SURVEY ON TRADE-RELATED ENVIRONMENTAL MEASURES AND ENVIRONMENT-RELATED TRADE MEASURES IN APEC

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Executive Summary

Trade and investment liberalization promotes the development of economic globalization, resulting in ever-increasing interdependence of economies and regions around the world and expanding and intensifying the mutual influence between trade and investment activities and the environment. With growing awareness of the linkage between trade and environment, unrelenting efforts have been made at the multilateral and regional levels as well as by individual economies to integrate trade and environment policies and to address the interface between the two high-profile issues of trade and sustainable development.

Asia Pacific economies have benefited greatly from liberalization of trade and investment and have a keen interest in maintaining an open rules-based multilateral trading system. However, their continued economic success also depends on their capacity to meet the environmental challenges arising from rapid industrialization and economic growth and reconciling these objectives with the goal of free and open trade and investment in the APEC region.

Recognizing this, APEC has placed environment issues on its agenda. APEC Environment Ministers have launched an ambitious program to promote cleaner production, cleaner oceans and sustainable cities in the region. Trade- and environment-related issues have been intensively discussed and incorporated into the work programs of many APEC Working Groups. And APEC Trade Ministers included environmental goods and services in the early voluntary sectoral liberalization initiative.

As part of APEC's information gathering and analysis in support of the program of trade and investment liberalization and facilitation (TILF), the Economic Committee has undertaken this survey on the Trade-Related Environment Measures (TREMs) and Environment-Related Trade Measures (ERTMs) in APEC, based on information available from member economies and other sources as well. As the survey was designed before the participation of three new members (Peru, Russia and Vietnam) in APEC, information was collected only from the 18 member economies prior to the recent expansion.

This report on the survey, as a starting point, is intended to provide APEC member economies not only with background information but also an essential point of reference in addressing trade and environment issues in the region, to promote policy dialogue among the member economies, to enhance the transparency of measures, and to identify gaps and thus help to ensure that all APEC activities are carried out within the framework of sustainable development.

Scope of the Survey

The present survey, as a preliminary effort to explore the trade- and environment-related measures within APEC, is composed of the following main parts:

- An overview of TREMs and ERTMs in the APEC region, as well as the stance and attitude of the member economies and sub-regional groups towards coordination of trade and environment.
- An outline of the relationships and interactions between trade liberalization and environment protection, identifying the possibility of mutually supportive and coordinated development between them.
- An analysis of environment cost internalization and its impact on competitiveness.
- An examination of transparency of trade and environment measures in the APEC region.

TREMs and ERTMs in the APEC Region

Definitions

Trade and environment is a cross-cutting type of issue. It is broad and the boundaries are not well-defined. To undertake a study and analysis of TREMs and ETRMs in the APEC region, it is necessary, first of all, to define these two categories.

Trade-related environment measures have a relatively wide coverage. They refer to environmental measures with significant trade effects, including laws, regulations, administrative measures as well as regional and multilateral agreements that are formulated and implemented or signed by APEC member economies.

Environment-related trade measures refer to national trade laws, regulations as well as administrative measures enacted to achieve a specific environmental goal or for environmental purposes, including trade-related measures adopted by individual economies pursuant to the multilateral environmental agreements. Examples of ERTMs include bans, restrictions, or permit requirements in respect of imports or exports.

Trade-Related Environmental Measures

Multilateral Environmental Agreements

Multilateral Environmental Agreements (MEAs) are the result of the international effort to respond to global environmental challenges. A number of the MEAs include trade measures as an integral and important component. In fact, according to data from international organizations, some 20 of about 180 existing MEAs are related to trade. However, those with significant trade effects are even fewer. It is commonly recognized that the following four MEAs have, or will have, significant effects on trade: the Montreal Protocol, CITES, the Basel Convention and the United Nations Framework Convention on Climate Change (UNFCCC).

The first three of these MEAs, which have specific trade clauses for environmental

purposes, aim to protect the environment through various means, including restrictions, bans, or permits. These measures, in practice, inevitably have significant impacts on trade. As for the UNFCCC, although it does not explicitly include any trade clauses, it will have a long-term and wide-ranging impact on trade since the reduction of emissions has implications for a broad range of industries.

APEC member economies have accepted most MEAs related to TREMs. Moreover, they have enacted corresponding measures for implementing the MEAs, though varying in degree and scope.

Unilateral Measures

APEC member economies have promulgated a large number of regulations and laws with respect to environmental protection. Environmental measures with significant observed trade effects are classified into three types: (a) direct administrative tools employed for environment purpose; (b) voluntary schemes implementing product-related environmental measures (eco-labeling, packaging and recycling) and the environmental management system (ISO 14000 series); and (c) economic instruments such as environmental taxes, tradable permits, deposit/refund systems and financial incentives.

Direct Administrative Measures

Direct administrative intervention, or the "command and control" approach, can be defined as the application of rules and regulations that limit the discharge of given pollutants by regulating the production process, restricting the consumption of products, or limiting certain activities of direct polluters in a given time and area.

APEC member economies are highly diverse with respect to the formulation and implementation of environmental laws and regulations. Environmental laws and regulations cover different areas in the various economies, depending on the natural conditions prevailing in their territories. As well, the differences in the level of economic development, differences in production and consumption structures, and the varying levels of science and technology tend to influence the priority placed on environmental policies in different economies as well as the ability to implement them. Some member economies, particularly the developed members, have comparatively stringent environmental standards and technical regulations; others, developing members in particular, have much less stringent ones.

Not only do environmental standards vary from economy to economy, even within an individual economy environmental standards often lack uniformity. For instance, in the United States, California alone has 191 environmental regulatory boards and agencies by one count, applying different standards.

Voluntary Schemes

Voluntary schemes include measures addressing product packaging, labeling, waste recycling and recovery, as well as environmental management systems like ISO 14000. Although in principle compliance with such measures by government and industrial entities is for the most part voluntary, in practice they act more like mandatory provisions.

Also of note is the fact that the product categories established for the purposes of ecological labeling and the certification of standards vary across APEC member economies.

Packaging, labeling, waste recovery and recycling provisions are typically based on market mechanisms, and rely largely on market information and responses from manufacturers and consumers. The survey shows that transparency, accessibility to the information set out on labels, and the responses of producers and consumers are very important for effective implementation of eco-labeling schemes.

ISO 14000 is internationally unified and highly transparent. Some economies, such as Australia, New Zealand, Singapore, Malaysia and the United States, have adopted ISO 14000 standards as their national standards for environmental management systems; other economies have made them, or plan to gradually make them, the basis of their national standards. By the end of 1996, a total of 155 enterprises in the APEC member economies had achieved the required standards.

Environmental Economic Instruments

Environmental Economic Instruments (EEIs) have been commonly used by APEC member economies, although such use has varied from economy to economy in terms of degree and areas of application. Environmental taxes/charges, deposit/refund systems, tradable permits and financial incentives are the most popular instruments. These measures typically apply equally to imports and domestic products.

The survey results show that the use of economic instruments for environmental purposes is still at a preliminary stage, but that many economies are embarking on this practice. However, even in those economies where EEIs have been implemented, the product categories to which they apply are still limited. Moreover, experience shows that, for successful implementation, it is insufficient to rely solely on government efforts and that parallel efforts by all sectors of society are needed to achieve the desired goals.

ERTMs Taken by APEC Member Economies

Trade measures enacted by APEC member economies to protect the environment are divided into two broad groups: those adopted pursuant to multilateral environmental agreements, and those worked out unilaterally by the individual member economies.

Trade Measures Pursuant to MEAs

The measures adopted by APEC member economies pursuant to MEAs reflect the provisions of these agreements and range from prohibitions and restrictions on the import and export of controlled products, import and export license requirements, and application of import and export quotas.

Unilateral ERTMs

Domestic trade legislation encompassing environmental measures but not deriving from an MEA is unilateral in nature. Unlike the measures adopted pursuant to MEAs, unilateral ERTMs tend to lay particular emphasis on specific environmental objectives of the individual economy based on its domestic conditions and preferences. The measures are typically mandatory in nature and generally strictly enforced. In some circumstances, such measures could induce friction between economies, especially when used as punitive measures to achieve extraterritorial environmental objectives.

Interrelationship between Trade and Environment

Trade Liberalization and Economic Growth in the APEC Region

Until the recent economic crisis, economic growth in terms of GDP for the region, developing economies in particular, outperformed the rest the world during the last few decades. The dynamism has been attributed not only to the gradual and steady movement of global trading regime in the direction of free trade, but also to a series of reform programs, including trade and investment liberalization programs, within the region.

Environmental Trends

Economic growth has brought a range of benefits to APEC member economies, including lifting more and more people out of poverty, leading to higher rates of school enrollment, supporting higher life expectancy, and lowering rates of infant mortality. However, despite some improvement of environmental indicators for individual members, the state of the environment within the APEC region as a whole is far from satisfactory. The main environmental problems fall into two broad categories: one is resource destruction and degradation, such as land degradation, deforestation, loss of biodiversity and depletion of fisheries; while the other is pollution, mainly of the air and water.

The relationship between environmental degradation and economic growth is not simple. In general, environmental problems tend to increase with economic growth in the early stages of development but decline with economic growth in the later stages of development. Environmental degradation arises when the environmental costs to society in the development process are ignored or underestimated. In part, the problem is rooted in the lack of recognition of the scarcity and economic value of environmental resources. In this regard, problems can be traced back to both market failure and policy failure.

Environmental Impacts of Trade Liberalization

To identify both the positive and negative effects of trade liberalization on the environment involves addressing various aspects of product trade, economic growth, the role of market mechanisms and the build-up of regulation.

<u>Product Effect</u>

Trade in products with specific ecological content can have significant impacts on the environment. For instance, free or uncontrolled trade of endangered species accelerates their depletion and threatens their extinction. The same thing holds for non-renewable resources. Trade liberalization is also likely to facilitate the international transfer of harmful waste and produce an unwanted environmental effect if the recipient economies, which are mostly developing economies, do not have adequate technology and facilities to treat the waste properly.

On the other hand, trade has not only expanded markets for products incorporating environment-friendly technology, but also has provided more opportunities for global spread of environmental technology and services to help solve specific ecological problems. In this sense, APEC's incorporation of environmental goods and services in the Early Voluntary Sectoral Liberalization (EVSL) initiative not only represented a solid step towards its final goal of free and open trade but also promised substantial environmental gains to the APEC region.

Growth Effect

The implication of economic growth (whether trade led or not) for environment have two dimensions. On the one hand, economic growth generates positive effect on environment through raising income, improving industrial structure and upgrading technological level. On the other hand, economic growth leads to increased production input and waste emission and also involves change of uses of some resources which may exert more pressure on the environment. Therefore, economic growth alone is not sufficient for a better environment. That is to say, economic development without appropriate complementary environmental policies in place will not bring about a good result of environment.

Market Effect

Trade liberalization expands the scope of function of the market mechanism. On the one hand, this tends to enhance economic efficiency, which will in general be positive for the environment in the sense that a given amount of input will produce more output. On the other hand, trade openness subjects governments and enterprises to more intense competition which may make them reluctant to adopt more stringent measures than others do and to voluntarily internalize environmental costs. Most prices of goods and services in the international market, therefore, fail to reflect the environmental cost. It should be noted that some policy choices such as subsidies further intensify market distortion.

Regulatory Effect

Regulations and measures adopted by the member economies for environmental purposes have an important role to play in enhancing the level of environmental protection. Though varying in degree, the majority of APEC member economies are in favor of the role of trade measures to attain specific environmental goals. However, there are heated debates over justification of unilateral use of trade measures to achieve extraterritorial environmental objectives.

Impact of Trade and Environment-related Measures on Trade

MEAs

The Multilateral Environmental Agreements (MEAs) with trade provisions affect trade by way of, first of all, influencing parties' formulation of environmental and trade policies. In light of MEA-related requirements, the parties need and are authorized to take appropriate trade measures to meet the environmental targets. Though some of the MEAs do not explicitly include trade clauses, their application might have indirect impacts on trade.

Unilateral Measures

Besides those trade and environmental measures developed to honor the obligations under the Multilateral Environmental Agreements, numerous unilateral measures for environmental purpose have been adopted by both developed and developing economies.

Most TREMs and ERTMs in APEC member economies have no direct impact on trade since they carry no intention to affect patterns of trade or terms of trade. Nevertheless, some indirect effects on trade were observed through the impact of environmental measures on domestic economic growth, trade balances, industrial and trade structures and employment at the national level, and on production costs and price level – and thus on competitiveness – at the industry and firm level.

Statistical analysis shows that developed economies' shares of environmentally sensitive goods in total global trade have not changed significantly over the past two decades, despite the use of relatively stringent environmental measures adopted by some economies.

Developed economies generally have higher environmental standards with stricter enforcement, and more mature environmentally sound technologies and processes. And for businesses in these economies, environmental costs have long become part of their regular costs of production. So far, there has not been any evident proof that their competitiveness is being adversely affected by tough environmental measures.

Despite the application of more and tougher environmental measures over the past two decades, developed markets remain the principal destination of exports for developing economies even today. For example, in 1993, more than 50 percent of the APEC developing members' exports went to developed economies, of which markets with stringent environmental measures like the EU, the USA, Canada and Japan took over 90 percent.

A time series statistical analysis shows that export performance of environmentally sensitive products for most APEC member economies remained unchanged between the 1960s and 1990s despite the introduction of stringent environmental standards in most developed member economies in the last two decades. This means that, in the light of the available data, the assumption that strict environmental measures may reduce the competitiveness of the environmentally sensitive exports can not be verified.

Though a direct and systematic impact still cannot be ascertained in general, effects on the competitiveness of particular industries are observed. Case studies have identified a number of industries in some APEC member economies that are suffering from a negative impact on trade as a result of rising costs and weakened competitiveness due to application of environmental measures.

Environmental Cost Internalization and Its Implications

Concept of Environmental Cost Internalization

International trade in products whose prices do not fully reflect environmental costs undoubtedly contributes to environmental degradation. Environmental cost internalization (ECI) has been recognized as a fundamental way to address the interface between trade and environment and to promote sustainable development in general.

The central idea of environmental cost internalization is to take into account the full environmental or "life cycle" cost associated with the production, consumption and disposal of a product, including pollution of air and water, depletion of environmental resources and exacerbation of trans-national or global environmental problems (such as acid rain and climatic warming). The value of these environmental assets is often overlooked and the environmental costs are not reflected in the price of the product involved. Internalization of environmental costs involves defining ownership of environmental assets and pricing environmental assets.

Implementation of ECI

Many policies and measures related to cost internalization have been used by APEC member economies to achieve environmental goals. In fact, all of the environmental measures taken could arguably be characterized as cost internalization. It is difficult accordingly succinctly to describe the instruments of environmental cost internalization, let alone their use in practice and their effects. According to the present survey, the measures used by APEC member economies to internalize environmental costs include regulations, economic instruments and voluntary schemes.

Economic instruments used by APEC member economies include: environmental/user charges, deposit/refund systems, tradable permits/quotas, and financial incentives/ environmental liability. The voluntary schemes cover ISO 14000 and eco-labeling which have been widely used by the member economies. Besides these, many central governments and sub-national governments in the APEC region have widely introduced the "polluters pay" principle to deal with the environmental consequences of industrial activities within their economies. Many of these instruments are domestic regulatory measures, which are not constrained in any way by trade law. However, these instruments have indirect effects on trade through their impacts on a product's production cost and/or market competitiveness; in some cases, such instruments may even have significant

impact on market access.

Different forms of instruments for environmental cost internalization will generate different competitiveness effects. Emission taxes, for example, would entail a variable cost increase, a relatively low administrative burden and an ongoing economic incentive to reduce emissions.

The implication of Eco-labeling for competitiveness varies from developing economies to developed economies and from large companies to small and medium-sized companies. Generally speaking, the environmental consciousness of consumers in developed economies is relatively strong, and the benefit from implementation of Eco-labeling might be greater than in developing economies. For large enterprises, the eco-labeling application fee accounts for a very small proportion of sales volume. For small and medium-sized enterprises, the application fee for eco-labeling is relatively higher. These fees will raise the cost of products and thus weaken the competitiveness of the products.

As for ISO 14000, its implementation tends to have more significant negative impacts on small and medium-sized enterprises, of which most have difficulty bearing the kind of expenses. The effect of implementation of ISO 14000 on the competitiveness of products depends on the size of the company, the degree of pollution and the situation regarding the management of environment protection.

At present, quite a few enterprises within APEC member economies have obtained ISO 14000 certifications. The performance of these enterprises indicates that ECI will eventually increase environmental efficiency, even in the developing economies.

Improving the Transparency of Trade and Environment Measures

Transparency is promoted by the standardization, legalization and publicity of measures. Standardization and legalization are the prerequisite and guarantee of improving transparency, while publicity is the key to reach the goal.

Increased transparency helps APEC member economies to gain a better knowledge of regional trade and environmental measures, supports more informed policy-making, and enhances both trade and environmental protection by providing enterprises with information at a lower cost.

Standardization

An analysis of the data from APEC member economies shows that only some have fully aligned their trade and environment measures with international standards, while the majority have only partially done so. Hence, much remains to be done in realizing standardization of measures.

Legalization

Legalization – i.e., the establishment of measures on the basis of laws and regulations – has an important role to play in increasing transparency. It also helps to reduce inconsistency of application of measures, raises awareness of environmental protection, and promotes compliance with the measures.

Environmental and trade legislation advances more rapidly in developed economies than in developing ones. Even so, all APEC member economies are working hard to protect the environment and reduce the negative impact of trade activities on the environment. Such efforts have proven to be quite positive for the concerned economies in terms of improving coordination of environmental and trade measures and integrating environment and development in policy-making.

Publicity

Ensuring public availability and promoting public understanding of measures is important to increase participation in implementation. Publicity is thus one of the main criteria for measuring the transparency of measures and has direct bearings on their effectiveness.

According to surveys, the APEC members have adopted the following means to promote publicity of their measures: bulletins released by the government; reports of mass media; submission of notifications; establishment of databases; public participation in the legislative process; public participation in environment impact assessments; and consultation with enterprises and individuals.

Main Conclusions

Asia Pacific economies have experienced impressive economic growth in recent decades largely due to the improved market access achieved through the several rounds of trade negotiation under the aegis of GATT and to the unilateral economic liberalization adopted by APEC members in particular. However the ecological/environmental system across the region has been under intense pressure from population expansion and trade-led economic growth. With the improved awareness of environmental protection, efforts have been made by APEC member economies to deal with these environmental issues at multilateral, regional and individual economy levels.

It is evident that the trade- and environment-related measures have been widely adopted to achieve environmental goals by APEC member economies. Both types of measures are designed and employed for environmental purpose, yet there are distinctions between the two. TREMs are applied equally to both internationally traded goods and domestically traded ones, while ERTMs apply only to import and export of goods. Both types of measures affect trade, but in different ways. TREMs have subtle effects on trade through setting up technical standards, environmental requirements; ERTMs use trade measures directly to regulate the flow of environment-related goods. These measures might be trade bans, restrictions and trade permitting requirement etc.

Environmental measures constitute only one of many factors affecting competitiveness of the relative export and it is difficult to identify through statistical analysis any systematic relationship between environmental measures and competitiveness at the global level.

However, at the industry or firm level, it has been found that competitiveness of some exporters, especially SMEs in developing economies, has been affected adversely by stringent environmental measures, either adopted by the importing economies or enacted by the domestic authorities.

Though environmental measures constitute, to some extent, barriers to market access by affecting a number of export commodities, principally from some developing economies, statistical data indicate that developed markets with stringent environment measures still remain the principle markets for the affected goods. This means that while stringent environmental measures create impediments to trade, they also bring about fresh opportunities for the producers meeting the requirements of target markets. It should be noted that only well-designed environmental policies could create some positive gains. Those measures based on PPMs should be developed cautiously because they may have trade-restrictive effects, although they are mainly designed to protect environment.

In view of the fact that APEC members vary in stage of economic development, technology, natural resource endowments and so forth, it would be difficult to formulate a unified environment standard for the whole region in the short term. This means that at the present, the advancement of environmental protection in the region proceeds on the basis of member economy formulating their own objectives and action plans based on their own conditions, progressively raising standards. Moreover, it is of critical importance to strengthen the enforcement of the measures adopted by the member economies.

Environmental cost internalization is a fundamental way to address the interface of trade and environment issues and to promote sustainable development. The key is to take into account the environmental costs associated with the production, consumption and disposal of a product. To realize environmental cost internalization, two key steps are to define ownership of environmental assets and to price environmental assets. A number of instruments could be used for this purpose, ranging from command and control measures, to economic instruments and voluntary schemes as well. Among these, the “polluters pay principle” (PPP) might be most effective. The main reason for this is that environmental cost internalization will increase the cost of products, thus weakening the competitiveness of enterprises. The principle provides incentives to polluters to actively adopt measures to treat pollutants produced or eliminate environmental pollution if they do not want to lose the market share.

In light of the important role of environmental cost internalization (ECI) in alleviating the negative effects of trade on the environment, the following steps might well be considered to promote ECI in APEC: Sectoral approaches, international cooperation, adoption and implementation of internationally recognized and viable environmental and quality management standards such as ISO 14000, and development and application of economic instruments such as discharge fees, resource tax, trading permits and subsidies.

Transparency is the prerequisite for effectively reconciling trade and environment policies and measures. Though APEC members have made great efforts in this regard, much more could be done. For instance, notification systems, cost-effective publicity network like Internet among APEC economies are requisite for monitoring and coordinating trade and environment polices and measures, identifying gaps between the members and avoiding pitfalls.

1. Introduction

In the process of economic globalization, economies around the world are facing the challenges of trade liberalization, environmental protection and sustainable development. Efforts have been made at the multilateral, regional and individual economy levels to reconcile trade and environment policies and to address the interface between the two high-profile issues of trade liberalization and sustainable development.

The United Nations (UN) emphasized in its Agenda 21, which was approved in December 1992, that environment and trade policies should be mutually supportive. An open, multilateral trading system, supported by the adoption of sound environmental policies, would have a positive impact on the environment and contribute to sustainable development. To this end, some UN agencies have done a great deal to address trade and environment issues.

The trade and environment issue did not appear in the original agenda of the Uruguay Round. However, trade-related environment issues were raised, which led to modification of the objectives of the GATT to make direct reference to sustainable development[1] and a ministerial decision to establish a Committee on Trade and Environment (CTE). The mandate of the CTE is to examine trade rules to ensure that they promote positive interaction between trade and the environment, while avoiding trade protectionism and encouraging compliance with multilateral disciplines[2].

Asia Pacific economies have benefited greatly from both multilateral and unilateral efforts to liberalize trade and investment. As important players in global trade, they have a keen interest in maintaining an open and rules-based multilateral trading regime and expanding regional and global trade. However, their continued economic success also depends on how well they reconcile the trade objectives with environmental protection.

