RESEARCH NOTE

TRADE ISSUES FOR AGRICULTURAL GMOS UNDER INTERNATIONAL TRADE AND ENVIRONMENT RULES*

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Key words: genetically modified organisms (GMOs), trade measures, multilateral environmental agreements (MEAs), Biosafety Protocol

ABSTRACT

The objective of this paper is to investigate international regulatory development and underlying approaches, and analyze trade implications for genetically modified organisms (GMOs). To explore potential application of legitimate trade measures against GMOs, it visited and compared most relevant international agreements and rules for environmental and trade goals. Special attention is given to trade measures potentially applicable to agricultural GMOs under which the provisions of the Cartegena Protocol on Biosafety are comparatively analyzed with the multilateral environmental agreements (MEAs) and the WTO agreements.

I. Introduction

Rapid development and adoption of new technology has led innovations in a broad spectrum of industries such as food,

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chemicals and pharmaceuticals. Agriculture is one of the prominent industries where the new technology has been increasingly adopted. Modern biotechnology has been applied to agriculture over the past 15 years and opened a new era of plant breeding through genetic modification or engineering. The first generation of biotechnology refers to crop traits that affect crop production by carrying herbicide-tolerant or insect-resistant genes. A second generation of biotechnology products involves crops with enhanced output characteristics such as rice with higher vitamin A content.

As of 2001, the global area of transgenic crops is estimated at 52.6 million hectares, which is equivalent to almost twice the area of the United Kingdom (James 2001). Transgenic crops are equivalent to genetically modified or engineered crops in this paper. Likewise, genetically modified organisms (GMOs) and living modified organisms (LMOs) are used interchangeably.[1] Four major transgenic crops are soybeans, corn, cotton and canola of which transgenic soybeans account for 63 percent. Leading producers include the United States, Argentina, Canada and China. About 68 percent of total transgenic crop area is attributable to the United States. Over the period of 1996 to 2001, the global area of transgenic crops increased by up to 19 times.

In the midst of this drastic development of biotechnology, various economic, consumer and social issues are also emerging. Economic issues include economic benefits and costs by adopting genetically modified (GM) crops (USDA 2001; Commission of the European Communities 2000a; Moschini 2000). Consumer issues are mainly related to food safety (FAO/WHO 2000; OECD 2000a). Social issues, the broadest concerns on GM food and other LMOs address environmental impacts as well as public acceptance of LMOs (OECD 2000b).

Mounting concerns on biosafety call for regulatory responses in many countries. For example, the countries requiring or developing regulations for labeling foods containing GM products include Australia, EU, Hungary, Indonesia, Hong Kong,

[1] Accepted as a more general definition, LMOs is a term peculiar to the Cartagena Protocol of Biosafety.

Japan, Korea, Mexico, New Zealand, Norway and Switzerland (OECD 2000b; USDA 2000). It is argued that such regulatory development is likely to impede world trade by raising costs (USDA 2000; Ballenger, Bohman and Gehlhar 2000).

International institutional development is also noteworthy. For instance, 138 member countries adopted the Cartagena Protocol on Biosafety (CPB) in January 2000 under the auspices of the 1992 Convention on Biodiversity (CBD) of the United Nations Environmental Program (UNEP). This Protocol provides rules for transboundary movements of LMOs intended for environmental release and for those destined for direct use as food or feed or for processing (FFPs).

The objective of this paper is to investigate international regulatory development and underlying approaches and analyze trade implications for LMOs. To do so, various international agreements and rules for environmental and trade objectives are visited and compared with one another. Special attention is given to trade measures potentially applicable to LMOs under which the Protocol provisions are comparatively analyzed with the multilateral environmental agreements (MEAs) and the WTO Agreements.

II. Framework of Trade Measures from an Environmen Perspective

Trade measures are aimed at preventing potential damage from trade. Importers may trigger preventive actions against uncertainty or lack of sufficient information on traded products. Ranging from complete bans to information requirements, trade measures are legitimate only when specific conditions are met. From a broad perspective, trade measures can be grouped by five categories depending on the situations they intend to address (Table 1).[2]

[2] Detailed context and objectives of agreements are referred in OECD (1999). The UNEP website also provides related information regarding most MEAs (http://www.unep.org).

