

## STRATEGIC USE OF TECHNICAL BARRIERS TO TRADE BY DEVELOPING COUNTRIES FOR ENVIRONMENTAL SUSTAINABILITY WITHIN THE WTO FRAMEWORK

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### Abstract

*Developing countries are increasingly adopting green industrial strategies that aim to protect the environment while also growing their economies. These countries recognize that becoming more competitive and achieving sustainability can go hand in hand. The World Trade Organization (WTO) has a Technical Barriers to Trade (TBT) Agreement, which allows countries to set technical rules for environmental protection, if these rules don't unfairly restrict trade. With environmental technical barriers (like eco-labels, green product rules, and energy standards), developing countries can cut pollution, use energy more efficiently, and manage natural resources wisely. These regulations help local green businesses and drive innovation. The WTO's rules say these measures must be fair, open, and not overly restrictive. Countries must also let the WTO know about new regulations to build trust and avoid disputes. Following international standards, such as those from the International Organization for Standardization (ISO), makes it easier for everyone to comply and keeps trade flowing smoothly. However, these standards should also match the unique needs of developing nations, which can sometimes be a challenge. Green trade rules (TBTs) can spur innovation by encouraging companies to improve environmentally and technologically. Yet, many developing countries struggle to create and enforce these policies because they lack the necessary skills and resources. International organizations like the WTO, UNCTAD, and UNEP offer important support and training to help close these gaps. This study shows that by following WTO rules, building up local skills, and aligning with global standards, developing nations can use green trade measures to support sustainable growth and compete globally—all while helping the planet.*

**Keywords:** WTO, Sustainability, UNCTAD, TBT, UNEP, GATT, Environmental Development

### I. Introduction

Environmental deterioration has emerged as a major worldwide concern in the age of industrialization and globalization (Ahmad et al., 2023). Encouraging economic growth while protecting the environment has become a top priority as the world moves closer to the goals of sustainable development. According to the 1987 Brundtland Report, sustainable development is development that satisfies current demands without endangering the capacity of future generations to satisfy their own (World Commission on Environment and Development, 1987). National regulatory systems are significantly shaped by trade, especially within the framework of the World Trade Organization (WTO) (Mathlouthi et al., 2025). In this regard, trade and environmental protection have become more closely related, especially with the use of tools like Technical Barriers to Trade (TBTs), which provide a regulatory framework for environmental governance (Howse & Regan, 2000). International trade may be impacted by technical standards, rules, and conformance assessment processes, which are known as technical barriers to trade (TBTs). If not implemented correctly, these regulations can serve as covert trade barriers even though their primary goal is to safeguard the environment, public health, and safety. Such measures are permitted by the WTO's TBT Agreement, but they must not impose more trade restrictions than are required to achieve a justifiable goal, like environmental preservation (WTO, 1994). However, because of a lack of institutional and

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technical ability, financial limitations, and the possibility of trade disputes, developing nations frequently find it difficult to negotiate the complexity of this system (Ahmad et al., 2024). These obstacles make it more difficult for them to create and carry out environmental laws that are both WTO-compliant and consistent with their sustainable development needs (Jinnah & Lindsay, 2016).

Investigating how developing nations might create environmental laws that support sustainable development and adhere to WTO commitments is the goal of this study. It explores how TBTs might be used to safeguard the environment without creating unwarranted trade restrictions. Within the bounds of WTO rules, the study aims to determine workable legal and policy solutions that developing nations might use to guarantee the achievement of their environmental goals. The study will involve analyzing and interpreting the pertinent TBT Agreement clauses, studying pertinent WTO case law, and looking at policy responses that combine trade commitments with environmental goals (Bodansky & Brunnée, 2017). The following queries are put out to direct the investigation:

1. What are the legal restrictions on using TBTs for environmental goals under WTO law?
2. What obstacles do developing nations face when creating and executing such policies?
3. How can international trade regulations be adhered to while also promoting environmental goals?

Given that environmental problems like pollution, resource depletion, and climate change necessitate quick and coordinated solutions, particularly in the Global South, these questions are especially important (Afzal & Haider, 2025). Developing nations must be equipped with institutional support, policy creativity, and legal clarity required to balance their trade obligations with environmental demands (Esty, 2001).

