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The impact of WTO law on environmental protection in maritime trade

Leya Susan Binu
LLM-International Trade Law, Gujarat Maritime University, Gujrat, India
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Abstract
The decarbonization of international shipping has created a clash between WTO norms, such as non-discrimination and market access, and state environmental policies regulating ships, green fuels, and maritime services. Through exploring the ambiguities in technical standards, subsidies, and process-based discrimination, this paper will critically analyze the intersection of WTO law and marine environmental regulation. Through the use of doctrinal legal research and the interpretation of WTO jurisprudence, IMO instruments, and multilateral environmental agreements, this study will assess the scope of the GATT Article XX exceptions. The paper will test the hypothesis that although WTO law has mechanisms for accommodating maritime environmental policy, doctrinal and institutional limitations prevent effective governance, and thus provide ways forward.

Keywords: Decarbonization of international shipping, WTO law, marine environmental regulation

Introduction

The growth of International maritime Trade has been a pillar of economic progress, facilitating the transfer of commodities and materials around the world on an unprecedented level. At the same time, this increase has exerted mounting pressure on the marine ecosystem, leading to overfishing, ocean pollution, and the destruction of vulnerable ecosystems. The World Trade Organization (WTO) is the multilateral trading institution, yet it continues to struggle in aligning its liberalization agenda with the imperative for environmental management, especially on the seas. Comprehending the role of WTO law adapting to this challenge particularly its legal principles, dispute case law, and relationship with marine-specific environmental agreements is imperative for a sustainable maritime trade.

Given the rapid growth in maritime trade and global initiatives aimed at reducing marine pollution and decarbonizing shipping, the International legal regime regulating global trade has never been faced with greater challenges. At the center of this international legal system is the difficult balance that exists between the liberalization of international trade and the maintenance of the global commons. In the system of the World Trade Organization (WTO), there is an inherent tension that exists between fundamental tenets of trade such as non-discrimination, transparency, and market access and policies that control vessel emissions, greening shipping fuel, and maritime services. There is considerable legal uncertainty in the relevant WTO treaties especially regarding standard equivalencies, the legality of green innovation subsidies, service regulation, and process discrimination. This is further complicated by the lack of any legal protection of national or regional environmental measures and the inherent institutional disharmony between trade law and environment treaties.

This analysis of the problem thus requires an assessment of how legal convergence between WTO law and the law of the environment at sea may be improved through a critical examination of the relevant multilateral treaties, dispute resolution cases, technical standards, subsidy regimes and institutional reform processes in relation to the same. In this analysis, there is an attempt to assess the nature and manner in which agreements and dispute settlement under the WTO are viewed in the context of the legitimacy of maritime environmental measures; the legal doctrines facing challenges in justifying the same within the framework of Article XX GATT exceptions, among others; and how this might be achieved through institution building mechanisms between the WTO and other international bodies such as the IMO.

This work has limited its scope to the study of the relationship of the WTO legal regime comprising of GATT 1994, relevant sectoral agreements, and Appellate Body jurisprudence as it affects marine ecosystems, and the interplay of multilateral environmental agreements (MEAs) and trade law considerations from a global and regional perspective. Purely terrestrial trade-environment issues are not part of this study's scope save for where they affect oceanic freight transport issues. The methodological approach taken in this study involves doctrinal analysis of legal documents, comparative analysis of cases, and interpretation of treaty language.

Chapter I - WTO Law and Environmental Protection

International trade serves as an important Mechanism for Global Economic Activity. This facilitates growth as percentage of GDP which rose from less than 40% in 1990 to over 60% in 2022 [1]. This intense global reliance on maritime trade, however, has also brought in environmental challenges, starting from chronic pollution and oil spillage to the demands of climate mitigation, including the reduction of greenhouse gases (GHG) emissions, and the management of invasive aquatic species via ballast water [2].

WTO's Core Principles and Environmental Exceptions

The WTO multilateral trading system is founded on non-discrimination principle of Most Favored Nation and National Treatment and trade liberalization. Article XX of GATT, nonetheless, creates general exceptions, particularly paragraphs (b) and (g), which allow for measures "necessary to protect human, animal or plant life or health" and

"relating to the conservation of exhaustible natural resources," respectively [3]. These exceptions have served as points of entry for the defense of environmental trade-restrictive measures but have also necessitated states showing necessity, proportionality, and non-protectionist use.