TABLE 1. Trade Measures by Category

Category	Measures	Description	International Rules
Restriction	Ban	Prohibit trade Eliminating the problem at origin Likely conflicts with trade rules	Montreal Protocol[1] Bamako Convention[2] Basel Convention[3]
	Quota	Quantitative restriction Applied to protect natural resources	CITES[4] CSBT Convention[5]
	Moratorium	Temporary ban of trade Applied mainly to fisheries accompanying further research	
Assessment	Risk Assessment	Process of converting uncertainty into risk	
	Environmental Impact Assessment	Planning tools to identify (adverse) environmental effects of trade	Convention on EIA[6]
Information	Research	Improving knowledge on the traded goods	Basel Convention Montreal Protocol
	Cooperation	Sharing common programs and information	Biosafety Protocol
Standards	Environmental Standards	Setting the acceptable level of quality, emission, product, PPMs, and performance standards	TBT[7]
Approval	Prior Informed Consent & AIA	Requiring the prior, informed, written consent from importers	Basel Convention Biosafety Protocol Convention on PIC[8]
	Approval	Requiring approval by the competent authorities	
	Labeling	Providing information on the properties of goods	Biosafety Protocol Convention on PIC Basel Convention

Note: 1. Montreal Protocol on Substances that Deplete the Ozone Layer.
2. Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa.
3. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora.
5. 1993 Convention for the Conservation of Southern Blue-fin Tuna.
6. Convention on Environmental Impact Assessment in a Transboundary Context.
7. Agreement on Technical Barriers to Trade.
8. Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade.

Source: OECD (1999).

Restrictions include bans, quotas and moratoriums. By imposing quantitative restrictions importing countries may attempt to limit or minimize the extent of potential damages caused by tradable products. These measures have a direct impact on trades, causing likely conflicts with trade rules at worst. For this reason, the Uruguay Round trade negotiations aimed at improving market access and converting such quantitative restrictions such as quotas into tariffs. This is called 'tariffication' (WTO 1998).

Assessment requirements are not trade measure *per se*, but they can indirectly affect trade. As the process of converting uncertainty into risk, risk assessment helps identify, characterize and estimate potential risk. As a planning tool, environmental impact assessment (EIA) seeks to identify adverse environmental consequences. Since both assessments are integral elements of food safety and environmental polices respectively, they have spillover effects on trade.

Information requirements encompass research and international cooperation. No direct link can be made between information and trade. Enhanced knowledge on tradable products by research is useful information upon which trade policies rest. International cooperation comprises agreeing on commitments, implementing common projects and exchanging information. Insufficiency of scientific, technical, legal and environmental information tend to hinder trade flows.

Standard-setting affects trade in terms of its rules, guidelines and characteristics of products. Different standards across countries may raise trade conflicts. But in most cases, international standards such as the Codex Alimentarius are available and the country that wants to set a higher standard is required to rely on scientific evidence without any discrimination.

Finally, approval requirements have significant implications for trade. Prior informed consent (PIC) is a procedure to require written consent from importers. It is an internationally-recognized tool against trade in potentially dangerous substances. Approval procedures are an essential element in the marketing of food and food additives. Differences in scientific disciplines, people's

preferences and attitudes and national procedures are likely to result in dissimilar rules and standards.

III. Trade Measures for Safety in the WTO Agreeme

The WTO Agreements are designed to ensure fair and equal competition for market access in all traded goods and services. While restricting measures that impede free trade these agreements underline the importance of safety issues. For example, the preamble to the Marrakesh Agreement establishing the WTO specifies that environmental protection is one of its objectives.[3] Food safety is also addressed by several agreements.

The WTO Agreements that contain explicit trade measures for environmental protection are the General Agreement on Tariffs and Trade (GATT), the Agreement on Technical Barriers to Trade (TBT), and the Agreement on the Application of Sanitary and Phytosanitary (SPS) measures. The WTO Agreements are related in particular to packaging, labeling and handling requirements for LMOs.

