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FROM TRANSPARENCY TO STANDARDS:

the role of the TBT agreement in addressing AI regulatory challenges[1,2,3,4]

Milena da Fonseca Azevedo[5]

ABSTRACT: This article examines the role of the World Trade Organization's (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) in addressing the regulatory challenges arising from the proliferation of artificial intelligence (AI) regulations. The objective is to assess how the TBT Agreement can facilitate international cooperation, enhance transparency, and mitigate regulatory fragmentation in the context of a "multilayered AI governance". The methodology consists of a doctrinal analysis of the TBT Agreement's provisions - particularly those related to transparency, notification, and the use of international standards - supplemented by case studies of recent AI regulatory measures, such as the European Union (EU)'s AI Act, and their treatment within the WTO system. The article also draws on WTO jurisprudence and empirical data on notifications and Specific Trade Concerns (STCs) to evaluate the practical application of the TBT framework to AI-related measures. The analysis demonstrates that the TBT Agreement's mechanisms - especially the notification process and the encouragement of the use of international standards - are increasingly relevant for AI regulation. The TBT Committee has emerged as a unique forum for the preemptive discussion and peer review of national AI regulations, enabling Members to identify and address po-

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5. International Trade Lawyer at Demarest Advogados, a PhD candidate in International Law at the University of Sao Paulo (USP). She was fellow of the Ministry of Education in the Program of Academic Excellence (CAPES/PROEX) in Brazil (2023 -2024). She was also a Visiting Researcher at the World Trade Institute (WTI) of the University of Bern in Switzerland, and a participant at the World Trade Organization (WTO) Support Programme for Doctoral Studies. https://orcid.org/0009-0008-8863-7327.

tential trade concerns before they escalate. In conclusion, the article argues that the TBT Agreement provides valuable tools for improving AI governance and reducing regulatory fragmentation, but also underscores the need for further reforms to ensure its continued effectiveness in the context of emerging digital technologies.

KEYWORDS: World Trade Organizations; Technical Barriers to Trade; Artificial Intelligence.

DA TRANSPARÊNCIA ÀS NORMAS TÉCNICAS: O PAPEL DO ACORDO TBT NA ABORDAGEM DOS DESAFIOS REGULATÓRIOS DA IA

RESUMO: Este artigo examina o papel do Acordo sobre Barreiras Técnicas ao Comércio (Acordo TBT) da Organização Mundial do Comércio (OMC) no enfrentamento dos desafios regulatórios decorrentes da proliferação de regulações sobre inteligência artificial (IA). O objetivo é avaliar de que forma o Acordo TBT pode facilitar a cooperação internacional, aprimorar a transparência e mitigar a fragmentação regulatória no contexto de uma "governança multinível da IA". A metodologia consiste em uma análise doutrinária das disposições do Acordo TBT—especialmente aquelas relacionadas à transparência, notificação e uso de normas técnicas internacionais—complementada por estudos de caso de medidas regulatórias recentes sobre IA, como o Regulamento de IA da União Europeia, e seu tratamento no âmbito do sistema da OMC. O artigo também se baseia em jurisprudência da OMC e em dados empíricos sobre notificações e Preocupações Comerciais Específicas (STCs) para avaliar a aplicação prática do arcabouço do TBT a medidas relacionadas à IA. A análise demonstra que os mecanismos do Acordo TBT—especialmente o processo de notificação e o incentivo ao uso de normas técnicas internacionais—tornam-se cada vez mais relevantes para a regulação da IA. O Comitê TBT se consolidou como um fórum único para a discussão preventiva e revisão por pares de regulações nacionais sobre IA, permitindo que os Membros identifiquem e abordem potenciais preocupações comerciais antes que se agravem. Em conclusão, o artigo sustenta que o Acordo TBT oferece ferramentas valiosas para aprimorar a governança da IA e reduzir a fragmentação regulatória, mas também destaca a necessidade de reformas adicionais para garantir sua efetividade contínua diante do avanço das tecnologias digitais.

PALAVRAS-CHAVE: Organização Mundial do Comércio. Barreiras Técnicas ao Comércio. Inteligência Artificial.

INTRODUCTION

According to the WTO report *Trading with Intelligence,*[6] AI constitutes a structural shift in the global economy with broad implications for supply chain optimization and logistics, including improved demand forecasting, inventory management, shipment tracking, and route optimization. AI has also optimized international businesses by breaking barriers of language and access to information, fostering trade partnerships, and automating services and tasks. Additionally, it has spurred the demand for technology-intensive goods, such as semiconductors, chips, software, and other digital components. AI has also enabled the emergence and improvement of other technologies, such as the Internet of Things (IoT), autonomous vehicles, and automated production methods.

The global AI market was valued at US$189 billion in 2023 and is projected to reach US$4.8 trillion by 2033. It also has the potential to increase global trade by nearly 14 percentage points by 2040, with digitally delivered services growing by as much as 18 percentage points. However, in a scenario where access to AI technologies remains uneven, trade gains could be cut by more than half. AI also has the potential to exacerbate inequality and diminish the comparative advantage of low-cost labor in developing countries by replacing jobs, even as it creates new industries and empowers workers.[7]

The potential impact of AI on trade, privacy, job displacement, access to data, and fundamental rights, as well as innovation, has triggered a regulatory and governance race.

To illustrate this scenario, on the international stage, a number of organizations have developed frameworks and principles, such as the Organisation for

6. World Trade Organization, Trading with Intelligence: How AI Shapes and Is Shaped by International Trade (Geneva: WTO Secretariat, 2024), 17–35, https://www.wto.org/english/res_e/publications_e/trading_with_intelligence_e.htm

7. World Trade Organization, Trading with Intelligence. United Nations Conference on Trade and Development (UNCTAD). "AI's $4.8 Trillion Future: UN Trade and Development Alerts Divides, Urges Action." Accessed July 16, 2025. https://unctad.org/news/ais-48-trillion-future-un-trade-and-development-alerts-divides-urges-action.