Evolution of WTO Environmental Discourse

Since the creation of the WTO, institutional awareness of the relationship between international trade and sustainable development has been increasingly recognized. This development is reflected in Ministerial Declarations, the establishment of the Committee on Trade and Environment (CTE), and a richening body of jurisprudence concerned with balancing trade and environmental goals, especially where marine resources are involved [4].

The US – Shrimp-Turtle (1998) case is a landmark ruling that strongly shed light on the permissible limits of environmental trade remedies under WTO law. The main issue concerned a US prohibition on shrimp imports caught without Turtle Excluder Devices (TEDs), a policy aimed at conservation of endangered sea turtles, a migratory marine animal. Challenged by a number of developing nations, the Appellate Body (AB) finally decided that conservation of exhaustible natural resources, including migratory species of marine animals, is a valid environmental interest within the purview of Article XX(g) of the GATT. Nevertheless, the AB criticized the application of the US measure as discriminatory and overly stringent in its imposition on some WTO members. This decision enunciated a fundamental principle: although WTO law allows the pursuit of extraterritorial environmental goals, implementing measures must meet the provisions of the Article XX chapeau—namely, they must not be administered in a way that is arbitrary or unjustifiable discrimination between nations where the same conditions exist, and a non-arbitrary approach with flexible negotiation must be undertaken with trading partners.

Adding further to the case law on protection of the environment was the previous case of US – Gasoline (1996). In this case, the United States had implemented standards for clean gasoline with the specific purpose of lowering air and ocean pollution. While the measure was initially rejected by the Panel, the Appellate Body's ultimate decision was significant in reaffirming that environmental objectives, i.e., reducing pollution, are actually within the exceptions granted by Article XX(b)and Article XX(g). However, in line with the underlying principles of the GATT, the decision also emphasized that in order for such environmental measures to be legitimate, their application must strictly not include discrimination against WTO Members without justifiability, thus upholding the requirement that environmental protection measures must be trade-neutral in application.

Chapter II: Institutional Dynamics over Environmental Measures

The International Maritime Organization (IMO) has become the main regulatory organization, creating conventions like the International Convention for the Prevention of Pollution from Ships (MARPOL) and the Ballast Water Management (BWM) Convention. The more recent IMO initiatives, prompted by worldwide climate necessities, have grown more and more ambitious, leading to the 2023 IMO Strategy for GHG emissions reduction and its net-zero emissions by or around 2050 target [5]. This aspiration is realized through near-term technical and operating measures like the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII), and mid-term proposals like the IMO Net-Zero Shipping Framework, which features an economic component, commonly thought of as a worldwide GHG pricing scheme [6].

IMO Measures under the TBT Agreement

The TBT Agreement sets out the rules to develop and use obligatory technical regulations and voluntary standards, and in particular ensure that such requirements are not used to create arbitrary or unjustified obstacles to trade. The TBT Agreement has a wide application to product features and increasingly to process and production methods (PPMs) connected with the product features [7].

Classification of IMO Measures: Most IMO environment mandates fit squarely within scope of TBT technical regulations:

a. **IMO Fuel Standards:** The IMO 2020 Sulfur Cap, requiring a lowering of the permissible sulfur content in marine fuel from 3.5% to 0.5%, establishes product characteristics and is a typical technical regulation [8].

b. **IMO EEXI/EEDI:** The Energy Efficiency Design Index (EEDI) for new vessels and the Energy Efficiency Existing Ship Index (EEXI) for in-service vessels are technical measures that impose a minimum energy efficiency requirement on the ship's design, in terms of grams of CO2 per ton-mile [9]. Such compulsory design and technical requirements constitute technical regulations under the TBT Agreement.

The TBT Necessity Test and International Standards: A technical regulation that is challenged under the TBT Agreement has to satisfy the test of being "necessary" to achieve a "legitimate policy aim," e.g., protection of the environment or human health. The TBT Agreement itself positively encourages WTO Members to utilize relevant international standards where they are available. This requirement provides a significant legal benefit or "coherence dividend" to IMO measures. As EEXI and EEDI standards are produced, agreed on, and enforced worldwide under the IMO regime, they represent recognized international standards. A national measure applying EEXI or EEDI that meets the IMO standard is extremely immune to a WTO challenge under the TBT Agreement since the international character of the standard will be a very strong support for the contention that the measure is not an "unnecessary barrier to trade" [10].

