LEGACY ECONOMIC AND TRADE MODELS, EVOLVING CONTOURS OF REGULATIONS, AND GROWING DIGITAL TRADE:

Concerns and Challenges for Policy Makers

CRIT/CWS Working Paper Series No 93

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This paper examines the growing structural and intentional data gaps shaping the global trading system. It outlines how persistent imbalances in trade data collection and reporting undermine governance, predictability, and trust among trading partners. A key concern is the incomplete registration of tariff data, particularly the absence of Ad Valorem Equivalent (AVE) calculations for several developed countries' agricultural products, despite commitments under the WTO's Doha Development Agenda. Such omissions significantly underestimate tariff levels and constrain market access for developing-country exporters.

Similar inconsistencies appear in the notification of SPS and TBT measures, which are frequently reported without product coverage, limiting their usefulness for market access assessments. Additional gaps arise from the lack of bilateral services trade data, which obscures the proper balance of trade and fails to capture the growing share of digital and digitally delivered products, including those enabled by additive manufacturing.

The paper also highlights the widening divide created by the increasing privatisation of data, rising collection costs, and a shift from census-based to survey-based approaches. These challenges, combined with the growing use of regulatory measures over tariffs, contribute to a transition from global value chains to global supply chains. Finally, the paper cautions that unresolved data gaps may compromise the accuracy of AI-driven trade and investment forecasts.

December 2025

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[1] Cite this paper as: Kallummal Murali (2025), LEGACY ECONOMIC AND TRADE MODELS, EVOLVING CONTOURS OF REGULATIONS, AND GROWING DIGITAL TRADE: Concerns and Challenges for Policy Makers, CRIT/CWS Working Paper Series No 93, Centre for Research on International Trade (CRIT), Centre for WTO Studies, IIFT, New Delhi-14.

Abstract

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Keywords: WTO Negotiations, Multilateral Trade Negotiations, Data Gaps, Structural Issues, Agricultural VS Manufacturing, Digital Trade, Service Data, Trade Channels, Additive Manufacturing, Artificial Intelligence

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Legacy Economic and Trade Models, Evolving Contours of Regulations, and Growing Digital Trade:
Concerns and Challenges for Policy Makers

Murali Kallummal[2]

Introduction

This paper examines the underlying reasons for the decline in confidence among some countries in the international trading system since 2015 and the subsequent imposition of traditional trade policy tools, such as tariffs and similar measures, as well as hybrid measures, such as the EU-CBAM. Across global markets, there is growing fatigue with the multilateral trading system. To conduct a comprehensive analysis of this issue, it is imperative to review the subtle yet significant systemic or otherwise as documented agreements over more than eighty years of global trade regulations. Some of these measures across both these markets can be traced back to the early 2000s or earlier, but their application as regulatory measures and other barriers can be seen post-UNFCCC.

Evidence and indicators point to fundamental transformations at the global level, primarily driven by developed nations, such as the expanded role of the private sector in trade diplomacy. This development helps explain why the United States and the European Union have shown diminished confidence in multilateral trade agreements, as these arrangements shift from a state-led approach to one dominated by private firms. Furthermore, the influence of the Anglo-Saxon financial model introduced during the 1980scharacterised by deregulation, liberalised finance, flexible labour markets, and shareholder primacy, has played a pivotal role in this evolution. This model preceded other economic systems and forms of capitalism that tend to be more state-centric, coordinated, and socially embedded. Such market-led systems have precipitated changes, including reforms to data-collection methods for cross-border trade flows. Additionally, there is an increasing lack of transparency in market access solutions that favour dominant market players. Ultimately, while the movement of tangible goods across borders remains trackable, trade in services has largely been neglected, leading to the integration of digital trade into conventional economic models. Many of these developments have undermined GATT/WTO frameworks and market access solutions, which are increasingly tailored to established actors, thereby disadvantaging newcomers. Trade is transitioning from customs-based tracking of goods to fragmented and opaque digital transaction data. Those above are profound historical transformations that require detailed examination.