Economic Co-operation and Development (OECD) AI Principles.[8] This was the first intergovernmental standard aiming to foster a policy environment at the international level that promotes a human-centered approach to trustworthy AI, fostering research, preserving economic incentives for innovation, and applying to all stakeholders.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) Recommendation on the Ethics of AI[9] adopted in 2021, was one of the first instruments developed within the United Nations (UN) with the goal of serving as a standard-setting instrument to guide states and other stakeholders in formulating their policy instruments. This was followed in 2024 by the adoption of the UN General Assembly Resolution on The Promotion of 'Safe, Secure and Trustworthy' AI systems'[10] and the Global Digital Compact, which opened for endorsement in 2024 with the goal of taking concrete action to make the digital space safe and secure. In May 2024, the Council of Europe (CoE) adopted the Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law,[11] marking the first hard law and binding commitment on AI.

At the national level, in 2023, 75 countries[12] and territories had enacted their regulatory strategies for AI, while another 7 countries were developing their AI

8. Organisation for Economic Co-operation and Development (OECD). "OECD Principles on Artificial Intelligence." Accessed June 20, 2024. https://oecd.ai/en/ai-principles.
9. United Nations Educational, Scientific and Cultural Organization (UNESCO). "Recommendation on the Ethics of Artificial Intelligence." Accessed July 3, 2024. https://www.unesco.org/en/artificial-intelligence/recommendation-ethics.
10. United Nations. "UN News: Artificial Intelligence." Accessed July 3, 2024. https://news.un.org/en/story/2024/03/1147831.
11. Council of Europe. "Council of Europe Adopts First International Treaty on Artificial Intelligence." Accessed June 20, 2024. https://www.coe.int/en/web/portal/-/council-of-europe-adopts-first-international-treaty-on-artificial-intelligence.
12. The countries are: Canada, China, Finland, France, Germany, India, Mauritius, Mexico, Sweden, Argentina, Bangladesh, Chile, Colombia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Japan, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Qatar, Romania, Russia, Sierra Leone, Singapore, Slovak Republic, United Arab Emirates, United States of America, Uruguay, Algeria, Bulgaria, Croatia, Greece, Hungary, Indonesia, Latvia, South Korea, Norway, Poland, Saudi Arabia, Serbia, Spain, Switzerland, Australia, Austria, Brazil, Hong Kong, Ireland, Malaysia, Peru, Philippines, Slovenia, Tunisia, Turkey, Ukraine, United Kingdom, Vietnam, Belgium, Ghana, Iran, Italy, Jordan, Thailand, Azerbaijan, Bahrain, Benin, Dominican Republic, Ethiopia, Iraq, Israel, Rwanda. According to: Stanford University. Artificial Intelligence Index Report 2024. Accessed June 23, 2024. https://aiindex.stanford.edu/report/.

strategies in the same year.[13] Between 2016 and 2024, 39 out of 114 countries had enacted at least one AI-related bill, with a total of 204 AI-related laws enacted globally.[14]

In April 2021, the European Union (EU) proposed the first regulation on AI, the EU AI Act, which became law in July 2024.[15] Other jurisdictions are also advancing on AI regulatory frameworks. A total of 40 countries, including Brazil, China, the United States (US), Peru, Mexico, and Australia, have developed AI legislative activities.[16] In 2024, the Brazilian Senate approved the country's first AI regulation in December.[17] In the same month, South Korea passed the AI Basic Act, the first comprehensive framework concerning AI in Asia.[18]

As public-private initiatives, the work of standard-setting organizations can be cited. For instance, the International Telecommunication Union (ITU),[19] the UN's specialized agency for information and communication technologies, has published over 100 standards on AI, with 120 more in development as of 2024.[20] In addition, the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) established Subcommittee (SC)

13. The countries are: Antigua and Barbuda, Barbados, Belarus, Costa Rica, Jamaica, Pakistan, Senegal. Stanford University. Artificial Intelligence Index Report 2024.
14. Artificial Intelligence Index Report 2024.
15. European Union. "Regulation (EU) 2024/1689 of the European Parliament and of the Council." Accessed January 19, 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1689.
16. Digital Policy Alert. "Regulatory Activity Around AI." Accessed January 16, 2025. https://digitalpolicyalert.org/blog/regulatory-activity-around-ai.
17. Next step is the analysis of the draft Law by the House of Representatives. More information available at: Senado Federal do Brasil. "Senado aprova regulamentação da inteligência artificial; texto vai à Câmara." Accessed January 16, 2025. https://www12.senado.leg.br/noticias/materias/2024/12/10/senado-aprova-regulamentacao-da-inteligencia-artificial-texto-vai-a-camara.
18. Digital Policy Alert, "Regulatory Activity Around AI," accessed January 16, 2025, https://digitalpolicyalert.org/activity-tracker?offset=0&limit=10&jurisdiction=410&period=2019-12-31,2025-01-15 and Linklaters. "Korea's AI Basic Act: Asia's First Comprehensive AI Legislation." Accessed January 16, 2025. https://techinsights.linklaters.com/post/102js56/koreas-wonsouth-koreas-ai-basic-act-asias-first-comprehensive-ai-legislatio.
19. International Telecommunication Union (ITU). "About ITU." Accessed August 22, 2024. https://www.itu.int/en/about/Pages/default.aspx.
20. United Nations. United Nations System White Paper on AI Governance: An Analysis of the UN System's Institutional Models, Functions, and Existing International Normative Frameworks Applicable to AI Governance. Accessed August 5, 2024. https://unsceb.org/united-nations-system-white-paper-ai-governance.

42, dedicated to AI standard setting, under Joint Technical Committee (JTC) 1 on information technology, in 2017.[21]

This proliferation of regulations has given rise to what can be described as "Multilayered AI Governance", characterized by a growing body of AI regulations with diverse characteristics that may overlap and address the same phenomena from different perspectives. This regulatory landscape is also accompanied by challenges, such as keeping pace with technological developments[22] and fragmentation due to the different approaches to legislation followed by various organizations and countries.[23]

It is in this scenario that the WTO still holds a relevant role. While the organization has ongoing negotiating initiatives like the Work Programme on E-commerce (WPEC) [24] and the Joint Statement Initiative (JSI) [25] on e-commerce that do not directly discuss the application of AI and data-driven technologies,[26] there are ongoing discussions at the Technical Barriers to Trade (TBT) Committee on

