exceeds the quality indifferent consumers. The former can be trusted to pay a premium price for superior quality. There is ample scope for further research on the issues of the extent of market segmentation, the degrees of demand elasticities of the quality sensitive and quality indifferent consumers and the prospects of shifting the cost burden on to the consumers in the traditional markets. The incorporation of demand aspects in the foreign markets factoring in consumers’ preferences and their demand elasticities shall lend strength to the analysis of the question of whether these standards and regulations on food products are non tariff measures meant to limit trade or are these measures designed to protect life and health of the citizens. The emergent research issues shall sharpen our insights on the long run viabilities of marine product export sector of Kerala that is in a transient phase persistently striving to move towards internationally acclaimed levels of quality and hygiene.

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APPENDICES

Appendix -1

Interview Schedule

PART I

1. **Name of the firm** :
2. **Year of establishment** :
3. **Address** :
4. **Status** :

☐ 1. Preprocessor ☐ 2. Processor
☐ 3. Pre Processor cum processor ☐ 4. Exporter
☐ 5. All the above

5. **Kinds of Ownership**

☐ 1. Private ☐ 2. Public limited
☐ 3. Others

6. **Sources of Fish**

☐ 1. Marine ☐ 2. Inland
☐ 3. Aquaculture ☐ 4. All the above

7. **Rank the major varieties of fish in the order of their importance in terms of availability for processing. That is, assign rank 1 to the most available variety, rank 2 to the next and so on.**

☐ 1.Shrimp ☐ 2.Cuttlefish
☐ 3.Squid ☐ 4. Others (Specify)

8. **What are the major forms in which fish products are exported?**

☐ 1.Fresh ☐ 2. Frozen
☐ 3.Chilled ☐ 4. Dried
☐ 5.Others (Specify)

9. **If frozen is it**

☐ 1.IQF ☐ 2. Block frozen ☐ 3.Individual Frozen

10. Rank the markets in the order of their importance in terms of value of export at the time of establishment of the company. Assign rank 1 to the major export market; rank 2 to the next major market and so on.

☐1.US ☐2.EU ☐3.Japan
☐4.South East Asia ☐5.Middle East ☐6.Others

11. Has the markets of export of the company changed over the years?

☐Yes ☐ No

12. If yes, since when the change of markets occurred?

13. Give details of the volume and value of fish products exported to each of these markets for the last 5 years.

Annual Quantity and Annual Value of Fish Exported Q: in 000 tonnes V: in Rs crores

Year	US		EU		JAPAN		SEA		MEA		Others	
	Q	V*	Q	V	Q	V	Q	V	Q	V	Q	V
2005-06												
2006-07												
2007-08												
2008-09												
2009-10												

***value=price multiplied by quantity**

14. Do you face barriers to entry in the above markets?

☐Yes ☐No

15. If yes, assign rank in the order of their restrictiveness in terms of approving the imports into their respective markets. Assign rank 1 to the most restrictive markets, rank 2 to the next restrictive market and so on.

☐1.The US ☐2.The EU ☐3.Japan

16. What are the types of barriers faced in the US, the EU and Japanese Market?

Type of Barriers	Markets		
	The US	The EU	Japan
Tariffs			
Non Tariff Measures (NTMS)			
Others (Specify)			
All the above			

17. What are the NTMS faced by our exporters in the US, EU & Japan? (Give a tick mark in the appropriate columns)

Types of NTMs	Encountered Non Tariff Measures (NTMs)		
	US	EU	JAPAN
Technical barriers			
Labeling requirements			
Marking, Packaging Requirement			
Certification			
Testing requirements			
Others			
Food safety standards			
Limits on antibiotics			
Limits on heavy metals			
Limits on chemical contaminants			
Hormone treatment			
GMO foods			
Food Additives			
Irradiation			
Testing Certification and Conformity Assessment			
Others (Specify)			
Environmental regulations			
Turtle excluder devices			
Bio terrorism act/Catch certificate/Traceability			
Others			
Regulatory standards			
Customs and Administrative Entry Procedures			
Consular Formalities and Documentations			
Border inspection			
Custom valuation			
Anti dumping duties			
Countervailing duties			
Rules of Origin			
Import Licensing			
Specific Limitations			
VERs			
Tariff Quotas			
Quantitative Restriction			
Embargoes			
Others			
Others (Specify)			
Safeguard measures and emergency actions			
Insufficient Distribution Contacts			

18. Assign rank in the order of their intensity of application in each market. Assign rank 1 to the most intensely applied standard, rank 2 to the next most intensely applied standard and so on.

	EU	US	Japan		EU	US	Japan
1. Technical Standards				2. Food Safety Standards			
3. Environmental Regulations				4. Regulatory controls			
5. Others				6. All The Above			

19. Assign rank in the order of frequency of application in each market. Assign rank 1 to the most frequently applied standard, rank 2 to the next most frequently applied standard and so on.

	EU	US	Japan		EU	US	Japan
2. Technical Standards				2. Food Safety Standards			
3. Environmental Regulations				4. Regulatory controls			
5. Others				6. All The Above			

20. Were your consignments rejected at the ports of these markets?

☐ Yes ☐ No

21. If yes, what are the reasons cited for the rejection

Reasons for Rejection	US	EU	Japan
Food additives			
pesticide residues			
Heavy metals			
Mould			
Micro biological contaminants			
Chloramphenicol			
Nitrofurans			
Decomposition			
Filth			
Low acid canned foods			
Labeling			
Others(Specify)			

22. Specify the number of rejections faced by the firm over a period of time in each of these markets.

Year / Market	2005-06	2006-07	2007-08	2008-09	2009-10
The US					
The EU					
Japan					