Recognizing this, Asia Pacific Economic Cooperation (APEC) has also placed environment issues on its agenda. Following a first meeting of APEC Environment Ministers in 1994, APEC Ministers and Leaders, at Osaka in 1995, took note of the inter-related, wide-ranging issues of environmental protection, sustainable development and trade and investment liberalization, and requested that environmental considerations be integrated in all relevant APEC activities. APEC Environment Ministers have since launched an ambitious program to promote cleaner production, cleaner oceans and sustainable cities in the region. Trade- and environment-related issues have been intensively discussed and incorporated into the work programs of many APEC Working Groups. Environmental goods and services were included in the Early Voluntary Sectoral Liberalization (EVSL) initiative.

Trade and environment is a cross-cutting issue. It is broad and the boundaries are not well-defined. It involves disciplines such as economics, trade and environment policy and law, the environment-related sciences, industrial practices and so forth. Work on cross-cutting

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[11] See the preamble to the Agreement establishing the WTO.

[2] See the information booklet, *The Work of the World Trade Organization's Committee on Trade and Environment*, Department of Foreign Affairs and Trade of Australia.

issues is difficult and complex. To date, work on this issue has been pursued primarily through case studies or statistical analysis focusing on specific industries like agriculture, transportation and so forth, or on certain products such as textiles and garment, leather goods, electronics, etc. A comprehensive review of trade-related environment measures and environment-related trade measures within APEC however has not been conducted.

To fill this gap, the Economic Committee has undertaken the present survey of Trade-Related Environment Measures (TREMs) and Environment-Related Trade Measures (ERTMs) in APEC, to fill this gap. The work is formally part of APEC's information gathering and analysis in support of the program of trade and investment liberalization and facilitation (TILF). The survey is based on information available from member economies and other sources as well. As the survey was designed before the participation of the three new members (Peru, Russia and Vietnam) that joined APEC at the Ministerial meeting in Kuala Lumpur in November 1998, information was collected only from the 18 member economies prior to this expansion.

This report on the survey is intended to provide APEC member economies not only with background information but also an essential point of reference in addressing trade and environment issues in the region, to promote policy dialogue among the member economies, to enhance the transparency of measures, and to identify gaps and thus help to ensure that all APEC activities and action programs are carried out within the framework of sustainable development.. Moreover, the assembled information will provide reference material for the academic and business communities; for the latter in particular, it is hoped that the material will be helpful in entering and developing overseas markets.

The present survey, as a preliminary effort to explore the trade- and environment-related measures within APEC, is composed of the following main parts:

- An overview of TREMs and ERTMs in the APEC region, as well as the stance and attitude of the member economies and sub-regional groups towards coordination of trade and environment.
- An outline of the relationships and interactions between trade liberalization and environment protection, identifying the possibility of mutually supportive and coordinated development between them.
- Analysis of environment cost internalization and its impact on competitiveness.
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2. TREMs and ERTMs in the APEC Region

As a starting point, it is important to distinguish between TREMs and ERTMs in terms of how they affect trade and investment in fulfilling their environmental objectives and to map out a distinct picture of the extent of use of the two types of measures in the APEC region. This will permit an examination of the relationships and interactions between trade and environment and thus serve to shed light on how the goals of environmental protection and trade and investment liberalization can be pursued in a coordinated and harmonious fashion and without creating new barriers to trade.

2.1 Definitions

Although the terms TREMs and ERTMs sometimes appear in documents of international organizations and in independent studies, there is neither an agreed definition of these terms, nor a clear protocol for classification of measures.

In this survey, we consider Trade-Related Environment Measures (TREMs) to be laws, regulations and administrative measures adopted as domestic policy or pursuant to regional and multilateral agreements for the purpose of environmental protection that have significant incidental trade effects. Environment-Related Trade Measures (ERTMs) on the other hand are laws, regulations and administrative measures adopted as domestic policy or pursuant to regional and multilateral agreements for the purpose of environmental protection by directly regulating or restricting trade in goods and services. Of note, the trade measures adopted pursuant to the major multilateral environment agreements (MEAs) fall into the latter category.

One important distinguishing feature between the two categories is that TREMs apply to both domestically and internationally traded goods and services while ERTMs apply only to internationally traded goods and services

A second important difference is that, whereas ERTMs are reasonably clear cut conceptually (being limited to the universe of trade law), the same is not necessarily true for TREMs. Environmental measures have a broad scope. Moreover, to qualify as TREMs, they must pass a test of significance, i.e., to what extent do they affect trade? This is an empirical question, involving both quantitative analysis and judgement. Quantitative analysis is difficult given the lack of systematic data while judgements must grapple with the sometimes indirect nature of the impact of measures on trade. For instance, a stringent requirement for certain types of packaging or labeling, or for certain levels of materials used, will end up having effects on traded goods but the determination of significance of the impact will involve unraveling the impact of the TREM from other influences.

In practice, TREMs and ERTMs are sometimes difficult to differentiate, even on the basis of a given definition. First, both are adopted for environmental purposes and the consequences of applying either type of measure tend to be rather similar. Second, different understandings of the measures by various economies make it difficult to gather the data required for international comparison and systematic analysis.

2.2 Trade-Related Environmental Measures

Multilateral Environmental Agreements

The past several decades have seen ever-increasing ecological impacts and environmental degradation around the world. To address the global or transboundary environmental problems, international efforts have resulted in approximately 180 multilateral environmental agreements (MEAs). Of these, about 20 are related to trade, including four that are commonly recognized as having significant effects on trade. The latter are the Montreal Protocol, CITES, Basel Convention, and UNFCCC.

The Montreal Protocol on Substances that Depleting the Ozone Layer (Montreal Protocol), signed in 1987, is aimed at restricting the emission of chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODSs) defined by this Protocol that might damage the ozone layer. According to the relevant trade measures, parties are restricted from importing the controlled substances or products containing such substances from non-parties; and they are banned from exporting controlled substances and transferring the technology used for the production and utilization of controlled substances to non-parties. Nevertheless, the trade of controlled substances between the parties is allowed, but subject to a phased-out reduction of production and consumption of these controlled substances. The signatory parties have the obligation to ensure that all substitutes and the related technologies exported to developing economies are environmentally sound. In addition, a Multilateral Fund was set up to provide developing economies with capital and technological assistance.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was adopted in 1973, and came into force in 1975. CITES is designed to protect those species on the verge of extinction or under the threat of extinction by means of trade restrictions or prohibitions. The treaty includes three appendices, dividing the species into three classes according to the extent of the threat of extinction.

- Appendix I covers all species threatened with extinction, which are or may be affected by trade. Trade in these species must be subject to particularly strict regulation
- Appendix II includes the species that may become endangered unless trade in these species is strictly regulated.
- Appendix III includes the species that a party identifies as subject to regulation within its own jurisdiction and requiring international cooperation in the control of trade.

Trade in the species listed in the three appendices is subject to an import-export permit system, although the requirements for trade may vary. With regard to those species in Appendix I, exporters must acquire a permit from both the importing and exporting economies. With regard to those species in Appendix II, an export permit is needed. With regard to those species in Appendix III, the export permits must be issued by the exporting economies if the species is being exported from the economy that listed the species. However, if a specimen listed in Appendix III originates from an economy that has not itself listed the species, a "Certificate of Origin" is required. The definition and revision of the lists of species in Appendix I and Appendix II must be supervised and managed by a conference of parties and the standing committee of the treaty.

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal (Basel Convention) went into effect in 1992 for the purpose of prohibiting hazardous waste from the illegal transboundary trade and their inappropriate disposal. The convention refers to hazardous waste and other industrial wastes. Although most waste is either disposed of or reused by the producing nation, some amounts are still found crossing boundaries and presenting threats to human health and the environment. The trade measures involved in the convention include the following aspects:

- A state has the right to prohibit the transboundary movement and disposal of the hazardous waste and other waste within the areas of its territory;
- A party shall not permit the hazardous waste and other waste to be exported to a non-party or to be imported from a non-party.
- A party should not allow the export of hazardous wastes or other wastes to a state if it has reason to believe that the wastes in question will not be managed in a environmentally sound manner.

In September 1995, a second meeting of the parties to this Convention adopted a decision to prohibit, by year-end, 1997 all hazardous waste shipments for recycling or resource recovery from OECD to non-OECD countries.

The goal of the **UN Framework Convention on Climate Change (UNFCCC)** is to prevent the risk of global warming. In December 1997, the third Conference of the Parties was held in Kyoto, Japan. The meeting reached the Kyoto Protocol in which developed nations all set for the first time with legal-binding effect the target and timetable for the reduction of greenhouse gas emissions. While this Convention does not explicitly embody any trade clause, it will have a long-term and wide-ranging impact on trade since reducing emissions involves a wide range of industries.

With the growing number of parties, multilateral environmental agreements are playing an increasing role in trade. Up to now, few disputes had arisen from the use of trade measures in MEAs. There are, however, several key concerns with MEAs and in the following aspects in particular:

- The relationship between the rights and obligations that economies have accepted under MEAs and WTO: Economies which are members of the WTO and party to an MEA that includes trade measures need to consider both their MEA obligations and their obligations to other WTO members, regardless of whether the latter are parties to the MEA.
- Distinctions between parties and non-parties in the trade provisions of some MEAs: The trade provisions in some MEAs, e.g., CITES, the Montreal Protocol and the Basel Convention, may make formal distinctions between parties and non-parties. The effect of these distinctions appears to be to impose similar restrictions and requirements on trade with non-parties as apply to parties.

The international community has acknowledged that it is necessary to include trade measures in MEAs to achieve the goals of environmental protection. Nevertheless, to ensure a smooth functioning of the system of international trade, it is important that trade measures embodied in MEAs should be consistent with the accepted international trade rules of WTO.

APEC economies have signed most trade-related MEAs as illustrated in Table 1 below.

TREMs Adopted by Individual Economies

APEC member economies have promulgated a large number of laws and regulations with respect to environmental protection, addressing issues that range from air pollution, to water management, noise control, marine environmental conservation, waste treatment and toxic chemicals control.. Environmental measures with significant observed trade effects are classified into three types: (a) direct administrative tools employed for environment purpose; (b) voluntary schemes implementing product-related environmental measures (eco-labeling, packaging and recycling) and the environmental management system (ISO 14000 series); and (c) economic instruments such as environmental taxes, tradable permits, deposit/refund systems and financial incentives. Since these measures tend to affect the production, sale and consumption of specific goods, they also have indirect effects on trade.

Table 1
Signatory Status of the Selected Trade-Related MEAs: APEC Member Economies

Member economy	CITES 1973	Montreal Protocol 1987	Basel Convention 1989	Convention on Climate Change 1992
Australia	1976.7	1989.5	1993.1	1992.12
Brunei	1990.4	1993.5		
Canada	1975.4	1988.6	1992.11	1992.12
Chile	1975.2	1990.3	1992.11	1992.6
China	1981.1	1991.6	1991.12	1993.1
Indonesia	1978.12	1992.6		1992.6
Japan	1980.8	1988.9	1993.9	1993.5
Korea	1993.7	1992.2	1994.2	1993.12
Malaysia	1977.10	1989.8	1993.10	1993.6
Mexico	1991.7	1988.3	1991.2	1993.3
New Zealand	1989.5	1988.7	1989.12	1992.6
Papua New Guinea	1975.12	1992.10		1993.3
Philippines	1981.8	1991.7	1989.3	1992.6
Singapore	1986.11	1989.1		1992.6
Thailand	1983.1	1989.7	1990.3	1992.6
USA	1974.1	1988.4	1990.3	1992.10

Sources: *Register of International Treaties and Other Agreements in the Field of the Environment 1993*, UNEP; National reports.

Direct Administration Measures

Direct administrative intervention, or the "command and control" approach, can be defined as the application of rules and regulations that limit the discharge of given pollutants by regulating the production process, restricting the consumption of products, or limiting certain activities of direct polluters in a given time and area [OECD (1989)][3].

In general, the environmental standards stipulated by governments require potential polluters to meet these standards or stimulate them to make efforts to satisfy the standards. Penalties for failure in compliance with the standards have been laid out as well as specific departments monitoring the implementation of environmental standards been created. It seems those standards regulating toxic content, emission/effluent and product energy efficiency have more direct effect on trade where imported goods are prohibited if they not meet these standards. Table 2 illustrates some of these regulations.

Table 2
Trade-Related Environmental Regulations in Selected APEC Economies

Economy	Legislative Base	Regulations
Australia	Motor Vehicle Standards Act 1989	Impose on the road vehicles covered under this Act, and their components, standards in relation to the emission of exhaust fumes.
	Food Standards Code	
	Environment Protection (Sea Dumping) Act 1982	Controls the dumping of any waste into the sea through a system of permits and licenses; provides for a regime of offences and penalties for unauthorized or excessive dumping
	Quarantine Act 1908	Measures for the prevention of the introduction or spread of diseases or pests affecting humans, animals or plants; administered by the Australian Quarantine and Inspection Service.
	Fisheries Act 1905	Provides for the regulation of the fishing industry and fish farming, and for the conservation and management of fisheries and aquatic animal and plant life
Brunei	Vehicle Emission Standards	As of late December 1993 all vehicles as part of the registration process are to be tested. The testing of gasoline vehicles include emission test for carbon dioxide and hydrocarbons at idle, and for diesel vehicle, a smoke test at free acceleration. Similarly, motorcycle are also tested for carbon monoxide and hydrocarbon levels.
	Petroleum Mining Act Water Supply Act Fisheries Enactment & Fisheries Regulation Forest Enactment & Forest Rules	
Canada	Benzene in Gasoline Regulations (SOR/97-493)(CEPA)	The sale of gasoline with benzene concentrations exceeding 1.5% by volume is prohibited. Effective July 1, 1999, this figure is 1.0%. Importers must keep certain records of all batches imported.

[3] OECD, 1989, Council Recommendation on the Application of the Polluter Pays Principle to Accidental Pollution in the Polluter Pays Principle, OP., Cit.

Economy	Legislative Base	Regulations
	Fuels Information Regulations, No. 1(C.R.C.,c. 407)(CEPA)	Importers of certain types of fuels (primarily vehicle fuels) are required to keep quarterly records and submit them annually to Environment Canada. Records specify the volumes imported, and their sulfur content.
	Motor Vehicle Safety Regulations(C.R.C., c.1038)(Motor Vehicle Safety Act)	Imports of light-duty vehicles, light-duty trucks, heavy-duty vehicles, heavy-duty engines and motorcycles must conform to the emissions standards set for the vehicle? model year. This part of the Regulations (Schedule V) in effect harmonizes Canada? standards and test procedures for those vehicles with those of the United States Environmental Protection Agency.
	New Substances Notification Regulations (SOR/94-260)(CEPA)	Importers of new substances not covered by other statutes, including organisms and polymers, and where the imports exceed a certain amount, must provide specified information including extensive test data.
	Energy Efficiency Regulations(SOR/94-651)(Energy Efficiency Act)	All energy-using products as defined in the regulations (mostly household appliances) are assigned a minimum standard for energy efficiency. All such products when imported must bear a label, which describes their efficiency use, as specified in Schedule II of the regulations.
Chile	Emission Related to the Discharge of Liquid Industrial Wastes into Sewers	All point sources of liquid industrial waste discharges, that dump into sewer systems.
	Emissions Related to the Discharge of Liquid Industrial Wastes into Surface Water	All point sources that create liquid industrial and/or domestic wastes that discharge into surface streams and bodies of water, such as sanitary or industrial services.
	Maximum Permissible Levels of Annoying Noise Generated by Fixed Sources	Fixed sources, such as industries, shops, discotheques, recreation activities, etc.
China	Environmental Protection Law of P. R. China.	Technology and equipment harmful to the environment are restricted for import to China. Producing, restoring, transferring, selling and using toxic and radioactive materials must comply with the state relevant requirements in order to prevent and control pollution
	Marine Environment Protection Law	Prevention of dumping solid wastes into China marine area that pollute the marine environment
	Law on the Prevention and Control of Water Pollution of P. R. China	
	Law on the Prevention and Control of Air Pollution of P. R. China	
	Law on the Prevention and Control of Noise Pollution of P. R. China	
	Law on the Prevention and Control of Environmental Pollution by Solid Wastes of P. R. China.	
Hong Kong, China	Air Pollution Control (Motor Vehicles Fuel) Regulation	Motor vehicle diesel should contain not more than 0.20 by weight of Sulfur. Unleaded petrol should contain not more than 0.013 grams of lead per litre and 0.10% by weight of sulfur.

Economy	Legislative Base	Regulations
	Noise Control (Air Compressors) Regulations (Cap. 400)	Noise emission standards for certain portable air compressors.
	Noise Control (Hand Held Percussive Breakers) Regulation (Cap. 400)	Noise emission standards for certain hand held percussive breakers.
	Air Pollution Control (Motor Vehicle Design Standards)(Emission) Regulation	Control of emissions for imported vehicles; The regulation stipulated that all vehicles seeking first registration shall comply with the emission standards in the regulation.
Indonesia	Environmental Management Law	
	Technical Guidelines for the reporting of Containment of Impacts on Living Environment in the Industrial Sector (Ministry of Industry Decree No. 250/M/SK/10/1994	Regulate 20 types of industrial activities that need environmental impact analysis certificate (cement through the process of clinker, pulp, chemical fertilizers, up-stream petro-chemicals, steel-melting, black tin melting, copper melting, alumina processing, mixed steel, aluminum ingot, pellet and sponge processing, pig iron, ferro alloy, industrial estates, shipyard with production of over 3,000 DWT, aircraft, integrated plywood, arms, ammunition and detonators, battery, primary pesticides.
Japan	Chemical Substances Control Law	Notification submitted safety examination and test Biodegradation, bioaccumulation and chronictoxicity
	Law concerning the Disposal and Cleaning of Wastes (Law No. 137 of 1970)	
	G/TBT/Notify. (97.7)	Gas oil for automobile emission reduction
	G/TBT/Notify. (97.764)	Electric refrigerator-freezers for energy conservation
Korea	Air Quality Preservation Act	Car manufacturers must obtain authentication that their motor vehicles emit exhaust gases in conformity with permissible exhaust standards.
	Water Quality Preservation Act	Discharge standards of wastewater
	Noise and Vibration Control Act	All cars required to meet the motor vehicle noise control standards
	Act Relating to Treatment of Sewage, High Soil, and Livestock Wastewater	Facilities discharging livestock wastewater on large scale should maintain the pollutant level below the standards for effluent
	Noxious Chemical Substance Control Act 1990	The chemical substance as prescribed by the Presidential Decree shall not be manufactured or imported without undergoing the examination on noxiousness conducted by the Minister on Environment
	Drinking Waste Management	Drinking water quality standards
Malaysia	Environmental Quality (Clean Air) Regulations 1978	Control of industrial waste water pollution
	Environmental Quality (Prohibition on the use of Controlled Substance in Soap, Synthetic Detergent and Other Cleaning Agents) Order 1995	Control of industrial emissions
	Motor Vehicles(Control of Smoke and Gas Emission) Rules 1977	Control of motor vehicle emissions

Economy	Legislative Base	Regulations
	Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985 Environmental Quality (Motor Vehicle Noise) Regulations 1987	
Mexico	Project NOM-020-SCT2-1995 Project NOM-105-ECOL-1000 NOM-006-FITO-1995 NOM-097-ECOL-1995 NOM-097-ECOL-1995	Provides general requirements for the design and construction of containers to transport hazardous materials and re4siduals. Establishes the permissible maximum emission to the atmosphere of solid particles and reduced sulfur compounds from the production of cellulose Establishes the minimum requirements applicable to vegetables, their products and by-products for importation Establishes the permissible maximum limits of emission of particles and nitrogen oxides to the atmosphere due to the glass production States the limits of lead and soluble cadmium in glazed pottery articles
New Zealand	Transport Act 1962	Motor vehicles , road traffic, and commercial transport services , speed limits, heavy traffic restrictions and hazardous substances
Papua New Guinea	Environmental Contaminants Act 1978	Control of discharges of emissions to the environment through licenses. Regulate use of hazardous environmental contaminants through permits.
Philippines	Presidential Decree 984: Pollution Control Law National Air and Water Act Toxic Substances and Hazardous and Nuclear Wastes Act of 1990 (Republic Act No.6969) Pre-Manufacturing and Pre-Importation Notification (PMPIN)	Allowable standards for wastes or discharges Effluent regulations controlling the discharge of biochemical oxygen demand (BOD), metals , P.H, solid, organic compounds and temperature Air quality standard rules and regulations for NOX, SO2, and H2S emissions. Water quality standards regulate maximum amount of pollutants and toxic substances that may be discharged Hazardous waste generators are required to comply with strict standards for on-site storage like labeling and condition of containers A notification period of 120 days prior to import or manufacture of the chemicals
Singapore	The Clean Air Act and Regulations The Sale Of Food Act and the Food Regulations PSB ISO 14000 General Terms and Conditions PSB ISO 14000 Application Procedures	All imported used diesel vehicle required to comply with the UN /ECE R 2403 emission standard All food imported complies with the safety standards stipulated
Chinese Taipei	The Management Code of the Permissible Vehicle Energy Exhaustion Standards	Energy exhaustion standards for motorcycles of various sizes
	Effluent Standards Toxic Chemical Control Act Motor Vehicle Noise Control Regulation	

Economy	Legislative Base	Regulations
	Regulations Governing the Application of Petroleum Coke Import Permits Regulations Governing the Import Permits Application of Used Diesel Generators and Air Compressor	
Thailand	Enhancement and Conservation National Environmental Quality Act B. E. 2535: ECNEQA Specifying type and sizes of projects or activities of government agency, state enterprise of private person which are required to prepare reports on Environmental Impact assessment	
United States	Clean Air Act	National ambient air quality standards, hazardous air pollutant standards
	Clean Air Act Amendments	Vehicle emission standards and phase-out of the most Ozone-depleting chemicals
	1974 Safe Drinking Water Act	Drinking water quality standards in respect of both anthropogenic and naturally occurring contaminants and specifies requirements for treatment
	Air Quality Preservation Act	SO2, NO2, CO, PM10, Ozone and Lead

Source: Individual economy responses to the survey; *Guide to Environmental Legislation in Australia and New Zealand,* Australian and New Zealand Environment and Conservation Council, Report No. 31,1997; *Environmental Performance Reviews*, Canada, OECD 1995; *Environmental Performance Reviews*, United States, OECD 1995; *Environmental Protection in Korea 1997*, Ministry of Environment Republic of Korea; Ministry of the Environment, *Annual Report 1996*, Singapore.

APEC member economies are highly diverse with respect to the formulation and implementation of environmental laws and regulations:

- Environmental laws and regulations cover different areas in different economies; factors which decide the priority of environmental policies are the natural conditions of each member economy, the level of their economic development, patterns of production and consumption, and the levels of science and technology which impact on capacity to give effect to them.
- The variation in the implementation of laws across economies reflects, to a large extent, the differences in their environmental performance. Some member economies have implemented stringent environmental standards and technical regulations, while others have much less stringent ones, lacking monitoring and testing mechanisms. In some instances, the readiness of the landowners to accept compensation for logging and mining undermines the state's ability to enforce regulations.[4] In other instances, government officers still act reactively instead of proactively in case of pollution abatement. Environmental laws enforcement is lax and fines are relatively low and

[4] Mawuli, A., 1998, *Environment and Trade: Related Regulatory Measures in Papua New Guinea*, for APEC Workshop on Trade and Environment, Beijing.

consequently, environmental laws fail to induce a change of production methods.[5]

- Environmental standards vary from economy to economy. For instance, there are different testing protocols and data requirements for pesticides. Also, with different risk analysis, the standards for pesticide residues differ. Even within an individual economy, there can be a lack of uniform environmental standards. For instance, in the United States, California alone has 191 environmental regulatory boards and agencies by one count, applying different standards from the rest of the country.[6]

Voluntary Schemes

Voluntary schemes include measures addressing product packaging, labeling, waste recycling and recovery, as well as environmental management systems like ISO 14000. Although in principle compliance with such measures by government and industrial entities is for the most part voluntary, in practice they act more like mandatory provisions. Packaging, labeling, waste recovery and recycling provisions are typically based on market mechanisms, and rely largely on market information and responses from manufacturers and consumers. Also of note is the fact that the product categories established for the purposes of ecological labeling and the certification of standards vary across APEC member economies. Table 3 provides a list of these measures in member economies.