21. International Organization for Standardization (ISO). "ISO/IEC JTC 1/SC 42 Artificial Intelligence." Accessed June 23, 2024. https://www.iso.org/committee/6794475.html and International Electrotechnical Commission. "IEC - TC 42: Artificial Intelligence." Accessed June 23, 2024. https://www.iec.ch/dyn/www/f?p=103:7:::::FSP_ORG_ID:21538.
22. Niels Lachmann. "Chasing the Elusive Bird? The Technological Development of the Digital Economy and International Trade Law's Susceptibility to a Pacing Problem." The Journal of World Investment & Trade 26, no. 3 (May 2025): 479–511. https://doi.org/10.1163/22119000-12340368.
23. Anu Bradford. Digital Empires: The Global Battle to Regulate Technology. New York: Oxford University Press, 2023.
24. World Trade Organization. "Work Programme on Electronic Commerce." Accessed June 25, 2024. https://www.wto.org/english/tratop_e/ecom_e/ecom_work_programme_e.htm.
25. World Trade Organization. "Joint Statement Initiative on E-Commerce." Accessed June 25, 2024. https://www.wto.org/english/tratop_e/ecom_e/xcom_e/joint_statement_e.htm.
26. The communication about the release of the JSI stabilized text, Ambassador Hung Seng Tan of Singapore stated that: "Members have participated actively, contributed constructively, and developed successfully a substantive and credible package of digital trade rules which we have stabilized in our Chairs' Text." (emphasis added) It was also remined that other topics would be addressed in later discussions, such as the information and communications technology (ICT) products that use cryptography will not be part of the Chairs' text going forward and other outstanding issues. The latter includes data flows, data localization and source code after the US withdraw support to these provisions on negotiations. In World Trade Organization. "E-commerce JSI: Co-convenors Announce Stabilized Outcome Text." April 25, 2024. https://www.wto.org/english/news_e/news24_e/ecom_25apr24_e.htm. Diplomacy.edu. "The WTO Joint Initiative: Stabilised Agreement on Electronic Commerce – Looking at the Broader Picture." Accessed January 19, 2025. https://www.diplomacy.edu/blog/the-wto-joint-initiative-stabilised-agreement-on-electronic-commerce-looking-at-the-broader-picture/.

AI. These activities include thematic sessions,[27] the notification of national AI and AI-related regulations, and the incentive to use standards to improve production efficiency and facilitate international trade under the agreement's provisions.[28]

This is possible due to the rule-based system established with the goal of transparency, eliminating barriers to trade, based on consensus (e.g., single undertaking), and founded upon the pillars of negotiation, dispute settlement, and peer review. In view of this, even in the current state where negotiations and disputes face difficulties, it is still possible to address issues that affect trade through these principles and pillars.

This article intends to showcase this view through an analysis of the TBT Agreement provisions on transparency via the notification of measures and Specific Trade Concerns (STCs). This represents a unique position for the WTO and the TBT Agreement, as not even bilateral and regional trade agreements, which have negotiated different provisions on digital trade, have deliberately prepared a forum for discussing national legislation, especially concerning such a disruptive product as AI.

These discussions yield gains in national legislation and help prevent adverse effects on trade and further fragmentation, thus providing a unique opportunity to address this "multilayered AI governance".

In view of that, this article will first present the TBT Agreement and how AI has been discussed within it. A subsequent section will address whether AI measures are TBT measures. Parts three and four will provide details and critically analyze AI notifications and STCs, and the use of standards for AI products, respectively. The paper concludes by recognizing that the existing rules and procedures of the WTO play an important role in improving AI regulation, although improvements in the WTO system are necessary to cover issues particular to AI.

27. World Trade Organization. "Thematic Sessions of the TBT Committee." Accessed July 3, 2024. https://www.wto.org/english/tratop_e/tbt_e/thematicsession_e.htm.

28. Preamble, Article 2.4, 2.5 of the TBT Agreement

1. THE WTO'S AGREEMENT ON TECHNICAL BARRIERS TO TRADE (TBT AGREEMENT): A FRAMEWORK FOR AI AND GLOBAL TRADE

One of the many agreements recognized as crucial for analyzing regulation and the side effects of its proliferation in trade is the TBT Agreement.[29] The agreement regulates the preparation, adoption, and application of regulatory measures that encompass: technical regulations, standards with requirements on safety, quality, health, among others; and conformity assessment procedures (CAPs) for assessing product compliance with such requirements (e.g., testing, inspection, accreditation, etc.).

These measures are supposed to follow a series of principles to ensure that the regulatory process is not discriminatory and does not impose trade restrictions, while safeguarding the right to regulate and addressing legitimate public policy objectives (e.g., protection of human health, protection of the environment, among others). [30] These principles include obligations of non-discrimination,[31] the prohibition of unnecessary obstacles to trade,[32] special and differential treatment for developing and LDCs,[33] harmonization and coherence (i.e., mutual recognition agreements and applicability of relevant international standards), and transparency (i.e., notifications and STCs).

Although the agreement applies exclusively to goods,[34] it has been utilized as a tool in the regulatory process for AI and is recognized by the WTO itself as a significant instrument in this context, for instance, for bridging regulatory fragmentation in AI regulation through the notifications of AI draft laws to the TBT Committee.[35]

29. World Trade Organization. The WTO Agreements Series: Technical Barriers to Trade. Third Edition.
30. Annex 1, TBT Agreement
31. Articles 2.1, and 5.11, and Annex 3.D, TBT Agreement
32. Article 2.2, Article 5.1.2 and Annex 3.E, TBT Agreement
33. Article 12, TBT Agreement
34. Annex 1, TBT Agreement
35. World Trade Organization, Trading with Intelligence, 42. 3. World Trade Organization, Trading with Intelligence 42, 66 - 69, 76.