Increasingly, the connection between trade and investment is influenced by geopolitical factors, with growing tensions among major powers affecting trade policies, investment flows, and regulatory approaches. The main challenges faced by Indian exporters when selling goods and

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services globally require a deeper understanding of the difficulties involved. This theme aims to unite academics, practitioners, policymakers, and students in exploring the evolving landscape of law and regulations under the new IPR and trade agreement regimes. The current economic environment, technological changes, the rise of digital platforms, and the increasing power of global corporations have introduced new issues related to ownership, access, data privacy, labour conditions, corporate financing, and environmental protection. These developments demand a closer review of who owns rights, how these rights are created, and how they are protected or challenged in practice. (Mendez-Parra, et al., 2025)

GATT to WTO: Role of Public and Private Sectors

There is a growing influence of the private sector over the public or state in trade diplomacy. It can be traced back to the GATT era (1947–1994), when trade diplomacy was primarily dominated by state actors negotiating tariff agreements and working to eliminate, reduce, and harmonise trade barriers. This influence was gradually weakened as MNCs gained influential status but primarily operated behind the scenes, lobbying national governments for favourable treatment in specific sectors (e.g., processed agricultural products, textiles, steel, and automobiles). (Hoekman, Bernard M. ; Mavroidis, Petros C.;, 2007) During the Uruguay Round (1986-1994) and the establishment of the WTO (1995), trade rules expanded to include services (GATS), intellectual property (TRIPS), and investment. MNCs, particularly in the pharmaceutical, financial, and ICT sectors, played a significant role in shaping these agreements. Two of these were particularly influential: notably, the TRIPS agreement of the WTO, which was heavily influenced by the U.S. and European pharma and entertainment lobbies, and the GATS, which reflected and legitimised the interests of financial and telecom giants seeking market access abroad. (Mavroidis, Petros, 2008)

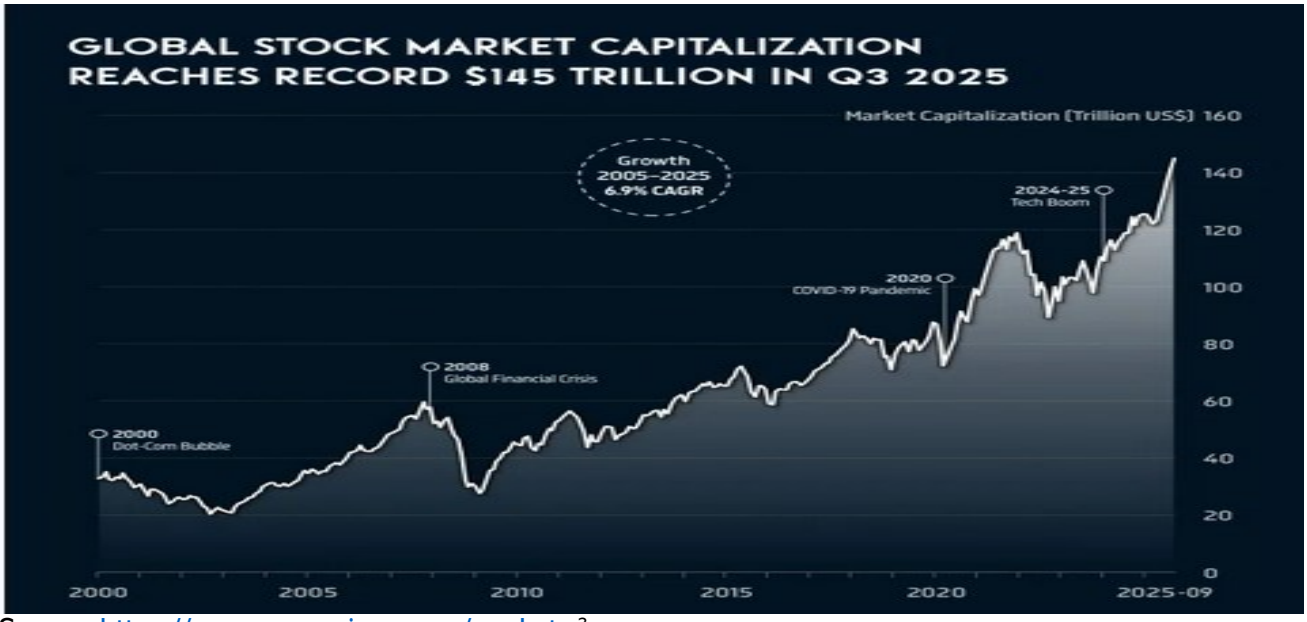
OEMs: Manufacturing Vs Services Sectors

The dominance of digital giants and regulatory capture has characterised the post-Y2K period from the 2000s to the present. This has led to the rise of platform economies, such as Google, Amazon, Meta, and Alibaba, which have introduced data flows, e-commerce, and digital services into trade discussions. Firm-led trade policies are now evolving, primarily through digital trade chapters in RTAs (e.g., USMCA, CPTPP, DEPA) and WTO e-commerce negotiations, as well as some Joint Statement Initiatives. These lobbying efforts have resulted in provisions concerning cross-border data flows, bans on data localisation, non-disclosure of source code, and a moratorium on digital tariffs. (Brühl, Volker;, 2023)