[5] Jesdapipat S., 1998, *Trade, Environment, and Sustainable Development: Thailand's Mixed Experience*, for APEC Workshop on Trade and Environment, Beijing.

[6] Esty, D.C., 1994, *Greening the GATT: Trade, Environment, and the Future.* Washington: Institute for International Economics.

Table 3
Product-related Environmental Measures Taken by Selected APEC Economies

Packaging	Canada	Code of Preferred Packaging Practices Pest Control Products Regulations (C.R.C., c.1253) (Pest Control Products Act) Transport Packaging of Radioactive Materials Regulations(SOR/83-740)(Atomic Energy Control Act)	Increase recycled content of grocery products, paper, cardboard, glass containers and plastics The packaging and labeling of registered imported control products must conform to the conditions set out in the Regulations. The fissile material, or devices or packaging of a certain level of radioactivity, that is imported or exported must be packaged and labeled as specified in the Regulations.
Ecological Labeling	Australia	Environmental Choice	
	Canada	Environmental Choice Program	Diapers, paints, batteries and household appliance, automotive fuels/carburants automobiles, toilet tissue
	China	China Environmental Labeling	Low CFC household refrigerators, CFC-free , aerosol products used in hair, unleaded gasoline, toilet paper, water-based paints, silk products, mercuryless cadmium-lead rechargeable batteries
	Hong Kong	Energy efficiency labeling schemes(EELS)	refrigerators, room air-conditioners and washing machines
	Japan	ECO Mark	Packaging, cosmetics, vehicles & parts thereof, batteries, etc.
	Korea	ECO Mark	Recycled paper, toilet paper
	New Zealand	Environmental Choice	
	Singapore	Green Label Singapore)	In 1996, total number of Green Label products to 702
	United States	Green Seal	Tissue paper, re-refined engine oil, refrigerators, clothes washers, paints etc.

Source: Economies' responses to the survey. *Eco-labeling: Actual Effects of Selected Programs*, OECD/GD (97) 105.

Eco-labels provide consumers with environment-related information on the overall environmental quality or characteristics of a product and are closely related to the life cycle assessment of a product. The survey shows that transparency, accessibility to the information on these labels and the response of producers and consumers are very important factors for effective implementation of eco-labeling schemes. For example, whereas eco-labels are effective marketing tools for particular products in some economies, in others such as Korea, products with eco-labels do not attract consumers since they doubt the quality of products made using recycled or reused materials.[7]

Another voluntary scheme is the ISO 14000 international standards for environmental

[7] Yoo, S. H., 1998, *International Environmental Pressures and Korean Trade*, for APEC Workshop on Trade and Environment, Beijing.

management systems. Compared with product technical standards, the ISO 14000 standards reflect a more complex conception of activities, products and services of industrial entities. They cover environmental management systems, environmental auditing, environmental impact assessments, environmental logos, life-cycle of products, technical terms and so forth. However, at this stage, the ISO 14000 series covers only procedural aspects, not substantive aspects.

The ISO 14000 standards came into effect on September 15, 1996, and have gained support from more than 110 economies. Since ISO 14000 is internationally unified and highly transparent, some economies adopted it as their own national standards on the day it came into effect. At present, among APEC members, Australia, New Zealand, Singapore, Malaysia and the United States have directly adopted ISO 14000 international standards for domestic purposes. Other economies, meanwhile, have made them the basis of their national standards or plan to gradually adopt them. The reasons that standards of these economies are not reconciled yet lie in differences as regards industrial development levels, geography, climate and technologies.

In view of its increasing significance in addressing trade and environment issues, many APEC member economies have given great attention to it and have established certification institutions to conduct the training of auditors for the certification of enterprises. The fact that ISO 14000 is a unified, authoritative and highly transparent system and has implications for market entry, has also stimulated enterprises to be active in adopting it for their own activities. By the end of 1996, a total of 155 enterprises in APEC member economies had achieved the required standards.

Environmental Economic Instruments

In addition to the aforementioned measures, Environmental Economic Instruments (EEIs) also play a part in the overall trade and environment issue. EEIs include environmental taxes/charges, deposit/refund systems, tradable permits and financial incentives. These measures typically apply equally to imports and domestic products. In principle, EEIs aim to correct for the failure of markets to fully reflect negative environmental externalities in the prices of products – in other words, they seek to "internalize" the environmental costs of economic activity by in effect making the polluter pay (the so-called "Polluter Pays Principle"). Since the reflection of environmental costs in product prices will have implications for trade, they are of relevance here.

The interest in EEIs reflects "the realization that the traditional measures for dealing with environmental protection, the so-called command and control approaches, were becoming increasingly expensive and did not provide much incentive for technological innovation."[8] The efficiency gains from use of EEIs are considered to lie in the fact that these instruments are flexible in choice opportunities, allow producers to reach the goal of environmental protection at a relatively low cost, and stimulate the development and utilization of environmentally sound technologies and products. [9] EEIs have been

[8] APEC Economic Committee, *Survey Results on the Use of Economic Instruments in APEC Economies* (APEC Secretariat, Singapore, 1998), p. 2

commonly used in OECD countries, and can be expected to play an increasingly important role in coping with trade and environmental issues. The various kinds of EEIs employed in the APEC region are summarized as follows:

Environmental taxes/charges: These include taxes on pollutant emissions and/or polluting products as well as adjustments to the existing tax structure, such as altering the energy tax structure, to make it serve environmental as well as revenue-generating purposes.[9] These taxes and charges create incentives for polluters to reduce pollution, including by employing environmentally sound technology, in order to lighten their economic burden. This is the so-called "dynamic effectiveness" effect. An advantage of such charges is that they are easily adjusted. On the other hand, to the extent that such charges are levied on products with low elasticities of consumer demand, they will tend to be more effective in raising revenues than on changing the practices of the polluters as the taxes are passed on to the consumer in the form of higher prices.

- *Emission and effluent charges*: Fees are collected according to the quality and quantity of pollutants discharged into the environment. Generally, one sort of waste-emission tax is aimed at one kind of emission. The charges are closely related to the last source in the waste-discharge chain, namely the actual point of discharge, and to the amount of the substance discharged. Due to high monitoring and administration costs, waste-emission taxes can only be appropriately applied to fixed polluting point sources.
- *Product charges*: These are fees collected from the sale of products that produce pollution during the production process or through consumption.
- *Tax differentiation*: Under this approach, positive and negative fees are collected from products, with the objective of respectively encouraging or discouraging products and services that have respectively positive and adverse effects on the environment – i.e., taxes on products or services that damage the environment during production and consumption are higher than for other goods and services. This approach can be implemented through existing indirect taxes, such as goods tax, sales tax or value-added tax, or through taxes collected specifically for environmental purposes.
- *User Charges*: These can be considered as ecological compensation taxes collected from manufacturers and consumers who exploit environmental resources. The revenues are then available to compensate for or repair damage to natural resources. In respect of administrative fees collected for public services such as waste water removal and garbage treatment, the user charges, by accounting for the full cost of particular services, influence behaviour by creating incentives for individuals to lower their own costs – e.g., by conserving water and/or restricting creation of garbage.

As can be seen from Table 4 below, APEC members levy a range of taxes and charges on products or practices identified as having adverse effects on the environment, although in some APEC members the taxes and charges are set at a quite low level.

Table 4
Types of Environmental Taxes/Charges in Selected Economies

Emission	China	According to the Environmental Protection Law of the

[9] OECD, *Implementation Strategies for Environmental Taxes*, Paris, 1996.

Charges		People's Republic of China, those who discharge restricted, or polluting materials that surpass State standards must make reparations based on the volume and density of the excessive restricted or polluting materials.
	Korea	Violation the established permissible limits required to pay emission charges in an amount equivalent to the treatment expenses for excess volume of pollutants emitted) air pollutants, (sulfur dioxide), water pollutants (BOD and COD), livestock wastewater pollution(BOD, suspended solids)
	Indonesia	Impose taxes on vehicle fossil fuels.
	Japan	Impose taxes on the discharge of carbon, restricting the release of carbon dioxide. Impose taxes on vehicle fossil fuels.
	Philippines	Impose taxes on vehicle fossil fuels.
	Thailand	Impose taxes on vehicle fossil fuels.
	United States	Impose taxes on the discharge of carbon, restricting the release of carbon dioxide. Impose taxes on vehicle fossil fuels.
User charges	Australia	Ozone depleting substances Marine environment discharges
	Canada	Waste disposal Water pricing
	Chile	Water pricing
	Hong Kong	Cost for treating and/or disposing of effluent from polluting trades, sewerage, chemical wastes, MARPOL waste, etc.
	Korea	Environmental improvement charges for owners of large diesel powered motor vehicles Charges imposed on manufacturers and importers of bottled water Waste treatment charges system for curbing consumption of products and containers difficult to collect, treat or recycle
	Mexico	Waste water
	Philippines	Pollution from forestry, oil and gas, mining
	Chinese Taipei	Air pollution prevention fee for gasoline, diesel or fuel oil consumed Municipal and industrial solid waste industrial wastewater, sewage services, air pollution
	United States	Garbage collection and disposal and collect fees on drinking water supply and water waste discharge Air pollution Solid waste disposal
Product charges	Canada	Try charges Tax on lead-acid batteries Non-refundable charges on beverage containers
	China	Impose taxes on the exploitation of mineral resources, including petroleum, natural gas, coal, non-metallic materials, ferrous and nonferrous metals, and raw salt.

	New Zealand	Imposition, assessment and collection of a levy on certain energy resources produced in N Z. Levy on natural gas, coal, South Island lignite
	Papua New Guinea	Natural resource tax (royalty)for mined products(petroleum) Export duties on logs and fish including shellfish
	Thailand	All mineral products and petroleum products are subject to royalty, 30% of mineral royalty and 20% of petroleum royalty are collected and returned to sub-district organizations for social and environmental purposes.
Tax differentiation	Canada	Surcharge on less fuel efficient vehicles and lower taxes on fuel efficient vehicles
	Japan	Preferential tax treatment the emission control facilities such as tightly covered cleaning machines and CFC recovering machines

Source: Individual economies' responses to the survey; *Guide to Environmental Legislation in Australia and New Zealand,* Australian and New Zealand Environment and Conservation Council, Report No. 31,1997; *Environmental Performance Reviews, Canada*, OECD 1995; *Environmental Performance Reviews, United States*, OECD 1995; *Environmental Protection In Korea 1997*, Ministry of Environment Republic of Korea;

Deposit/Refund System: These systems impose extra charges on the sale of products that might cause pollution. When certain conditions are met (for instance, the used or abandoned materials are assembled at an assigned place to avoid pollution), the money is be refunded. Under most circumstances, deposit/refund systems are voluntarily carried out by manufacturers. However, in some APEC member economies, some compulsory systems have been introduced. The main application of this system has been in the treatment of beverage containers were it has contributed greatly to the recovery and recycling of useful materials, with recovery rates ranging from 40 to 100 percent, with an average of 70 percent.

Table 5
Deposit/Refund System for Beverage Containers

Economy	Charge Base	Deposit as of Market Price	Return Rate
Australia	Per Container	Varies from 3-16%	Range from 61.7% for PET containers to 96% for refillable glass container
Canada	Soft drink, beer, wine ,spirits, others	Less than 20% of price	Ranges form 45% to 86%, particular cases up to 98.5?for beer bottles
China	Cans, bottles	25% for beer	90% for beer bottles
Japan	Cans, bottles	Around 10%	Local rates range from 70-80%, ?100% for beer bottles
Chinese Taipei	PET bottles	Not available	75.3?in 1995
U.S.	Can, bottles, PET containers	Not available	Range from 50% for PET bottles to 95% for aluminum cans

Note: PET: Polyethylene terephthalate
Source: *Survey Results on the Use of Economic Instruments in APEC Economies*, 97/SOM3/EC/005, prepared for the APEC Economic Committee.

Tradable Permit System**:** Tradable permit systems are designed to establish markets for polluters to conduct limited trade in "discharge rights", or the use of natural resources. The limited number of quantity and/or quality permits on emissions and/or effluents in

such markets ensures their trading value. In principle, tradable discharge rights should be effective in meeting environmental management objectives, since the environmental tolerance is (or should be) built into the design of the system. They should also be economically efficient by leading to an equalization of abatement costs by all discharges trading in the market.[10] Moreover, in Australia for instance, transferable rights including water consumption rights may be exchanged for the tradable quotas of renewable resources (forest and fishery resources).

Table 6

Tradable Permit System in Selected APEC Member Economies**.**

Member Economy	Measures	For Purpose
Australia		Over-fishing of certain species Inappropriate fishing methods Declining catches SO2 and air quality Logging of native forests
Canada	Not available	Emission of Nox VOCs Emission to ODSs
Chile		Over-exploitation of fishery Fishery management Water use
China		Water pollution, SO2
New Zealand		Emission of ODSs Over-fishing in the inshore fisheries Water quality Resource management
United States	The transfer of water rights The offset program A tradable permit system for CFCs 1990 Acid rain program Air quality control	For efficient use of waste Allowing companies to trade emission credits To implement the Montreal Protocol SO2 allowance trading system Allowance trading system

By providing polluters with opportunities to exchange permits for pollutant emissions, the tradable rights approach can help to minimize the costs of pollution reduction. So long as polluters face differing costs, there is a natural market in which polluters with high costs will purchase licenses from polluters with low costs. However, empirical evidence suggests that the market is rather weak: the number of permits for trade is quite small, the restrictions on trade vary and the efficiency of the tradable permit market is accordingly low. The question remains open whether or not it is possible to establish a simple and open market; and if there were, whether a sufficient number of trades would occur to achieve efficiency gains.

Financial Incentives: **Financial incentives for enterprises to modify behavior so as to reduce pollution can be broadly broken down** into subsidies/loans and performance bonds.

[10] James, D., *Environmental incentives: Australian Experience with Economic Instruments for Environmental Management,* Environmental Economics Research Paper No. 5, Environment Australia, 1997.

- *Subsidy/Loan*: subsidies involve using financial assistance or price supports (allocation, loan or tax allowance) to encourage reduction of pollution or to help pay for administrative compliance costs, for example, accelerated depreciation allowances for investment in pollution abatement equipment or in scientific research and development.
- *Performance bonds*: Performance bonds establish environmental management funds on the basis of tax income or financial assistance, to support scientific research and development of environmental protection.

There are a number of caveats concerning the effectiveness of tax reductions and exemptions. For one, administration costs can be high. For example, Australia introduced in 1992 a tax exemption on recycled paper and provided a tax exemption of 21 percent on recycled paper products. However, despite evident environmental benefits, it was abolished because it had proven to be administratively inefficient.

As regards subsidies, these are always controversial and that is true of this case as well. On one hand, subsidies can help firms to increase their investment in pollution abatement capacity. On the other hand, they can generate unfair competition. Some economies perceive them to be economically inefficient (and in some cases even illegal) and thus to be avoided; others perceive them as necessary to meet environmental goals. If uniform standards exist, concerns about subsidies are mitigated. The problem remains as to which types of subsidies are permissible and to what extent the subsidies should be granted.

Table 7 gives an indication of financial incentives in selected APEC economies.

Table 7
Financial Incentives in Selected APEC Member Economies

Financial Incentives	Economy	Measures	Content
Subsidy/ Loan	Australia	Environment (Financial Assistance) Act 1977	Provides for the Commonwealth to give to the states for planning projects that aim to conserve the environment
		Natural Resource Management (Financial Assistance) Act 1992	Granting of financial assistance in connection with projects relating to soil conservation
		Mala Fund	Incentives for biodiversity conservation, research into the Mala, or Rufous Hare-Wallaby, an endangered marsupial found in the central Australian deserts
		Tax exemption on recycled paper products	Disposal of waste paper
		Tax incentive	Lead emission from petrol
	Canada	Federal Tax System	Grants, tax rebates provided for control technology or reduce emissions
		Accelerated Capital	Encourages the purchase of air and water
		Cost Allowances	Pollution control equipment

	China	Subsidy, favorable tax for environment protection, performance bond	Pollution reduction Cleaner production
	Japan	Construction and transfer(C&T) program and low interest loan	Not specified
	Korea	Financial resources for Water Pollution Prevention Projects	Sewage treatment facilities River water purification project Livestock wastewater treatment facilities
	Mexico	Gasoline tax	Support environmental projects through a trust fund
	New Zealand	Forestry Encouragement Act 1962	Loans for establishment and maintenance of farm woodlots
	Chinese Taipei	Import tariff reduction Accelerated depreciation Low interest loans Industry Upgrading Enhance Act Tax incentives	Air pollution, solid waste, water pollution, noise, vibration Tax credit allowance as much as 20% of the expenditure on domestically produced pollution control equipment and 15% on the imported one Lead emissions from gasoline combustion
	United States	Construction Grants Program	Waste water treatment facilities
Performance Bond	Australia	Forest Industries Research Export Charge Act 1993 Forest Industries Research import Charge Act 1993	Impose levies and charges on the forest and wood products industry to fund the wood and wood products research and development corporation
	China	Subsidy, favorable tax for environmental protection, performance bond	Pollution reduction, cleaner production
	Hong Kong	Default payments, bonds, insurance	Air, noise, water, waste discharges
	New Zealand	Commodity Levies Act 1990	Certain commodities and levies payable for research or protection or improvement of animals or plants
	Thailand	Petroleum concession supporting funds Super Fund	Environmental purpose
	United States	Superfund	(Financed from) taxes on chemical feedstock and petroleum products to help the state operate resource conservation and recovery act

Source: Individual economies' responses to the survey.

2.3 ERTMs Taken by APEC Member Economies

APEC member economies have implemented a range of environment-related trade measures to advance their environmental goals. As shown in Table 2, some were adopted pursuant to multilateral environmental agreements (MEAs) while others were worked out

unilaterally by individual member economies.

Trade Measures Pursuant to MEAs Taken by APEC Members

As a party to MEAs, individual APEC member economies have devised Legislative trade measures in line with the provisions of MEAs. These are aimed at implementing the responsibilities under these MEAs. The measures normally range over prohibiting and restricting the import and export of controlled products, imposing requirements for import and export licenses, and granting import and export quotas.

Table 8
Trade Measures Taken by APEC Member Economies Pursuant to Selected MEAs*

Member Economy	National Legislation	Contents of Trade Measures
Australia	Ozone Protection Act 1989, Ozone Protection Amendment Act 1995, Ozone Protection (License Fees-Imports) and Ozone Protection (License Fees-Manufacture) Acts 1995	Regulate the imports and exports of substances that deplete the earth's ozone layer.
	Hazardous Waste (Regulation of Exports and Imports) Act 1989	Control the transport, storage, export and import of hazardous substances as defined in the Basel Convention.
	Wildlife Protection (Regulation of Exports and Imports) Act 1982	Regulating the export and import of certain plants, animals and goods including those covered by the CITES, permits are only granted in limited circumstances; provides for offences and penalties for unauthorized exports or imports.
Canada	Ozone-depleting Substances Regulation (SOR/95-576) Ozone-depleting Substances Products Regulation (SOR/95-584)	Prohibits export to or import from non-parties to the Montreal Protocol of certain controlled ozone-depleting substances and products contain such substances.
	Export and Import of Hazardous Wastes Regulation 1992 (SOR/92-637)	To control the export and import of hazardous wastes.
	Wild Animal and Plant Trade Regulations (SOR/96-263)	Species of plant or animal, or derivatives thereof, listed under Appendices = 1 * Roman I-= 3 * Roman III of the CITES require either an import permit, or a permit or certificate granted by the export country.
China	Law on Preventing Environment Pollution by Solid Wastes 1995, and Provisional Regulations on Environmental Protection management of Waste Imports 1996	Wastes import and transit control, and wastes import-licensing procedures.

Member Economy	National Legislation	Contents of Trade Measures
	Wildlife Protection Law 1988; Regulations on the Protection of Land-born Wild Animal 1992; Circulation from the State Council on Prohibiting the Trade of Rhinoceros Horn and Tiger Bone 1993; Regulations on the Protection of Wild Aquatic Animals 1993.	Regulate the import and export of wild animals covered by the State's key protection program or their products and of the wild animals restricted by international conventions or their products.
Hong Kong	Ozone Layer Protection Ordinance (Cap.403) Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation Waste Disposal Ordinance (Cap. 354) Animals and Plants (Protection of Endangered Species) Ordinance (Cap.187)	Import/export control of ozone depleting substance. Import/export control of products containing ozone depleting substances. Import and export permit control of waste other than specified uncontaminated waste intended for recycling or reuse purpose. Import and export license regulation of endangered species.
Indonesia	Minister of Industry and Trade Decree No.137/MPP/Kep./6/1996 Minister of Industry and Trade Decree No.111/MPP/Kep/1/1998 Minister of Industry and Trade Decree No.110/MPP/Kep./1998	Any person who desires to export and import wastes shall obtain the permission of the Minister of Trade and Industry under the condition as prescribed by the Presidential Decree. Production, import and sales of specified substances subject to strictly controlled. Different level of charges imposed on producers and importers. Prohibition of producing and trading ozone depleting substances and the production and trade of new goods using ozone depleting substances
Japan	Law for the Conservation of Endangered Species of Wild Fauna and Flora 1992 Law concerning the Protection of the Ozone Layer 1998 Law for Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes 1992	
Korea	Act Relating to Transboundary Movements of Wastes and Their Disposal 1992 Act of control on the production, etc. of specified substances for the protection of the Ozone Layer 1991	Prohibit the import of ozone depleting substances and products containing such substances.
Malaysia	Wildlife Protection Act No.76, 1972 Customs (Prohibition of Imports) Order 1988	Wildlife species under the CITES appendices have been included. Prohibited imports of substances covered by the Montreal Protocol: Annex A (Groups I and II) and Annex B (Groups I, II,and III) to the Protocol.