Other WTO Agreements are also considered to be related to environmental objective. They include the Agreement on Agriculture (Annex 2 paragraph 12), the Agreement on Subsidies and Countervailing Measures (Article 8.2 (c)), the General Agreement on Trade in Services (GATS; Article XIV (b)), and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS; Article 27.2). This paper will, however, examine only trade measures under the provisions of the GATT, TBT and SPS Agreements.

Firstly, trade measures under the GATT had to meet the

[3] The WTO has the objective of *"raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance them and for doing so in a manner consistent with their respective needs and concerns at different levels of economic development".*

general principles such as most favored nation (Article I), national treatment (Article III), ban on quantitative restrictions (Article XI), and not being a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade. In addition, the WTO Committee for Trade and Environment (CTE) aims to focus on final products and not production and processing methods (PPMs). However, Article XX sets out the common exemption of environmental and natural resources in terms of which countries are allowed to take relevant measures.[4]

Secondly, the TBT Agreement is designed to ensure that technical regulations and standards do not create unnecessary obstacles to international trade. Article 2.2 clearly points out this objective.[5] Since protection of the environment belongs to such a legitimate objective countries are allowed to apply technical regulations for the environment under specified requirements.

Thirdly, the SPS Agreement recognizes the right of Members to enforce sanitary and phytosanitary measures for the protection of human, animal or plant life or health.[6] The SPS measures should be based on scientific principles (Article 2.2) and are not a disguised restriction on international trade (Article

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[4] Article XX allows Members to take measures *"necessary to protect human, animal or plant life or health" (paragraph b) or "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production and consumption"* (paragraph g).

[5] It states that *"technical regulations are not prepared, adopted or applied with a view or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfill a legitimate objective, taking account of the risk non-fulfillment would create. Such legitimate objectives are protection of human health or safety, animal or plant life or health, or the environment. In assessing such risk, relevant elements of consideration are, inter alia, available scientific and technical information, related processing technology or intended end-use of products."*

[6] Preamble and Article 2.1 states that *"Members have the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health provided such measures are not inconsistent with the provisions of the agreement."*

2.3).

Article 5 obliges Members to enforce the SPS measures on the basis of an assessment of the risk to humans, animal or plant life or health and provides details for risk assessment procedures. However, Article 5.7 provides for exceptions to the application of scientific principles.[7]

Among the above three WTO Agreements, the SPS Agreement is the only one which allows for imposing measures in cases of uncertainty (OECD 2000). This is because the lack of specifications for the measures or a causal link between threat and damage under the GATT and the TBT Agreement. The GATT and the TBT Agreement are relatively general, to justify trade measures in such a way that it is not clear if a trade measure can be considered as *'necessary'*. Furthermore, both agreements allow other rules than scientific principles. In the TBT Agreement the elements of risk assessment are not only scientific and technical information but related processing technology or intended end-use of products. The GATT is silent on what the exceptions would be based. This sheds light on the potential efficacy of the SPS provisions in linking trade measures to uncertainty or precautionary principles.

The WTO Environmental Database (EDB) shows environment-related measures or provisions that WTO Members notified to the WTO (WTO 2000b). The EDB was established in 1998 for the Secretariat to compile and update annually all environment-related notifications to the WTO. The EDB can be useful to derive what measures Members are actually adopting and practicing for environmental protection. In 1999, WTO

[7] Article 5.7 states that *"In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary and phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measures accordingly within a reasonable period of time."*

Members submitted 2,427 notifications under the various WTO Agreements. The WTO Agreements covered by the EDB are the seven above-mentioned agreements. The notifications are categorized by either directly environment-related or contained environmental reference.

Under the TBT Agreement, 1,162 notifications were made in 1999 of which 84 or 12.5 percent contain environment-related objectives (Table 2). The notifications encompass diverse environmental measures pertaining to vehicles, engines, genetically modified organisms (GMOs), biotechnology and others.

During the period from 1995 to mid-2001, total notifications associated with agricultural GMOs under both SPS and TBT Agreements recorded 85 of which SPS measures accounted for about 57 percent (Table 3). It is significant that notifications have shown an upward trend in recent years. In 2001, Korea made three notifications for SPS including measures for environmental risks, safety evaluation and labeling of GMOs. The country also notified three TBT measures in the same year regarding labeling, safety evaluation and labeling standards for GMOs.