23. Do you find the number of rejections higher prior to the implementation and upgradation of standards?

☐Yes ☐No

24. Are the rejected consignments destroyed at the border?

☐Yes ☐No

25. If No, are the rejected consignments re-exported to other markets?

☐Yes ☐No

26. If Yes, specify the markets to which consignments are re-exported?

27. What are the quality control systems that have to be implemented as per the rules?

☐1.GMP ☐2.HACCP ☐ 3. SSOP
☐4. IFC ☐5.BRC ☐6. ISO
☐7.All The Above

28. Are these requirements and standards changed frequently?

☐Yes ☐No

29. If yes, how often?

30. Are these changes intimated officially?

☐Yes ☐No

31. Are the standards set by the export markets above the international Codex standards?

	EU	US	Japan		EU	US	Japan
Yes	☐	☐	☐	No	☐	☐	☐

32. Do you face discriminatory treatment vis-à-vis other foreign competitors in these markets.

	EU	US	Japan		EU	US	Japan
Yes	☐	☐	☐	No	☐	☐	☐

33. If yes, specify

34. What is your opinion about the standards implemented in these markets?

	Very high	High	Moderate	Low	Very low
EU	☐	☐	☐	☐	☐
US	☐	☐	☐	☐	☐
Japan	☐	☐	☐	☐	☐

PART II

Quality Issues Encountered by the Company and Quality Control Enforced in the Supply Chain

1. Elaborate the supply chain of fish product prepared for export

2. What is the distance between the source of raw material and plant?

- 1.Within 20 Kms
- 2.20kms-40 Kms
- 3.40kms-60kms
- 4.Above 60 Kms

3. What are the factors affecting final quality of fish products?

- 1.Quality of raw material
- 2. Storage condition
- 3.Transportation condition
- 4. Quality of ice
- 5.Processing technology
- 6. Inventory time of finished products
- 7.Others, (Specify)
- 8. All the above

4. Tick against the possible hazards that affect quality.

Possible Hazards	Affecting Quality of Fish Products
Microbiological Hazards	
E.Coli	
Coliform	
Salmonella	
Chemical Hazards	
Pesticide residues	
Heavy metals	
Chloramphenicol	
Oil, Lubricants	
Others	
Physical Hazards	
Metal piece	
Glass piece	
Others	

5. What are the methods employed to detect the hazards

- 1.Visual Methods
- 2.Lab Testing
- 3.Both

6. What are the major problems faced at the time of storage

- 1.Maintaining temperature
- 2.Old warehouse
- 3.Warehouse hygiene
- 4.Storage time
- 5.Backward Technology
- 6.Others (Specify)
- 7.All The Above

7. What are the major transportation problems encountered?

- 1.Maintaining temperature
- 2.Transportation means
- 3.Transport hygiene
- 4.Time taken
- 5.Others (Specify)
- 6.All the above

8. What are the quality control systems implemented in the factory?

☐1. GMP ☐2. HACCP ☐3.SSOP
☐4. IFC ☐ 5.BRC ☐6. ISO
☐7. All The Above

9. Is the quality control implemented throughout the supply Chain?

☐Yes ☐No

10. If yes, specify.

11. What are the methods employed to evaluate freshness of fish?

☐1. Instrumental ☐ 2.Sensory 3.Both

12. Is employee participation present in quality control?

☐ Yes ☐No

13. If yes, specify.

14. Is management participation present in quality control?

☐ Yes ☐No

15. If yes, specify.

☐ Yes ☐No

16. Do quality control measures respond to consumer complaints?

☐ Yes ☐No

17. If Yes, Specify.

18 Are the consumers in the importing markets aware of quality issues related to seafood imports?

☐ Yes ☐No

19. If yes, are the buyers in the importing countries willing to pay a higher price for the product complying with the standards?

☐ Yes ☐No

20 If yes, state the price premium the company gets for its products vis-à-vis other companies.

PART III

Cost and Benefits of Exercising Quality Control

1. Year of implementation of quality control in line with the requirements in foreign markets

2. Tick against the facilities upgraded in the company and specify the details of the cost incurred. (Cost in ` crores)

Types of Facilities	Upgraded	Cost Incurred
Pre Processing Facility		
General Construction		
Air Conditioning		
Ice Plant		
Chill Room		
Changing Room		
Lab Facilities		
Water Tank		
Wash Rooms		
Water Treatment Plants		
Tables		
Effluent Treatment Plants		
Thermographs		
Freezers		
Others (Specify)		

3. Give details of annual compliance cost of company to implement quality and safety standards. (Cost in ` Lakhs)

Elements of cost	Annual cost
1) Hygiene maintenance	
a. Expenses on chlorine and other disinfectants	
b. Pest control	
c. Polishing of tables and utensils and painting	
d. Others (Specify)	
2)Labour expenses	
a. Health cards	
b. Uniforms	
c. Periodic training	
d. Others (Specify)	
3) Lab testing charges	
4) Monitoring charges	
5) Renewal of HACCP, BRC, etc	

6) Others (Specify)	

4. Details of annual production cost **(Cost in ` Crores)**

Items of cost	Annual cost
1)Raw material cost	
a Shrimp	
b Squid	
c Cuttlefish	
d Others (specify)	
2) Labour cost	
a. Male	
b. Female	
3) Electricity charges	
4) Freight charges	
a. US	
b. EU	
c. Japan	
d. SEA	
e. MEA	
f. Others	
5) Transportation charges	
6)Interest charges	
7) Packing charges	
8) Others (Specify)	

5. Has there occurred an increase in the labour strength of the company with the strengthening of standards and integration of preprocessing and processing facilities?