Member Economy	National Legislation	Contents of Trade Measures
	Customs (Prohibition of exports) (Amendment)(No.2) Order 1993, Customs (Prohibition of imports) (Amendment) (No.3) Order 1993	Prohibited any export or import of toxic and/or hazardous wastes (56 as listed).
Mexico	Declaration of Basel Convention on the Control of Cross-boundary Transportation of Hazardous Wastes and the Treatment of Hazardous Wastes.	Regulate the imports and exports of substances that deplete the earth's ozone layer.
New Zealand	Import Control (Hazardous Waste) Conditional prohibition Order 1994	Prohibit the importation of hazardous wastes as defined in the Basel Convention.
	Ozone Layer Protection Act 1996	Prohibit the importation of ozone depleting substances and those products containing such substances, and prohibit the export of such materials and/or products to non-parties to the Montreal Protocol.
	Trade in Endangered Species Act 1989	Regulate the export and import of endangered species of wild fauna and flora and any products derived from those species.
	Customs Export Prohibition Order 1996	Prohibit the export of hazardous wastes.
Papua New Zealand	International Trade(Fauna and Flora) Act 1979	Fully controlling the import and export of certain endangered species of animals and plants between CITES members
Philippines	Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990	
Singapore	Measures to phase out ozone depleting substances, started from 1991	
Chinese Taipei	Management Regulations on the Imports, Exports and Transshipment of Hazardous Waste 1993	
Thailand	The Ministry of Commerce Notification Regarding Imports (No.120) B.E. 2540	Prohibition of imports of household refrigerators utilizing CFC in the production process.
	The Wild Animal Reservation and Protection Act 1960	To control importing, exporting of both overseas and domestic wild animal and carcasses and prohibit anyone to trade reserve and protected wild animal or product from carcasses of wild animal except only with the permission from Director General.
	Hazardous Substances Act B. E. 2535	Prohibition of producing and trading ozone depleting substances and the production and trade of New Goods Using ozone depleting substances. Prohibition of imports of goods that damage the ozone layer.
USA	The Endangered Species Act 1973	Prohibit import and export of endangered and threatened species.
	The Clean Air Act, 1990 Amendment	Restrict the use, emission and disposal of ozone-depleting chemicals such as CFCs.
	Solid Waste Disposal Act, 1965	

*Basel Convention, Montreal Protocol and CITES.
Sources: (1) Guide to Environmental Legislation in Australia and New Zealand, Report No.31,1997, by Australian and New Zealand Environment and Conservation Council. (2) Pollution Control Report 1996, Ministry of the Environment, Singapore. (3) A complete work of the policies, laws and regulations concerning China? environment and natural resources, Secretariat of the Environmental Protection Commission of the State Council, 1995. (4) Economies' responding to our survey.

Unilateral ERTMs

Domestic legislation with respect to the environment enacted by individual member economies encompasses trade measures not deriving from any MEAs. Some unilateral environment-related trade measures taken by selected member economies are listed in Table 9.

Table 9
Unilateral Environment-Related Trade Measures Taken by Selected Member Economies

Economy	National legislation	Content of trade measures
Brunei	Forest Act 1934	Prohibition, either absolutely or conditionally the export and import of any forest produce or class or description of forest produce
Canada	Export of Logs Permit (C.R.C., c. 612) (Export and Import Permits Act) Fish Health Protection Regulations (C.R.C. , c. 812) (Fisheries Act)	Permits are needed to export logs of all kinds of wood. Permits will only be granted for peeled logs of less than 11 inches top diameter. Requires an import permit for the importation of wild fish, live cultured fish or eggs of wild fish, presently applying only to salmonid species.
China	Foreign Trade Law of P. R. China Interim Rules for the Import of Electromechanical Products Interim Rules of Limitation for the Import of Ordinary Goods	Prohibit the import or export of any goods or technologies in any of the following circumstances: where such goods or technologies will endanger national security or public interest; where the import or export of such goods or technologies must be prohibited in order to protect human life or health; where such goods or technologies will disrupt the ecological environment; where the import or export of such goods or technologies shall be prohibited in accordance with the provisions of international treaties or agreements to which China is a contracting party or a participating party. Prohibition, limitation on import of electromechanical products in order to protect human life or health and ecological environment. Limitation on import of some products which will be harmful to human life or health and ecological environment.
Hong Kong	Air Pollution Control Ordinance (Cap. 311)	Ban on import and sale of amosite and crocidolite or any substance or item made with or containing amosite and crocidolite unless with exemption granted by the Authority
Indonesia	Minister of Trade Decree No.99/kp/IV/92 Minister of Trade Decree No.349/kp/XI/1992	Notification of imports of yellow-fin tuna and products. Import prohibition of plastic wastes.
	Minister of Trade Decree No. 94/kp/V/1995	Export prohibition of Napoleon Wrasse Fishes

Economy	National legislation	Content of trade measures
Malaysia	Customs (Prohibition of exports) Order 1988	Coral alive or dead. Logs, sawn timber, moulding, plywood, veneer chips or partical boards, fire boards, wood chips and groundwood.
New Zealand	Customs Import Prohibition (whales and whale products) Order 1975	Conservation.
	Smoke Free Environments Act 1990	To control the importation of chewing tobacco.
	Customs Export Prohibition order 1996	Bluff oysters, greenshell (live) NZ mussels with a shell size of less than 50mm in length, greenstone, indigenous timber and its products, toheroa. (conservation measures)
	Marine Mammals Protection Act 1978	To protect marine mammals.
Papua New Guinea	Crocodile (Trade & Protection) Act 1982	Licensing and export controls on crocodile industry.
Thailand	Ministry of Commerce Notification Regarding Imports: **Import prohibition**	
	(No.99) B. E. 2536	Used engines, parts and accessories of motorcycle, displacement not over 50 cc. And wheels with diameters not over 10 inches.
	Non-automatic licensing	
	(N0.34) B. E. 2508	Ceramic food containers coated with lead of solubility more than 2 mg. Per litter.
	(No.107) B. E. 2538	Clenbuterol compounds and its salts.
	(No. 91) B. E.2521	Chain saw and accessories. (For conservation of exhaustible resources.)
	(No.50) B. E. 2512	Waste, parings and scrap, of plastic.
	(No.66) B. E. 2515	Used motor vehicles.
	(No.88) B. E. 2512	Used motorcycles.
	(No.85) B. E. 2534	Used diesel engines with displacement of 331-1100cc.
USA	Marine Mammal Protection Act 1972, 16 U. S. C. §1361-1421h	Bans import of commercial fish caught with methods that cause incidental kill or injury of marine mammals in excess of US standards. Bans import of yellow-fin tuna harvested by purse seines in the Eastern Tropical Pacific ocean.
	Pelly Amendment to the Fisherman Protective Act of 1967, 22 U. S. C. §1978	Authorizes the President to impose import restrictions upon products of any country who conducts fishing operations that diminish the effectiveness of an international environment agreement.
	Conservation of Sea Turtles, 16 U. S. C. §1537note	Bans imports of shrimp from nations engaged in commercial fishing using technology that may adversely affect protected species of sea turtles.
	Lacey Act Amendments of 1981, 16 U. S. C. §3371-3378	Prohibits trade (including import and export) of fish, wildlife, or plants taken, possessed, transported, or sold in violation of any US law, treaty or regulation.

Sources: APEC member economies respond to our survey.

In some circumstances, this type of measure can induce conflicts with other economies, especially when these measures are used as punitive actions to achieve extraterritorial environmental objectives. The US Marine Mammal Protection Act ban on imports of

Mexican tuna caught using purse seine nets, which also killed dolphins, stand out as a celebrated case in point. More recently, the US Conservation of Sea Turtles Act ban on imports from Thailand and Malaysia shrimp caught using fishing techniques that threaten endangered sea turtles is another example. These conflicts resulted in cases being brought to the GATT/WTO where they were solved under the GATT/WTO disputes settlement procedures.

Debate has being arisen as to whether or not it is legitimate and in compliance with the GATT/WTO rules to insert unilateral trade measures in an economy's environmental legislation. Some hold that as environmental protection is a transnational issue, it is difficult for an economy to avoid domestic environmental legislation with direct or indirect effect on other economies. Others believe that if a trade measure does not comply with WTO principles of Non-Discrimination and National Treatment, it should not be practiced. In this respect, it may be useful to note that the Rio Declaration on Environment and Development has voiced the desire of the international community that "unilateral actions deal[ing] with environmental challenges outside the jurisdiction of the importing country should be avoided… Environmental measures addressing transnational or global environmental problems should, as far as possible, be based on an international consensus." (Rio Declaration, Principle 12).

Case Study 1.
The US ban on Mexican tuna imports and GATT resolution

In 1988, the US amended its Marine Mammal Protection Act to restrict the imports of fish and fish products caught by methods that are more damaging to marine mammals than what the American standards allow. In the amended Act, there are also special provisions that ban the import of yellow-fin tuna fished with purse-seine nets, which also kill dolphin, from the Eastern Tropical Pacific ocean, unless the US Secretary of Commerce believes the ratio of marine mammals so caught is similar to the average rate for US fishing vessels. This restriction had a serious effect on Mexican exports.

For this reason, the Mexican government appealed to GATT, claiming the restriction was not in consistence with Article XI of the General Agreement general prohibition of quantitative restrictions and in violation of Article XIII not to establish discriminatory specific conditions for a specific geographical area. Mexico also asserted that nothing in Article XX entitled any contracting party to impose measures in the implementation of which the jurisdiction of one contracting party would be subordinated to the legislation of another contracting party.

The US argued that the Act is an internal regulation and that the measures in question were made effective in conjunction with restrictions on domestic production or consumption. The dolphin roamed the seas and were therefore common resources within the jurisdiction of no one contracting party. Embargo was necessary to protect the life and health of dolphins, and that it conforms to Article III, or if not so, still accords with exceptions in Article XX(b) and (g).

GATT panel dispute resolution determination concluded that the US tuna ban violated GATT Article III national treatment requirement, and that while Article XX (b) and (g) were designed to protect human or animal life and exhaustible natural resources, parties could not take advantage of these exceptions to justify "Extrajurisdictional" actions.

2.4 Efforts Made by APEC Member Economies and Sub-Regional Groups

APEC

APEC leaders made commitments at Blake Island in 1993 that APEC would protect the quality of air, water, and green spaces, and manage the region's energy resources and renewable resources to ensure sustainable growth and provide a more secure future for the people. To implement the leaders' commitments, APEC Environmental Ministers met in Vancouver in 1994 and issued the *APEC Environment Statement* and *A Framework of Principles for Integrating Economy and Environment in APEC.* The statement declares that for the purpose of integrating environmental considerations into relevant policy development and economic decisions throughout the region, we encourage APEC working groups and policy committees to integrate environmental concerns into their work programs." The Framework of Principles includes nine articles:

- Sustainable development
- Internalization of environmental costs
- Science and research
- Technology transfer
- The precautionary approach
- Trade and the environment
- Environmental education and information
- Financing for sustainable development
- Role of APEC

According to Article 6, "Trade and the Environment", the member economies should support multilateral efforts to make trade and environmental policies mutually supportive. While Article 9, "Role of APEC", stipulates that to attain sustainable development, APEC can add "concrete value" to the ongoing activities of existing multilateral and bilateral forums.

During the Osaka Meeting in 1995, the leaders reiterated that, the Asia Pacific region's fast-expanding population and rapid economic growth would increase the demand for food and energy, and result in pressure on the environment. To cope with the problem, the leaders agreed that it is necessary to put these interrelated, wide-ranging issues on APEC's long-term agenda and to consult further on ways to initiate joint actions so as to ensure that the region's economic prosperity is sustainable. To this end, many APEC Working Groups incorporated environmental considerations in their agendas while the inclusion of environmental goods and services as one of the sectors for early liberalization under the Early Voluntary Sectoral Liberalization (EVSL) initiative brought about some measure of integration of environment with the TILF agenda.

Member Economies' Attitudes towards Some Related Issues

All APEC member economies have committed to pursue sustainable development. While striving to realize the long-term objectives of trade and investment liberalization and facilitation, so as to maintain economic growth, they have also paid close attention to the environment. They have participated in multilateral environmental agreements and adopted domestic legislative measures to implement them. Sustainable development is embodied in the unilateral actions of APEC member economies as well as in APEC's collective actions.

APEC member economies have great disparities in terms of their level and stage of development, which has implications for their choices of priority goals and positions on

trade and environmental issues. Concerns on trade and environmental issues mainly exist in the following aspects:

- *Appropriateness of using trade measures to reinforce multilateral environmental agreements or of using unilateral trade sanctions to realize extra-jurisdictional environmental objectives.* The developing member economies are concerned that trade measures with environmental motivation may generate new non-tariff barriers that will erode the market access opportunities for their products to the developed member economies. They strongly oppose the implementation of unilateral trade actions not consistent with WTO rules to realize environmental goals beyond national boundaries. The developed members, however, stress trade measures as beneficial to the realization of environmental goals.
- *Different environmental standards exist in trade-related environmental measures*. The developing member economies demand that environmental standards not be used to reject their products, but the developed member economies insist on the regulatory sovereignty and the right to set their own environmental standards.
- *Relationship between trade and investment-driven economic growth and environmental protection*. Developing members emphasize their right to develop, but some environmentalists point out that the development objectives will inevitably lead to environmental pollution and the consumption of rare resources.

These disputes are not at all new. However, they can only become more intense as a result of deepening economic integration across APEC region. Moreover, globalization and the emergence of regional groups will require APEC member economies to pay more attention to each other's domestic environmental policies, as well as the direct and indirect consequences of these policies on other member economies.

Almost all APEC economies that are also members of the WTO participate in the WTO Committee on Trade and Environment (CTE) which reports to the WTO General Council in which most APEC member economies also participate. The WTO recognizes that trade and environment are both important areas of policymaking and that they should be mutually supportive in order to promote sustainable development.

The WTO's Agreements on Technical Barriers to Trade and on Sanitary and Phytosanitary Measures take into account the use of measures by government to protect human, animal and plant life and health and the environment. The Agreement on Agriculture exempts direct payments under environmental programs from WTO committees' commitment to reduce domestic support for agricultural production. The Agreement on subsidies and countervailing measures treats as a non-actionable subsidy government assistance to industry covering up to 20 per cent of the cost of adopting existing facilities to new environmental regulation.

Sub-Regional Trade Groups

There are several major sub-regional trade groups in APEC, including the North American Free Trade Agreement (NAFTA) and the Association of South East Asian Nations (ASEAN). Both aim at promoting economic growth through developing free trade and have incorporated environmental protection into their agreements and actions, so as to ensure sustainable development in the region. The two groups are attempting to establish a

harmonious relationship between free trade and environmental protection, but their methods differ.

The North American Free Trade Agreement: The NAFTA, which includes the United States, Canada and Mexico, is the first regional trade agreement between developed economies and developing economies. NAFTA incorporates environmental protection into the objectives of stable economic development for the first time. The agreement also defines environmental protection as an international obligation that members must bear while developing their economy.

- Article 104 of NAFTA says that trade obligations set out in CITES, Montreal Protocol, and the Basel Convention shall prevail in the event of inconsistency. This ensures all parties to NAFTA are able to implement multilateral environmental agreements (MEAs) and to settle any legal contradictions between NAFTA and the MEAs.
- NAFTA had incorporated the general environmental exceptions from WTO, permitting all parties to the agreement to take measures that may not be in compliance with related rules on commodity trade to protect natural resources in danger of extinction as well as social morality, human, animal or plant life or health. But these measures should not produce arbitrary or unjustifiable discrimination or disguised restrictions on international trade in any form. In this way, NAFTA sets up the priority status of environmental protection.
- On environmental standards and measures, NAFTA permits each of its parties to adopt certain environmental standards suited to its own situation, which are possibly more stringent than those regulated by other international agreements. Nevertheless, the application of these standards should not be discriminative or lead to unnecessary non-trade barriers. To foster the uniformity of the standards and measures, NAFTA has set up a committee of standards and measures to supervise its signatories.
- Members of NAFTA committed themselves not to lower their environmental standards to attract foreign investment.
- A mechanism for environmental dispute settlement has been set up

The Association of South East Asian Nations (ASEAN): In recent years, the ASEAN member nations have relied on exports to spur economic development, and at the same time have attached great importance to environmental protection. Since 1981, ASEAN has put forward seven declarations and resolutions on the environment and launched three regional cooperative schemes in this area. The ASEAN member economies have recognized that the relationship between the environment and development must be considered in the course of policy-making to guarantee sustainable development. They have decided it is necessary to set up a regional framework for this purpose. At the sixth ASEAN environmental ministerial meeting, "The ASEAN Environmental Strategic Action Plan" was adopted, which pointed out that environmental and trade policies must support each other. According to the plan, the strategic actions would focus on the study of trade and environmental policies in the light of the principle of sustainable development and the consequences of the ASEAN Free Trade Area on environmental, so as to take measures to integrate preferential trade policies with environmental policies. The ASEAN Secretariat has embarked on a study on the relationship between trade and the environment, which is expected to help harmonize the environmental policies among ASEAN member nations.

2.5 Conclusions and Suggestions

- The use of trade measures for environmental protection is a global trend. All APEC member economies have accepted sustainable development as their goal. They have participated in international cooperation on environmental protection and put into empirical practice through corresponding domestic legislation.
- Differing stages of development in APEC member economies have led to differences in their strength of their environmental legislation and the enactment of measures and standards. Arbitrary attempts at creating uniform standards will inevitably court disputes, which can obstruct free trade.
- While making unremitting efforts to coordinate trade and environmental policies, APEC member economies still hold different stands on some problems. In particular, the unilateral implementation of some environment-related trade measures by a member economy often leads to frictions.
- The establishment of a notification system. All member economies should timely notify the related bodies of APEC of their revision and implementation of ERTMs and TREMs as well as new ones, with view to update the APEC database and maintain transparency on a regular basis.

3. Interrelationship between Trade and Environment

Trade liberalization promotes the development of economic globalization resulting in ever-increasing interdependence of various economies and regions around the world and enhancing the scope and intensity of mutual influence between trade and investment activities and ecology. The 1972 Stockholm UN Conference on the Environment With raised awareness of the environmental problems brought about by human activities. Since then, there has been increasing concern about the environmental effects of economic integration and trade liberalization, and many measures (including standards, laws and regulations, eco-labeling and taxes, etc.) have been introduced for the purpose of environmental protection, some of which have significant trade effects. This part touches upon four important issues under the trade and environment discussion.

3.1 Trade Liberalization and Economic Growth in APEC Region

Until the recent economic crisis, economic growth in terms of GDP for the region, developing economies in particular, outperformed the rest the world during the last few decades, fueled by growing exports. Based on purchasing power parity, APEC's share (excluding the United States and Japan) of global GDP in 1995 stood at 23.4%[11], surpassing that of EU (22%), which used to command the largest share of global economy. The dynamism has been attributed not only to the gradual and steady movement of global trading regime in the direction of free trade, but also to a series of reform programs, including trade and investment liberalization programs, within the region, which reflect the conviction that an open, multilateral trading system is the foundation of the region's economic growth.[12]

Based on this conviction, APEC has made a great contribution to the establishment of a more open world trading system (including, in the view of some observers, by helping to bring the Uruguay Round to a successful conclusion). Meanwhile as a supplement and support to the global trade liberalization process, APEC has engaged actively in expanding and accelerating the region's process of free and open trade and investment.

A preliminary study[13] shows that a substantial benefit will be reaped from implementation of the "Manila Action Plan" (MAPA) by APEC members. The net effect of the MAPA on exports from APEC and the world would be approximately 3.0 percentage points and 1.8 percentage points respectively. The real GDP of APEC economies as a whole would be raised by about 0.4% or a permanent increase of US$69 billion per year in 1995 prices.

Table 10
Economic growth and Export Performance:

[11] Dua, Esty, 1997, *Sustaining the Asia Pacific Miracle*.

[12] See, *The First APEC Leaders Statement for Economic Outlook*, 1993

[13] APEC Economic Committee, 1997, *The Impact of Trade liberalization in APEC* (APEC, Secretariat, Singapore, 1997).

Selected APEC Member Economies 1980-1994 (%)

Region	Real GDP	Export	Export /GDP(1994)
World	3.14	7.90	16.8
Developed Economies	2.44	7.07	14.02
Developing Economies	4.24	10.43	26.03
APEC*	3.43	10.65	17.5
NIEs	8.47	10.94	55.9
ASEAN	5.54	11.72	45.8
CHINA	10.16	18.29	22.0

Source: Real GDP growth is calculated on the basis of GDP index at constant prices, from *International Financial Statistics Yearbook 1997*, International Monetary Fund. GDP in local currency and exchange rate data are from *World Development Indicator 1997*, World Bank. Exports value and export unit value index are from *Direction of Trade* and *International Financial Statistics*, International Monetary Fund, various years. Export Volume is calculated using export volume divided by export unit value index. Growth rates refer to annual compound growth rates. Data for Chinese Taipei are from that economy's *Statistical Data Book*, Chinese Taipei, 1997.

* not including Peru, Russia and Vietnam which joined APEC in November 1998.

While the Asia Pacific region has great potential, and significant gains are expected from the movement towards the Bogor goals, there have developed some apprehensions about the future of Asia's development, particularly since the middle of 1997 when the financial crisis erupted. It is to be expected, as stability is progressively restored, that the long-term factors that determine the growth will again move to the central stage, and that economies will draw on the lessons learned from the crisis in reforming domestic economic structures so as to meet the challenges arising from the globalization. In spite of slow growth or even minus growth rates, APEC as a whole still hold to their commitment to open markets which will create a favorable condition for renewed growth.

3.2 Environment Trend

Economic growth has brought about a range of benefits to APEC members, including by lifting more and more people out of poverty, helping to raise rates of school enrollment, increasing life expectancy and lowering rates of mortality of infant. Besides these, the experience of Newly Industrialized Economies (NIEs) suggests that, as economies become wealthier, people become more environmentally conscious and have greater capacity to address the environmental problems resulting from rapid industrialization and economic development.

However, despite some improvement of environmental indicators for individual members, the state of the environment in the APEC region as a whole is far from satisfactory. The main environmental problems fall into two broad categories: resource depletion and degradation, such as land degradation, deforestation, loss of biodiversity and depletion of fisheries; and heavy pollution, mainly air pollution and water pollution.

Resource Depletion

An assessment of global land degradation caused by human activity puts the affected area at 1.9 billion hectares, of which 0.85 billion is located in the Asia and Pacific region[14], accounting for 24% of the region's total land (WRI, UNEP, UNDP, WB, 1996). As revealed by Table 11, some fast-growing economies of the region have suffered from high rates of land degradation.

Table 11
Estimated Land Degradation and Deforestation in selected APEC member economies
(1981-1990)

Economy	Share of degraded area in the total land	Share of deforestation in the total forest
China	30	7
Indonesia	24	11
Malaysia	-	18
Philippine	17	34
Thailand	34	34

Source: *World Development Report*, World Bank 1994

This century has seen the extent of tropical forestland reduced by 1/5 and still declining at accelerated rate. While the world as a whole recorded a 0.9% pace for cutting of the tropical forest in 1980s, Asia's rate was much higher at 1.2%. As shown in the Table 2, Thailand and Philippine lost more than one third of their forests. Even if Malaysia and Indonesia seemed to have experienced less deforestation on a proportional basis, they also lost vast areas of forest in absolute terms, taking into account the forest coverage in these countries.