## **II. Legal and Institutional Framework**

### **WTO's TBT Agreement**

Adopted in the Uruguay Round of 1994, the WTO's TBT Agreement seeks to prevent needless trade barriers from technical regulations, standards, and conformity assessments. It encourages transparency, notification, and the use of international standards for all goods except those covered by the SPS Agreement, and it strikes a balance between trade facilitation and members' rights to pursue public policy objectives, such as environmental protection and human and animal health (WTO, 1994). The preamble highlights the conflict between regulatory autonomy and trade harmonization (Marceau & Trachtman, 2002). The Agreement emphasizes that economic liberalization shouldn't take precedence over sustainability by acknowledging "legitimate objectives" like environmental protection (Article 2.2). Health-related measures can be justified under WTO law, according to the EC-Asbestos case (WT/DS135) (WTO, 2001). However, members must demonstrate that these measures are not covert restrictions (Van den Bossche & Zdouc, 2021). Nondiscrimination and necessity are among its fundamental tenets (Haider, Ahmad, et al., 2024). Equal treatment of "like" imported and domestic products is guaranteed under Article 2.1, and Article 2.2 mandates that trade restrictions do not exceed what is necessary. To promote regulatory coherence and lessen fragmentation, the Agreement promotes dependence on international standards like ISO and Codex Alimentarius (Joergens, 2001).

### **Sustainable Development in WTO Law**

A fundamental tenet of international law and the WTO framework today is sustainable development. The preamble of the WTO Agreement emphasizes raising living standards, promoting full employment, and growing trade in addition to making the best use of the world's resources in accordance with sustainable development (WTO, 1994). This illustrates a change in trade policy that incorporates social and environmental issues. The Appellate Body stressed

sustainable development as an interpretation tool in US-Shrimp, stating that WTO regulations must be in line with more general principles of international law (WTO, 1998; Cottier & Veron, 2008). If they adhere to their WTO commitments, members are free to implement environmental protection measures thanks to this recognition. If they are not imposed arbitrarily or discriminatorily, trade restrictions that are required to preserve natural resources, protect life, or safeguard health are permitted under Article XX of the GATT (WTO, 1994, Article XX). By recognizing legitimate public policy objectives, the TBT and SPS Agreements further show that trade liberalization and environmental regulation may coexist (Howse & Langille, 2012). Finding balance is difficult, though. According to WTO law, members must provide justification for their actions, guaranteeing necessity, nondiscrimination, and scientific validity (Van den Bossche & Zdouc, 2021).

### **Flexibility for Developing Countries**

Recognizing the weak institutional and economic capabilities of developing and least-developed nations, the WTO has Special and Differential Treatment (SDT) provisions to assist them. These clauses provide more flexibility in implementation, longer transition times, and preferential market access. When creating and implementing technical regulations, members are required under Article 12 of the TBT Agreement to take developing nations' unique trade and development requirements into account (WTO, 1994). For instance, Article 12.3, which reflects the WTO's larger commitment to equality, exhorts developed members to refrain from imposing international norms that are inappropriate for the circumstances of developing nations (Hoekman et al., 2004). Under Articles 11 and 12, the TBT Agreement encourages technical support and capacity-building in addition to SDT. These programs assist developing nations in enhancing their capacity for regulation design, conformance evaluation, and standard-setting (Haider, Mathlouthi, et al., 2024). To encourage involvement in international standardization initiatives, the WTO holds workshops, training, and evaluations, frequently in collaboration with UNIDO and ISO (UNIDO, 2017). There are still issues despite these attempts. Because of irregular funding, poor coordination, and the non-binding character of assistance agreements, scholars point to ongoing implementation gaps (Michalopoulos, 2001; Jansen, 2010). Thus, even though the legislative structure is flexible, both home preparedness and ongoing international cooperation are necessary for its success (Hui et al., 2025) ; (HUI et al., 2015).

## **III. Challenges for Developing Countries**

### **Institutional and Technical Limitations**

Many developing nations are unable to create and implement efficient laws due to institutional and technical constraints under the WTO's TBT framework. The development and application of environmental and product standards are frequently hampered by inadequate regulatory frameworks, scarce resources, a lack of qualified staff, and inadequate interagency collaboration (Jansen, 2010). Technical measures might therefore not meet WTO standards or face opposition from trading partners. Their participation in international standard-setting bodies, where consistent engagement and knowledge are crucial, is likewise restricted by this capability gap (Hoekman & Kostecki, 2009). As a result, rather than forming technical legislation around local environmental concerns, many emerging countries adopt it reactively. There may be difficulties even though the TBT Agreement promotes harmonization through international standards (WTO, 1994, Article 2.4). Implementation of such standards may be challenging or expensive since they may not be in line with regional circumstances, public health priorities, or economic realities (Perez, 2006) ; (Haider, Rana, et al., 2024). Furthermore, developing nations frequently rely on standards created by wealthy economies or institutions like ISO or Codex, over which they have little control. This dynamic limit policy autonomy

and perpetuates global trade imbalances (UNCTAD, 2015). Because of this, developing countries run the risk of becoming passive adopters of standards, which will hinder their capacity to create efficient, customized environmental policies (Ahmad et al., 2025) ; (Ahmad et al., 2023).