The TBT Agreement has provisions that require WTO members to notify draft technical regulations,[36] draft CAPs,[37] and draft standards[38] that will affect trade with other members and are not in accordance with relevant international standards, to discuss bilaterally and receive comments. If bilateral information is not sufficient, Members can raise STCs.[39]

For instance, the EU's notification of its AI Act—the first national legislation on AI—was submitted to the TBT Committee and later became the subject of an STC between the EU and China.[40]

In addition, the TBT Agreement encourages the use of international standards as a basis for technical regulations, standards, and CAPs.[41] This encouragement is strengthened by the presumption that a technical regulation does not create unnecessary obstacles to trade if it aligns with relevant international standards.[42] The TBT Agreement also motivates comprehensive participation in standard-setting activities,[43] although challenges may arise in setting those standards, especially on social aspects.[44] The agreement also guides the enactment of standards[45] and CAPs.[46]

The WTO has also recognized the important role of standards in AI regulation. Firstly, through the participation of standard-setting organizations like ISO, IEC, and UNECE at the TBT Committee, which inform members of developments in

36. Articles 2.9, 2.10 and 3.2, TBT Agreement
37. Articles 5.6, 5.7 and 7.2, TBT Agreement
38. The "Decision of the Committee on Principles for the Development of International Standards, Guides and recommendations with Relation to Articles 2, 5 and Annex 3 of the Agreement".
39. Article 13.1, TBT Agreement.
40. G/TBT/N/EU/850, 11 November 2021 and STC ID 736.
41. Article 2.4, Article 5.4, and Annex 3. F, TBT Agreement.
42. This presumption is not applicable to standards and CAPs. Article 2.5 of the TBT Agreement
43. For instance, at G/TBT/GEN/385, June 2024.
44. WTO, Trading with Intelligence, 68 – 69.
45. The "Decision of the Committee on Principles for the Development of International Standards, Guides and recommendations with Relation to Articles 2, 5 and Annex 3 of the Agreement".
46. Guidelines on conformity assessment procedures. As available at: https://www.wto.org/english/tratop_e/tbt_e/conformity_assessment_proc_e.htm. Accessed on 05/06/2024.

the AI field.[47] Secondly, through the possibility of incorporating the standards developed by these organizations into technical regulations and CAPs.

These events highlight the growing recognition of AI's impact on international trade and the efforts to address its regulatory challenges within the WTO framework. However, for these abovementioned provisions to be applied to AI regulation, the latter must first be considered TBT measures, which will be addressed below.

2. AI REGULATION AS A TBT MEASURE

The above-mentioned provisions on notifications and obligations apply to TBT measures. To assess this, a thorough analysis must consider the provisions of the TBT Agreement and their existing interpretation by the WTO Dispute Settlement Body (DSB). This paper will examine the EU AI Act, which was notified to the TBT Committee, to analyze its potential for coverage under the TBT, considering both the literal text and current WTO jurisprudence.

Annex 1 of the TBT Agreement defines technical regulations as mandatory requirements established by recognized bodies. They specify product characteristics or related processes and production methods. They may also address supplementary aspects such as terminology, symbols, packaging, marking, and labeling requirements.

Soprana states that the EU AI Act satisfies the three-tier test established in the Appellate Body's interpretation of Annex 1.1 of the TBT in *EC-Asbestos* and *EC-Sardines.*[48] Soprana further argues that it is a technical measure because

47. For instance G/TBT/GEN/391, 1 November 2024.

48. In *EC – Asbestos* and *EC – Sardines*, the Appellate Body established a three-tier test for determining whether a measure is a technical regulation: (i) the measure must apply to an identifiable product, (ii) the measure must lay down product characteristics; and (iii) compliance with the product characteristics laid down in the measure must be mandatory. Appellate Body Report, EC – Sardines, para. 176 (referring to Appellate Body Report, EC – Asbestos, paras. 66-70). See also Panel Reports, EC – Seal Products, paras. 7.85-7.87; US – COOL, paras. 7.147-7.148; US – Tuna II (Mexico), paras. 7.53-7.55; and US – Clove Cigarettes, paras. 7.24-7.25. See also Appellate Body Reports, EC – Seal Products, paras. 5.21-5.23; US – Tuna II (Mexico), para. 183. Each of the criteria in the three-tier analysis have other jurisprudence on their interpretation, asavailable at: World Trade Organization. Analytical Index: Technical Barriers to Trade. Accessed October 1, 2024. https://www.wto.org/english/res_e/publications_e/ai17_e/tbt_e.htm.

(i) it is a document that applies to products using AI technology, (ii) it lays down product characteristics based on their risk, and (iii) compliance is mandatory.[49]

The question of what constitutes a technical measure fits into an ongoing discourse regarding the applicability of the TBT Agreement to processes and production methods that do not affect the physical characteristics of the final product put on the market, known as non-product-related processes and production methods (NPR PPMs). This extends to a debate among WTO members about whether NPR PPMs are included in the definition of technical regulations because of the language, 'characteristics and *related* processes and production methods' (emphasis added), while the explanatory notes only mention 'products or processes and production methods'.[50] The Appellate Body in *EC–Seals* determined that process and production methods should have a sufficient nexus to the characteristics of a product to be considered related to those characteristics.[51]

This same discussion is present in the classification of environmental goods as sustainable, or, as available in the Panel Report of *EU – Palm Oil (Malaysia),* in the classification of energy as renewable. In the aforementioned panel report, it was decided that the quality of a product can constitute a product characteristic and that the measure "...effectively regulates the product characteristics required of biofuels needed to qualify as renewable energy on the EU market (and thus eligibility to be counted as contributing towards the mandatory sectoral target in the transport sector and overall target of renewable energy consumption)."[52] In other words, the quality of being 'renewable' would be a product characteristic, and therefore would make this measure a technical regulation.

The Panel Report of *EU – Palm Oil (Malaysia)* establishes a precedent by which a measure may be considered a technical regulation based on product

49. Marta Soprana. "Compatibility of Emerging AI Regulation with GATS and TBT: The EU Artificial Intelligence Act." Journal of International Economic Law, 2024. https://doi.org/10.1093/jiel/jgae040

50. Annex 1, TBT Agreement item 2, explanatory note.

51. Appellate Body Reports, *EC – Seal Products*, para. 5.12. Also at: Van den Bossche, Peter, and Werner Zdouc. The Law and Policy of the World Trade Organization: Text, Cases, and Materials. 5th ed. Cambridge: Cambridge University Press, 2021.

52. Panel Report, EU and Certain Member States – Palm Oil (Malaysia), para. 7.97 and para. 7.115.

characteristics that do not necessarily define the good itself, nor affect the characteristics that define the final good. Rather, it relates to the product's characterization and classifying it as 'renewable'.