By 2025, the digital economy is expected to be dominated by a few massive technology companies, primarily based in the United States, with notable players from Europe and Asia. A direct outcome of the Anglo-Saxon model, market-led financing led by digital giants by market capitalisation in 2025, as follows: NVIDIA, with a market capitalisation of $4.16 trillion, operates in semiconductors, artificial intelligence (AI), and GPUs, and is based in the United States. Microsoft, with a market value of $3.76 trillion, is the second-largest company in the world, operating in cloud computing, software, and AI, and is also headquartered in the United States.

Apple, valued at $3.12 trillion, is the third-largest company, involved in consumer technology and ecosystem services, and based in the United States. Amazon, with a market cap of $2.40 trillion, specialises in e-commerce, cloud services, and logistics, and is located in the United States. The fifth-ranked company is Alphabet, with $2.21 trillion in revenue, active in search, advertising (Ads), cloud, and AI, and based in the United States. Meta holds the sixth position, valued at $1.08 trillion, operating in social media, virtual reality (VR), and AI, also in the United States. Tesla ranks seventh, with a valuation of $920 billion, focusing on electric vehicles (EVs), AI, and energy, and is based in the United States. The eighth position belongs to TSMC, with a market capitalisation of $780 billion, as a leading global supplier of semiconductors based in Taiwan. Next is ASML, with a market cap of $650 billion, providing lithography and chipmaking equipment, located in the Netherlands. Finally, SAP ranks tenth, with $420 billion in revenue, offering enterprise software, and is based in Germany. In total, these ten giants account for nearly $19 trillion, representing a share of 14 to 17% of the total global market capitalisation.

Figure 1: Total Market Capitalisation January 2000 to September 2025



Source: https://www.voronoiapp.com/markets.[3]

Although the CCI has been proactive in regulating dominant online platforms, the Competition Act of 2002 was not designed with digital platforms in mind. The rapid expansion of digitalisation has redefined how people interact, how businesses operate, and how data is generated, recorded, and exchanged. Although India has implemented the Digital Personal Data Protection Regulation 2023, its effectiveness remains under scrutiny due to weak enforcement mechanisms. An integrated legal framework would not only foster consumer trust in digital activities but also facilitate rapid growth in the digital economy. India also needs a robust, forward-looking competition framework in an evolving market structure, led by technological advancements in AI,

[3] Refer to https://www.voronoiapp.com/markets/-Global-Stock-Market-Capitalization-Hits-Record-134-Trillion-in-June-2025-5178

machine learning, and IoT, to harness the benefits of the digital economy and mitigate the risks of monopolisation and unfair trade practices. (CCI, 2025)

Is Multilateralism Taking a Backseat?

Challenges under FTAs and bilateral agreements, including the implementation of level-playing-field provisions that balance trade liberalisation with protecting domestic industries from unfair competition, remain a key discussion area. The economic-legal connection in trade agreements also extends to Foreign Direct Investment, where countries develop frameworks to attract investment while balancing domestic protections with foreign investment. Similarly, India faces challenges with Non-Trade Concerns (NTCs) due to its fragmented regulatory systems, particularly as modern FTAs increasingly incorporate environmental and labour standards. There is also the challenge of a rise in non-tariff measures (NTMs), which impact over 90,000 entries under the SPS and TBT notifications to the WTO and are a vital part of market access. Concerns about climate change and the environment primarily drive the most recent measures. Small and Medium Enterprises (SMEs), often regarded as the backbone of India's export sector, face specific challenges in navigating complex IPR regimes and non-tariff barriers that hinder their ability to compete globally and to leverage innovation to grow. (Kallummal, Murali, 2020a)

Streamlining regulations, enabling the mutual recognition of partner-country standards, and strengthening institutional capacity are crucial to improving trade facilitation and reducing compliance costs. Achieving India’s ambitious $2 trillion export target by 2030 requires comprehensive legislative reforms. A strong, harmonised legal framework will position India as a reliable FTA partner, ensure widespread trade benefits, and protect domestic interests in a rapidly changing global trade environment. Therefore, papers are invited to explore legal mechanisms that address developmental issues through instruments that consider the complex reality of trade policy. (IBEF, N.D.)

Imbalances in Data Capturing (GATT/WTO)

The imbalances in data capturing at the WTO are not merely technical gaps; they reflect deeper asymmetries in power, institutional design, and the evolving nature of trade itself.