### **Risk of Disputes or Trade Retaliation**

Developing nations that use Technical Barriers to Trade (TBTs) to achieve public health, or environmental goals run the risk of trade disputes if their policies are perceived as protectionist or contradictory with WTO regulations. If a legitimate action deviates from international standards or imposes significant trade costs, it may encounter difficulties. Peru contested the EU's rule that only *Sardina pilchardus* could be called "sardines," excluding *Sardinops sagax* from Peru, in EC–Sardines (WT/DS231). Because the EU policy was excessively trade-restrictive and did not depend on pertinent international norms, the WTO Appellate Body determined that it breached Article 2.4 of the TBT Agreement (WTO, 2002). In a similar vein, Mexico challenged US dolphin-safe labeling regulations in US–Tuna II (Mexico) (WT/DS381), claiming they unjustly singled out Mexican exporters. The WTO decided that certain of the requirements breached the TBT's non-discrimination principle and lacked a foundation in international standards, despite the United States' citation of environmental protection (WTO, 2012). For poor nations with limited resources, these situations highlight the difficult-to-manage boundary between reasonable environmental regulation and trade restrictions (Howse & Langille, 2012). According to Bernasconi-Osterwalder et al. (2005), the possibility of legal challenges may create a "regulatory chill," which prevents developing nations from enacting essential environmental regulations for fear of being branded as protectionist. Therefore, even while WTO legislation allows for environmental measures, there is still a practical danger of disputes, particularly for nations with little ability to defend them.

### **Compliance and Notification Burden**

Under the WTO's TBT Agreement, members are required to inform others of new or updated technical norms and take part in standard-setting. Nevertheless, developing nations frequently lack the institutional, financial, and technical resources required for significant involvement in international organizations such as ISO and the Codex Alimentarius Commission (Hoekman, 2005). Many developing countries lack the technical know-how, bilingual negotiating abilities, and steady funding necessary for active engagement. Because of this, they frequently acquiesce quietly to international standards that might not accurately represent their environmental priorities or levels of development (UNCTAD, 2015). According to Jansen (2010), countries with limited legal, scientific, or policy drafting capacity may find it difficult to comply with TBT Articles 2.9 and 2.10, which impose administrative burdens by requiring notification of draft regulations that could affect trade and justifications demonstrating that such rules are not unduly trade-restrictive and serve legitimate goals like environmental protection (WTO, 1994). Failure to notify or adequately defend a measure may expose them to legal challenges. Because of the technical complexity of WTO regulations, developing nations may be deterred from taking required environmental measures out of concern about non-compliance or trade retaliation (González, 2010) ; (Sadiq & Haider, 2024). As a result, even though the TBT Agreement seeks to guarantee transparency and uniformity, nations without institutional backing may face an unfairly high compliance burden.

## **IV. Strategies for Using TBTs to Promote Environmental Goals**

### **A. Compliance and Notification Burden**

Members are required by the WTO's TBT Agreement to establish standards and inform others of any updated or new technical requirements. However, many developing nations are unable to participate in international organizations such as ISO and the Codex Alimentarius due to

institutional, financial, and technical hurdles (Hoekman, 2005). Active participation necessitates knowledge, bilingual negotiating abilities, and consistent funding—all of which are frequently insufficient. Consequently, norms that may not be appropriate for their level of development or environmental requirements are often passively adopted by developing countries (UNCTAD, 2015). Additionally, draft regulations that impact trade are subject to notification and justification obligations under Articles 2.9 and 2.10 of the TBT Agreement. Governments are required to notify the World Trade Organization (WTO) and demonstrate that such restrictions serve justifiable objectives, like environmental protection, and are not unduly restrictive of trade (WTO, 1994). Although transparency is essential to removing needless obstacles, nations with weak legal, scientific, or drafting capabilities are disproportionately burdened by these standards (Jansen, 2010). Trading partners may file a lawsuit if you don't comply. Because of the intricacy of WTO regulations, developing nations may be deterred from implementing essential laws out of concern for non-compliance or reprisals (González, 2010). Therefore, even though the TBT Agreement encourages transparency and harmonization, countries lacking sufficient institutional support may find it expensive and difficult to comply with its requirements.