The same rationale could be applied to the EU AI Act. The Act defines 'AI systems' as: (i) machine-based, (ii) autonomous, (iii) adaptive after deployment, (iv) having explicit or implicit objectives, (v) receiving data or other sources of information (inputs), (vi) receiving instructions (infer), (vii) generating a result (outputs), and (viii) influencing physical or virtual environments.[53]

The legislation also establishes different levels of risk classifications for AI (unacceptable, high, limited, or minimal). These classifications determine the obligations of developers and deployers to establish a trustworthy system that respects fundamental rights.[54] While the level of risk is a valid regulatory concern, the emphasis the Appellate Body placed on 'characteristics and related processes and production methods' in *EC-Seals* calls into question whether the EU AI Act's risk-based approach qualifies as a process with sufficient nexus to the characteristics of the product to render the measure a technical regulation. On the other hand, *EU-Palm Oil (Malaysia)* offers some illumination towards integrating digital products like AI into the WTO system under the TBT agreement. It includes the quality of a product as product characteristics, and therefore qualifies it as a technical regulation.

The inclusion of product quality is a contentious issue with systemic implications for the applicability of the WTO Agreements to the regulation of AI, as it touches on the long-standing issue of NPR-PPMs, which have largely remained unaddressed in WTO jurisprudence but could resurface as a concern.

Given the above, the EU AI Act could be considered a technical regulation, but the nature of existing regulation also raises the question of whether this is an NPR-PPM, which is an issue at the TBT Agreement and in jurisprudence. This showcases that the nature of AI could bring challenges to the application of the

53. Article 3, EU AI Act

54. As available at: https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai. Accessed on 16/10/2024.

TBT Agreement. Having discussed the TBT Agreement potentially covering AI measures, the following section will delve into the transparency instruments of the TBT Agreement.

3. TRANSPARENCY IN TRADE: THE NEED FOR EFFECTIVE NOTIFICATIONS AND SPECIFIC TRADE CONCERNS

In cases where there are no international standards, or a measure is not in accordance with the technical content of relevant international standards, and if the technical regulation or CAPs may have a significant effect on the trade of other Members, Members shall: (i) publish a notice to enable interested parties to become acquainted with the measure; (ii) notify the Secretariat of the products to be covered by the proposed technical regulation, along with a brief indication of its objective and rationale, at an early stage for comments; and (iii) provide other Members with particulars or copies of the proposed regulation and, whenever possible, identify the parts which in substance deviate from relevant international standards.[55]

These notifications are the cornerstone of the TBT Agreement because they (i) reveal how Members intend to regulate to achieve specific policy objectives; (ii) allow for an initial assessment of potential trade implications of their regulations; (iii) give trading partners an opportunity to provide comments either bilaterally or at the TBT Committee, and to receive feedback from industry or other stakeholders; (iv) assist in improving the quality of their draft regulation and avoiding potential trade problems; and (v) early notification also helps producers and exporters adapt to changing requirements.[56]

As of June 2025, it is estimated that Members had notified more than 500 measures related to digital products, such as IoT, 5G technology, unmanned aircraft systems, autonomous vehicles, software in various products, medical devices (as software), and AI. Such notifications envisage, among others, safety, interoperability, national security, cybersecurity, performance, quality require-

55. Article 2.9, 5.6, TBT Agreement

56. WTO, The WTO Agreements Series: Technical Barriers to Trade, 38 – 44.

ments, and different CAPs. Objectives of such measures include prevention of deceptive practices, consumer protection and information, quality requirements, harmonization, and protection of human health or safety.[57]

One of the most notable notifications was the draft regulation of the EU AI Act in 2021. The draft regulates the development, marketing, and placement of AI systems in the EU market, whether embedded or not embedded into physical products, which pose certain risks. According to the notification, the draft is limited to "the minimum necessary requirements to protect the safety and fundamental rights of persons considering the risks and challenges posed by AI systems, without unduly constraining or hindering technological development or otherwise disproportionately increasing the cost of placing AI solutions on the market." The strictness of the rules varies in accordance with the "degree of risk" AI systems are considered to pose (e.g., unacceptable, high, limited, minimal).[58]

The notification foresees the opacity of many algorithms, which makes it difficult to ascertain how they produce results and understand the technology's effects on privacy, personal data protection, the principle of non-discrimination, safety, and the protection of fundamental rights. Therefore, the regulation's objective is to prevent deceptive practices, ensure consumer protection, protect human health and safety, maintain quality requirements, and create harmonization.

When notifications are not sufficient to resolve a matter among Members, a STC can be raised. A STC is a WTO mechanism that allows Members to discuss trade measures that are often still under development and not yet part of domestic law. It provides an opportunity to understand the reasoning behind

57. Information available at: https://eping.wto.org/. The information in this text was extracted in June, 2025 using key-words such as considered the following key words: "Internet" OR "Software" OR "Internet of things" OR "Robotic" OR "Artificial Intelligence" OR "Robot" OR "Autonomous vehicles" OR "5G" OR "3D" OR "3D printing" OR "Automation" OR "Smart functionality" OR "Connectable products" OR "Mobile Applications" OR "Digital elements" OR "unmanned aircraft System" OR "Source code" OR "ITC products" OR "cryptography" OR "ICT" OR "IoT" OR rob* OR autonom* OR sensor* OR actuator* OR "AI" OR "unmanned aircraft" OR "cybersecurity" OR cyber* OR "algorithm" OR algorit* OR "computer" OR "digital". There was a total of 3,859 results. This information was classified manually and therefore might have some imprecisions.

58. G/TBT/N/EU/850, 11 November 2021.

other Members' regulations and to question their validity, including their scientific or technical basis, transparency, and adherence to international standards. By fostering dialogue in a multilateral and non-confrontational setting, STCs help reduce trade tensions and encourage regulatory cooperation. This collaborative process enables Members to share experiences, exchange ideas, and learn from one another, ultimately leading to more effective and harmonized regulatory outcomes.[59]

It is estimated that during the same period, 50 STCs were raised on digital products. Therefore, approximately 10% of the notifications were further discussed through STCs, highlighting trade issues.[60]

For instance, in March 2022, China raised an STC with respect to the EU draft regulation.[61] China was concerned, among other things, with the measure's definition of "AI systems," which it considered too broad and asked the EU to narrow. China also requested the EU to eliminate the requirement that market surveillance authorities be granted access to the source code of the AI system. The EU responded that the definition was as technology-neutral as possible to allow for future innovation and market developments, and that it was built considering the OECD's internationally recognized definition of AI systems. In addition, the EU explained that the requirement for access to source code is conditioned upon a reasoned request from the market surveillance authority and is necessary for the conformity assessment of high-risk AI systems established in the regulation. According to the EU, this strikes a balance between intellectual property rights protection and safety protection to safeguard important public interests, aligning with the EU's international agreements and commitments.