☐ Yes ☐ No

6. If yes, specify the increase in labour strength and labour cost.

7. What are the benefits of compliance with standards fixed by the foreign countries?

☐ 1. Increased market access
☐ 2. Higher price premium
☐ 3. Fewer wastages
☐ 4. Others (Specify)
☐ 5. All the above

8. How has total revenue of the company fared since the implementation of standards?

☐ 1.Increased steadily
☐ 2.Decreased steadily

☐ 3.Remained constant

9 **Does the government provide any support to the implementation of standards?**

☐ Yes ☐ No

10. **If Yes, Specify**
11. **Give details of subsidy offered by the government for upgradation.**
12. **Are you satisfied with the government support?**

☐ Yes ☐ No

13 **If No, cite reasons**

14. **Assign ranks to the problems faced in foreign markets in the order of their importance. Assign rank 1 to the most important problem, rank 2 to the next and so on.**

☐ 1. Very strict standards on seafood safety and quality
☐ 2. Lack of market information
☐ 3. lack of govt. support
☐ 4. Low export price
☐ 5. High price of raw material
☐ 6. High competition from other foreign countries
☐ 7. Anti-dumping duties

15. Specify SWOT in each of the Foreign Markets

COUNTRY / SWOT	THE US	THE EU	JAPAN	SEA	MEA	OTHERS
Strengths						
Weaknesses						
Opportunities						
Threats						

Appendix -2

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Marine Product Exports of Kerala in the ASEAN India Free Trade Area: Possibilities and Challenges

Parvathy P[1*] Rajasenan D[2]

1. Government Victoria College, Palakkad-678001 India

2. D.Rajasenan, International Centre for Economic Policy and Analysis (ICEPA), Cochin -682022, India

*Email of the corresponding author parvathy.stc@gmail.com

Abstract

In the backdrop of issues encountered by the marine product exports from Kerala in the traditional strongholds of the European Union and the United States, there is a need to target newer markets. The ASEAN India Trade in Goods Agreement (TIGA) though proposes to liberalize trade between India and the ASEAN member nations, fails to deliver greater market access for our marine products in the markets of the ASEAN nations. This can be attributed to factors such as the lower prevailing MFN base rate in the ASEAN nations, tariff reduction commitments reciprocated by them being lesser than India's offers, inclusion of our prominent items of export in the restrictive lists of most of the ASEAN nations etc. Export forecast suggests that this is a market to be reckoned, which in turn stipulates the need to secure greater concessions and preferential treatment for our marine product exports in the ASEAN nations to capitalize on the gains that have been made.

Keywords: food safety standards, marine products export, tariff, preferential treatment, seasonality

1. Introduction

Kerala, endowed with 10 percent of the coastline with a population of about 2.7 percent of India, has risen to the status of a key player in the global fish supply chain. Kerala accounts for 107183 metric tonnes (16 percent) in terms of quantity by fetching a value of Rs.1668.49 (17 percent) of the marine products export from India. Historically, Kerala's marine product exports targeted the markets of the EU, the US and Japan. But there has been strengthening of food safety standards and regulations in these markets since the mid 1990s. The marine product exports from India encountered a ban in the EU, though for a period of 5 months in 1997 owing to quality issues, while the shrimp exports to the US were subject to the anti-dumping duties in the early 2000s. These issues forced the marine product exports from Kerala to focus new markets. This brings out the importance of the South East Asia (SEA) as an emerging market for the marine product exports of Kerala. In the context of India's thrust on 'Look East Policy' since the 1990s, the move to the formation of ASEAN India Free Trade Area (AIFTA) has far reaching implications for trade in the region. The ASEAN India Trade in Goods Agreement (AITIGA) that came into force on January 1, 2010 proposes to liberalize trade between India and ASEAN member nations.

The key provisions as per the agreement, fish and fishery products for which tariff reduction commitments have been accepted by India fall in 3 categories: normal track (NT), sensitive track (ST) and exclusion list (EL). Tariffs on fish and fishery products included in NT1 will be completely eliminated by December 31, 2013. Items included in NT2 are subject to tariff elimination requirement only by December 31, 2016. Tariff imposed on items in the sensitive track (ST) should be reduced to a low of 5 percent by December 31, 2016. No tariff reduction commitments exist for items mentioned in the EL. However the items in the EL are subject to review as the agreement proposes to enhance market access and boost trade in the region. India has offered to undertake tariff reduction or elimination commitments for 142 tariff lines with respect to fish and fishery products. ASEAN nations reciprocate following tariff reduction or elimination commitments with respect to fish and fishery products vis-à-vis India.

Table 1 about here

But tariff reduction commitments offered by the ASEAN nations for fish and fishery products are comparatively limited. Besides, the major items of India's marine product exports figure in the restrictive lists of most of the ASEAN nations. The frozen shrimp that happens to be a prominent export item from Kerala falls in the restrictive lists such as ST, EL, Highly Sensitive List (HSL) B and HSLC in most of these nations (Note 1). Frozen tuna figures in the restrictive lists such as EL, HSL C, and ST in the tariff reduction commitment schedules of nations such as Vietnam, Indonesia, Myanmar and Philippines (see Table 1). Frozen mackerel,

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which is an important item of export, is also included in the restrictive lists of EL and HSL B in ASEAN nations such as Thailand, Vietnam and Philippines.

Further, India cannot expect to expand its fish and fishery product exports to the ASEAN markets despite tariff reductions as the prevailing MFN base rate in 2007 is found to be low for most of these nations with respect to fish and fishery products. Another provision in the FTA relevant for the marine product sector of India is the one pertaining to Rules of Origin. As per the ASEAN Agreement, a product is considered to be originating from a country if 35 percent value addition takes place within that nation. Since the ASEAN nations have free trade agreements with China, it is likely that fish and fishery products from China will reach India through the ASEAN member nations.

1.1 Materials and Methods

The concept of Free Trade Area is a typical case of a compromise between free trade and protection. One of the lowest degrees of economic integration, the parties to the FTA reduces the trade barriers among themselves retaining the restrictive trade policy to the rest of the world. The implications of FTA for its members can be both trade creating and trade diverting as Viner (1950) puts forth in his theory of Customs Union. In the context of the Asean India FTA, a host of literature examines the probable gains and losses accruing to both the parties (Harilal, 2010; Francis, 2011; Sikdar and Nag, 2011; Veeramani and Saini, 2011; Chandran and Sudarsan, 2012)

Marine product exports from Kerala to the South East Asia (SEA) market for the period 1995-2010 constitute the data source. ARIMA model seems to be the best fitting one explaining the underlying structure of the quantity and value of marine product exports from the state to the SEA. The model makes a forecast of marine product exports from Kerala to the SEA for the quarters of 2010-13.