### **B. Transparent Rulemaking**

A fundamental tenet of the WTO's TBT Agreement is transparency, which is particularly important for developing nations to foster trust and minimize trade disputes when enforcing environmental regulations. Stakeholder consultation, which involves both domestic and foreign parties, including industry, environmental organizations, and trading partners, is an important step in ensuring that policies are equitable, nondiscriminatory, and appropriate for local conditions; it also helps to reduce claims of protectionism and improves the legitimacy of regulations (Wijkström & McDaniels, 2013). Consultations also help identify implementation challenges, bring in technical expertise, and improve coordination among frequently resource-constrained agencies (Jansen, 2010). Notifying the WTO TBT Committee of draft regulations, as mandated by Articles 2.9 and 2.10 (WTO, 1994), is another crucial component. Members are notified of proposed trade regulations through this process, which also provides time for comments. In addition to meeting transparency requirements, notice reduces the likelihood of disputes by resolving issues early (WTO, 2019). It gives developing nations an opportunity to show good faith compliance and request cooperation or technical aid, despite the administrative demands. The rule's legitimacy under the TBT Agreement is further reinforced by unambiguous notifications that provide the policy and environmental justification (González, 2010). Transparency thus promotes sustainable regulatory capacity-building in addition to protecting against legal concerns.

### **C. Regional Cooperation**

By unifying standards and exchanging knowledge, regional cooperation aids developing nations in strengthening their regulatory capabilities, lowering trade obstacles, and advancing environmental protection (Haider, 2025). Aligning technical rules with environmental standards is a feature of many regional trade agreements (RTAs), including MERCOSUR, ASEAN, and AfCFTA. In addition to lowering regulatory disparities and facilitating intraregional commerce, this standardization enables smaller economies to take advantage of economies of scale in the establishment and enforcement of standards (Brenton & Chemutai, 2021). Sustainable development can be promoted, and trade distortions can be avoided by uniform regional environmental laws, such as shared labeling or emissions regulations. Additionally, RTAs offer forums for addressing complicated problems that individual developing nations might find difficult to resolve on their own, like climate change and sustainable trade (UNESCAP, 2020). In addition to harmonization, regional cooperation makes

it possible to share resources and technical know-how, which is essential for nations with lax regulatory frameworks. Mechanisms that lower compliance costs and enhance regulation include shared environmental monitoring, cooperative testing facilities, and mutual recognition agreements. As an example, ASEAN's ACCSQ promotes alignment with international standards and technical collaboration (ASEAN, 2015). Countries can increase their influence, lessen their reliance on outside assistance, and collaborate to define worldwide standards through this kind of collaboration (Horn, Mavroidis, & Sapir, 2010). In general, regional integration improves institutional capacity and WTO compliance, allowing developing countries to work together to achieve environmental goals.

#### **D. Capacity Building and Technical Assistance**

Developing nations require technical support and capacity building to enhance environmental regulations and adhere to WTO regulations (Afzal et al., 2025). To assist these countries in achieving trade and sustainability objectives, international organizations such as UNEP, WTO, and UNCTAD provide focused assistance. Through its TBT Committee, the WTO offers technical assistance and guidelines on notice obligations, transparency, and the application of international standards (WTO, 2020). UNCTAD incorporates sustainable development into trade policymaking and provides training on non-tariff measures (UNCTAD, 2021). UNEP advocates for the green economy and offers guidance on environmental governance instruments like pollution regulation and carbon pricing (UNEP, 2020). The goal of these initiatives is to increase institutional and technical capacity to create green policies that comply with WTO regulations. The lack of scientific infrastructure, qualified staff, and legal knowledge required to pass TBT tests on necessity and non-discrimination presents difficulties for many developing nations (Hoekman, 2005). Building capacity enables nations to carry out impact assessments, create sensible environmental policies, and participate more successfully in international standard-setting. For example, collaborative initiatives that connect trade, health, and environmental protection are supported by the WTO's Standards and Trade Development Facility (STDF) (STDF, 2022). Effective policy implementation requires long-term institutional development, which includes improved interagency collaboration and public-private partnerships. In the end, robust capability guarantees that trade policy turns into an instrument for sustainable development rather than a hindrance.

#### **E. Green Industrial Policy**

By creating ecologically minded Technical Barriers to Trade (TBTs) within the framework of the World Trade Organization (WTO), developing nations are progressively implementing green industrial policies that promote both economic growth and environmental sustainability. These TBTs encourage domestic innovation and industrial upgrading in addition to achieving policy objectives like energy efficiency and pollution reduction. Examples of policies that encourage companies to embrace sustainable practices and support local green industries include eco-labeling, energy-efficiency standards, and green product legislation (Rodrik, 2014). Such standards can provide domestic manufacturers with a competitive edge while adhering to WTO regulations under the TBT Agreement, provided they are non-discriminatory and tailored to local capacity (WTO, 1994). To pass the WTO "necessity" test and prevent hidden trade restrictions, green TBTs must be properly crafted. Transparency is crucial; nations should align their rules with international norms and notify the WTO TBT Committee beforehand (Wijkström & McDaniels, 2013). These actions can also encourage innovation and R&D investment by establishing specific performance goals (UNIDO, 2022). The issue for policymakers in developing countries is to strike a balance between promoting domestic green businesses through well-crafted laws and maintaining trade openness consistent with the WTO.