Market Access Imbalance: Agriculture and Non-Agricultural Sectors

The market access pillar is at the heart of WTO negotiations, and concerns differ sharply between agriculture and non-agricultural market access (NAMA).

Agriculture is governed by the Agreement on Agriculture (AoA), which originated from the Uruguay Round of trade negotiations. Based on WTO tariff schedules and Secretariat analyses, many members continue to apply non-ad valorem tariffs (NAVs) in the agricultural sector. The European Union extensively uses both specific and compound duties on commodities such as dairy products, cereals, sugar, meat, and fruits and vegetables; some of these duties are applied at the TARIC code level, corresponding to a 14-digit Harmonised System (HS) code. Switzerland, Norway, and Iceland mainly rely on NAVs for sensitive agricultural products. Japan maintains specific duties on

rice, wheat, barley, dairy products, and certain processed foods. The Republic of Korea applies NAVs on rice, barley, starches, and some processed foods. The United States enforces specific duties on select products, including sugar, dairy, peanuts, and tobacco. Canada imposes NAVs on dairy, poultry, and eggs under its supply management system. Turkey keeps NAVs on cereals, sugar, and processed foods. India primarily uses ad valorem duties; however, specific duties are also in place, such as those on nuts. Additionally, other nations, including Russia, Chinese Taipei, Israel, and various developing countries, continue to maintain NAVs within their bound schedules. India and other G-33 members emphasised that AVE conversion must reflect actual protection, not dilute it. NAVs often concealed high protection in sensitive products like dairy, sugar, and meat.

The European Union utilises non-ad valorem duties (NAVs) as a tool to shield itself from international market fluctuations. These NAVs protect EU farmers from global price fluctuations and enable agricultural imports to be maintained at low duties during off-seasons, thereby helping to stabilise consumer prices. This approach is a policy legacy that directly continues the price support system of the Common Agricultural Policy (CAP). Some developing countries argue that developed member states still impose prohibitively high tariffs on sensitive products such as dairy, sugar, and rice. Non-tariff barriers, including quotas, have been converted into tariffs; however, many members still use ceiling-bound rates, which keep them at high levels. Tariff Rate Quotas (TRQs) for agricultural goods allow limited imports at lower tariffs, with higher tariffs applied beyond the quota. Additionally, developed nations utilise Special Agricultural Safeguards (SSGs) to implement safeguards during import surges. Overall, these practices make tariff management, such as NAVs and TRQs, less transparent, and TRQs are often underutilised, which limits actual market access. (Kallummal, Murali, 2015)

The Special Safeguard Mechanism (SSM) has been one of the most contentious issues in the Doha Round of WTO negotiations, particularly for developing countries seeking greater flexibility to protect their agricultural sectors from import surges and price volatility.

Non-Agricultural Market Access (NAMA): Concerns

NAMA covers industrial goods, which encompass all goods and services except those related to agriculture. The negotiations focus on tariff and non-tariff barriers. The primary tool for tariff reduction in the Doha Round is the debate over the “Swiss formula,” which calls for steeper cuts on the bound rates. Developing countries fear losing policy space for industrialisation if subjected to steep tariff cuts. Developed countries maintain very high tariffs on sensitive products, such as textiles, footwear, and leather, a phenomenon known as tariff escalation.

This occurs when low tariffs on raw materials are paired with high tariffs on processed goods, thereby discouraging value-added production in developing countries. During the Doha Round (2001–no consensus), the Swiss formula was selected as the basis for NAMA negotiations; all 149 WTO members at the time agreed in principle to use it for industrial tariff reductions. Subsequently, all later-joining WTO members signed on to nearly all the terms of the agreement, which sometimes included Doha-plus commitments. Doha-plus commitments are agreements made after

2001 that incorporate elements still under negotiation in the Doha Round for example, tighter rules on state trading, increased transparency in subsidies, or commitments on export taxes. The DDR called for many developing countries to have **unbound tariffs** with no WTO ceiling commitments, while developed members pushed for binding them, which reduces flexibility.