1.1.1 Results and Discussions

In the late 1980s, the major export markets for the marine products of Kerala were Japan, the US and the EU. Together these markets accounted for 91 percent and 87 percent of the marine product exports from the state in terms of quantity and value respectively. But the mid 1990s witnessed greater degree of market diversification as the share of the newer markets such as the SEA, the Middle East Asia (MEA), China, Turkey, Tunisia, etc improved both in terms of quantity and value. The share of the SEA in the marine product exports of Kerala rose from 7 percent to 16 percent in terms of quantity and from 5 percent to 8 percent in terms of value during 1995-96 to 2009-10. The importance of the SEA market for the marine product exports of Kerala is reflected in the compound annual growth rate recorded during the period 1995-96 to 2009-10 (see Table 2). The compound annual growth rate of marine product exports to the SEA was significantly higher than those registered for traditional markets.

Table 2 about here

Figure 1 about here

The quantity of marine product exports from Kerala (Figure 1a) registered an increase from 5163 tonnes in 1995-96 to a high of 17425 tonnes in 2009-10. In terms of value (Figure 1b), the exports of marine fish and fishery products from Kerala to the ASEAN nations increased from Rs. 3920.74 lakh in 1995-96 to Rs. 14030.69 lakh in 2009-10 (Note 2).

Table 3 about here

The prospects of the SEA for marine product exports of Kerala are assessed through models of best fit. Quantity of marine product exports from Kerala to the SEA during the period is found to be simple seasonal. As the t value is significantly related at 0.001 levels, it can be concluded that the quantity of marine product exports from

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Kerala to the SEA during the given period is influenced by seasonality. However, the value of marine product exports to the SEA from Kerala during the period is ARIMA (0, 0, 0) (0, 1, 1), is statistically significant at 0 .001 level suggesting the marked influence of seasonal random error term on the series (see Table 3). This is further used to forecast quantity and value of marine product exports from Kerala to the SEA for all the quarters during 2010-13.

Table 4 about here

(3)

The forecast numbers given in Table 4 clearly exhibit the influence of seasonality for quantity, while the forecast numbers are not free from the influence of the current and lagged values of seasonal random error terms for value. The quantity and value of marine product exports to the SEA peaked during the II and III quarters of every year which coincide with the periods of peak activity in the marine sector of the state. A decline is observed in quarters I and IV, which also coincides with the dull phase of activity in the marine sector of Kerala. When the harvest season comes and the seafood export units are working to their optimal capacity, the quantity and value of marine product exports moving to the SEA definitely picks up. This suggests that the SEA is a promising market for our marine product exports especially in terms of quantity as it is not possible to overlook the influences of irregular variations on the value of exports.

2. Conclusion

The provisions in the TIGA between India and ASEAN nations pertaining to fish and fishery products are biased in favour of the SEA. The tariff reduction or elimination commitments on imports of fish and fishery products offered by India are definitely greater than that it has received from the ASEAN member nations. Besides, tariff reductions in ASEAN nations in line with TIGA may not benefit India's fish and fishery product exports as expected because most of the ASEAN nations have a low MFN base rate. Further, the ASEAN nations have included most of the prominent items of India's fish and fishery product exports such as frozen shrimp, frozen tuna, frozen mackerel in their restrictive list such as EL, ST, HSL B and HSL C. However, the exports of marine fish and fishery products from Kerala to the SEA have increased since the mid 1990s. This is evident from the rise in the share of the SEA in the marine product exports of Kerala in terms of quantity and value from 1995-96 onwards. The compound annual growth rate of marine product exports from Kerala to this market too is higher compared to the traditional markets. This is relevant as the marine product exports from Kerala had to face several challenges in its traditional markets such as the EU, the US and Japan owing to the strengthening of food safety standards and technical regulations in the post WTO phase in the wake of the SPS and TBT agreements.

In this context, India can capitalize the opportunity to make further inroads into the South East Asian nations, only if the ASEAN nations open up their markets further by giving greater access to fish and fishery products such as frozen shrimp, frozen tuna etc. in which India has a comparative advantage. The AIFTA in the present framework does not offer much prospects for our marine product exports in the SEA market. It calls for further liberalization and preferential treatment for the marine product exports of India so that we can capitalize on the gains that have already been made.

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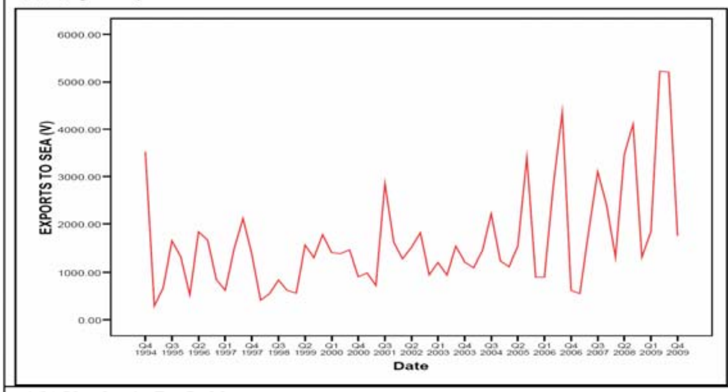
Notes

Note 1. HSLB and HSLC calls for reduction of MFN rates by 50 percent and 25 percent respectively.
Note 2. Lakh = 0.1 million

D. Rajasenan (PhD) is the Director at the International Center for Economic policy and Analysis (ICEPA), Cochin University of Science and Technology (CUSAT), Kerala., India and the Professor of Econometrics and Mathematical Economics at the Department of Applied Economics, CUSAT. He is also a former DAAD fellow, Senior Commonwealth Fellow and Indo-Canadian Shastri fellow.

Parvathy P. is Assistant Professor at the Department of Economics, Government Victoria College, Palakkad. She is also a Ph.D scholar at the Department of Applied Economics, Cochin University of Science and Technology, Kerala, India.