Additionally, in November 2022 and during subsequent sessions in 2023, China raised concerns regarding CAPs and the proportionality of applicable penalties. The EU responded that the legislation requires the provider to follow

59. WTO, Trading with Intelligence, 79

60. Same methodology as described in note 53,

61. ID 736. Available at: https://eping.wto.org/en/TradeConcerns/Details?imsId=736&domainId=TBT. Accessed on 22/06/2024.

the relevant conformity assessment as stipulated under those legal acts. Finally, the penalty mechanism follows the model of other existing legislation, such as the General Data Protection Regulation.[62]

As noted, the aforementioned notification of the EU AI Act raised a number of important policy concerns related to interoperability, definition, disclosure of source code for security reasons, opacity, privacy, and the protection of human rights. These notifications thus address various policy concerns related to the technical requirements of AI.

These discussions, however, tend to remain superficial. An analysis of the minutes from the TBT Committee reveals that while important questions are raised, there is little in-depth examination of their merits or the proposal of technical solutions. The situation is even more opaque when it comes to discussions within STCs, as many of these issues are resolved bilaterally, with limited transparency regarding the outcomes or the nature of the exchanges involved.

This is especially important given the current non-functionality of the DSB. Empirical studies have shown an increase in notifications raised in different WTO committees, including TBT notifications, after the deadlock of the WTO DSB.[63]

This demonstrates that Members are finding an amicable alternative to discuss regulatory concerns at the WTO that may raise trade issues, without resorting solely to the DSB. This is especially relevant in the context of DSB reform, as one of its main objectives is to improve and incentivize the use of alternative methods of dispute resolution.[64] However, this method is not new. The Sanitary and Phytosanitary (SPS) Agreement includes a Decision to encourage resolution of issues under the scope of the agreement. Members would be able

62. Available at: https://epingalert.org/en/TradeConcerns/Details?imsId=736&domainId=TBT. Accessed on 22/06/2024.

63. Roy Santana and Adeet Dobhal. "Canary in a Coal Mine: How Trade Concerns at the Goods Council Reflect the Changing Landscape of Trade Frictions at the WTO." World Trade Organization, 2024. https://www.wto.org/french/res_f/reser_f/ersd202404_f.htm. According to data of the WTO, as of November 2024 there were a total of 56,314 TBT notifications, 846 STCs raised, 11 trade disputes. As available at: https://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm. Accessed on 12/09/2025.

64. JOB/GC/385, 16 February 2024, Title I "Alternative Dispute Resolution Procedures and Arbitration".

to request consultations under the supervision of a facilitator to resolve trade issues. The procedure includes deadlines and a final report with the outcome.[65] This mechanism appears to be an improvement over the notifications and STCs mechanism. While consultations in notifications and STCs happen in the committee and bilaterally, respectively, this decision suggests a more structured and transparent way of solving trade issues with a facilitator and a final report.

Furthermore, transparency mechanisms are entirely Member-driven, meaning it is the responsibility of Members to submit notifications. Unlike accusations of activism or overreach that have occurred in the DSB,[66] Members will not face scrutiny for being overly transparent when notifying measures, even if there is uncertainty about whether they qualify as technical regulations.

Strengthening the notification system in the context of digital products is crucial for enhancing legislative discussions prior to enactment, promoting coherence, interoperability, and international cooperation. The notification process within the TBT Committee provides a platform for technical discussions involving the participation of specialized bodies, which can be further expanded and utilized.

Further to the discussion of legislation, it is also important to assess the standards on which those TBT measures could be based. Therefore, the next session will detail and explore the role of standards in AI governance from the perspective of TBT provisions.

4. STANDARDS SCENE AND THE TBT AGREEMENT

A large number of standards are being developed for AI to ensure technological and semantic interoperability, enabling machines to interpret and act on data. Standards are vital for protecting against cybercrime, ensuring the provenance of goods, enabling secure data sharing, and aligning regulations with industry

65. G/SPS/61, 8 September 2014

66. United States. Congressional Research Service. "Artificial Intelligence: Background, Selected Issues, and Policy Considerations." R46852, updated September 1, 2021. Accessed October 9, 2025. https://www.congress.gov/crs-product/R46852.

best practices. They improve the quality, security, sustainability, and resilience of markets, while fostering competition and efficiency. Additionally, standards support global policy goals by ensuring AI systems are secure, explainable, robust, and free from bias. They promote safe failure mechanisms and discourage opaque and unsafe methods. By shaping responsible AI development, standards build trust between states and researchers, enhance credibility, and facilitate interoperability, reducing trade barriers and aligning AI progress with global best practices.[67]

In view of this, SC 42, the joint committee under ISO and IEC, is responsible for creating international standards that guide the responsible adoption of AI. These standards are developed through a consensus-based, voluntary system that brings together a diverse range of global stakeholders, including developing countries, various industries, and individuals from different backgrounds. The standards are designed with an ecosystem approach, ensuring that regulatory, business, societal, and ethical concerns are integrated. SC 42 focuses on various dimensions to address the complexities of AI adoption.[68] Currently, ISO/IEC SC 42 has 37 published standards and 47 standards under development.[69]

The committee develops foundational standards that cover concepts and terminology, as well as standards that promote trustworthy AI. SC 42 develops guidelines to address key issues such as explainability, transparency, bias, controllability, robustness, and oversight of AI systems. Additionally, the committee

67. Allan Mayo and Cindy Parokkil. "BSI Whitepaper: The Role of Standards in Supporting the Transition to a Digital Economy and Facilitating Digital Trade: Transforming Systems Using Standards." Accessed [date you accessed the document]. https://www.bsigroup.com/en-GB/insights-and-media/insights/whitepapers/standards-and-digitalization-in-developing-economies/. Peter Cihon. Standards for AI Governance: International Standards to Enable Global Coordination in AI Research & Development. Oxford: Future of Humanity Institute, 2019. https://www.fhi.ox.ac.uk/wp-content/uploads/Standards_-FHI-Technical-Report.pdf.