Though land degradation and deforestation have something to do with natural erosion, the speed and extent of deterioration in APEC economies is clearly related closely to improper industrial, agricultural and trade activities such as excessive grazing, backward irrigation methods, over consumption of chemical fertilizer, industrial pollution and timber trade. Land degradation has resulted in a drop in the land value of use for agriculture, thus threatening the region's capability to meet its own grain demand. According to a rough estimation, the loss of potential productivity due to land degradation amounted to between 0.5%-1.5% of GDP in some economies (World Bank, 1992). Rapid deforestation will also lead to disastrous consequences: experts of UNDP have predicted that Asia's timber reserves will run out in no more than 40 years, if the present rate of deforestation persists.

Land degradation and deforestation are also directly responsible for the loss of biodiversity in the region, which is the host of four out of eleven of the world mega-diversity economies, namely Australia, China, Malaysia, and Indonesia. These economies and the other two APEC members (the United States and Chile) have also the highest

[14] The Region covers the area across from Mongolia in the north to New Zealand in the South, from the Cook Island in the East to Iran in the west.

incidences of endangered species.

As the biggest production base of seafood in the world, the APEC region is also confronted with the rapid depletion of the Pacific fishery due to overfishing. As shown in Table 12, in most parts of the Pacific, the rates of overfishing and depletion exceed 50% with the eastern central Pacific as an exception.

Table 12
State of Exploitation of the Pacific Fisheries

Region	Catching volume (m/ton)		% of Stocks of full-fished, overfished, depletion, recovering
	1981-1983	1991-1993	1992
Northwest	18.5	20.2	100
Northeast	1.9	2.7	50
Central west	5.2	7.8	63
Central east	1.6	1.3	29
Southwest	0.4	0.8	45
Southeast	7.4	14.2	50

Source: WR 1996-1997

Pollution

Water Quality

Despite relatively better condition of fresh water supply in most APEC economies as compared with other regions of the world, water bodies in the region are being severely polluted by untreated sewage, municipal waste which give rise to breeding of pathogens in large quantity, and toxic waste from industrial and agricultural activities which leads to high concentration of organic and heavy metals. According to a forecast of World Resource Institute, China will face the pressure of water shortage by 2025.

Air Quality

At the beginning of the 1990s, a survey on air quality was completed under the sponsorship of WHO and UNEP for 20 cities with population over 10 million and estimated population over 10 million in 2000. The result of the survey indicated that air pollution was a problem for all nine APEC cities within the survey, though to varying degree. Suspended particles (SPM) were found to be the most threatening pollutant to these cities. Of the nine cities[15] surveyed, six cities[16] were regarded as being severely polluted with the content of SPM exceeding more than two times and one as being moderately polluted with SPM exceeding two times.

Acid rain and climate change

These unfavorable changes of the environment have a great deal to do with the emission of SO_2 and CO_2 respectively. The APEC region accounted for 50.6% and 46.7% of world

[15] The cities are Bangkok, Beijing, Los Angeles, Manila, Mexico City, New York, Seoul, Shanghai, Tokyo

[16] Those are Bangkok, Beijing, Manila, Mexico City, Seoul, Shanghai.

total emission of SO_2 and CO_2 in 1992. Over the recent ten-odd years, most APEC members, fast growing members in particular, have recorded much higher emission rates than the world's average (See tables 13 and 14).

Increased emission of SO_2 has given rise to acidification in some parts of the APEC region. The early 1990s witnessed the concentration of acid in the southeast of China; some parts of Thailand, Indonesia and small portion of Korea, Japan and Philippine exceeded the international guideline by a big margin.

Table 13
Growth of SO_2 Emission in the APEC Region 1980-1992

Economy	Growth rate	Economy	Growth rate
Indonesia	5.7	Canada	-0.4
Philippine	2.6	Hong Kong	4.9
Thailand	8.9	New Zealand	3.3
Malaysia	7.9	Papua New Guinea	2.06
Korea	7.2	Singapore	4.2
Japan	1.3	Mexico	2.0
The United States	0.4	Chile	2.1
Australia	2.3	China	4.9

Source: WR 1987, 1996-1997

Table 14
Growth of CO_2 emission in the APEC region

Economy	1990	2020	Growth	Annual growth
The United States	5168	6371	23.28	0.70
EU	3110	3675	18.17	0.56
Japan	1238	1679	35.62	1.02
Canada	466	612	31.33	0.91
Australia	268	386	44.03	1.22
New Zealand	27	42	55.56	1.49
China	2974	10162	241.69	4.18
ASEAN*	266	777	192.11	3.64
NIEs in Asia**	529	1224	131.38	2.84
Other Countries	8059	15909	97.41	2.29
World	22105	40837	84.74	2.07

Note: * not including Vietnam, Singapore
** Including Korea, Singapore, Hong Kong and China Taipei.
Source: MEGABARE

Given the environmental trends cited above, it will be reasonable to conclude that the economic success in the APEC region has been accompanied by the deterioration of

ecological environment at national and regional level.

Underlying Causes of Environment Deterioration

Although environmental degradation has followed in the wake of economic growth in most APEC member economies, many studies including those conducted by experts of APEC members suggest that environmental problems should not be attributed to economic growth itself. The root of the problem lies in lack of recognition of the scarcity and economic value of environmental resources[17]. Environmental degradation arises when people ignore and underestimate the environmental cost to the society in the development process. The deviation is mainly caused by two types of failures.

Market Failure:

The market fails to reflect the true social value of the environmental resources due to difficulties in defining, allocating and enforcing the ownership or property rights of environmental resources. There is also a lack of good understanding of the benefits of environmental resources and of open access to these resources. For instance, the essence of overfishing lies in the free use of fisheries in the open sea. Fisheries are generally treated as public goods, which are accessible to anyone equipped with ships. In this case, no one has an incentive to conserve and protect this resource.

Policy Failure:

Government policies sometime encourage inefficiency, which in turn causes environmental damage. For instance, energy subsidies encourage over-consumption of energy, the consequences of which include accelerated depletion of non-renewable fossil fuels, air pollution and climate change among others.

Population Growth in APEC

The environmental problems arising from these two fundamental causes are often exacerbated by population growth, urbanization, poverty and industrialization.

The current population of the 18 APEC members, not including the three new members, Peru, Russia and Vietnam, is 2.18 billion, representing 37% of the global population. The population growth rate for the APEC was 1.7% on average over the period 1960 to 1995. At this rate, the population in the APEC region would reach 2.8 billion by 2025. The continued growth of population will put extra pressure on the environmental resources, for instance, the real and potential problem of food security tend to aggravate the already existed environmental problems such as land degradation, deforestation, and depletion of fisheries, etc.

Urbanization

Between 1975 and 1995, the urban population grew at 2.9% on average for APEC as

[17] *Development Report,* World Bank, 1992; OECD 1994; Dua and Esty, 1997, *Sustaining the Asia Pacific Miracle.*

whole, and 4.3% for APEC developing members, largely fueled by rural-urban migration. At this rate, the urban population in the APEC region is expected to reach 1.75 billion by 2025. The environmental stresses relating to urbanization include shortage of clean drinking water, insufficient capacity to deal with municipal waste and air pollution.

Poverty

According to UN statistics, there are approximately 1.5 million people living below the poverty line in the APEC region. Experience shows that poverty and environment degradation are mutually reinforcing: poverty contributes to many environmental problems such as overgrazing, overstocking, clearing more and more trees for cultivation; in turn, environmental degradation aggravates poverty.

Industrialization

While industrialization generates income and employment opportunities for society, it also brings about a lot of environmental pressure, such as air pollution, water pollution and toxic waste. Industrial production and energy use tend to pose serious threats to human health, productivity. Presently the consumption of energy in APEC economies is on the increase. Energy consumption of APEC economies constituted 45.5% of the world total in 1980, rising 6 percentage up to 51.5% in 1994. NIEs and fast growing members contributed to much of the increase. Meanwhile, pollution-intensive sectors like heavy and chemical industries grew, particularly in developing economies.

Small and medium-sized enterprises in APEC developing economies contribute not only to a considerable portion of GDP and export of these economies, but are also responsible to an important degree for the deteriorating indicators of environmental quality. Lacking efficient and clean technology and capital equipment, these small and medium sized enterprises usually have low utilization of resource and higher emission level and are poorly equipped to deal with environmental harms out of their production.

3.3 Environmental Impact of Trade Liberalization

Economic integration and ongoing trade liberalization at the unilateral, regional and multilateral levels have given rise to serious concern about possible detrimental effect on environment. For instance, grave fears were felt for the degradation of air and water quality in the southwest of the United States during the negotiation of the NAFTA. Again there arises a heated discussion around environmental consequences of free trade agreement between Chile and U.S.A., which has been under consideration by two governments for sometime. Some people deeply worry that Chile's environmental objectives would be foiled under such an agreement while others believe that the agreement would contribute to enhancement of the environmental standards and management and achievement of the environmental goals of the country.[18]

[18] See "Chile Environmental Program", *World Resources, 1994-1995*, by World Resources Institute, UN Environment Program, UN Development Program.

Traditional economic theory suggests that trade tends to facilitate efficient resource use by allowing for specialization and exchange. In this sense, trade liberalization works for a better environment, encouraging the production and consumption patterns among the economies built on efficiency of utilization of environmental resources. In practice, however, widespread lack of effective environmental measures to internalize environmental costs in market price implies that global production and consumption patterns based on free flow of goods and service can be costly both in economic and particularly ecological terms. The following part of this paper elaborates on the environmental consequences of trade liberalization from the aspects of trade, economic growth, the role of market mechanism, and regulation build-up, trying to identify both the positive and negative effects.

Product Effect

It is widely noticed that trade of some products with specific ecological content may produce great impacts on environment. For instance, free or uncontrolled trade of endangered species accelerates the extinction and depletion of them. The same thing holds for non-renewable resources.

The free flow of toxic waste across boundary also has also caused serious concern recently. With the growth of production and consumption, the amount of waste created has grown steadily, including some very toxic and harmful wastes, thereby doing severe damages to the environment. As the cost to treat the waste are becomes increasingly higher, a number of economies attempt to transfer harmful waste, via trade, mostly to developing economies that have lower environmental standards. Trade liberalization is likely to facilitate the international transfer of harmful waste and produce an unwanted environmental effect if the recipient economies, which are mostly developing economies, do not have adequate technology and facilities to treat the waste properly.

On the other hand, trade liberalization has not only expanded the market scale of the products turned out with environment-friendly technology, but also has provided more opportunities for global spread of environmental technology and services to solve specific ecological problems. It is evident that the environmental industry has grown rapidly, reaching a total value of industrial production of US$ 453 billion in 1996. An increasing number of enterprises has come to realize that environmental protection is not only a regulatory cost but also represents potential business opportunities. Their efforts to expand this market have compounded with further initiatives to liberalize trade at global and regional levels. The Uruguay Round has brought a fall in the tariff level of global trade, including those applying to environmental goods and technology (see Table 15).

Table 15
Average Tariff of Environmental Goods[19] in Selected APEC members

Economy	Bond tariff[20]	Applied	Economy	Bond Tariff	Applied

[19] See COM/TD/ENV9(98)37/ANN

[20] The bound level represents the upper limit at which a country's tariff has been fixed under the Uruguay Round commitments

	(UR)	MFN tariff[21]		(UR)	MFN tariff
Canada	4.0	4.5	Mexico	35.1	11.3
The US	1.4	3.2	Malaysia	11.85	5.2
Japan	1	1.4	Indonesia	33.9	7.1
Korea	9	7.8	Thailand	16.2	12.3

Source: OECD, 1998

A comparison of tariff levels of selected APEC members suggests that barriers still exist for products in this group; while the developed members have reduced their rates to low levels, the developing members' tariff remain high. Accordingly, there is room for further initiatives in this field, including through the Early Voluntary Sectoral Liberalization proposal which included environmental goods and service, among the nine fast-tracked sectors. This program represents a solid step further to the final goal of free and open trade in APEC and it may bring environmental gains to the APEC region as well.

Growth Effect

Trade liberalization involves reduction and removal of the impediments to the flow of goods and services. This makes it possible for economies with different resources and comparative advantages to overcome the constraints imposed by natural endowments, stage of development and inefficiencies of resource allocation to achieve economic growth. The experience of APEC in the past decades shows how trade can be an engine of economic growth. The implication of economic growth (whether trade led or not) for environment have two dimensions. On the one hand, economic growth generates positive effects on environment through raising income, improving industrial structure and upgrading technological level. On the other hand, economic growth leads to increased production input and waste emission and also involves change of uses of some resources which may exert more pressure on the environment.

While environmental benefits from economic growth are likely to be enormous, it is also seen trade-led economic growth has had negative consequences on the rural and marine environment.[22] Deforestation, which is widely seen in almost every Asia Pacific developing economy, is caused both by rising demand in the overseas market for timber or rising domestic demand for more land for agriculture. The results are massive flooding and soil erosion. Changed land use is responsible for an increase in amounts of carbon dioxide released into the air. Intensifying agriculture for export has contributed to an intensive use of fertilizer[23], degrading both soils and water quality.

Income Change

As incomes grow steadily, a middle class that has high education levels and strong

[21] The applied MFN tariff is the 1996 (non-preferential) level.

[22] Sitanon Jesdapipat, 1998, *Trade, Environment, and Sustainable Development: Thailand's Mixed Experience*.

[23] Intensifying agriculture for export has led to a 380 percent increase in the use of fertilizers to produce just a 25 percent increase in yields between 1980 and 1990 in Thailand.

environmental awareness develops and eventually forms the majority of the population[24]. With the existence and expansion of that part of the population, society tends to pay increasingly closer attention to environmental quality and to have higher demand for environmentally-friendly products. The enormous purchasing power represented by the middle class eventually turns into a powerful political force to influence policies, laws and regulations governing the environment. Precisely because of this social basis, enterprises are more willing to invest in clean production technology and to pay for pollution abatement, thus making it possible to internalize environmental cost.

Table 16-1
Consumption of Fossil Fuel (x 10^9/person)

	1961-1965	1971-1975	1981-1985	1986-1990
Developed economy	115.82	165.7	153.81	160.06
Developing economy	7.37	10.34	14.53	17.28

Table 16-2
Consumption of Log (M^3/100 person)

	1961-1965	1971-1975	1981-1985	1986-1990
Developed economy	1.1	1.14	1.17	1.29
Developing economy	0.43	0.44	0.48	0.48

Table 16-3
Consumption of Copper (T/100 person)

	1961-1965	1971-1975	1981-1985	1986-1990
Developed economy	6.17	7.46	7.5	8.06
Developing economy	0.17	0.26	0.38	0.48

Source: WRI

A comparison of material consumption per capita between developed economies and developing economies reveals the fact that wealthier people tend to exert more pressure on environment by consuming more resources. Though there is a downward trend in the consumption of resources in developed economies, they still consume an overwhelming portion of the world total.

Structural Change

Sustained economic growth ultimately leads to a change in economic structure. Table 17 provides a picture of the structural change in three APEC economies (Indonesia, Korea and Japan) during the recent three decades. Though these three economies differ remarkably in population status, natural resource endowment, the stage of industrialization

[24] This is precisely what is happening in Asia today. John Naisbnitt, a well-known American futurist, said in his book titled *Megatrends Asia* (1996) that a new middle class is appearing on a unprecedented scale in Asia. He predicted that the number of middle class people in Asia will increase by 100 at 200 percent over the next decade.

and the external conditions for industrialization. At the same time, they share many features in their structural change.

Table 17
Structural Change: Selected APEC Economies

	1960			1990		
	Indonesia*	Korea	Japan	Indonesia	Korea	Japan
Agriculture, hunting, forest, fishing	58.2	38.0	12.5	21.5	9.2	2.4
Mining quarrying	2.5	2.2	1.7	13.4	0.5	0.3
Manufacturing	7.6	14.0	31.7	19.9	29.5	28.1
Electricity, gas, water	0.1	0.8	2.3	0.6	2.1	2.6
Construction	1.7	3.4	5.3	5.5	13.5	9.6
Wholesale, retail	12.3	12.9	16.2	16.9	11.2	12.4
Transport, storage	2.1	4.7	8.3	5.6	7.2	6.2
Finance, insurance	3.0	8.7	8.9	6.7	14.8	15.8
Social, personal service	8.5	7.9	10.1	3.3	4.2	15.3
Production of government service	3.4	7.3	3	6.5	7.9	7.4

Source: Dua and Esty, *Sustaining the Asia Pacific Miracle*, 1997
* 1965

Structural change has a great bearing on environment as it determines the type and range of environmental damage that economies will face at any given period or stage of evolution. In the early stage of industrialization, when labor-intensive and resource-based industries dominate, the major environmental problems tend to derive from inefficient and sometimes even reckless exploitation of natural resources, as well as from deforestation and land degradation. As an economy moves to heavy and petro-chemical industry, toxic wastes, air pollution and water pollution rise to the top of the economy's environment agenda. Once the service and hi-tech industries gain importance in an economy, the whole economy shifts towards a non-pollution intensive type. Currently the industrial structures of most of APEC developing economies are characterized by higher energy intensity and capital intensity, with higher polluting potentials.

Technology Change

Economic growth and accumulation of material wealth create conditions for adopting new industrial technology, which enables the production process to move in the direction of low consumption in energy and raw material, low pollution emission and high output, and serves as an important channel for solving environmental problems. For instance, in the textile industry, new mills use two thirds less water than old mills. The adoption of the continuous steel casting technology saves such production links as casting steel into ingots and pre-rolling before finish rolling. New technology enables workers to turn out the same amount of products with 10 to 15 percent less crude steel than previously.

The above analysis identifies two dimensions of the problem, indicating that there is a clear linkage between environment quality and income. However, economic growth alone

is not sufficient for a better environment. That is to say, economic development without appropriate complementary environmental policies in place is not certain to bring about a good result for the environment.

Market Effect

Trade liberalization expands the scope of function of the market mechanism. On the one hand, this tends to enhance economic efficiency, which will in general be positive for the environment in the sense that a given amount of input will produce more output. On the other hand, trade openness subjects governments and enterprises to more intense competition, which may make them reluctant to adopt more stringent measures than others do and to voluntarily internalize environmental costs. Most prices of goods and services in the international market, therefore, fail to fully reflect the environmental cost. This neglect of environmental costs leads to excessive exploitation of resources and increased emission of pollutants and wastes. So, based on the premise of inadequate internalization of environmental costs, free trade tends to magnify the environment degradation. It should be noted that some policy choices such as subsidies further intensify market distortion.

Market distortions caused by protectionism also can lead to damage to the environment. There are numerous cases that illustrate this point. For instance, wide application of import restrictions and subsidies has in some cases resulted in excessive exploitation and consumption of renewable and non-renewable resources by protecting low-efficiency domestic producers. Thus, an increase in the role of the market by progressively reducing and ultimately ending protection for subsidized and sheltered enterprises (many of which are inefficient and pollution-intensive), not only enables resources to flow to the most efficient enterprises and sectors but also has the potential to greatly reduce the abuse of resources and damage to the environment.

Regulatory Effect

A multilateral trading system has an important role to play in facilitating the formulation and implementation of environmental policies and regulations, and enhancing the level of environmental protection.

In the first place, trade liberalization promotes the coordination of environmental policies among interested parties through clauses in trade agreements. Provisions in these agreements may be either directly environment-related or may include built-in environmental measures. The North American Free Trade Agreement has a supplementary agreement on environment, setting an international precedent for trade agreements. In recent years, more and more regional trade agreements have addressed environmental issues or include environment-related provisions. This has helped bring about direct and substantial economic and environmental benefits to the parties concerned.

In the second place, the multilateral trading system encourages adoption of international standards and development of conformity in assessments. The WTO sees this as very important and has concluded two important agreements in this field, the *Agreement on the Application of Sanitary and Phytosanitory Measures* (SPS) and the *Agreement on Technical Barriers to Trade* (TBT). Both the TBT and SPS have environmental dimensions, and both have imposed disciplines on related domestic policies and practices.

It is true that the TBT and SPS are basically designed to prevent higher (different) technical standards, including environmental standards from being used as trade barriers. Even in this sense, the WTO encourages adoption of international standards. For developing economies, conformity with international standards usually means "upward harmonization."

In the third place, a strengthened multilateral trading system helps to regulate the use of trade measures for environmental purposes. Recent years have witnessed an intensified trend towards the use of trade measures to attain environmental goals. According to the WTO Secretariat, 181 or 7.8% of all notifications made by WTO members in 1997 under the various agreements and notification obligations were either directly environment-related or had some environmental provisions in them. The main reasons to use trade measures to deal with environmental problem are to reduce the externalities derived from international trade where environment damages occur in the consumption of imported goods or in the production of exports. In general, the WTO allows its members to impose on imported products the same standards that are applied to domestic products. This results in trade restrictions on those that are not conformed to the standards of the importing economy. However, it generally holds that the WTO does not allow trade restrictions based on process and production method (PPM) evaluation.

Another factor motivating the use of trade measures to deal with environmental problems is to influence environmental policy of another economy.

Currently, the international community holds different attitudes towards trade measures pursuant to multilateral environmental agreements (MEAs) and those unilaterally adopted by individual economies. Though varying in degree, the majority of APEC member economies is in favor of the role of trade measures to attain specific environmental goal[25]. However, there is heated debate over the justification of unilateral use of trade measures to achieve extraterritorial environmental objectives.

3.4 Impact of Trade-and Environment-Related Measures on Trade

Multilateral Environmental Agreements

Multilateral environmental agreements (MEAs) affect trade by way of, first of all, influencing each economy's formulation of environmental and trade policies. To honour their commitment to these agreements, contracting parties are authorized to take appropriate trade measures to meet the environmental targets. For instance, signatories to the Montreal Protocol have all enacted laws and regulations and phase-out programs prohibiting or restricting the trading and use of controlled substances or goods containing or using such substances. The Montreal Protocol contains direct trade provisions such as the one that requires parties to ban or restrict the trading with non-parties of CFCs or other controlled substances, or products that either contain or use these materials. There remains dispute over the provisions' conformity with the multilateral trade system of GATT/WTO,

[25] Asian and Pacific development Economic and First WTO Ministerial Conference, Issues of Concern.

as it has been pointed out the restrictions on trade between parties and non-parties are against the GATT's principles of MFN and national treatment. This argument is, however, dying away since more and more economies are joining the convention on realizing the importance of ozone depletion for the global environment.[26]

The Protocol also exerts an indirect impact on trade, as the elimination of the controlled materials entails a lot of research and the adoption of new production technologies, thereby bringing about extra costs. But the case studies on the APEC developing economies have proved that the Protocol has little effect on these economies' exporting competitiveness.[27] With most of the exporters being joint ventures, subsidiaries of multinational corporations or other big businesses, there are not any major difficulties for them to obtain the necessary finance, information and applicable technologies. Moreover, the rising costs can be partially shifted onto consumers.[28]

For its part, the UNFCCC does not explicitly include any trade clause like the one that restricts trade on timber or other forestry goods, although it has so been suggested. But it will have a long-term and wide-ranging impact on trade since reducing emissions involves almost the full range of industries. For instance, the trading of excess emission-inducing products and technologies is likely to be affected,[29] and the shift to environmentally sound energy may also lead to rising costs of goods manufactured.