1(a) Q-quantity in tonnes



1(b) V-value in Rs. Lakhs

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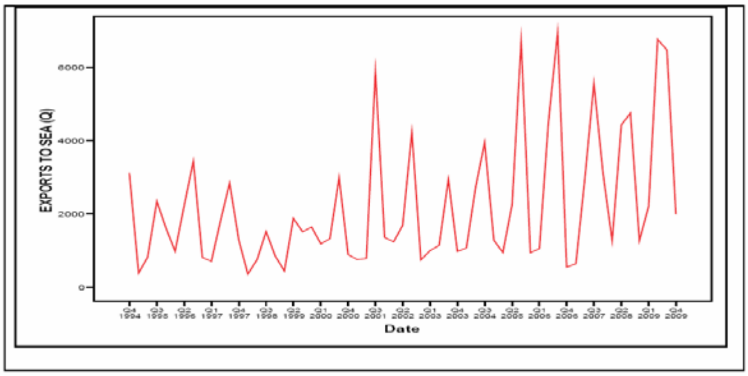

Figure 1 Marine Product Exports from Kerala to the SEA during 1995-2010
Source: computed from MPEDA data (1996- 2010)

Table 1 Number of tariff lines under tariff reduction/elimination category of ASEAN vis-à-vis India

Country	NT1	NT2	ST	HSL			EL	NT2/ SL	NT1/ NT2	Total
				A	B	C				
Brunei Darussalam	94	-	-	-	-	-	-	-	-	94
Cambodia	96	-	9	-	-	-	1	-	-	106
Indonesia	-	62	4	-	-	19	17	4	-	106
Lao PDR	100	-	5	-	-	-	-	1	-	106
Malaysia	106	-	-	-	-	-	-	-	-	106
Myanmar	64	-	7	-	-	-	23	-	-	94
Philippines	45	15	5	-	-	-	39	1	1	106
Thailand	68	-	17	-	-	-	21	-	-	106
Singapore	-	-	-	-	-	-	-	-	-	-
Vietnam	9	63	-	-	-	-	22	-	-	94

Source: Ministry of Commerce, Govt. of India (2011)

Table 2 Export Growth Rate from Kerala to Various Markets in the Period 1995-96 to 2009-10

Market	Compound annual growth rate (Quantity)	Compound annual growth rate (Value)
The EU	18.21	5.698
The US	6.38	-5.87
Japan	-6.69	-5.52
The SEA	23.92	8.69

Source: computed from MPEDA data (1996- 2010)

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Table 3 Best Fit Models for Quantity and Value of Marine Product Exports to the SEA

Marine Product Exports	Best Fitting Models	Model Parameters	Estimate	T value	Level of significance
Quantity	Simple seasonal	Level	0.085	1.114	0.270
		Season	0.433	3.477	0.001
Value	ARIMA(0,0,0)(0,1,1)	Seasonal MA (1)	0.475	3.398	0.001

Source: Computed from MPEDA Data (1995-2010)

Table 4 The Forecast of Quantity and Value of Marine Product Exports from Kerala to the SEA

				(Quantity in Tonnes)
Period	**2010**	**2011**	**2012**	**2013**
Q1	1969	1969	1969	1969
Q2	5276	5276	5276	5276
Q3	6071	6071	6071	6071
Q4	2012	2012	2012	2012
				(Value in Rs. Lakhs)
Period	**2010**	**2011**	**2012**	**2013**
Q1	1761.16	1761.16	1761.16	1761.16
Q2	4356.31	4356.31	4356.31	4356.31
Q3	4806.61	4806.61	4806.61	4806.61
Q4	1760.11	1760.11	1760.11	1760.11

Source: Computed from Table 3

Appendix -3

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From Market Concentration to Market Diversification: WTO and the Marine Products Exports from Kerala- Using ARIMA Method

Parvathy P[1] and D Rajasenan[2*]

1. Government Victoria College, Palakkad-678001 India
2. Centre for the Study of Social Exclusion and Inclusive Policy (CSSEIP), Athithi Bhavan Building, Cochin University of Science and Technology, Cochin -682022, Kerala, India

* E-mail of the corresponding author: rajasenan@gmail.com

Abstract

Marine product export does something pivotal in the fish export economy of Kerala. The post WTO period has witnessed a strengthening of food safety and quality standards applied on food products in the developed countries. In the case of the primary importers, like the EU, the US and Japan, market actions will have far reaching reverberations and implications for the marine product exports from developing nations. The article focuses on Kerala's marine product exports that had been targeting the markets of the EU, the US and Japan, and the concomitant shift in markets owing to the stringent stipulations under the WTO regime. Despite the overwhelming importance of the EU in the marine product exports of the state, the pronounced influence of irregular components on the quantity and value of marine product exports to the EU in the post WTO period raises concern. However, the tendencies of market diversification validated by the forecast generated for the emerging markets of the SEA, the MEA and others, to an extent, allay the pressures on the marine product export sector of the state which had hitherto relied heavily on the markets of the EU, the US and Japan.

Keywords: marine products, WTO, market concentration, ARIMA, market diversification

1. Introduction

Marine product export sector has, for a very long time, played a major role in the fish economy of Kerala. Kerala accounts for 16 percent marine product exports in terms of quantity and 17 percent in terms of value, and thereby serving the major markets for fish and fishery products of the European Union (the EU), Japan and the United States (the US). In the mid 1980s, the combined share of these markets in the marine product exports of the state accounted for 91 percent and 87 percent in terms of quantity and value respectively. Though the combined shares of these markets fell to 83 percent in terms of quantity at the start of the WTO period, their market shares in terms of value remained intact.

The developing countries have emerged as the net exporters of fish and fishery products since 1970s. About 75 percent of the fish and fishery product exports, in terms of value, from developing nations are directed to the developed countries (FAO, 2010). Considering the credence nature of the fish products, the EU, the US and Japan have strengthened the food safety standards and quality regulations to ensure the quality of the imported products. With the establishment of the WTO, there has been a lowering of tariff barriers on imports accompanied by a rise in non tariff measures imposed by the developed countries on the imported food products, especially fish and fishery products. The measures applied by the developed countries on the imports of fish and fishery products from developing countries are in the form of quality and safety standards, labeling and packaging, other technical requirements, countervailing and anti-dumping duties etc.