TABLE 2. TBT Notifications for the Environment

Year	Environment-related (A)	Total (B)	A/B (%)
1980-90	211	2,687	7.8
1995	41	3,928	10.6
1996	53	460	11.5
1997	89	794	11.2
1998	98	648	15.1
1999	84	669	12.5

Source: WTO (2000c).

TABLE 3. SPS and TBT Notifications for Agricultural GMOs

Year	SPS	TBT	Total
1995	3	1	4
1996	6	0	6
1997	1	4	5
1998	5	1	6
1999	4	12	16
2000	19	13	32
2001 (as of July)	10	6	16
Total	48	37	85

Source: Wolff (2001).

This review of notifications signifies two points. First, GMO-related measures have progressively appeared or been specified under the objective for environmental protection and food safety. Second, increasing measures for environmental protection and food safety are likely to lead formal disputes in an international forum.

So far, there have been no direct conflict between the WTO and MEAs obligations has leading to formal disputes in either system. In addition, growing concerns on biotechnology tend to result in international rule-making. For example, Korea and the United States submitted negotiating proposals, asking for proper consideration for GMOs or biotechnology in the negotiations on agriculture. Proposals by Korea and the United States are numbered by G/AG/NG/W/16 and G/AG/NG/W/98 respectively, and they are downloadable from the WTO website *(http://www.wto.org)*.

In summary, measures or issues pursuant to environmental protection and food safety are increasingly entering into WTO jurisprudence to the extent that it should be ready to deal with

LMOs as exceptions to the general principles of international trade. It is inter alia important to clarify how GATT Article XX (g) would be applied in a dispute settlement case. It is a matter of how to interpret *'exhaustible natural resources'* in Article XX (g). A challenge ahead is to defuse any ambiguity in the relationship between measures according to MEAs and the WTO rules.

Ⅳ. Trade Measures for Safety in the MEAs

Multilateral environmental agreements (MEAs) adopt a wide array of trade measures aiming at ensuring a variety of objectives. As shown previously trade measures can swing from trade bans to products standards, and from notification procedures to labeling requirements.

The Biosafety Protocol is the most direct and explicit of the MEAs that address LMOs trade. The Protocol sets out procedures and rules concerning the transboundary movement, transit, handling and use of most LMOs. The Protocol does not include pharmaceutical LMOs. Two striking provisions of the Protocol are adoption of the precautionary approach and use of Advance Informed Agreements (AIA).

The precautionary principle appears in the Preamble and the Article 1 (Objective) which refer to Principle 15 of the Rio Declaration on Environment and Development.[8] Articles 10.6 and 11.8 also allow importers to deny entry of LMOs in the case of a lack of scientific certainty.

The purpose of AIA (Articles 8 to 10 and 12) is to ensure that importing parties have the opportunity to assess environmental risks. It requires exporters to seek consent from

[8] Principle 15 of the Rio Declaration states *"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."*

importers before making the first intentional transboundary introduction of LMOs to the environment. LMOs for intentional introduction to the environment refer to agricultural seeds, live fish and micro-organisms for environmental bioremediation, which are subject to stringent procedures in light of the levels of risk assessment (Article 15), risk management (Article 16) and documentation (Article 18.2 (b)).

On the other hand, there are LMOs intended for contained or direct use as food or feed, or for processing (LMO-FFPs can be exempted from the application of AIA procedure and then an importer may take a decision under its domestic regulatory framework (Article 11). But, the bulk shipment of LMOs commodities must be accompanied by documentation which clearly specifies that it *"may contain"* LMOs and is not intended for intentional introduction into the environment (Article 18.2 (a)).

One of the most contentious issues is to establish how the Protocol's measures would relate to international trade rules such as the WTO Agreements. The Preamble includes a saving clause that states: *"Protocol shall not be interpreted as implying a change in the rights and obligations of a party under any existing international agreements."* However, it farther clarifies that *"the above recital is not intended to subordinate this Protocol to other international agreements."* As yet, it is not clear how to secure consistency between the Protocol and the WTO Agreements.