Integrating industrial and environmental objectives can result in a positive feedback loop that promotes competitiveness and sustainable growth.

### **V. Case Studies**

Developing nations like Brazil, Kenya, Indonesia, and India provide clear examples of how environmental laws can be crafted as Technical Barriers to Trade (TBTs) while still attempting to adhere to WTO requirements.

India, for example, through its Bureau of Energy Efficiency, has made energy labeling essential for products like refrigerators and air conditioners. This initiative minimizes trade distortions and advances domestic environmental goals by encouraging energy conservation and conforming to international standards (Bureau of Energy Efficiency, 2021).

Brazil, to lessen environmental damage, has implemented eco-labeling and product limitations, especially on chemicals and packaging materials. As demonstrated by Brazil's plastic bag laws, which are applied uniformly to both imported and indigenous goods, these policies are frequently reported to the WTO and are designed to be non-discriminatory (WTO, 2020).

Kenya offers a noteworthy illustration of the application of product restrictions for environmental reasons. To fight pollution, it enforced one of the most stringent plastic bags bans in the world in 2017. Although industry players expressed alarm over the prohibition, Kenya defended the action based on environmental and public health protection, which are valid goals under the TBT Agreement (UNEP, 2018).

Similarly, Indonesia's ISPO (Indonesian Sustainable Palm Oil) system has given palm oil sustainability certification programs. The program, while not without criticism, shows an attempt to create local standards that align with environmental objectives, even as Indonesia works with trading partners to increase recognition and steer clear of WTO conflicts (Obidzinski et al., 2012). These case studies emphasize three important lessons: the significance of establishing transparency through WTO notifications, designing policies with good environmental justification, and coordinating national actions with international norms. These requirements lower the likelihood of disagreements and increase the likelihood that trading partners will accept the measures as lawful. They also show that, with proper calibration, environmental restrictions can support development and sustainability objectives without going against WTO norms.

### **VI. Conclusion and Policy Recommendations**

This study shows that although Technical Barriers to Trade (TBTs) pose difficult legal and regulatory issues for developing nations, they also afford important chances to promote environmental protection within the World Trade Organization's (WTO) framework. Environmental controls are allowed under the TBT Agreement if they don't discriminate against or hinder trade and aim to achieve justifiable goals like environmental preservation, human health, and safety (WTO, 1994, Arts. 2.1 & 2.2). However, developing nations frequently struggle because of their weak institutional capacity, issues conforming to international norms, and the possibility of trade disputes when such policies are viewed as protectionist (Hoekman & Mavroidis, 2015). Well-crafted environmental TBTs, particularly those based on international standards and openly reported to the WTO, can reduce trade frictions while accomplishing sustainability goals, according to case studies from India, Brazil, Kenya, and Indonesia.

Countries should prioritize conformity with international norms, carry out thorough impact studies, and guarantee strong stakeholder consultation to create environmental TBTs that are WTO-consistent. The global trading system is made more legitimate and predictable through transparent rulemaking, which includes prompt notification to the WTO TBT

Committee and justification of actions (Wijkström & McDaniels, 2013). Furthermore, utilizing mutual recognition agreements (MRAs) and participating in regional harmonization initiatives can aid in reducing technical differences and fostering regulatory convergence (Brenton & Chemutai, 2021). To comply with WTO law on necessity and least-trade-restrictive measures, governments must also make sure that their environmental regulations are reasonable, necessary, and supported by facts (Hudec, 1999).

To fully realize the potential of TBTs as tools for sustainable development, national governments should invest in capacity-building at the policy level, including training regulatory personnel, testing infrastructure, and legal expertise to draft WTO-compliant measures. International organizations like the WTO, UNCTAD, and UNEP should expand technical assistance and cooperation programs, especially in helping countries participate in standard-setting bodies and develop green industrial policies (UNCTAD, 2021; UNEP, 2020). By supporting institutional development and encouraging policy coherence between trade and environment, these initiatives can assist developing nations. In conclusion, a collaborative, transparent, and standards-based approach is still crucial for balancing trade liberalization with global environmental goals.

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