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2. Materials and Methods

The concerns of the developing countries, in the wake of the implementation of the SPS standards and its potentiality to become non-tariff measures to limit trade, have been well documented via the seminal works of Henson and Loader (2001); Jha (2002); Athukorala and Jayasuriya (2003). In the context of trade limiting factors in the import markets, developing nations are persistently striving to mitigate volatilities in export earnings to go for market diversification to lend stability to their export performance (Prebisch, 1950; Singer, 1950) The article scrutinizes the impact of the strengthening of standards in the EU, the US and Japan on the marine product exports from Kerala in the post WTO phase vis-à-vis the pre WTO period with the help of export statistics available from the Marine Product Development Authority (MPEDA). The models of best fit generated using time series modeler describe the influence of various components of the time series on the quantity and value of marine product exports from the state to various markets in the pre and the post WTO periods (see Table 1). A forecast of the quantity and value of marine product exports from the state to these markets for the period 2010-14 is made.

3. Results and Discussions

The individual shares of the major markets in the marine product exports of Kerala underwent changes in the time period from 1995-96 to 2009-10. The EU retained its dominant share in the marine product exports of Kerala in terms of quantity and value over this period. But the respective shares of the US and Japan in the marine product exports of Kerala in terms of quantity fell from 17 to 12 percent in 1995-96 and from 6 to 5 percent in 2009-10. A similar drop in the respective shares of the US and Japan in the marine product exports of Kerala in terms of value ensued during this period.

The best fit models identified facilitates a pre and post comparison of the quantity and value of marine product exports from Kerala to the EU, the US and Japan. In the post-WTO phase, the quantity and value of marine product exports from Kerala to the EU illustrate an increase, except for the year 1997-98 when a ban was imposed by the EU on the marine product exports from India owing to quality issues (see Table 2). Despite the increase observed for the EU, it is not possible to overlook the influences of the random error terms on the quantity and value of marine product exports in the post WTO period unlike the pre-WTO period when the seasonal factors had an upper hand. The marked influence of random shocks on the marine product exports to the EU can be attributed to the issues of rejections and detentions faced by the exporters of the state in that market. The influence of random error terms on the quantity of marine product exports to the US in the pre-WTO period produced a lasting impact as the quantity of exports to this market began to decline in the subsequent phase (see Table 2). In the post-WTO phase, the exports to the US began to decline, both in terms of quantity and value since 2004, owing to certain factors such as the imposition of anti-dumping duties and enhanced bonding requirements on shrimps from developing nations including India. In the post-WTO period, while the quantity of marine product exports to the US is influenced by level and seasonality, the value of marine product exports is subject to the lone influence of the level of the series. The signs of decline became visible in the Japanese market since the late 1980s itself. This tendency accentuated in the post-WTO phase as the compound annual growth rate of marine product exports recorded for Japan in terms of quantity and value turned negative (see Table 2). The quantity of marine product exports to Japan in the pre and the post WTO periods are influenced by the level of the series. In fact, the mean quantity of exports from the state to Japan is lower in the post-WTO period vis-à-vis the pre-WTO period. The value of marine product exports from Kerala to Japan in both these phases is subject to the pressures of irregular variations. This is hardly a surprise for a market showing signs of deceleration.

The estimates of the model parameters, as given in Table 3, have enabled to forecast the quantity and value of marine product exports from Kerala to the EU, the US and Japan for the period 2010-11 to 2013-14. Forecast statistics suggests that the EU continues to hold sway in the marine product exports of Kerala. The quantity of marine product exports to the EU peaks during the II and III quarters of every year

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coinciding with the active phase in the marine sector of the state. The same pattern is also visible in terms of value to the EU markets (See Table 4). But the forecast offers a bleak picture for the US and Japan, especially in terms of quantity. The quantity of marine product exports from Kerala to both these markets is meager even during the peak phases of activity in the marine sector (see Table 3). This reveals that these markets have lost sheen of late. The value of exports forecast for the US and Japan, though lower than the forecast figures for the EU and other emerging markets as given in Table 4, still fares better due to comparatively higher unit value realized in these markets.

3.1 Shifts to New Markets

The marine product exports from the state are increasingly moving to the so called non-traditional markets, especially the markets of the South East Asia (SEA), the Middle East Asia (MEA) and 'Others' that consist mainly of China, Turkey, and Tunisia etc. In 1990-91, the combined share of these markets in the marine product exports of the state was 8 percent in terms of quantity and 4 percent in terms of value. Recent trends show a higher market share of 38 percent in terms of quantity fetching a value of 28 percent. Table 5 shows the model parameters and significance levels that explain the pattern of flow of marine products from the state to these markets in the pre and the post-WTO periods. The volume of exports moving to these markets was quite insignificant in the pre-WTO phase. The influence of irregular components on the quantity of marine product exports to these markets was so pronounced in the pre-WTO period. The value of marine product exports to various markets were subject to varied influences. While the value of exports to the SEA and 'Others' came under the influence of seasonal and irregular components respectively, those to the MEA were subject to a negative influence of autoregressive elements. The quantity and value of marine product exports to these markets increased in the post WTO phase. The SEA offers bright prospects for marine product exports in quantity terms as it is influenced by seasonal factors. This suggests that the bulk of our marine product exports move to this market in the peak seasons, reflecting the importance of this market. This is validated by the forecast for the SEA (see Table 6). However, the value of marine product exports is subject to the influence of random error terms suggesting the influence of factors other than availability of raw materials on the series (see Table 7).