The Convention and Kyoto Protocol also allow various measures to reduce greenhouse gas emission, including emissions trading, Joint implementation and Clean Development Mechanism. All these will have a far-reaching bearing on import and export.[30]

Unilateral Measures

Besides those trade and environmental measures adopted pursuant to MEAs, numerous unilateral measures for environmental purpose have been adopted by developed and developing economies as well. From the available statistical data on trade and environmental measures, as outlined in the survey, it may be concluded that developed economies have formulated an apparently greater number of environmental measures than their less-developed counterparts. Needless to say, their measures are more detailed and extensive in scope, higher in standards, and stricter in contents. Undoubtedly, this is

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[26] UNEP, 1995, *The Use of Trade Measures in Selected Multilateral Environmental Agreements*, 63, 91.

[27] ESCAP, 1996, *Enhancing Trade and Environment Linkages in Selected Environmentally Vulnerable Export-Oriented Sectors of the ESCAP Region*, 52-54, 104-105.

[28] For example, the Matsushita Group of Companies in the Philippines used substitute materials for CFCs in manufacturing refrigerators and air conditioners. The cost of production is thus raised 5-10%, but so is the price of the company's products.

[29] Australia worried about a decrease in its coal export because coal is not so "clean" as other kind of energy.

[30] The effect of an international carbon tax on Korean exports, for instance, will be very serious (more than 10% decrease in exports according to some estimation), especially for chemicals, rubber and plastics, iron and steel manufacturing, primary iron and steel products and fabricated metal products, which are more or less energy-intensive or resource-intensive. *See* Sang-hee Yoo, *International Environmental Pressures and Korean Trade*, 1998, for APEC Workshop on Trade and Environment.

closely related to the discrepancies in economic development, technological levels, environmental consciousness and preference as well as natural resource endowments.

Arguments and concerns are arising among developed and developing economies as their views on the impact of the existing environmental standards and regulations on trade are different. These include: Will industries in developed economies lose their competitiveness by bearing higher environmental costs in the face of their economies' stringent environmental measures? What impact will environmental measures have on the export of developing economies? Will there be any transfers of pollution and resources-intensive industries to economies with relatively lax environmental measures? What will be the impact of environmental costs internalization on trade, etc. All in all, the common concerns of APEC members are focused on what impact environmental measures will bring on the competitiveness and market access in the course of the regional trade liberalization.

Relationship between the Measures and Competitiveness

Economic globalization and trade liberalization have intensified market competition. While developed economies are worried about their competitiveness being eroded under stringent environmental measures, developing economies fear that meeting environmental standards higher than their own will incur compliance cost. These costs include the cost of obtaining information and technology, and the investment of new environmentally sound equipment, etc., which will give rise to higher total production costs or even result in partial or complete losses of their comparative price advantage.

It is worth noting that most TREMs in APEC member economies have no direct impact on trade since they carry no intention to affect patterns of trade or terms of trade. Nevertheless, some indirect effects on trade were observed as the environmental measures did affect domestic economic growth, trade balance, industrial and trade structure and employment at national level, and affect production cost and price level--and competitiveness in result--at industrial and firm level.

Impact on Developed Economies' Competitiveness

The degree of the impacts of TREMs and ERTMs on competitiveness is, however, industrially specific. In general, more polluting firms or the firms located in economies with more stringent environmental regulations and standards incur more pollution control cost than others and, therefore, are affected more significantly. But even in economies where relatively tough environmental measures have been introduced, environmental costs represent only about 1-3% of the actual cost structure of their industrial sectors.[31] And in the US cement industry, which pays the highest costs for pollution abatement in proportion to output value in that economy, the ratio stands just at 3.17.[32]

Although nowadays environment costs generally do not account for a high proportion in

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[31] Pan Jiahua, 1997, *Economic Analysis of Sustainable Development*, 445.

[32] ESCAP, 1996, *Enhancing Trade and Environment Linkages in Selected Environmentally Vulnerable Export-Oriented Sectors of the ESCAP Region*, 28.

the total costs of production, some pollution-prone industries are still being shifted to regions with less stringent environmental laws and regulations. This is mainly due to the manufacturers' concerns for losing competitiveness rather than actual loss of their market shares and competitiveness.[33] Statistical analysis shows that developed economies' shares of environmentally sensitive goods[34] have not changed significantly over the past two decades. It remains at 3/4 of the world total despite the common use of relatively stringent environmental measures by many of these economies.[35] On the other hand, these developed economies are still the top players of global trade, representing roughly 2/3 of the total world exports for the past over 30 years (see Table 18 below).

It is undeniable that environmental costs have somewhat increased as improved standards and changing policies have incurred some more expenses, such as those on information gathering, certification and inspection. But these expenses are not difficult to deal with for companies of developed economies.

One way is to digest them internally through heightened efficiency of resources and energy utilization. A case in point is the remarkable cost-saving of almost US$ 200 millions within 10 years by the Minnesota and Michigan Mining Co. through newly-invented production technology.[36] And another way is to partially shift the extra costs onto consumers, which would be much easier to accomplish in environment-conscious consumer markets.

Table 18
Shares of Gross World Trade and of Global Environmentally Sensitive Goods (ESG)

	Share of gross world trade						Share of world trade in ESG			
	Export			Import			Export		Import	
	1970	1990	1995	1970	1990	1995	1970	1990	1970	1990
Developed economies	71.5	71.4	68.7	72.1	72.6	67.3	81.3	81.1	78.2	72.0
Developing economies	28.5	28.6	31.3	27.8	27.4	32.7	18.7	18.9	21.8	27.1

Source: UNCTAD, *Handbook of International Trade and Development Statistics*, 1995; Sorsa, 1994, *Competitiveness and Environmental Standards: Some Exploratory Results*, policy research working paper 1249, for World Bank.

[33] Most of these industries are so-called sun-set industries those shoulder relatively high environmental abatement costs, such as iron and steel, metallurgical, shipbuilding, etc., as well as some toxic substances producers (e.g., chemicals producers). *See* Pan Jiahua, 1997, *Economic Analysis of Sustainable Development*, 445.

[34] Environmentally sensitive goods include all four-digit products in iron and steel (SITC 67); nonferrous metals (68); metal manufactures N. E. S. (69); pulp and waste paper (251); organic chemicals (512); inorganic chemicals (513, 514); radiative etc. material (515); coal, petroleum etc. chemicals (521); manufactured fertilizers (561); paper and paperboards (641); articles of paper etc. (642); veneers, plywoods, etc. (631); wood manufactures N. E. S. (632); petroleum products (332); agricultural chemicals (599) and cement (661). These industries incurred pollution abatement and control expenditures of approximately 1 percent or more of the value of their total sales (1988).

[35] Jan Adams, 1997, Environmental Policy and Competitiveness in a Globalised Economy: Conceptual Issues and a Review of the Empirical Evidence.

[36] M. K. Tolba, 1990, Sustainable Development: Constraints and Opportunities, Chinese Version, 230.

Developed economies generally have higher environmental standards with stricter enforcement, and more matured environmentally sound technologies and processes. And for businesses in these economies, environmental costs have long before become part of their regular costs of production. More importantly, price is only one of a vast array of factors that determine the competitiveness of developed economies. Other major factors include high quality of goods and services, and technical contents, which may offset relatively higher costs of environmental policies.[37] So far, there has not been any evident proof that their competitiveness is being affected by tough environmental measures.[38]

Impact on Developing Economies' Competitiveness

Despite their increasingly more and tougher environmental measures over the past decades, developed markets remain the principal destination of exports for developing economies even today. Taking developing member economies in APEC for example, in 1993, more than 50% of the respective economies' exports went to developed markets, of which markets with stringent environmental measures like the EU, the USA, Canada and Japan took over 90% (excluding Papua New Guinea) (please see Table 19).

[37] Jan Adams, 1997, *Environmental Policy and Competitiveness in a Globalised Economy: Conceptual Issues and a Review of the Empirical Evidence*.

[38] OECD, 1995, *Environmental Performance Reviews: Canada*, 115; OECD, 1995, *Environmental Performance Reviews: USA*, 135.

Table 19
Market Structure for Exports of APEC Developing Economies in 1993 (%)

Economies	EU (a)	USA & Canada (b)	Japan (c)	(a)+(b)+(c)	Total of developed economies	Total of developing economies
ASEAN*	14.7	21.3	15.6	51.6	54.9	45.1
Chile	25.3	16.5	17.0	58.8	61.0	39.0
China	12.8	19.8	17.2	49.8	52.5	47.5
Hong Kong, China	16.4	29.2	4.3	49.9	53.7	46.3
Korea	11.5	23.9	14.1	49.5	52.6	47.4
Mexico	5.0	85.8	1.4	92.2	92.9	7.1
Papua New Guinea**	15.8	2.4	21.2	39.4	82.8	17.2
Chinese Taipei***	12.9	27.8	11.0	51.7	55.2	44.8

Note: * ASEAN consists of Brunei, Indonesia, Malaysia, the Philippine, Singapore and Thailand. Figures of Brunei are for 1994.

** Figures of Papua New Guinea are for 1992.

*** Figures of Chinese Taipei are for 1994.

Source: The figures are calculated on the basis of data from *UNCTAD Handbook of International Trade and Development Statistics*, 1995.

A time series statistical analysis has examined whether stringent environmental standards reduce the international competitiveness of environmentally sensitive products. The analysis shows that export performance of environmentally sensitive products for most of the economies remained unchanged between the 1960s and 1990s despite the introduction of stringent environmental standards in most developed economies in the last two decades. This means that in the light of the available data, stringent environmental measures may reduce the competitiveness of the environmentally sensitive exports cannot be verified.[39]

Though a direct and systematic impact still cannot be ascertained in general, the effects on the competitiveness of some particular industries exist. This has been proved by the case studies on some APEC economies, where certain of sectors are suffering from a negative impact on trade as a result of the environmental measures-led rising costs and weakening competitiveness (please see case study 2). However some of the studies also suggest that the impact is either from abroad or homebred (please see case study 3).

Though meeting more stringent environmental measures gives businesses an extra burden in the short term, pressures from international market may in the long run bring about more opportunities to boost efficiency and competitiveness. This can be achieved through adopting environmental management system, increasing resources efficiency, improving

[39] A comprehensive data set of trade flows of environmentally sensitive products covers 34 economies (of which 16 are APEC members, excluding Brunei and Papua New Guinea) in the period from 1965 through 1995. These 34 economies account for nearly 80% of world export of environmentally sensitive products in 1995. The data show that those economies which exported more environmentally sensitive products than world average in 1965, remained the same performance in 1995. *See* Xu Xinpeng, 1998, *Export Performance of Environmentally Sensitive Goods: A Global Perspective*, for APEC Workshop on Trade and Environment.

productive technology and abating pollution[40] (please see case study 4).

As well, the external pressures can, in the long run, also play an important role in improving environmental quality, perfecting domestic environmental regulatory framework, stimulating environmental industries to expand and changing life style. That will be beneficial to industrial sectors in reducing environmental and operating costs, and exploiting new markets. Hence the impact of environmental measures on competitiveness is long-term based, complicated and often intermingled with other factors.

Case Study 2
The Effect of German Azo-dyed Consumer Goods Regulations on Hong Kong Garment Exports[41]

Germany prohibited the production and import of certain types of azo-dyed consumer goods as of July 1, 1995, and from Jan 1, 1996, the government also forbade the sale of such products. This regulation originates from the Federal Health Ministry's ban on the use of chemicals that can be resolved into cancerogen.

As this regulation involves all consumer goods that maintain long-time contact with human skin", Hong Kong garment export, which accounts for 50% of its gross exports to that country, has been severely affected. Manufacturers are obliged to spend extra time and costs getting inspection certificates, and the use of more costly substitute dyes and production process adjustment also entail additional expenses.
The extent of the impact on costs and price competitiveness in this case is yet to be determined.

Case Study 3
The Effect of Environmental Measures on Indonesia? Frozen Shrimp Exports to the USA[42]

The main problems with Indonesia? Cultured shrimp export include overharvesting, damage to mangrove forest, meeting foreign food standards, sea water contamination as well as waste disposal in the course of processing. For instance, according to one estimate, the maximum sustainable amount of catching for Indonesia should be 11,000 tones annually. But in practice, the total catch already reaches 155,000 tones.

Realizing the need to meet higher sanitary standards abroad for its aquatic products, the Indonesian government has introduced its own standard, and the expenses incurred therefrom are now considered part of the regular operating costs. But the competitiveness of the country? Frozen shrimp exports is eroded in the US market by the automatic detention system as well as the inspection expenses that represent 10% of the export value.

Case Study 4

[40] This can occur in various way: 1) increasing resource efficiency in production, due to reduction of raw material use or energy use in an existing process, or to development of a more resource-efficient process; 2) better use, reuse, or sale of a by-product formerly disposed of as waste; 3) development of products with better environmental attributes which command a price premium; 4) better monitoring and control of waste streams, which may also yield improvements in level and consistency of product quality; 5) product standards that can in some cases confer an early-mover advantage if other markets follow the lead. *See* Jan Adams, 1997, *Environmental Policy and Competitiveness in a Globalised Economy: Conceptual Issues and a Review of the Empirical Evidence*.

[41] Hong Kong Trade Development Council, *Trade Outpost*, 1995, Vol. 1, Vol. 11.

[42] ESCAP, 1996, *Enhancing Trade and Environment Linkages in Selected Environmentally Vulnerable Export-Oriented Sectors of the ESCAP Region*, 43.

A Philippines Company Cuts Down Costs by Adopting Environmental Management System[43]

Polysacharide is a Philippine company that extracts food additives from seaweeds, and its products are mainly exported to developed markets, like the USA, Japan and the EU, where there is a huge demand.

With a view to fitting in with the overseas market needs and minimizing the use of raw materials, the company introduced environmental management system, including enacting appropriate policies on environmental protection and introducing new productive technologies that have reduced sewage discharge and cut down raw materials input. As a result, it annually saves 10.01 million pesos (approximately US$ 400,000) in production costs, making its food additives more competitive on international market.

It deserves to be noted that APEC member economies, and its developing economy members in particular, are characterized by the leading role of their small and medium-sized enterprises (SMEs) in the overall growth of export. For example, SMEs account for 90% of Indonesia's leather industry and about 60% of Korean electronics exporters.[44] Despite their contributions, however, SMEs may experience more difficulties due to domestic or external environmental measures than large enterprises. The difficulties stem from lack of funds and information, lack of adaptable environmentally sound technologies and input materials, and lack of ability to pass additional costs onto consumers. These enterprises accordingly face investment and management costs that are relatively greater than those of big companies, rendering them more vulnerable to the impact of environmental measures.

Impact on Market Access

Additional input of capital, technology and human resources is required of exporters, particularly exporters in developing economies to conform to importers' environmental regulations and standards. But this input may not necessarily produce the desired effect in short-term, or even an added input cannot come up to importer's standards, or the input does not suit the concrete conditions of the exporters. Under such circumstances, these regulations and standards pose to a certain extent barriers to market access. A number of industries in developing economies, such as textiles and garment, electronics, chemicals and farm produce (including forestry and fishery product), have suffered from this in exporting to developed markets. The tuna-dolphin dispute between the US and Mexico is the most famous case. Again, some cases show that sometimes developing economies' exports are affected by those environmental measures from domestic initiatives (please see case study 5).

Case Study 5
Malaysia's Self-imposed Restriction on its Timber and Wood Product Exports[45]

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[43] Environmental Management Bureau, Department of Environment and Natural Resources, the Philippines, Industrial Environmental Management Project: Pollution Prevention Success Stories.

[44] Sang-hee Yoo, 1998, *International Environmental Pressures and Korean Trade*, for APEC Workshop on Trade and Environment.

[45] Khalid Abdul Rahim, 1998, *Trade-Environment-Related Measures: Lessons from Studies in Malaysia*, for APEC Workshop on Trade and Environment.

Malaysia's tropical timber exports are under both local and overseas pressures. Domestically, some restrictive measures have been in place to protect the timber resources. At the same time, demands for its timber products have been curbed because of the changing preferences of the environment-conscious consumers and the practice of eco-labeling in foreign markets. The volume of timber exports decreased from 20.4 million m^3 in 1990 to 9.3 millions m^3 in 1993.

The economy's forest control law not only sets the production at a sustainable level, but also limits timber exports and encourages local processing with a view to gaining added value. These policies were, at least in part, responsible for the reduction in the share of production destined to exports from 85% in 1980 to 25% in 1993. In reality, overseas environmental measures are of no great significance for Malaysian local supplies and export control. This has been proved by the fact that 86% of Malaysian timber exports go to Japan, Korea and Chinese Taipei, where no laws or regulations have ever been introduced regarding timber import. The restrictions are therefore imposed primarily for the purpose of developing local economy and preserving natural resources. It should be noted, however, that such measures bear distorting effect on trade, i.e., restraining overseas consumers from market access to forest resources.

Disputes over market access are not only arising between developed and developing economies, but are also to be found among developed nations. For instance, the Australian government continues to restrict the import of uncooked and unprocessed salmon from Canada, although studies have proved that indigenous salmon are not exposed to the risk of being contaminated by their imported foreign counterparts.[46]

The cause for such a dispute lies in that different economies have based their environmental measures, like environmental standard and eco-labeling on industries, standards and classifications solely out of their own respective advantages and interests. Objectively, this has placed foreign suppliers in an unfavourable position. In another instance, although recycling and trading on waste paper benefits both the US and Canada, environmentally, the minimum contents level of recycled paper in newsprint, as required by many American states, has produced an adverse effect on Canadian exports.[47] Hence the impact of environmental measures on market access varies with the different product lineups and commodity flows of each exporter. In general, the vulnerability of exports to environmental measures depends on many factors, such as the export structures in terms of products and markets, industrial structures, rate of economic growth, level of development and domestic and international facilitating policies.

Table 20 outlines the effect of environmental measures by the US, EU and Japan on some APEC economies. Among the 24 types of export products affected, chemicals are most extensively affected, followed by agricultural, forestry and fishery products. Standards and Regulations (ST) fall into measures with the most extensive effects on the export of these economies, by which 21 types of the products have been affected.

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[46] Dua and Esty, 1997, *Sustaining the Asia and Pacific Miracle*, 86.

[47] Newsprint export to the US accounts for 50% of total Canadian export of paper and paperboard. The Canadian paper industry invested CS$ 650 million in de-ink and recycling equipment to meet American standards from 1989 to 1993. Owing to insufficient domestic supplies, Canada imports 800 thousand tons of waste paper from the US annually. Although the country's recovery rate of waste paper was up from 20% in 1980 to 32% in 1993, 2% below the American rate, it still remained the lowest within the G7 nations. *See* OECD, 1995, *Environmental Performance Reviews: Canada*, 83.

Although the tough environmental measures of the developed economies have posed somewhat barriers to the export of the developing economies, developed economies like the US, EU and Japan still remain the principal markets for the affected goods from developing economies (please see Table 21). This suggests that the producers have improved their products for export so as to meet the requirements of target markets.

There is an increasing concern, in developing economies in particular, over the adverse trade effect of PPM standards. Although PPM standards are mainly designed to protect environment and provide information to consumers (e.g., eco-labeling), they may have trade-restrictive effects. However, there is no empirical evidence that eco-labels do affect exports significantly since eco-labels are applicable to a relatively small number of product categories, and granted to a small percentage of the eligible market. But in the long run, PPM standards and other LCA-based environmental regulations, such as eco-labels, will bring pressures to bear on exports of developing economies. For example, there is a growing trend that eco-labels are being increasingly developed in sectors of export interest to developing economies such as textiles, garments and footwear, with the criteria focusing on the process and production methods (PPM). In general, it can create market access obstacles to these exporting products and industries of developing economies. It is because product categories for labels may be selected to favour domestic producers' interest over foreign competitors, the criteria for certification may favour domestic producers, and the product classification process may discriminate against foreign firms and products.[48]

[48] Yee Che Fong, 1998, *Trade, Environment and Sustainable Development*, for APEC Workshop on Trade and Environment.

Table 20
The Impacts of TREMs and ERTMs in Developed Markets on Exports from APEC Developing Economies

Products \ Measures	PR	ST	RR	TC	DR	EL	ML	VA	GP	CS
Flowers		*								
Tuna	*	*				*				
Shrimps	*	*								
Fruits		*								
Asbestos and products	*	*								
Organic chemicals	*	*					*	*	*	
Fertilizers		*		*			*			
Paints, varnishes	*	*				*	*	*		*
Cosmetics										*
Detergents	*	*				*	*	*		*
Insecticides, fungicides	*	*					*	*	*	*
Plastics	*	*	*			*		*	*	*
Leather and products		*								
Footwear		*				*				
Tires			*	*		*				
Tropical timber								*	*	
Wood and products		*				*				
Pulp and paper		*	*			*				
Textiles/clothing	*	*				*	*			
Airconditioners		*	*			*	*			*
Refrigerators etc.		*	*			*	*	*	*	*
House appliances		*	*			*	*	*		
Batteries etc.		*	*		*	*	*	*		
Vehicles		*	*	*		*		*	*	

Note: PR, prohibition; ST, standards and regulations; RR, recycling/reuse measures; TC, taxes and charges; DR, deposit refund schemes; EL, eco-labeling; ML, mandatory labeling; VA, voluntary agreements; GP, government procurement; CS, controlled substances

Table 21
Market structure for affected exports of selected APEC developing economies
(1993 value in US$ millions, export shares in percentages)

Economies	EU (a)	USA (b)	Japan (c)	(a)+(b)+(c)	Other regions	Total
ASEAN	29.7	18.5	27.2	75.4	24.6	100.00
China	13.7	19.2	25.4	58.3	41.7	100.00
Hong Kong, China	42.3	18.0	8.7	69.0	31.0	100.00
Korea	17.8	23.1	16.6	57.5	42.5	100.00
Chinese Taipei	11.8	22.5	33.7	68.0	32.0	100.00

Source: ESCAP, 1996, *Enhancing Trade and Environment Linkages in Selected Environmentally Vulnerable Export-Oriented Sectors of the ESCAP Region*.

While stringent environmental measures have created problems, they may also bring about fresh opportunities for obtaining market shares. For example, an exporter that has met higher environmental standards can enter more markets than competitors. In this connection, a product from a developing economy can be regarded as being acceptable both environmentally and in quality by developed nations. This will improve the product's image of being low-priced with poor quality and help boost demand from overseas market (please see case study 6). Stringent environmental measures have, moreover, established a US$ 250 billion environmental technology market with an annual average growth of 8%.[49]

Case Study 6
China Hair Refrigerators Increased Exports after Obtaining EU's Green Certification[50]

In the early 1990, European countries imposed a ban on the import of refrigerators that use freon as refrigerant, dealing a heavy blow to Chinese refrigerator makers as exports to the European market in 1991 dropped to 230,000 from 560,000 in 1988, down 59%, with the gross export value declining by 58%, falling from US$ 130 million to just US$ 5.4 million during the same period. Faced with this grim situation, Chinese manufacturers began to develop new and environmentally friendly refrigerators. The Hair refrigerator by a Qingdao factory is one of these new products. Since being granted an "EU Green Certification" from the EU in 1990, the factory has boosted its exports to overseas markets. The total number of its refrigerators sold around the world in 1992 amounted 80,000, of which Germany alone took 40,000 worth some US$ 8 million, in sharp contrast to only a limited number sold to Southeast Asia and the Middle East just before the EU certification. Indeed, the "EU Green Certification" has become a "Green pass", opening for its products the entire world market.