68. The description of the content of standards is available at: United Nations Educational, Scientific and Cultural Organization (UNESCO). "How ISO and IEC Are Developing International Standards for the Responsible Adoption of AI." Accessed August 26, 2024. https://www.unesco.org/en/articles/how-iso-and-iec-are-developing-international-standards-responsible-adoption-ai; JTC 1 Information. "JTC 1/SC 42: Artificial Intelligence." Accessed August 26, 2024. https://jtc1info.org/sd-2-history/jtc1-subcommittees/sc-42/; and JTC 1 Information. "JTC 1 Plenaries." Accessed August 26, 2024. https://jtc1info.org/sd-2-history/jtc-1-plenaries/.

69. International Organization for Standardization (ISO). "ISO/IEC JTC 1/SC 42 Artificial Intelligence." Accessed August 1, 2025. https://www.iso.org/committee/6794475.html.

sets frameworks for risk management, such as the ISO/IEC 42001 standard, and ensures the functional safety of AI technologies.

SC 42 also emphasizes governance and accountability in AI systems. It develops standards that address the governance implications of AI, helping organizations define responsibilities and assign accountability within AI operations and the application of machine learning. To further ensure reliability, SC 42 collaborates with other committees to produce guidelines for the testing, verification, and validation of AI systems.

Sustainability, ethical considerations, and societal concerns are another priority for SC 42. The committee works on assessing the environmental impact of AI systems and strives to align its standards with the UN Sustainable Development Goals (SDGs).

These aspects of standardization-related to the structure of AI, governance and accountability, sustainability, and ethical and social concerns-directly affect the product lifecycle. The AI "lifecycle"[70] involves the stages of development and deployment of AI systems. Throughout the lifecycle, emphasis is placed on transparency, accountability, and the alignment of AI systems with human rights and democratic values. It is at the lifecycle phase that the system's parameters are settled, ethical guidelines are established, standards are implemented, and the risk assessment of how algorithms influence the system is tested and established. Designing against unacceptable behavior will catalyze the development and deployment of AI systems that are 'safe by design' to comply with these mandates.[71]

The international standards designed by ISO/IEC and other international standard organizations are later adopted locally and nationally. In the US, the National Standards Strategy for Critical and Emerging Technology was released

70. Organization for Economic Co-operation and Development (OECD). "OECD Principles on Artificial Intelligence." Accessed September 12, 2025. https://oecd.ai/en/ai-principles.

71. Brian Judge, Mark Nitzberg, and Stuart Russell. "When Code Isn't Law: Rethinking Regulation for Artificial Intelligence." Policy and Society, 2024. https://doi.org/10.1093/polsoc/puae020

in 2023, supporting[72] the development and emergence of international standards on technology.[73] In addition, the European standard authorities-the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC)-[74] - also have Joint Technical Committee 21, which identifies and adopts international standards already available or under development from other organizations like ISO/IEC on AI. CEN/CENELEC are part of the implementation ecosystem of the EU AI Act by developing the standards for compliance of high-risk AI systems.[75]

In view of this, standards are a great source of AI regulation. One of the key advantages of standards is that they are developed by technical bodies and experts, facilitating collaboration between legal frameworks and market needs.

However, the technical nature of standards does not render them apolitical.[76] Standardization organizations may involve a range of participants, including national standardization bodies, companies, and technical experts, depending on the organization. Given that standards shape the terminology and production of critical technologies such as AI, there is also a significant political incentive to engage in the standardization process.[77]

The Economist[78] has highlighted the crucial role of standards in global governance and the growing competition between China and the West in setting technological standards, particularly for AI, as China aims to position itself as a global leader in AI technical standards by 2035. While China's regulatory approach is government-driven, the West typically relies on private companies

72. National Institute of Standards and Technology (NIST). "USG National Standards Strategy." Accessed October 1, 2024. https://www.nist.gov/standardsgov/usg-nss.

73. Available at: https://dig.watch/updates/us-administration-releases-national-standards-strategy-for-critical-and-emerging-technology. Accessed on 23/06/2024.

74. More information at: https://www.cencenelec.eu/. Accessed on 01/10/2024.

75. CEN-CENELEC. "Artificial Intelligence." Accessed September 10, 2025. https://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/.

76. Cihon, Standards for AI Governance.

77. Sebastian Klotz. International Standardization and Trade Regulation: Exploring Linkages between International Standardization Organizations and International Trade Agreements. Leiden, Boston: Brill Nijhoff, 2024.

78. The Economist. "China is Writing the World's Technology Rules." Accessed October 18, 2024. https://www.economist.com/business/2024/10/10/china-is-writing-the-worlds-technology-rules.

and industry associations to lead the standard-setting process. Additionally, China has made significant efforts to secure leadership positions for its officials in international standards organizations and has focused on shifting influence towards the ITU, where it holds greater influence compared to company-led initiatives. These efforts help bolster China's preferred technical standards at international forums like the ITU.

China has also signed over 100 bilateral standards agreements, primarily with countries in the Global South. Even if China's standards do not gain widespread global adoption, they may still become the norm in countries with which it has established bilateral ties, potentially locking out Western companies that do not conform to Chinese standards. In response to China's push, the US and the EU have become more active in the international standard-setting process, recognizing the strategic importance of these norms.[79]

In this sense, SC 42 in ISO is chaired by the US, and it was previously chaired by China's national body. In practice, not many countries are participating in the development of AI standards, especially developing countries and LDCs. For example, SC 42 has limited representation from regions such as Africa, Latin America, the Middle East, and South Asia.[80] This is in addition to a known political dispute within ISO concerning the dominance of European countries.[81]

As mentioned before, the TBT Agreement connects free trade with the development of standards that occur in parallel entities. The TBT Agreement includes in Annex 3 the "Code of Good Practice for the Preparation, Adoption and Application of Standards." The Code contains obligations and guidance in standard-setting, such as ensuring that standards do not accord less favorable treatment to products from one country in relation to national products, and that they do not create unnecessary obstacles to international trade. There are also obligations to avoid duplication and overlap of standardization bodies in the

79. *Ibid.*

80. International Organization for Standardization (ISO), "ISO/IEC JTC 1/SC 42 Artificial Intelligence," accessed September 30, 2024, https://www.iso.org/committee/6794475.html?view=participation.