Chapter III: Multilateral Environmental Agreements and WTO

Multilateral Environmental Agreements (MEAs) are essential elements of international environmental governance, particularly for the marine environment, imposing binding commitments on states to conserve biodiversity, manage fisheries, and minimize marine pollution [11]. The provisions of MEAs usually comprising trade-related measures to be effective, they have to coexist and harmonize with WTO law, which regulates international trade and seeks to prevent unjustifiable trade restrictions.

MEAs and Trade-Related Environmental Measures

MEAs often place trade-related obligations and limitations on marine living resources to fulfill vital conservation objectives, including managing the trade in threatened species, managing overfishing, and limiting pollution hazards [12]. Most MEAs mandate trade-related measures, e.g., prohibitions or certification procedures, in order to comply with environment-related commitments [13]. Some of the key examples that are pertinent to maritime trade are the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—which places controls on trade in marine endangered species the Convention on Biological Diversity (CBD), and the fisheries protocols under the United Nations Convention on the Law of the Sea (UNCLOS) [14]. UNCLOS, though a treaty of the sea primarily, also establishes substantive norms for the sustainable exploitation of marine resources, which cut across WTO-regulated fisheries trade and subsidies.

Legal Challenges in MEA-WTO Compatibility

Even as MEAs have an environmental imperative, their trade measures are inconsistent with WTO principles. The WTO's fundamental rules of GATT and associated agreements stress non-discrimination, transparency, and minimizing restrictions on trade. Conversely, MEAs tend to generate differentiated obligations among states, sometimes making more onerous restrictions upon trade in order to further environmental objectives [15].

This legal tension is expressed in a number of ways:

a. **Non-Discrimination vs. Environmental Prioritization:** The WTO law's Most-Favored Nation (MFN) and national treatment norms mandate equality of trade between like products. MEAs can, nevertheless, invoke trade restrictiveness on grounds of conservation requirements that distinguish between treatment by method of production or origin, a quintessential tension in process and production methods (PPM) cases like US—Shrimp-Turtle and United States Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (US—Tuna II) disputes.

b. **Article XX Exceptions as the Legal Gateway:** The absence of a comprehensive interface agreement brings ambiguity: MEA-justified measures are justified only if they also satisfy the conditions of Article XX of the GATT 1994, the exception authorizing trade restrictions required for environmental protection and resource conservation (particularly paragraphs (b) and (g)) in so far as the "chapeau" conditions of non-arbitrariness and unjustifiable discrimination are satisfied. The stringent demands of Article XX give rise to "fragmentation" risks in international law.

c. **Fragmentation and Jurisdictional Conflicts:** The WTO's binding dispute settlement system exerts authority that can override or undermine MEA obligations. For example, the European Communities Measures Affecting the Importation of Certain Poultry Products (EC-Chilean Swordfish) case revealed competing jurisdictions between WTO panels and marine environmental dispute bodies, complicating resolution and raising risks of conflicting rulings [16].

Chapter IV - Subsidies And Services Disciplines In Maritime Environmental Protection

Subsidies disciplines, mainly under the Agreement on Subsidies and Countervailing Measures (SCM Agreement), and services trade disciplines, under the General Agreement on Trade in Services (GATS), are of particular importance to disciplining the financial and operational terms of maritime trade, especially environmental sustainability. This chapter examines how these agreements influence government action to promote "green" shipping and sustainable marine operations [17].

The SCM Agreement and Green Subsidies to the Shipping Industry

The SCM Agreement provides for multilateral disciplines on government financial assistance, classifying them broadly as prohibited (export or import substitution) or actionable. Actionable subsidies, encompassing government provision of goods or services or financial assistance, are unlawful only if they are "specific" and result in "adverse effects" to another WTO Member's trade interests [18].

The Specificity Test: In order for a subsidy to be actionable, it must be "specific," i.e., access is limited explicitly or de facto to a particular firm, industry, or group of industries. Green subsidies for promoting maritime decarbonization (e.g., green shipbuilding assistance, engine retrofits, or alternative fuel infrastructure development for a specific purpose) are nearly always specific in that they aim at a narrow group of beneficiaries in the shipping value chain.