The MEA, as a market for the marine products of Kerala, grew principally in terms of quantity. The quantity of marine product exports to the MEA in the post-WTO period is influenced by the level of the series. In fact, the mean quantity of marine product exports to the MEA is higher in the post rather than the pre-WTO period. But the value of marine product exports to this market continues to be under the adverse influence of autoregressive elements (see Table 6 and 7). Though the market segment 'Others' has assumed significance in quantity terms and the series in the post-WTO phase is influenced by level, trend and season, the forecast predicts a declining trend for this market. Nevertheless, the value of exports to this market is influenced by the level of the series which is higher for the post-WTO period vis-à-vis pre-WTO period. This is indeed a welcome signal as this market segment is getting transformed from being a market for low end value product to high value added products.

4. Conclusion

The empirical estimates and its forecasts, based on export data pertaining to the marine products export from Kerala for the period 2010-11 to 2013-14, present a very bleak picture in as much as the traditionally strong market base of the US and Japan has eroded considerably in the post-WTO phase. Though the EU holds a considerable sway over the marine product export basket of the state, it is not possible to overlook the influences exerted by the irregular components on the quantity and value of exports. However, the forecast generated from the model estimates gives a promising estimate for the markets of the SEA, the MEA and 'Others'. The market segment 'Others' is a market to reckon as it offers bright prospects for the marine products of Kerala, especially in value terms. It is also worth mentioning here that these new markets have acted as shock absorbers for the marine product exports of the state in the events of crisis in

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the traditional markets. This is testified by the fact that the quantity and value of marine products to these markets shot up in 1997 followed by the ban in the EU. Further, the importance of these markets has grown tremendously since 2004 when the marine product exports from the state started facing problems in the US and Japan. With these empirical justifications, it is possible to hypothesize that the marine product exports from Kerala in the post-WTO period have witnessed a shift from market concentration to market diversification.

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Note: Lakh = 0.1 million

Prof. (Dr.) D. Rajasenan is the Director at the Centre for the Study of Social Exclusion and Inclusive Policy (CSSEIP) and Professor, Econometrics and Mathematical Economics, Department of Applied Economics, Cochin University of Science and Technology (CUSAT), Kerala, India. He is also a former DAAD fellow, Commonwealth Senior Fellow and Indo-Canadian Shastri Fellow. Ph: +91-484-2577566; Email: rajasenan@gmail.com.

Parvathy P. is Assistant Professor at the Department of Economics, Government Victoria College, Palakkad. She is also a Ph.D scholar at the Department of Applied Economics, Cochin University of Science and Technology, Kerala, India.

Table 1 Models of Best Fit for the markets–Pre and Post WTO Periods

The EU	**Pre WTO Period**	**Post WTO Period**
Quantity in tonnes	ARIMA (0,1,0) (0,0,0)	ARIMA(0,1,1)(0,1,1)
Value in Rs (Lakhs)	Winters' additive	ARIMA(0,0,0)(0,1,1)
The US		
Quantity in tonnes	Winters' additive	Simple seasonal
Value in Rs (Lakhs)	Winters' additive	Simple
Japan		
Quantity in tonnes	Simple seasonal	Simple seasonal
Value in Rs (Lakhs)	ARIMA(0,0,0)(0,0,0)	ARIMA(0,0,0)(0,1,1)

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Table 2 Model Estimates and Significance of Market wise Exports of Marine Products from Kerala-Pre and Post-WTO Periods

	Best Fitting Models	Model Parameters	Estimate	t value	Level of significance
Exports to the EU (Quantity) in the Pre WTO Phase	ARIMA (0,1,0)(0,0,0)	Fails to yield a parameter	-	-	-
Exports to the EU (Quantity) in the Post WTO Phase	ARIMA(0,1,1)(0,1,1)	Non seasonal MA (1)	0.704	6.219	.000
		Seasonal MA(1)	0.712	5.316	.000
Exports to the EU (Value) in the Pre WTO Phase	Winters Additive	Level	4.26E-06	2.86E-05	1.000
		Trend	0	1.51E-07	1.000
		Season	1	3.511	0.002
Exports to the EU (Value) in the Post WTO Phase	ARIMA(0,0,0)(0,1,1)	Constant	1539.498	9.238	.000
		Seasonal MA(1)	0.671	5.286	.000
Exports to the US (Quantity) in the Pre WTO Phase	Winters' Additive	Level	0.09	0.934	0.358
		Trend	2.09E-06	0	1.000
		Season	9.88E-05	0.001	0.999
Exports to the US (Quantity) in the Post WTO Phase	Simple seasonal	Level	0.279	3.02	0.004
		Season	0.507	3.575	0.001
Exports to the US (Value) in the Pre WTO Phase	Winters' Additive	Level	0.409	2.256	0.032
		Trend	0.26	0.929	0.361
		season	0.001	0.009	0.993
Exports to the US (Value) in the Post WTO Phase	Simple	Level	0.291	3.202	0.002
Exports to Japan (Quantity) in the Pre WTO Period	Simple seasonal	Level	0.3	2.008	0.054
		Season	1.61E-05	0	1.000
Exports to Japan (Quantity) in the Post WTO Period	Simple seasonal	Level	0.3	3.285	0.002
		Season	5.94E-07	5.33E-06	1.000
Exports to Japan (Value) in the Pre WTO Period	ARIMA(0,0,0)(0,0,0)	Constant	7.785	133.749	.000
Exports to Japan (Value) in the Post WTO Period	ARIMA(0,0,0)(0,1,1)	Seasonal MA (1)	0.754	5.908	.000

Source: Computed from MPEDA Data, 1988- 2010

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Table 3 Forecasts of the Marine Product Exports to the EU, the US and Japan

(Quantity in tonnes)

Period	**2010-11**		**2011-12**	**2012-13**	**2013-14**
The EU	**Predicted Values**	**Actual Values***			
Q1	12004	9582	12447	12891	13335
Q2	16205	16403	16649	17093	17536
Q3	15637	18061	16081	16525	16968
Q4	12130	12955	12574	13017	13461
The US					
Q1	1417	1497	1417	1417	1417
Q2	2113	1822	2113	2113	2113
Q3	1925	2095	1925	1925	1925
Q4	1462	2127	1462	1462	1462
Japan					
Q1	1457	1245	1457	1457	1457
Q2	1597	2008	1597	1597	1597
Q3	955	1424	955	955	955
Q4	1639	1749	1639	1639	1639