In addition to the Protocol, many MEAs contain trade measures. Table 4 shows the main trade measures in use in the three MEAs, including the Montreal Protocol, Basel Convention and CITES in matrix form. Table 4 is comparable with Table 1 where the three main MEAs are also referred to. But, there are differences in categorizing trade measures. Generally speaking, trade measures in MEAs contribute to an increase in the comprehensiveness of a set of policy responses to complex problems (OECD 1999). But, trade measures appear to play a limited role as sanctions for non-compliance by members. It is

because MEAs do not have cross-sectoral application of punitive trade sanctions—unlike in the WTO.

TABLE 4. Trade Measures in Selected MEAs

Trade Measure Objective	Labeling	Reporting	Notification and PIC	Export Permit or license	Import Permit or license	Selective intra-Party export ban	Selective intra-Party import ban	Party/non-Party trade ban
Monitoring and data collection		Basel CITES MP	Basel	CITES MP	CITES MP			
Promotion of participation in regime								Basel CITES MP
Promotion of environmental control of trade or compliance with treaty		Basel CITES MP	Basel CITES	CITES MP	CITES MP	MP		
Punishment of non-compliance						CITES MP	CITES MP	
Assistance by others' enforcement	Basel CITES MP		Basel CITES	MP	CITES MP	Basel MP		
Generation of environmental information	Basel CITES MP		Basel CITES	CITES				
Prevention of trade diversion								Basel CITES MP
Prevention of free-riding								CITES MP
Prevention of industrial relocation								Basel MP

Note: Basel indicates Basel Convention and MP means Montreal Protocol.
Source: OECD (1999).

V. Regulatory Relationships between the Biosafety Protocol and Other International Rules

There remain gray areas or lack of explicit procedures that should be further clarified in the provisions of the Biosafety Protocol. In particular, some of the provisions are of great relevance since they are likely to be linked with other international rules. An example is Article 18 of the Protocol, which addresses handling, transport, packaging and identification.

No specific international rules or standards exist governing the handling, transport, packaging and identification of LMOs for the purpose of the Protocol. But, if goods are defined as posing potential danger to human or animal health and the environment, specific requirements are stipulated. For example, the International Plant Protection Convention (IPPC) covers invasive pests injurious to plants and plant products. Since all alien plants and plant pest species can be invasive, they fall into the IPPC's span under the definition of pest and quarantine pest.[9] Being regarded as goods to pose some phytosanitary risk LMOs can be within the scope of the IPPC. The IPCC is also inclusive in a sense that it considers any potential phytosanitary risks associated with any LMOs, even the import of pharmaceuticals and other objects that may have capacity to spread pests.

As with the Biosafety Protocol, the IPPC also uses risk analysis and has a regulatory approach based upon the control of imports so that it is capable of assessing and managing potential phytosanitary risks linked to LMOs. But, unlike the case of the Biosafety Protocol, importing countries have the responsibility for risk analysis and for bearing financial costs under the IPPC. The IPPC also has operational standard-setting mechanisms and

[9] Pest is defined as *"any species, strain or bio-type of plant, animal or pathogenic agent injurious to plants or plant products"* and quarantine pest as *"a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled."*

procedures.

The UN Recommendations on the Transport of Dangerous Goods, namely the Orange Book is of relevance to the transport of LMOs. The Recommendations present a core set of provisions that should *"allow for the uniform development of national and international regulations governing the various modes of transport"*. The Recommendations adopt a system that categorizes goods by the types of risk connected with their transportation. GM micro-organisms can be included under the divisions of *"Infectious Substances"* and *"Miscellaneous Dangerous Substances and Articles"*. It is required that itemized lists of contents be included within the packaging and if the packaging is to have a UN packaging symbol, it must meet more detailed documentation requirements.

A number of international bodies address identification requirements for safety reasons. With few exceptions, the majority of the regulations aim at ensuring food safety for consumers. For instance, the FAO/WHO Codex Alimentarius is developing recommendations for the labeling of foods obtained through biotechnology and a set of broad general principles for risk analysis and specific guidance on the risk assessment of foods derived from biotechnology. Since 1995 the OECD has undertaken programs for the harmonization of regulatory oversight in biotechnology and examined safety of foods and feeds derived from biotechnology. The IPPC is to develop standards addressing plant pest risks of LMOs.