The Policy Gap: The SCM's "Green Paradox." The SCM Agreement historically contained a "green light" category for non-actionable subsidies, which included those intended for environmental compliance. However, this category expired, meaning that specific environmental support is now fully actionable and vulnerable to dispute settlement or countervailing duties if found to cause serious prejudice or injury. The sector's decarbonisation needs substantial, focused public financial support to cover the cost difference between "dirty but cheap fossil fuels" and "clean but costly renewable energy [19]." However, the SCM Agreement is equally suspicious of environmentally friendly subsidies as it is of regular protectionist subsidies, valuing competitive neutrality in the present at the expense of the imperative long-term structural transformation imposed by international climate commitments. Therefore, governments are compelled to make an impossible choice between fast, targeted decarbonization strategies (which might provoke a WTO complaint) and gradual, legally secure, non-targeted aid which might prove ineffective in meeting environmental objectives quickly enough. This legal inflexibility must be reformed, perhaps by reinstating safe harbor provisions for environmental subsidies [20].

Fisheries Subsidies and Marine Sustainability

The difficulties in the SCM Agreement led to a particular negotiation that created a new sectoral agreement, which provides a potential template for broader reform.

Agreement on Fisheries Subsidies: The WTO Agreement on Fisheries Subsidies concluded after nearly two decades of negotiation targets subsidies that contribute to illegal,

unreported, and unregulated (IUU) fishing, overfished stocks, and overcapacity. Its disciplines are designed to align trade practices with the sustainability of marine living resources, implementing strict notification and transparency requirements for member states [21].

Anticipated Impacts and Constraints: The agreement contribute toward curbing environmentally harmful subsidies widely acknowledged as perpetuating ocean resource depletion. Realization, however, is contingent on capacity development, strong enforcement mechanisms, and coordination with other international agreements, which is challenged in the areas of data generation, capacity needs, and interference with non-WTO fisheries management frameworks. The ambition evident in this Agreement provides a template for environmental subsidy safe harbors in the broader SCM reform agenda [22].

Services Disciplines (GATS): General Agreement on Trade in Services (GATS) sets out rules for the environmental component of maritime services, ranging from port charges to operational requirements. GATS Article XIV contains general exceptions that allow measures that are necessary to protect human, animal, or plant life or health, or measures required to secure compliance with laws or regulations. Any such measure, however, has to show its necessity and proportionality so that it will not be a disguised restriction on trade [23].

Chapter V - Analysis of WTO Law and Maritime Environmental Protection

The Legal Framework of WTO and its Capacity to Support Maritime Environmental Protection

WTO law and jurisprudence provide a sophisticated but underpinning legal framework that oversees the relationship between trade and environmental protection in maritime situations. GATT 1994, which is complemented by the TBT, SCM, and GATS agreements, identifies the principles of non-discrimination, liberalization of trade, and technical regulation that are essential in the governance of maritime trade. The exceptions clause in Article XX of GATT is important in granting an exception to member states in adopting measures to conserve exhaustible natural resources and human, animal, or plant life. Yet the legal potential of WTO law to legitimate maritime environmental regulations is tempered by strict standards of procedural justice, the need, and non-discrimination between domestic and foreign producers and service suppliers. Milestone cases, including US Shrimp-Turtle and US Gasoline, reveal the contradiction between the preservation of marine life and compliance with WTO disciplines. This legal scheme hence establishes measures to assist with environmental protection but under strict limits that push states away from regulating their own affairs [24].

Doctrinal and Institutional Challenges in Applying WTO Law to Marine Environmental Measures

In spite of WTO provisions aimed at making room for environmental measures, justifying such actions under GATT Article XX is riddled with controversies. The vagueness surrounding the term "like products" and the debate on regulating non-product related process and production methods (PPMs) are major doctrinal hurdles, especially for measures predicated on carbon intensity or ecological footprint without changing physical product characteristics. These issues raise issues of difficulty in determining the validity of carbon pricing, emission standards, or fuel regulations under WTO law.

Additionally, institutional imbalance between WTO's binding dispute resolution mechanism and the consultative nature of environmental institutions such as the IMO presents daunting coordination and coherence challenges. WTO's power can override environmental regulatory action in the absence of formal communication and harmonization, undermining the creation of uniform marine environmental policies. The absence of concrete provisions to link Multilateral Environmental Agreements (MEAs) with WTO law leads to regulatory fragmentation, legal insecurity, and threats of conflicting decisions. Innovative policy measures Article XX amendments, WTO waivers for MEA-imposed measures, and rewritten subsidy rules identifies institutional possibilities but need sensitive negotiation and enhanced international coordination [25].

Pathways to Integration: Reform Imperatives and Environmental Governance in WTO Law

Connecting WTO law to maritime environmental protection requires pushing forward legal clarity, operational coherence, and institutional collaboration. The new WTO Agreement on Fisheries Subsidies is a good example of successful integration of environmental necessities with trade regulation and offers a model for future reforms. Reforming the Subsidies and Countervailing Measures (SCM) Agreement to accept environmental subsidies with safe harbors would reduce legal barriers against green maritime technologies and shipbuilding.