Throughout the APEC economies, there are massive inflows of investments by transnational corporations (TNCs). In terms of market access, TNCs in this region are far superior to the SMEs. For those TNCs that have set up manufacturing plants all over the world, it will increase their operating costs to conduct in-depth study and adopt so many different standards and regulations of various economies. As their home economies are generally developed markets with relatively strict environmental measures, these TNCs tend to use environmentally sound technologies and internalized standards (normally stringent ones) to cut down the costs of operation and transaction, while actively

[49] David G. Morgan, 1996, *Trade Liberalization and Regional Environment Cooperation in the APEC Forum*.

[50] Xia Qing, Liu Zunwen and Wang Yu, 1996, *Eco-labeling*, 22.

supporting universally-accepted standards and systems (e.g. ISO 14000).[51] For example, as the Japan Matsushita Group has adopted internalized stringent standards on quality and environment, its products have become much more adaptable around the world, getting into almost all foreign markets without running into any obstacles on environmental standards and regulations. At present, the Group's electronic factories across the world have either passed or are applying for the certification of ISO 14000.

3.5 Conclusions and Suggestions

Asia Pacific economies have experienced impressive economic growth in recent decades largely due to the improved market access achieved through the several rounds of trade negotiation under the aegis of GATT and unilateral liberalization adopted by APEC members in particular. However, they also have paid a high environmental cost for their economic success. The environmental damages, in the short term, engender loss in health and welfare, offsetting the hard earned economic growth, and from a long-term perspective, they impair the resource base that supports the sustainable development of the economy.

The environmental problems are rooted in market failure and policy failure and not in economic growth itself, whether trade-led or otherwise. Trade liberalization has both the positive and negative environmental effects depending in most cases on whether the complementary environmental policies are in place. On the other hand, trade protectionism can also be costly in both economic and ecological terms. Wide use of import restrictions and subsidies result in market distortion, encouraging the low efficient allocation and excessive use of natural resources, and foil the efforts of developing economies to change the primary resource based export structures and increase the manufactured products and high value-added products.

Environmental measures constitute only one of many factors affecting competitiveness of the relative export. There is not sufficient evidence so far, according to statistical analysis on ESG, to indicate whether a systematic relationship between environmental measures and competitiveness exists. But at the industry or firm level, it is evident that competitiveness of some exporters, especially SMEs in developing economies, has been affected by stringent environmental measures. As more and tougher environmental measures are introduced and the drive to accelerate trade and investment liberalization in APEC continues, larger and more evident effects of trade- and environment-related measures on competitiveness can be expected.

Though environmental measures constitute, to some extent, barriers to market access by affecting a number of export commodities from some developing economies, statistical data have indicated that developed markets with stringent environment measures still remain the principle markets for the affected goods. This means that while stringent environmental measures create impediments to trade, they also bring about fresh opportunities for the producers meeting the requirement of target markets. It should be

[51] Zarsky, 1996, *APEC and the Environment: Guiding Principles, Innovative Strategies*.

noted that only well-designed environmental policies could create some positive gains. Those measures based on PPMs should be developed cautiously because they may have trade-restrictive effects, although they are mainly designed to protect environment.

In light of the above, APEC should consider:

- Coordinating trade liberalization and environment, giving priority to environmental friendly products and services for early liberalization.
- Developing an environmental action plan to promote regional cooperation in environmental protection, which contains assessment of environmental impacts, capacity building, regional technological transfer, and information exchange as well as establishment of monitoring mechanism.
- Establishing a consultation mechanism to facilitate mutual understanding and consensus building between trade and environmental sectors, formulate the governance principles, and identify the key points and priority fields for cooperation and action. In this regard, a full play should be given to APEC's another wheel – economic and technology cooperation.

A common understanding has been reached that trade liberalization and environmental protection should develop hand in hand under the general guideline of sustainable development. The different views on trade and environment are closely related to the divergence in economic development, varied environmental consciousness and preferences, and distinct technological levels and environmental regulations among the economies. Specifically, the general concerns of the APEC economies are the impact of TREMs and ERTMs on competitiveness and market access in the process of trade liberalization in APEC.

4. Environmental Cost Internalization and its implications

4.1 Concept of Environmental Cost Internalization

Environmental cost internalization (ECI) has been recognized to be of a fundamental way in addressing the interface of trade and environment issues, and promoting sustainable development. However, there is neither a clearly defined or widely accepted definition of ECI, although this term turns up in the literature under a number of different headings. It is, therefore, of significance to define ECI to explore the possibility of implementing ECI in the APEC region.

Environmental cost internalization is associated with externalities that refer to the negative effects from a transaction or activity that fall on third parties. An example of an externality is pollution, emitted as part of a manufacturing process, the cost of which does not fall on the manufacturer. In international trade, certain export products and marketing activities might pollute air and water, worsen environmental resources and even cause transnational or global environmental problems (such as acid rain, water pollution and climatic warming). However, the value of these environmental assets is often overlooked and not counted into production and international trade, thus undoubtedly exacerbating environmental degradation. The central idea of ECI then is to take into account environmental or "life cycle" costs associated with production, consumption and disposal of a product, including environmental damage, abatement costs as well as the price of resources that have been neglected. To internalize environmental costs two most important issues, among others, should be dealt with:

- **Defining ownership of environmental assets.** When environmental and resource property rights have not been defined, no economic actor has the incentive to take responsibility for the loss resulting from environmental deterioration. If there lacks a control mechanism for the use of natural resources, it will lead to excessive exploitation and excessive consumption of resources. So there is need of a way to ensure that all environmental resources and associated services are properly "owned" as a first step towards getting them priced to maintain their sustainable use and conservation.
- **Pricing environmental assets.** It is more difficult to get environment assets priced in practice than in theory. For instance, loss of water and soil erosion caused by vegetation destruction, climate change resulted from pollution, effects of biological destruction on human beings, etc. are very hard to accurately assess and price. Even so, a number of economies around the world, including APEC members, have been trying to internalize the environment costs incurred in the course of production, consumption and disposal of products in various ways and scope, and have achieved active progress in the field.

4.2 Means of ECI

Up to now, no body can state clearly how many means of ECI exist in deed. According to present studies, they might be summed in three categories as follows:

- Specific Regulations(command and control)
  - Product standards

- Process standards or methods
- Emission standards
- Recycling requirements

- Economic Instruments
  - User charges
  - Environment charges
  - Deposit/refund systems

Moreover, it should be noted that one of important, effective means is implementation of Polluters Pay Principle (PPP)**.** This principle requires that the polluters undertake the responsibility to treat the source of pollution, adopt measures to eliminate environmental pollution and compensate the loss for the victims, and urge the polluters to actively treat the pollutants produced.

4.3 The Implementation of Environmental Cost Internalization in APEC

Many policies and measures related to cost internalization have been used by APEC member economies to achieve environmental goals. It is difficult to describe the instruments of environmental cost internalization, let alone its practice and effect. In fact, all of the environmental measures taken could arguably be characterized as cost internalization. According to the present survey, the measures used by APEC economies to realize environmental cost internalization include regulations, economic instruments and voluntary schemes.

Regulation is the most common instrument, which set limits for pollution emissions or requirements for environmental performance. These instruments include water discharge standards for factories, fuel efficiency standards for appliances, quotas for refillable containers, and exhaust standards for automobiles. All APEC member economies have formulated various environmental laws, regulations and standards.

Economic instruments used by APEC member economies include: environmental/user charges, deposit/refund systems, tradable permits/quotas, financial incentives/ environmental liability, and the voluntary approaches such as ISO 14000 and eco-labeling which have been widely used by the member economies. Many of these instruments are domestic regulatory measures, which are not constrained in any way by trade law. But these instruments will have indirect effect on trade through influencing a product's cost or competitiveness in production or market, of which some instruments such as eco-labeling and ISO 14000, in some cases, have significant impact on market access and competitiveness.

Effect of ECI on Competitiveness

It is supposed that under the circumstance of other factors remaining unchanged, the internalization of the environmental cost is bound to increase the cost of enterprises, thereby weakening their competitiveness. On the contrary, the production cost of the manufactured products of an economy which has not implemented the internalization of the environmental cost is comparatively low, which greatly enhance the international

competitiveness of their export products.

What is about practice? A study report of the World Bank shows that strict environmental standards of developed countries have not lowered their international competitiveness. There is no inevitable links between environmental standards and the exportation of environmentally sensitive commodities (referring to products needing fairly large amounts of pollution treatment and control expenses)[52]. The report indicates that between 1970 and 1990, the export of manufactured products of developed economies dropped from 91.3 percent to 81.3 percent, while the exports of those industries that bore the highest pollution control expenses in the developed economies had, in fact, almost experienced no decline, falling from 81.3 percent to 81.1 percent.

According to the OECD studies, it is widely accepted that the impact of environmental cost internalization on competitiveness is very weak. Firstly, to date, environmental measures do not seem to have had significant impacts on trade and environment, particularly in the case of developed countries. Secondly, the implications for competitiveness of differing environmental standards are no different in principle from those of other policy differences across nations, there are legitimate reasons for differences in standards. Thirdly, it is now widely believed that fears of eco-dumping" and relaxation of environmental standards in order to attract investments or gain export competitiveness are not well-supported.

Different forms of instruments of environmental cost internalization will generate different mixes of competitiveness effects. Emission taxes, for example, would entail a variable cost increase, a relatively low administrative burden and an ongoing economic incentive to reduce emissions, in contrast to highly prescriptive legal instrument mandating technologies, processes, and compliance procedures. Ambient standards have a different effect on competitiveness than do emission standards, as the impact of the former on a firm varies according to the receiving environment, whereas that of the latter does not. Product standards have a different competitiveness impact than do process standards: the former can be applied to both local and foreign products, and in practice can sometimes afford protection to domestic products, whereas the latter are generally applied only to domestic producers.

For eco-labeling, expenses of application fee and certification fee might be added to the production cost, thus increasing the cost of products. Yet, with increasing awareness of environment protection, eco-labeling will make some consumers more willing to buy that at relatively higher price, thereby increasing the enterprise market share and enhancing its competitiveness. The implication of Eco-labeling on competitiveness varies from developing economies to developed economies and from large companies to small-medium companies. Generally speaking, the environmental consciousness of consumers in developed economies is relatively high, and the benefit from implementation of Eco-labeling might be more than developing economies. For large enterprises, the eco-labeling application fee accounts for a very small proportion in its sales volume. For small and medium-sized enterprises, the application fee for eco-labeling is relatively high in their

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[52] Partrick Low and Alexander Yeats, *"Do Dirty Industries Migrate?"*, International Trade and Environment.

sales value. These fees will raise the cost of products and thus weaken the competitiveness of the products.

As for ISO 14000, its implementation exerts conspicuous negative impact on small and medium-sized enterprises, of which most have difficulty bearing the kind of expenses. A survey report by U.S.A. shows that spending on the implementation of ISO 14000 ranges between US$ 100,000 and US$ 600,000 (averaging US$ 245,000, depending on the company scale and nature), the time taken for the establishment of the system ranges from six to 24 months (averaging 12 months). A survey conducted by European Union in November 1995 indicate that small and medium-sized enterprises had to spend at least 40 persons per day annually to carry out this system, which is likely to weaken the competitiveness of the products of small and medium-sized enterprises entering the international market.

Briefly stated, the effect of implementation of IS0 14000 on the competitiveness of products depends on the size of the company, the degree of pollution and the situation regarding the management of environment protection. Since developed economies differ vastly from developing economies in development levels as well as environment objectives, it is very difficult to draw to an absolute conclusion.

Even so, it is evident that environment cost internalization should be one of most effective ways to coordinate trade and environment. At present, there quite few enterprises within APEC economies have obtained ISO 14000 certifications. But the performances of these enterprises indicate that ECI will eventually bring about more output than input, even in the developing economies like China (see cases 7 and 8).

Case 7
Economic Benefit Gained by Hair Refrigerator After Implementing IS0 14001

Hair Refrigerator, China first enterprise granted IS0 14001 certification, has gained remarkable economic benefits one year after implementing IS0 14001. Although the introduction of IS0 14001 increased the cost of Hair, it, however, brought the enterprise enormous economic returns. In 1996, the sales income and profits of the Refrigerators Co. Ltd. grew by 63.4 percent and 81.5 percent respectively over the previous year. Accretion of ISO 14000 has also generated a favorable response from oversea markets, with the export up 320.7% in 1996.

Implementation of IS0 14001 has pushed the enterprise to a new level in energy conservation and consumption reduction. It was planned that the total amount of material consumption would be 25.71 millions yuan in 1996, yet the actual consumption stood at 16.72 million yuan only, 8.992 millions yuan less than the planned figure or 34.96 percent drop of the previous level. In terms of the per unit cost, the value of materials consumed for each refrigerator fell from 31.58 yuan at the beginning of the year to 5.71 yuan at the end of the year, with 82 percent reduction.

Table 22
Tabulation of Material Consumption by the Hair Refrigerator Development in 1996
Unit: 10,000 yuan

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total material consumption	218.6	160.5	195.6	171	138	162.1	160.4	138.7	97.55	83.95	78.37	67.21
No1 Factory	28.5	19.37	18.89	20.4	22.33	21.03	15.48	12.91	1.73	12.58	11.83	1.31
No.2 Factory	18.86	15.37	25.55	15	14.33	19.28	32.07	30.82	24	16.81	16.42	15.1
No.3 Factory	25.61	18.95	30.53	27.1	26.64	26.14	29.07	27.99	16.13	15.11	16.08	13.1
No.5 Factory	130.1	82.26	99.25	95.1	57.92	82.33	69.46	52.98	36.91	27.82	22.61	21.26
No.6 Factory	10.4	16.76	13.78	11	13.78	11.73	10.53	12.78	9.73	9.86	9.64	1.26
No.7 Factory	4.54	7.79	7.58	2.07	2.97	1.56	3.76	2.64	2.05	1.77	1.78	1.18

Source: The Certification Team of the Hair Refrigerator Department

In order to save power resources more effectively, Hair transformed its 30 kw blower fans and three sets of 18.5 water pumps and replaced its headlamps with energy-saving lamps, thus saving large amount of fund (See Table 23).

Table 23
Comparison of Energy Consumption in Each Hair Refrigerator In 1995 and 1996

Year	Total Consumption (kW/hour)	Total refrigerator output (10,000 units)	Power consumption volume of each refrigerator
1995	2167.59	100	21?6759
1996	2650.88	168	15?700

Source: The Certification Team of the Hair Refrigerator Business Department

Case 8
Beijing Matsushita Charactron Implements IS0 14001

Beijing Matsushita Charactron Co. Ltd. (BMCC), a joint venture co-funded by China and Japan Matsushita Group, was founded in 1987 and put into operation two year later.

As a factory specialized in the production of picture tubes and fluorescent lamps, BMCC uses large amounts of chemical materials in the process of production and at the same time discharges huge quantity of waste water, waste gas and rejected materials. The two investors pay great attention to the environment. At its early stage, the company installed waste water and gas treatment equipment, in the first-phase of the project, it invested 15 millions yuan in installing 2,000 tons of waste water treatment equipment, accounting for 3 percent of the total investment. In the second- and third-phase of the projects, it installed 2,500-ton and 5,000-ton water treatment equipment; and built five to six sets of waste gas treatment facilities. Except for one above-standard discharge in 1995, the emission levels of the company are lower than state-set standards. Itswater treatment facilities are even better than those made by Japan, it assigned 15 persons specially engaged in the environmental protection work.

Since it implemented IS0 14001, BMCC has gained remarkable economic and social efficiencies and further enhanced its competitiveness. By the end of 1996, the company had saved expenses to the tune of nearly 14.42 millions yuan (See Table 24).

Table 24
Economic Efficiency Achieved by BMCC after Implementing ISO14001
Unit: 10,000 Yuan

Item	Organic Solvent (F113,triclene and zellon)	Cleaning agent patent income	Sand blast deburring technique	Low-temperature exhaust lead-in
Expense saved	416.9	25	576	424

Source: The Environmental Protection Division of the BMCC

The case study on the US electricity industry revealed that competition in it and related industries clearly helped improve its environmental performance, at lower cost than first estimated and in unforeseen ways. Competition in rail transport led to dramatic cost reductions in the delivery of low-sulfur coal. Deregulation in the natural gas industry lowered prices of this environmentally preferable energy source and encouraged its substitution for coal. Increased competition in the electricity industry itself fed back to the industries competing to provide environmental solutions such as low-sulfur coal, gas turbines, and scrubbers, forcing innovation to reduce costs. SO2 trading allowances were another policy measure that helped lower costs.

The case study of Malaysia palm oil industry pointed out that environmental cost internalization need not necessarily impair the overall competitiveness of the industry in the open economy and the industry continued to expand even when the regulations were more stringent (Case 9).

Case 9
Competitiveness Effect of Environmental Cost Internalization Palm Oil Industry in Malaysia

In the 1960s, when rubber prices began a prolonged decline, the Malaysian Government started to encourage palm oil production. With very fast growth rates, Malaysia soon became world largest producer of crude palm oil (CPO). However, by 1975, CPO had become the country worst source of water pollution. In the crude palm oil industry, severe pollution was caused by the discharge of palm oil mill effluent (POME) into watercourses. The POME problem was unique to Malaysia and no proven treatment technology existed. In July 1977, the DOE announced the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, imposing standards on eight parameters of POME. The regulations required CPO mills to apply for an operating license every year. The DOE also announced that it would make the standards increasingly stringent over four years.

During the initial years of the enforcement of the regulation the palm oil industry regarded effluent treatment as an additional cost of production. Compliance with the discharge standard of 5,000mg/BOD was not mandatory during the first year of implementation both to allow sufficient lead time for the building and commissioning of treatment systems and for further development of relevant treatment technology. The performance of the regulations during the first year was somewhat disappointing since the standards were not mandatory. Many mills chose to pay the excess fee. From the second year onwards, the DOE made the standards not only more stringent, but also mandatory. The average mill reduced its daily discharge of BOD significantly from 220 to 60tonnes daily. The BOD load continued to decrease in succeeding years. The industry efforts to develop better treatment technologies were given another boost in 1980 when the government established the Palm Oil Research Institute of Malaysia (PORIM). The industry ability to reduce its BOD discharge was also facilitated by the development of various commercial by-products made from POME (e.g. in feed mixes for pig and poultry, as fertilizer or biogas).

The implementation of the regulations to control pollution from the palm oil mills are encouraging, as these mills have been constructively receptive to the regulations and have progressed satisfactorily towards meeting the desirable target of 100mg/l BOD. The industry did incur additional costs due to the implementation of the

regulation. Capital costs accounted for most of the costs associated with treatment systems. However, relative to the industry total production costs, treatment costs were low: only 0.2% in 1983 (chooi, 1984). Due to the nature of the world market structure for fats and oils, the increased costs of production were unable to be shifted onto the consumers. Instead, two-thirds to three-fourths of the costs were shifted upstream and ultimately borne by oil palm growers, who had no outlet for palm oil fruits aside from sales to the palm oil mills. The regulations caused prices of fresh fruit bunch (FFB) to be much lower than they would have been otherwise due to the monopolizing nature of the market. With regard to the competitiveness effects of these regulations, a key question is who actually paid the compliance costs. Both crude and refined palm oil is sold in an extremely competitive world market for oils and fats. This prevented industry from passing the costs of treating POME onto the consumers in importing countries. Instead, CPO mills lowered the prices they paid farmers for fresh fruit bunches (FFBs). Thus, most of the costs are ultimately borne by palm oil growers, who have no other outlet for their FFBs. One study estimates that while the competitiveness effects on the RPO and CPO sectors were very small, the FFB growing sector (both small holders and plantation owners) suffered significant losses in revenues. Thus, while environmental protection did not impair the competitiveness of the exporting sector, it significantly changed the distribution of returns to trade, affecting in particular producers of primary inputs.

4.4 Conclusion – Agenda for the Future

In light of the important role of EIC in alleviating the negative effect of trade liberalization on environment, consideration should be given to possible steps that might be taken in this direction:

- Trying to achieve consensus on the principles and guidelines regarding internalization of environmental costs on a sectoral basis among APEC members, starting with such sectors as fishery, energy, forestry and chemistry, which might be relatively easy to do.
- Setting up a technological and capital supporting mechanism to launch the program of internalization of environmental cost to facilitate economic and technological cooperation, particularly between developed and developing members.
- A strict ban or restriction on environmentally damaging trade and investment in the region, such as transfer of pollution-intensive industries to those economies that have lax environment policies, could also be considered.
- Strengthening cooperation in the field of cost internalization, such as implementation of eco-labeling systems, establishing scientifically sound standards to deal with regional cross-border environmental issues, and encouraging enterprises to adopt ISO 14000.
- Exploring possible pilot projects to establish producer or consumer agreement for specific sectors (pulp and paper, chemical industry and transportation and tourism) based on the polluters pay principle.

5. Improving the Transparency of Trade and Environment Measures in APEC

Transparency could be defined as the unity of standardization, legalization and publicity of measures. Standardization and legalization are the preconditions and guarantee of improving transparency, while publicity is the key to reach the goal. The three elements complement each other and are indispensable.

The improvement of transparency will help APEC members to gain a better knowledge of regional trade and environmental measures. It helps with policy-making and improves trade liberalization and environmental protection by providing enterprises with information at a lower cost. It also helps small and medium sized enterprises overcome their difficulty of the lack of efficient information channels so that they can acknowledge in time the environmental protection and trade laws and regulations of other members, and renovate their own technologies, thus improving their competitiveness while protecting the environment.

5.1 The Present State of the Transparency of Measures

Standardization of Measures

There are two kinds of standards: national standards and international standards. National standards are standards of domestic production technology, processes or quality, while international standards are standards largely established by ISO. The latter do not have direct legal force on individual members. This paper mainly focuses on how domestic standards of APEC member economies could gradually be aligned with international standards and realize regional conformity.

According to the concept of "Standard" defined by WTO, it refers to document approved by a recognized body, which provides, for common and repeated guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include terminology, symbols, packaging or label requirements. Standardization of measures - those to be unified with the international standard - is a major part of improving measure transparency. It helps enterprises know the trade and environment measures in different economies, thus lowering cross-border costs of transactions among APEC members. It also helps reduce the technological trade barriers.

An analysis of the data from the eighteen APEC economies shows that only a few have fully conformed their trade and environment measures to international standards, while the majority have only partially done so. Hence, much work remains to be done in realizing measure standardization.

It is stipulated in the Osaka Action Agenda that the national standards of APEC members shall match international standards, with mutual recognition from both sides. Through the efforts, APEC so far has achieved the following:

- A guiding principle for unification of standards;
- Membership of the International Standards Organization (ISO) and International

Electronics Committee (IEC) in 1996;

- Agreement on mutual recognition of consistent food appraisal;
- Arrangements for exchanging toy safety information among APEC members;
- Establishment or participation in a network for mutual recognition of agreements on a voluntary base;
- Investigations into measurement standards, technological development for laboratory management and attestation, quality control system of testing bodies, and the work of attesting bodies;
- Launch in 1997 of the PFP project for the coordination of standards and consistent appraisal;
- Preliminary steps in establishing the availability and use of information on standards among APEC members, as a first step towards creating a database and network system;
- In some fields, standards have been unified with international standard, such as those for household electrical appliances (air-conditioners, televisions, refrigerators, radios and spare parts and video tape machines), food labels, rubber gloves and condoms.