Source: Computed from Table 2, MPEDA Data, 2011

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Table 4 Forecast Values of Exports to the EU, the US and Japan

(Value in Rs Lakhs)

Period	2010-11		2011-12	2012-13	2013-14
The EU	Predicted values	Actual values*			
Q1	21570.28	17619.76	23109.78	24649.28	26188.78
Q2	28568.44	30730.07	30107.94	31647.44	33186.94
Q3	27299.35	32355.54	28838.85	30378.35	31917.85
Q4	22077.3	24844.14	23616.8	25156.3	26695.8
The US					
Q1	3710.63	3198.78	3710.63	3710.63	3710.63
Q2	3710.63	3870.21	3710.63	3710.63	3710.63
Q3	3710.63	4006.19	3710.63	3710.63	3710.63
Q4	3710.63	4954.19	3710.63	3710.63	3710.63
Japan					
Q1	3908.66	3146.79	3908.66	3908.66	3908.66
Q2	4340.26	5697.92	4340.26	4340.26	4340.26
Q3	3081.68	4190.82	3081.68	3081.68	3081.68
Q4	4257.24	4744.15	4257.24	4257.24	4257.24

Source: Computed from Table 2, MPEDA Data, 2011

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Table 5 Model estimates of Marine Products from Kerala to New Markets-Pre and Post -WTO Periods

	Best Fitting Models	Model Parameters	Estimate	t value	Level of significance
Exports to the SEA (Quantity) in the Pre WTO Phase	ARIMA(0,1,0)(0,1,0)	Constant	0.974	0.52	0.608
Exports to the SEA (Quantity) in the Post WTO Period	Simple seasonal	Level	0.085	1.114	0.27
		Season	0.433	3.477	0.001
Exports to the SEA (Value) in the Pre WTO Phase	Winters Additive	Level	0.135	1.032	0.311
		Trend	1	0.717	0.479
		Season	1	1.82	0.079
Exports to the SEA (Value) in the Post WTO Period	ARIMA(0,0,0) (0,1,1)	Seasonal MA (1)	0.475	3.398	0.001
Exports to the MEA (Quantity) in the Pre WTO Phase	ARIMA(0,0,0)(0,1,0)	Constant	42.269	2.819	0.009
Exports to the MEA (Quantity) in the Post WTO Phase	Simple	Level	0.88	6.866	.000
Exports to the MEA (Value) in the Pre WTO Phase	ARIMA(2,1,0)(0,1,0)	AR(1)	-0.568	2.829	0.01
		AR(2)	-0.465	2.412	0.025
Exports to the MEA (Value) in the Post WTO Period	ARIMA (0, 0, 1) (1, 1, 0)	Constant	0.148	2.956	0.005
		Non seasonal MA(1)	-0.384	-3.015	0.004
		Seasonal AR (1)	-0.656	-6.41	.000
Exports to 'Others' (Quantity) in the Pre WTO Period	ARIMA(0,0,0)(1,0,0)	constant	5.72	24.96	.000
		Seasonal AR (1)	0.553	3.285	0.003
Exports to 'Others'(Quantity) in the Post WTO Period	Winters' multiplicative	Level	0.566	6.749	.000
		Trend	0.376	2.396	0.02
		Season	0.701	3.733	.000
Exports to 'Others' (Value) in the Pre WTO Period	ARIMA(0,0,0)(0,1,1)	Constant	0.208	3.44	0.002
		Seasonal MA(1)	0.556	2.386	0.025
Exports to 'Others' (Value) in the Post WTO Period	Simple seasonal	Level	0.7	5.631	.000
		Season	1.27E-005. 701	8.24E-05	1.000

Source: Computed from MPEDA Data, 1988-2010

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Table 6 Forecast generated for Marine Product Exports to the SEA, the MEA and 'Others'

(Quantity in tonnes)

Period	**2010-11**		**2011-12**	**2012-13**	**2013-14**
The SEA	**Predicted values**	**Actual values***			
Q1	1969	3991	1969	1969	1969
Q2	5276	5328	5276	5276	5276
Q3	6071	10581	6071	6071	6071
Q4	2012	5791	2012	2012	2012
The MEA					
Q1	1981	1061	1981	1981	1981
Q2	1981	1986	1981	1981	1981
Q3	1981	1581	1981	1981	1981
Q4	1981	1901	1981	1981	1981
'Others'					
Q1	3445	2872	3041	2636	2231
Q2	3681	4296	3236	2790	2345
Q3	5049	10109	4419	3789	3159
Q4	3042	4151	2650	2258	1867

Source: Computed from Table 5, MPEDA Data, 2011

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Table 7 Forecast Figures of Marine Product Exports to the SEA, the MEA and 'Others'

(Value in Rs. Lakhs)

Period	**2010-11**		**2011-12**	**2012-13**	**2013-14**
The SEA	**Predicted values**	**Actual values***			
Q1	1761.16	3349.69	1761.16	1761.16	1761.16
Q2	4356.31	5179.45	4356.31	4356.31	4356.31
Q3	4806.61	9051.54	4806.61	4806.61	4806.61
Q4	1760.11	3947.29	1760.11	1760.11	1760.11
The MEA					
Q1	2328.16	1556.96	2696.53	3334.91	3932.96
Q2	3064.91	2613.23	3495.32	4361.9	5111.29
Q3	2576.55	1722.22	3179.25	3767.61	4567.18
Q4	2598.02	2181.48	2906.91	3673.27	4269.17
'Others'					
Q1	5243.8	5240.41	5243.8	5243.8	5243.8
Q2	6228.4	7399.05	6228.4	6228.4	6228.4
Q3	7116.6	12925.48	7116.6	7116.6	7116.6
Q4	5502.5	5685.14	5502.5	5502.5	5502.5

Source: Computed from Table 5, MPEDA Data, 2011

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