The WTO Agreements contain further rules of potential relevance in dealing with especially handling, transport, packaging and identification for LMOs. Under the GATT, a party may apply trade measures to protect human, animal or plant life or health (Article XX (b)) and conserve exhaustible natural resources (Article XX (g)).

Linked to Article XX (b) in the GATT, the SPS Agreement recognizes the right of a party to exercise trade measures when necessary to protect human, animal or plant or health provided that the measures are consistent with the WTO's

general principles, that is, non-discrimination and non-disguised restriction. The Agreement covers all measures to protect human and animal health from pests and diseases, risks in food or feed such as toxins or pesticide residues, and animal-borne diseases including rabies. The trade measures must be based upon scientific principles. But, provisional precautionary restrictions can be imposed when sufficient scientific information is lacking.

Governments have two alternative ways to meet the obligations. First, since the WTO does not itself develop technical standards by itself, it is specified to base trade measures on international standards, guidelines and recommendations developed by the Office International des Epizooties (OIE), the FAO/WHO Codex Alimentarius Commission and the IPPC and thus they are consistent with the WTO (Article 3.2).[10] Second, a higher level of protection can be set under a scientific justification assessed in terms of criteria set out in Article 5 (Article 3.3), which is referred as acceptable risk level. A risk assessment is required where no relevant international standard exists.

Discussion regarding LMOs can be relevant within the SPS Agreement jurisdiction in certain conditions. First, it depends on the characterization of LMOs if they are viewed as any risk to human and animal health. If so, LMOs would be subject to trade measures under the SPS provisions. More directly, precautionary principles can be triggered when uncertainty or the lack of sufficient scientific information on a causal link between LMOs and human health, animal or plant life is widely recognized. A prerequisite here will be to confirm the validity of uncertainty or the degree of potential risks. Second, the development of standard settings for LMOs by relevant international technical bodies will indirectly affect potential

[10] Article 3.2 states that *"Sanitary or phytosanitary measures which conform to international standards, guidelines or recommendations shall be deemed to be necessary to protect human, animal or plant life or health, and presumed to be consistent with the relevant provisions of this Agreement and of GATT 1999."*

direction of trade measures for LMOs. For instance, the Codex Alimentarius and the IPPC referenced by the SPS Agreement have been implemented to set or improve LMOs-related standards, guidelines and recommendations. When they are established, the SPS Agreement will be further equipped to deal with LMOs trade in a transparent manner.

The TBT Agreement (referred to as the Standards Code) encompasses two broad policy considerations. First, it deals with technical regulations and standards including packaging, marketing and labeling requirements and procedures for testing and certifying compliance with these regulations and standards. Second, the objectives of the TBT Agreement are to protect national security, prevent deceptive practices, and protect human health or safety, animal or plant life or health and the environment. The scope of the TBT Agreement differs from that of the SPS Agreement to the extent that the former additionally includes protection of the environment (Article XX (g) in the GATT). As a result, the TBT Agreement does not cover sanitary and phytosanitary measures that belong to the disciplines of the SPS Agreement.

By in large, LMOs labeling requirements have been discussed in the context of technical standards under the TBT Agreement rather than food safety under the SPS Agreement. If mandatory labeling policies were challenged under the TBT Agreement, the challenged party would have to demonstrate that the labeling requirements are intended and designed for legitimate objectives and implementing costs for labeling are proportional to the purpose of the standard. However, some argue that such mandatory labeling programs for LMOs would be unsuccessful under the TBT Agreement (Caswell 2000).

Ⅵ. Limitations and Challenges

Despite the variety and array of regulatory rules and standards, few deal comprehensively with LMOs. First, in general, many of the relevant rules and standards address the requirements of

pathogens or dangerous organisms. As a consequence, it is not clear how to internalize LMOs into the existing rules and standards. There remain gray areas yet to be clarified and likely to cause potential disputes or conflicts.

Secondly, and more specifically, rules and standards for LMOs' handling, transport, packaging and identification are few in number and limited in scope. For example, few regimes are applicable to the safe transportation of LMOs and there is limited information available on its methodological guidelines. In addition, many a rules for labeling requirements are restricted to food products.