81. Klotz, International Standardization and Trade Regulation, 41.

national territory, a preference for standards based on performance requirements instead of design or descriptive characteristics, and obligations on publication and publicity of the work developed. Article 4.1 of the TBT Agreement requires central government standardizing bodies to accept and comply with the Code, as well as requiring that reasonable measures be taken to ensure subnational entities follow these same good practices.

In addition, the TBT Agreement regulates the adoption of standards through the Principles for the Development of International Standards, Guides and Recommendations (the so-called Six Principles) with a view to guiding Members in the development of international standards, guides, and recommendations. The Six Principles provide guidance in the areas of "transparency," "openness," "impartiality and consensus," "effectiveness and relevance," "coherence," and "development dimension."

These guidelines are important for defining the parameters of standards that will later be used to produce technical measures and CAPs.

The TBT Agreement foresees in Article 2.4 that whenever a relevant international standard exists, Members shall use it to enact a technical regulation. One of the criteria for being considered a relevant international standard body is to be open for the participation of WTO Members.[82]

These criteria are important because, unlike the SPS Agreement which establishes such standard bodies, the TBT Agreement has no list of relevant international standardization bodies. This leaves space for forum-shopping or regime-shifting.[83] On the other hand, the absence of a list of standardization bodies makes TBT Agreement provisions applicable to all organizations.[84]

82. As available at the "Decision of the Committee on Principles for the Development of International Standards, Guides and recommendations with Relation to Articles 2, 5 and Annex 3 of the Agreement", G/TBT/9, 13 November 2000, para. 20 and Annex 4, principle c. "openness". In the Appellate Body at *US-Tuna II (Mexico) (2012)* it is stated that a body is considered to be open if the invitation "occurred automatically once a Member or its relevant body has expressed interest in joining the body concerned". As available at: Van den Bossche and Zdouc, The Law and Policy of the WTO, 1008.
83. Klotz, International Standardization and Trade Regulation, 22.
84. Cihon, Standards for AI Governance.

The use of standards is also highly desirable because, per Article 2.5 of the TBT Agreement, there is a presumption that a Member is not creating an unnecessary obstacle to international trade when using these standards. This provision was analyzed in a dispute by the DSB. The Panel in *Australia - Tobacco Plain Packaging*[85] decided that the article only applies to technical regulations that pursue one of the legitimate objectives, and the measure should have a closer connection with the relevant international standard.[86] Having a connection implies a close relationship and significant use of the standards in place, not just mere use of parts or inspiration from standards. Therefore, the use of standards has a significant influence on the final law and implies compliance with international trade law.

The legitimate objectives of Article 2.2 are: national security requirements; the prevention of deceptive practices; protection of human health or safety, animal or plant life or health, or the environment. The notification of the EU AI Act explicitly mentions as objectives of the measure: "Prevention of deceptive practices and consumer protection; Protection of human health or safety; Quality requirements; Harmonization."[87] This means that the EU AI Act could initially be presumed as not creating an unnecessary obstacle to international trade, but this would depend on how standards will be applied by the bloc, as countries have a level of discretion in the implementation of standards into technical regulations. Therefore, a case-by-case analysis of the standard's use would be necessary to determine compliance with Article 2.5 of the TBT Agreement.

Other exceptions to the use of standards include cases where standards are not appropriate or ineffective to achieve the legitimate objective pursued, for instance, due to fundamental technological problems. In *EC - Sardines*, the Appellate Body interpreted an international standard as "ineffective" when it does not fulfill the function of accomplishing the legitimate objective of the

85. WTO, The WTO Agreements Series: Technical Barriers to Trade, 36.

86. Panel Reports, *Australia – Tobacco Plain Packaging*, paras. 7.272 and 7.275 mentioned at World Trade Organization, Analytical Index: Technical Barriers to Trade.

87. G/TBT/N/EU/850, 11 November 2021.

measure, while an international standard is "inappropriate" when it is not especially suitable for the fulfillment of the legitimate objective pursued by the measure.[88] In this case, a case-by-case analysis of the law with the objectives pursued is also necessary.

While the TBT Agreement has provisions to secure the use of standards with a view to promoting effectiveness and harmonization, there is a level of discretion in the use of those standards that raises doubts about their actual effectiveness for this purpose. In addition, the TBT Agreement's logic on harmonization of standards depends on the governance and interactions at standardization organizations, which have other criteria for participation and governance. It also involves political questions stemming from each country's interests in this participation. It is rash to conclude that standards will de facto improve AI governance and not politicize the topic. Evidence suggests that there is already a considerable level of geopolitical factors influencing standards.

FINAL CONSIDERATIONS

This article intended to present the tools available in the TBT Agreement that could effectively assist in discussions on AI regulation, improve its regulation, and decrease fragmentation.

It can be concluded that the TBT Agreement and its Committee discussions are uniquely positioned to allow high-level debate on AI governance and regulation because they permit the presentation of trade concerns and discussion among Members on the best solutions to avoid trade restrictions while allowing for the pursuit of legitimate public policy objectives.

This conclusion, however, is not without challenges and issues. It is not entirely clear that AI measures are, in fact, TBT measures, which means the applicability of the agreement could be questionable. There are strong elements to believe that, at least existing regulations based on risk-assessment, such as the EU AI Act, would qualify as a technical regulation. In such cases, the notification

88. Appellate Body Report, *EC – Sardines*, para. 282 and paras. 285 and 289

process and STCs would be valuable assets for ex-ante discussion of regulation and presentation of trade concerns.

The motivation for and application of standards in these technical regulations could also result in greater compliance with trade obligations. However, the standards debate, negotiation, and implementation occur in parallel organizations and bodies, separate from the TBT Agreement, and are not isolated from geopolitical issues that influence participation and the content of standards.

In view of that, the TBT Agreement has institutions capable of improving AI governance, though it is not without challenges and necessary improvements.

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