International treaties have played a substantive role in spreading and implementing standardization.

For example, the WTO *Agreement on Technical Barriers to Trade* (TBT) is an agreement ensuring that a technical regulation or standard is stipulated, passed or used solely for that purpose and do not create a trade barrier. One of the "legal purposes" of an acceptable technological regulation is to protect human health or safety, animal or plant life or health, or the environment" (Article 2.2, TBT).

The WTO *Agreement on the Application of Sanitary and Phytosanitary Measures* (SPS) is another WTO appendix, aiming at protecting life and health, providing a basis for an international standard, protecting consumers and trade partners' interests, and preventing hidden protectionism by means of unnecessary technological requirements. Article 2 of the SPS says, member economies should guarantee that any environmental or trade measures are only used to protect the life and health of human beings, animals or plants. The measures must be based on scientific principles, otherwise they should not exist unless they are in line with Provision 7 of Article 5, which stipulates a pre-warning principle, allowing temporary adoption of measures when there is, as yet, no sufficient scientific proof but other conditions are available. Provision 6 of Article 5 says that when implementing environmental or trade measures and exercising protection to certain extent, member economies should guarantee that these measures do not excessively limit trade, and pay due regard to technological and economic feasibility; further, that when it has been decided to exercise some protective measure, member economies should take into consideration ways to reduce any potential negative influence on trade.

In line with the TBT and SPS requirements, APEC member economies are exerting efforts to adopt the standards of ISO, IEC and so on as their domestic standards.

One example is the ISO 14000 environmental management system. ISO and the TC207

Technological Committee formally announced in 1996 and 1997 that 6 out of the 24 standards being drafted would be international standards. ISO 14000 is realizing the goal of improving the global environment and achieving sustainable development by means of its influence upon trade. At present, among APEC members, Australia, New Zealand, Singapore, Malaysia and the United States have directly adopted ISO 14000 international standards as their standards for national environmental management system, while others have made them the basis of their national standards or plan to gradually adopt them. The reasons why standards of these economies are not reconciled yet lie in different industrial development levels, geography, climate and technologies. Because of the unification, authorization, high transparency and influence upon market entry, enterprises are greatly active in carrying out ISO 14000. By the end of 1996, a total of 155 enterprises in APEC member economies had achieved the necessary standards.

Table 25
Numbers of Enterprises in Selected APEC Member Economies which have Passed ISO 14000 Conformation

Member	Canada	China	Indonesia	Japan	Korea	Malaysia	Singapore	Chinese Taipei
Number	14	4	4	84	23	1	6	19

Source: *ISO Bulletin*, April 1997

The environmental label, also called the green pass or eco-labeling, is a certificate granted to enterprises by government or private institutions. It indicates that the production process, application and disposal of a certain product conform to environmental demands; it is less harmful or totally friendly to the environment or is beneficial to resource recovery and recycling. Since the environmental label centers on consumers and can directly guide purchasing objectives, it is like a Green Passport that is playing an increasingly important role in today's international trade.

The International Standard Organization has drafted an international standard for the environmental label, which is now being discussed, is expected to be published before 2000. Since there is no unified international standard, many APEC member economies have established their own standards. During our visit to these economies, we found the following concerns about implementation of the international standard:

- In principle, the environmental label should be voluntary and open to both domestic and foreign suppliers. However, since implementation of the system is always suggested by domestic enterprises, they generally have a bigger influence on the establishment and implementation of the system.
- The interests of domestic enterprises are always given prior consideration by a government in selecting goods to adopt eco-labeling, but enterprises of foreign economies, especially developing economies, are easily to be ignored.
- Most environmental labels, including existing ones and those to be published, are not passed on to foreign manufacturers. In the meantime, suggestions on the bestowal of environmental labels to new products are generally made by domestic enterprises, and foreign manufacturers are in an inferior position to obtain the necessary knowledge.

Legalization of Measures

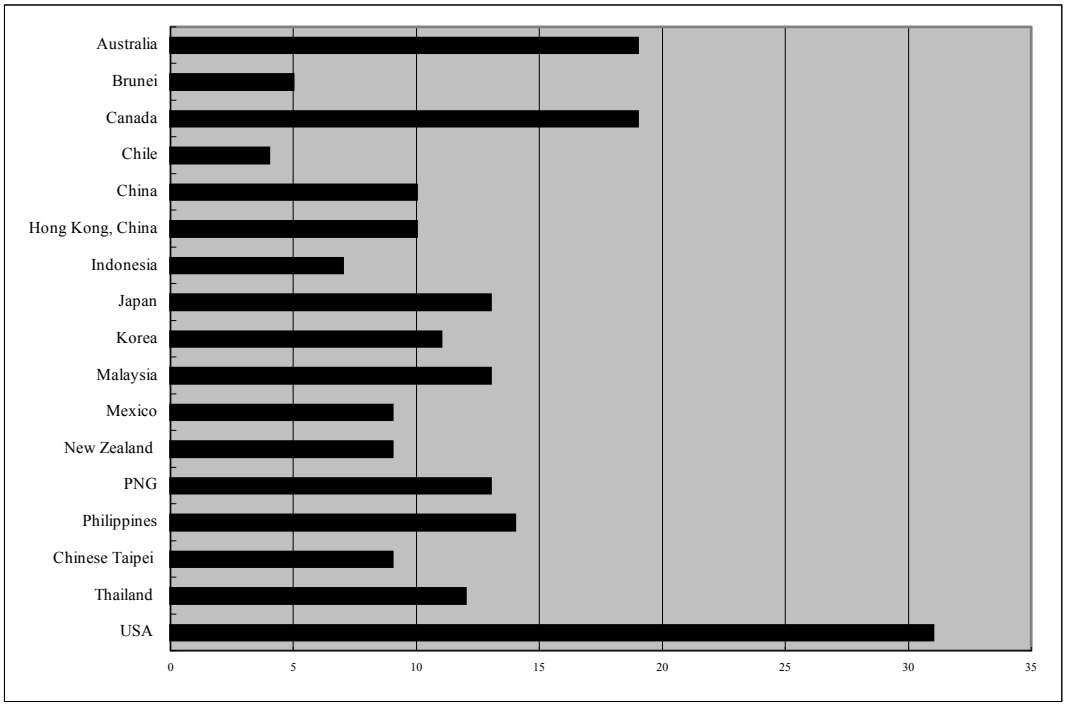
Legalization includes two aspects: national legislation on trade and environment and legalization pursuant to international agreements. In this paper, legalization of measures

refers to the transformation of administrative measures related to the environment and trade into national laws through the legislative process. It aims to make these measures much easier to be implemented and observed. To reduce the random nature and secrecy in implementing measures, legalization has an important role to play in increasing transparency. Relying on the coercive forces of state power, it guarantees lawful and timely implementation of all measures. Moreover, national legislation will help to sweep the mistaken ideas about environmental activities among the public, direct these activities on the basis of laws and regulations, raise people's awareness of environmental protection, and encourage them to follow related laws on their own accord.

Owing to the rising awareness of the environment and the deepened understanding of potential influence of trade activities on it, more and more laws relating to the two areas are currently being enacted. Many members have formulated laws on such trade and environmental problems as pollution control, management of pernicious materials, and protection of natural resources and bio-diversity. However because of their differences in economic development, public awareness of environment and cultural backgrounds, the number and scope of environmental legislation in these economies vary.

From the following chart, we can see that environmental and trade legislation develops faster in developed economies than in developing ones. However, all APEC member economies are working hard to protect the environment and to reduce the negative impact of trade activities on the environment. For example, China has recently declared it will revise its Environmental Protection Law and make eight new laws in the next four years before 2002 on the protection of the ocean environment, prevention and control of environmental pollution in Bohai Bay, prevention and management of chemical pollution, prevention and control of riverbed and soil pollution, and land management.

Number of Legislation of Trade and Environment -related Measures in Selected APEC Member Economies



Source: Statistics collected by the project group in APEC members

Laws help solve the majority of problems. They include environmental management and the basic principles and objectives of sustainable development; coordination among different departments and settlement of conflicts; mechanisms for the settlement of environmental and trade disputes; procedures for examining influences on the environment; codes and standards of environmental quality; as well as mass participation and spreading of environmental information.

Generally speaking, every member has a comprehensive law on environment, defining the overall, macro measures and objectives of environmental protection and rational exploitation of natural resources. Malaysia adopted the Law on Environmental Quality in 1974, which contains many articles to limit air, noise and soil pollution, and forbid drainage of oil or other waste liquids into the sea.

In addition to the comprehensive laws, there are also a large number of regulations to solve concrete problems. Covering a wider scope and having more detailed stipulations, they constitute the mainstay of an economy's legal system concerning the environment and trade. Papua New Guinea, for example, has a Law on Crocodile Trade (1974), Law on Environmental Pollution (1978), Law on Environmental Program (1978), Law on Water Resources (1982), and Law on Reserves (1980, 1982).

Formulation of laws in so many fields aims at effectively solving environmental problems in the present world. Such efforts are quite positive for the concerned economies to find a more appropriate way to reconcile environmental and trade measures and to integrate environment and development in policy-making, so as to improve the implementation of

environmental and trade measures as well as effectively strengthen law enforcement. The adoption of concrete laws will also increase the powers of the departments in charge and energetically push forward the implementation of all measures. In Mexico, the Minister of the Environment is authorized to make requirements, conditions, procedures, parameters and limits of pollution discharge. When activities that will probably lead to ecological imbalance or damage environment are engaged, or products that will produce the same results are used, these stipulations must be observed.

The administration of environment through economic means is causing increasingly extensive concerns. Many economies are starting to impose penalties on activities that cause pollution and production of disposable wastes. Legalization has provided a solid basis for pushing forward the implementation of these measures. At present, it has already become a universal way for governments of some developing economies to set up an administrative organ or special fund to solve the problems of trade and environment. For example, the State Environmental Quality Law was passed in Thailand in 1992. According to the law, an environmental foundation was established to sponsor capital construction of the environmental protection system and the settlement of urgent environmental accidents. Fund sources include the Petroleum Fuel Fund, government budget, service charges, fines, and donations from some international organizations. In the Philippines, however, such a fund is not established by the government. According to the law, some companies have set up environmental guarantee funds. These companies are required to establish personal credit funds that will receive government supervision and joint administration of the company and community. The negotiated sum of money is deposited to the fund daily or weekly, and is used for environmental protection projects, supervision, recuperation of environment and compensation for damages caused by the company.

Another legislative target for resolving the influences of trade on environment is to execute the Polluters Pay Principle. Through levies on polluters to solve pollution accidents and treat environmental damage, the government can not only balance expenditures on environmental control, but also add environmental costs to production and consumption costs. Take the example of the Republic of Korea, its revised Law on Management of Solid Wastes introduced a composite mechanism in 1991 to provide a cash deposit for covering the cost of waste disposal. According to the law, the minister of environment may order the manufacturers and importers of some products and packaging to deposit funds with the Foundation of Solid Wastes Management. When these manufacturers and importers have collected wastes from their products and packaging and safely placed them in an assigned place, the foundation will return their deposit.

With the acceleration of global economic integration, the connection between trade and environment has become more intimate. Consequently, a large number of international agreements on trade and environment have been signed in recent years. Many economies actively passed and carried out national measures that are suited to their national conditions and enacted related laws, so as to genuinely actualize these conventions. In China, the State Council ratified the State Plan of China to Eliminate Ozone Exhaustion Substances in 1993, to promote the implementation of the Vienna Convention and Montreal Protocol. China joined these agreements in September, 1989 and June 1991 respectively. In the Republic of Korea, the Law on Cross Boundary Transference and Disposal of Wastes was formulated, as a part of its preparations for joining the Basel Convention.

As we start to seek a sustainable development mode, international laws and agreements on trade and environment have become more important. Only when all economies legalize and implement these measures, will it be possible to promote the transparency of the measures and finally bring about the desired level of environmental protection. When an international environmental regulation is put into practice, all members should actively develop corresponding domestic legislation to guarantee the attainment of its objectives.

Publicity of Measures

Ensuring public availability and promoting public understanding of measures is important to increase participation in implementation. Publicity is thus one of the main criteria for measuring the transparency of measures and has direct bearings on their effectiveness. Therefore, improving the publicity of measures has already become a major target of all APEC member economies. The "Agenda 21" points out that acquiring information on the environment and development" is one of the five innovative themes.

The right to acquire information, for both individuals and the collective, comprises one major feature of the democratic process and the participation of the people. A better understanding of environmental information is a pre-requisite for the public to participate in decision-making and timely supervision of government and individual actions. It is helpful for people to make an appropriate choice before accidents, and further prevent irreversible losses. Article 10 of the Rio Declaration stresses that, at the State level, every individual should obtain a certain amount of information about the environment possessed by the state authorities. "The state should promote the environmental consciousness of the public and encourage their participation through wide dissemination of". Articles 18 and 19 point out: "all countries should promptly inform other countries of natural disasters or other circumstances that might cause damage to their environment. They should, beforehand or in a timely way, notify countries that might be affected of their activities which might possibly cause cross-boundary negative effects on the environment, and conduct friendly negotiations with those countries at an early stage."

According to surveys, APEC members have adopted various means to promote publicity of their measures: bulletins released by the government; reports of mass media; submission of notifications; establishment of database; public participation in the legislative process; public participation in the environment impact assessment; consultations of enterprises and individuals. The following table clearly shows the main methods used in each economy.

Table 26
Means of Publicity in APEC Members Economies

	Submission of Notification	Official Bulletin	Public Participation in Legislation	Data Base	Mass Media	Consultative Organization
Australia	Y	Y	NA	NA	Y	NA
Brunei	N	NA	NA	NA	Y	NA
Canada	Y	Y	Y	Y	Y	Y
Chile	Y	Y	Y	NA	Y	NA
China	N	Y	Y	NA	Y	NA
Hong Kong	Y	Y	NA	NA	Y	NA
Indonesia	Y	NA	NA	NA	Y	NA
Japan	Y	Y	Y	NA	Y	Y
Korea	Y	Y	Y	NA	Y	NA
Malaysia	Y	Y	NA	NA	Y	NA
Mexico	Y	Y	Y	NA	Y	NA
New Zealand	Y	Y	NA	NA	Y	NA
PNG	N	NA	NA	NA	Y	NA
Philippines	Y	NA	NA	NA	Y	NA
Singapore	Y	Y	NA	NA	Y	NA
Chinese Taipei	N	Y	NA	NA	Y	NA
Thailand	Y	Y	NA	NA	Y	NA
USA	Y	Y	Y	Y	Y	Y

Note: Y = Yes; N = No; NA = Not Available.
Source: Results of surveys conducted by the project group.

Notification

Among numerous ways of publicity, notifications between governments is widely used and seen as a most effective way. Article 2 of the WTO *Agreement on Technical Barrier to Trade* stipulates that, where the regulation on technology is likely to make a large impact on other member's trade, "the proposer of the regulation should, through the secretariat, notify the member concerned of the products that will be involved in the would-be technical regulation, and briefly explain the purpose and reason of using the regulation." It also stipulates that, "each member should issue a notification as quickly as possible, when the technical regulations are adopted, thus making others familiar with them."

Similar provisions can also be found in the *Agreement on Implementing Sanitary Quarantine on Animals and Plants*: "when the method of animal and plant quarantine is changed, all members should notify such a change and offer related information in accordance with Appendix II of the agreement." Appendix II has a special stipulation on the procedure of issuing a public notification, that is, when the related international standards, guidelines or recommendations are not available, or when the proposed animal and plant sanitary quarantine rules do not conform with international standards, guidelines or recommendations, and, hence, likely to have a great influence on the trade of other members, the proposer should issue a notification as quickly as possible. By doing so, those who are interested in the proposal will get to know of it.

In 1997, APEC members of the WTO submitted a total of 30 notifications regarding the environment to WTO. They referred to the following aspects:

- Reducing pollution: Many notifications refer to the technological standards for

pollution examining including water, air and soil pollution.

- Management of waste materials: Treatment, reproduction and utilization of waste materials.
- Energy: Raising efficiency in energy use and spreading energy-saving technology to cope with the increasing growth of energy consumption and global warming.
- Environmental standards and eco-labels: Environment standards and eco-labels constitute the main content of some notifications

Submission of a notification conveys, in an accurate and timely way, the contents of revised or new laws and regulations made by a member to a special body, which can then sort them out regularly and spread the information to every member. Therefore, the governments of all economies and their industrial enterprises are able to know of new regulations, and accordingly readjust their productive technology to meet the demands of their trade partners.

Public Access to Domestic Information

According to the survey, the governments of all economies normally issue their revised or new laws or regulations through government bulletins. These bulletins are available in each economy's environment and trade departments. Governments at all levels, enterprises and individuals can subscribe to these bulletins from publishers. With comprehensive information and regular publishing schedules, the bulletin can keep people abreast of changes in regulations. Besides, the bulletins are widely distributed, so it is easy for people to obtain them. Aside from the government bulletins, new and important measures are also disseminated through various news media.

In addition to the above two means, people in some economies can directly ask for related materials from the government. For instance, the US Information Act stipulates that citizens have the right to obtain details of every regulation and standard issued by the government. Enterprises and individuals can ask for the free materials from the government and the latter cannot refuse them with the excuse of not knowing their intention. Therefore, the law has guaranteed people's rights to get the information they want. This is vital for industrial and businesses to maintain up-to-date knowledge of related government stipulations and to abide by them consciously, thus raising the transparency of measures.

Public participation in policy-making

Policy makers normally lay much stress on the macro beneficial results of trade and the environment measures, but underestimate problems that may arise during the implementation of specific measures. Public participation in drafting regulations can make up for this weak point. In this way, people can enrich their knowledge of measures, which will increase the transparency level.

As an object for implementing measures and, at the same time, a subject in trade and environmental activities, the public is encouraged to join in appraising the state environment report. For instance, Chile gives its people an opportunity to appraise environmental protection. Environmental appraisals are open to the public with the

exception of those seen as involving commercial and industrial secrets. Individuals and communities can voice their opinions on the environmental appraisal that is to be discussed by the state environment commission. If the government does not deal with the opinions in time, they can sue later. Thailand and Mexico have also made similar clauses. Many economies have made special arrangement for public participation. For instance, the State Environment Commission of Thailand, which was set up in the early years and gained a high position in 1992 through legislation, has four members representing the public although the commission is led by the Prime Minister and involves many government ministers.

The cooperation between the government and the community is helpful to set environment criteria that can promote the development of trade. Members of the Association of South East Asian Nations (ASEAN) encourage the private sector to join in regulation revision with an aim of creating a perfect position for enterprises based on their technological ability. During this process, the government awards enterprises that introduce advanced technology and upgrade production for environmental improvement.

The involvement of the public in drafting and appraising regulation has increased the scope of policy maker from a handful of people to all the society. This has made a measure more comprehensive and scientific and narrowed the gap between the government and the people, thus greatly increasing the transparency of making and implementing measures.

Establishment of database

With the development of modern technology, computer networks have became more and more popular. The developed economies particularly take the lead in this field. The Internet has become a main channel for people to get information.

The developed members, including the United States and Canada, boast complete information database. The Environmental Protection Agency (EPA) of the United States, and the Canadian environmental protection agency and some other economies have set up web pages which are convenient for people to seek information. The database of most universities in these two economies are linked up with the environmental protection bodies. Thus, people can acquire information from different channels. In addition, the Internet has the advantage of low cost, high speed and large storage of information. However the developing members are far behind developed members in computer popularization and utilization.

5.2 Conclusions and Suggestions

Transparency is the prerequisite for effectively taking measures to protect environment. Members of APEC have made painstaking efforts in standardizing, legalizing and publicizing the measures. Because of different economic and technological levels among APEC members, their requirement for environmental protection and measures adopted to achieve their goals may vary. And their policies and stipulations on trade and environment are also different. With economic advancement, the developed members have a high demand for living standards and environment. They set higher environmental criteria than the developing economies, and they have worked out more complete laws. As high

technology has become popular, the developed economies can keep abreast of new information from Internet, while the developing economies have to gain information mainly from written materials.

To further increase transparency, each member should continue unremitting efforts. All members should ensure that their domestic standards are in conformity with that of the international ones as to large extent as possible.

In view of the comparatively low economic level of developing economies, they should be allowed to continue to use their existing technical regulations and criteria, and production technology in a short period. APEC should also abide by the principle as respecting voluntaries, obtaining a unified stand through consultation, and using flexible methods.

With regard to legalization, every member should perfect its legislative work, and increase its transparency in this respect. Representatives and experts from all walks of life should be invited to participate in drawing up related laws and regulations. The government should pay attention to their opinions. Before a new or revised law goes into effect, it should be discussed in local governments, industrials and enterprises to ensure it reasonable. The process of executing a law is also an important aspect of measure transparency. The enterprises and individuals that violate the law, must be punished strictly. This is particularly important for developing economies.

To raise transparency, members of APEC might consider doing the following:

- Each economy to draft its report on trade and environment on a regular basis, including catalogues of trade and environment measures, for circulation among the member economies.
- Regularly hold training activities so that officials who work with environment and trade development departments can gain accurate and new information in timely manner.
- Economies to notify their new and revised laws and measures to their trade partners in due course.
- For the convenience of seeking information, the database might be linked with the network of each member.

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Abbreviations

ANIE	Asian Newly Industrializing Economies
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
BOD	Biochemical Oxygen Demand
BTV	Beijing Television
CCTV	China Central Television
CFC	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COD	Chemical Oxygen Demand
CPO	Crude Palm Oil
CTE	Committee on Trade and Environment
DOE	Department of Environment (Malaysia)
EEI	Environmental Economic Instruments
EPA (US)	Environmental Protection Agency (USA)
ERTM	Environment-Related Trade Measures
ESCAP	Economic and Social Commission for Asia and the Pacific
ESG	Environmentally Sensitive Goods
EU	Europe-Union
EVSL	Early Voluntary Sectoral Liberalization
FFB	Fresh Fruit Bunch
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
IEC	International Electrotechnic Commission
ISO	International Organization for Standardization
LCA	Life-Cycle Assessment
MEA	Multilateral Environmental Agreements
MFN	Most Favoured Nations
NAFTA	North American Free Trade Agreement (NAFTA) and the
NIE	Newly Industrializing Economies
ODS	Ozone Depleting Substances
OECD	Organization for Economic Cooperation and Development
POME	Palm Oil Mill Effluent
PORIM	The Palm Oil Research Institute of Malaysia
PPM	Process and Production Method
PPP	Polluter Pays Principle
RPO	Refined Palm Oil
SMEs	Small and Medium-sized Enterprises
SPM	Suspended Particulate Matter
SPS	Agreement on the Application of Sanitary and Phytosanitory Measures
TBT	Agreement on Technical Barriers to Trade
TNC	Transnational Corporation
TREM	Trade-Related Environmental Measures
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

UR	Uruguay Round
WB	World Bank
WHO	World Health Organization
WRI	World Resources Institute
WTO	World Trade Organization