Thirdly, a rapid development of biotechnology tends to hinder existing rules and standards from covering all the new products and applications regard to the LMOs. This is significant since new LMOs could introduce different types of risk that are distinguishable from those of original organisms.

Finally, the objectives of existing rules and standards are mostly to protect animal and human health or plant life apart from the environment. LMO-related safety of the environment thus resorts largely under the umbrella of MEAs. A challenge that waits a head is to resolve potential discords between MEAs and trade agreements.

As for the Biosafety Protocol, much work needs to be done in the future. For example, detailed identification requirements for LMO-FFPs (food, feed or processing) must be discussed and determined after the date of entry into force of the Protocol (Article 18.2 (a)). This Protocol requires specific guidance on documentation and specification with respect to the LMO-FFPs. Most of all, it renders difficulty in setting a threshold level for identifying 'may contain' LMOs (Article 18.2). It also specifies modalities for developing standards.

Additional issues to resolve arise from consideration of the relationship between the Biosafety Protocol and the WTO Agreements. One is the issue of when and how to apply the precautionary principle. Advocates of the precautionary principle argue that the principle should be considered within a structured

approach to the analysis of risk (Commission of the European Communities 2000b). Opponents argue that the precautionary principle is invoked to justify a prohibition of LMOs (Goklany 2000). It is also claimed that the precautionary approach justifying trade measures under the SPS Agreement and the Biosafety Protocol is not identical (Phillips and Kerr 2000). The former is asking why and the latter asks *why not*.

Another issue focuses on the debates on 'like product'. Ultimately, under Article I (Most Favored Nation Treatment) of the GATT, the WTO regimes do not allow discrimination on 'like product' on the basis of PPMs. This is confirmed by the beef hormone case between the United States and the EU (Richardson 2000). The EU placed a ban on the import of hormone-treated beef from the United States and then the United States brought this case before the WTO. The WTO found against the EU because the EU had not conducted a scientific risk assessment as required by the SPS Agreement. In other words, it was not a finding about food safety or science.

On the contrary, the Biosafety Protocol establishes a clear distinction between LMOs and non-LMOs. Despite the absence of a visual difference between LMOs and non-LMOs, a country comes to establish enabling procedures for regulating LMOs leaning on the Protocol (Dawkins 2000). The absence of difference relies on PPMs, since genetic engineering is a kind of a process. Hence, there is room for a potential conflict between the WTO and the Protocol in this respect.

Finally, the Protocol has a provision to take into account the socio-economic considerations in reaching a decision on import (Article 26). It is mentioned that socio-economic factors arise from the impact of LMOs on the conservation and sustainable use of biological diversity. However, it remains indefinite about when and how to invoke relevant measures on the basis of this provision. Nevertheless, it can be viewed that this condition goes beyond the relative competitiveness, an economic determinant of international trade and thus broadened the scope of policy decisions.

So far, no dispute has been filed at the WTO with respect to the MEAs. It is quite unlikely that a measure taken pursuant to the MEAs would be challenged in the WTO (OECD 1999). But, ambiguity remains under a provision that allows stricter domestic measures than the minimum measures required by the MEAs as the cases in CITES and the Montreal Protocol.

According to the Basel Convention, Parties are required to resolve a dispute by negotiations or other peaceful ways. When they failed to reach a resolution, it was suggested to put the dispute to the International Court of Justice (ICJ) or to arbitration. It this happened then the ICJ would settle the dispute based upon international rules and laws. The WTO Committee on Trade and Environment (CTE) also suggested that Parties to an MEA should consider trying to resolve disputes arising from the use of trade measures through the dispute settlement mechanisms available under the MEA.

The Preamble of the Biosafety Protocol claims that trade and environment agreements should be mutually-supportive with a view to achieving sustainable development. But, the success of a mutually supportive relationship between them is less likely to take into account their inherent contradictory objectives and conditions. It is worth noting that a potential conflict may arise between the two and they may be challenged at a dispute settlement mechanism. Article 27 of the Protocol envisages a binding multilateral agreement and specifies completion of this process within four years. Nijar (2000) suggests three possible prospective regimes, including a transnational process regime, a negotiated international private law regime and an international arbitral regime. Therefore, it calls for efforts to achieve regulatory harmonization with respect to LMOs in national laws or in international regimes.

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