Institutionally, institutionalization of coordination mechanisms between WTO and institutions such as IMO can promote common standards and collective compliance monitoring. Increased flexibility in the interpretation of Article XX exceptions, particularly in accepting PPM-based environmental norms, is also crucial to growing WTO-compatible regulatory space. All these developments will make the WTO mature into a more trade-liberalization institution from one that is increasingly well-positioned to promote global marine environmental objectives [26].

Hence we can say that WTO law is capable of making maritime environmental protection possible but is subject to lasting doctrinal and institutional limitations that hamper its complete effectiveness and consistency. Plugging these gaps by way of doctrinal evolution, institutional creativity, and legislative overhaul is the urgency to synchronize trade and environmental regulation at the maritime level and to meet economic and ecological sustainability requirements alike.

Suggestions

1. **Modify WTO Rules to Specifically Include Marine and Ocean Sustainability Goals**

Modify or broaden WTO's exceptions clause (GATT Article XX) to specifically acknowledge MEA-compatible measures, particularly for fisheries, ocean pollution, and climate-related standards. This would bring legal clarity and minimize disagreements over environmental measures crucial for ocean sustainability.

Strengthen environmental safe harbors for subsidies (through SCM Agreement reform) to promote green shipping technologies, environmentally friendly ports infrastructure, and sustainable fisheries as part of WTO

disciplines on subsidies that are in harmony with climate and marine biodiversity conservation policies.

2. **Strengthen Institutional Coordination and Multilateral Cooperation**

Create cooperative frameworks between the WTO, IMO, FAO, and UNEP to provide consistency in standards, technical regulations, and enforcement. Creating joint frameworks would avoid jurisdictional overlap and conflict.

3. **Encourage International Data Sharing, Transparency, and Monitoring**

Establish unified marine emissions monitoring schemes leveraging AI, AIS, and satellite data for improved measurement of ocean industry GHG emissions, consistent with recent UNCTAD and IMO strategies.

Establish global early warning and climate-induced marine risk assessment systems into WTO's market access and trade policy frameworks for proactive trade-environment management.

4. **Establish Innovative Policy Instruments and Market-Based Solutions**

Trade facilitation measures for environment-friendly marine products, including green fuels, sustainable seafood, and marine-based biomaterials.

Promote market-driven strategies like certification, eco-labeling, and carbon pricing, under WTO-compatible standards, to enhance sustainable consumption and production patterns at sea.

5. **Enhance Support to Developing Countries and Small-Scale Fishers**

Enhance technology transfer and capacity-building through special funds, technical support, and streamlined financing schemes for Climate Resilient Ocean Trade, particularly for Small Island Developing States (SIDS).

Encourage inclusive governance frameworks that empower indigenous communities and local communities, combining science-based standards with traditional knowledge.

These suggestions, if implemented, will close the existing legal and institutional gaps, strengthen the ability of WTO law to uphold ocean sustainability, and encourage an integrated and resilient global marine economy that is consistent with SDG 14.

Conclusion

Maritime trade is a fundamental pillar of global economy, deeply connected with the environmental challenges faced by world's oceans. This research has demonstrated that WTO plays a pivotal role in shaping the legal and institutional landscape within which maritime environment protection measures must operate. While WTO law facilitates environmental protection through exceptions under GATT Article 20 and evolving agreements like the Fisheries Subsidies Agreement, it also imposes doctrinal constraints that require environmental measures to be both necessary and non-discriminatory, limiting some regulatory ambitions in context of process-based standards central to the Maritime Climate Initiative.

Institutional asymmetry between WTO's binding system and specialized maritime regulatory bodies further complicates the governance, generating uncertainties around the marine environmental measures with trade obligations. Although these challenges exist, judicial precedents highlight a growing recognition with WTO jurisprudence of the legitimacy of maritime environmental protection, which suggests for stronger integration. In concise, we can say that WTO stands as both an enabler and a restrictive framework for sustainable maritime trade. The regulatory potential of WTO law is significant but is also underutilized due to legal ambiguities and institutional gaps that inhibit fully coherent and effective marine governance. These issues can be addressed and explored to ensure that maritime trade advances in harmony with global environmental imperatives, safeguarding ocean ecosystems while supporting economic development.

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