The 14 sectoral proposals were a key part of the 2008 NAMA draft text and played an essential (Verma, Kallummal, & Varma, 2013) role in the Doha round. They covered nearly 70% of NAMA tariff lines. They included proposals for zero tariffs in specific sectors such as Automotive and Related Parts, Bicycle and Related Parts, Chemicals Products, Electronics/Electrical Products, Fish and Fish Products, Forest Products Sector, Gems and Jewellery Sector, Toys Sector, Textiles, Clothing and Footwear Sector, Sports Equipment Sector, Raw Material Sector, Industrial Machinery, Enhanced Healthcare, and Hand Tool Sector. Developing countries feared that if these proposals were accepted, it could lead to de-industrialisation, as their manufacturing sectors might shrink too quickly. Therefore, many developing nations argue that this arrangement favours wealthy-country farmers while their own producers face tough competition. Preference erosion faced by LDCs was highlighted as a tactic used by developed countries. Additionally, tariff escalation in developed markets, which affected exporters in developing countries, prompted their withdrawal, ultimately causing a deadlock.

Ad Valorem Vs. Non-Ad Valorem Tariffs

A lesser-highlighted but quite influential in WTO and trade policy circles is the presence of Non-Ad Valorem (NAV) tariffs and the calculation of Ad Valorem Equivalents (AVEs). It has led to North–South asymmetries in WTO negotiations, highlighting the deep imbalances between developed (North) and developing (South) countries revealed during the Doha Round. The developed countries (the QUAD: US, EU, Japan, Canada, plus Switzerland) maintained complex tariff structures that shielded their sensitive sectors while pressuring developing countries to deepen liberalisation.

The "tiered" (or banded) approach proposed in Doha divided each tariff line into three slabs according to the initial tariff level. It required progressively larger percentage cuts for higher tariff bands. In agriculture, members negotiated for nearly 700 tariff lines, with reduced commitments under an agreed framework of reduction across three tiers. Tier one with countries having tariffs roughly up to about 10%–15%; cut: small (single-digit to low double-digit per cent reductions); Tier two, tariffs roughly between about 10%–15% and 30% (or up to 50% in some proposals); cut: moderate (mid double-digit percent reductions) and tier three, tariffs above ~30% (or above 50% in other variants); cut: deepest (high double-digit percent reductions or steep proportional cuts). This required the conversion of all non-ad valorem tariffs into Ad Valorem equivalents and efforts to

The use of Non-Ad Valorem (NAV) tariffs was effective, with a central focus on specific duties and NAV tariffs (e.g., duties expressed in local currencies per kg rather than as a percentage of the value of imports). These are disproportionately used by developed countries in agriculture and related products, making protection less transparent and harder to negotiate. The Ad Valorem

Equivalents (AVEs) and methodological bias, as discussed by Kallummal 2015, critique the calculation of AVEs by showing how methodologies favoured developed countries, inflating the apparent tariff levels of developing countries and tilting negotiations against the South.

The impact on Agriculture and Allied Products has been very high, with sensitive products such as dairy, sugar, meat, and processed foods heavily protected by NAV tariffs in the North. This restricts genuine market access for developing country exports, undermining the development mandate of the Doha Round. The NAVs caused systemic imbalances, and Kallummal argued that the North's reliance on NAVs and hidden protectionism perpetuates structural inequities faced by developing countries, putting them under pressure to bind and reduce tariffs transparently. In contrast, developed countries retain opaque instruments and employ a simple profiling method.

The application of non-ad valorem tariffs introduces complexities in the tariff rate, particularly in terms of its application types. These can vary in terms of transparency for exporters, such as specific duties, mixed duties, and compound tariffs. The least transparent are technical duties, which may include the contents of sugar, salt, oil, and alcohol. They obscure the proper level of protection, since their impact depends on import prices and product composition. These make it difficult for exporters, especially from developing countries, to assess market access conditions. (Kallummal, M., 2013)

The negotiators have entirely overlooked the presence of the NAVs from developing and LDC members of the WTO over the past 13 ministerial meetings. Beginning with the Doha Round, negotiators were required to substantially cut the bound rates across the agricultural and non-agricultural sectors. The Doha Round, initiated in 2001, lasted up to 2008, almost as long as the Uruguay Round.

Table 1: Usage of Non-Ad Valorem Tariffs across Select WTO Members (2023)

S.N.	Economy Type	% of Tariff Lines with NAVs	Notes
1	Switzerland	~75%	Across all tariff lines
2	EU	~13%	Heavy use in Agriculture (dairy, meat, cereals).
3	US	~20%	NAVs are common in agriculture, Footwear, and Textiles.
4	Canada	~5%	NAVs are Common in agriculture, like dairy, beverages, cereals, oils,
5	Japan	~6%	NAVs in rice, dairy, and processed foods.
6	India	<6%	Mostly ad valorem; NAVs are rare, but appear in two Agri lines, and Textiles and Clothing.
7	Korea, South	~1%	NAVs in Fruits, Vegetables, and some not calculated textual
8	China	~0.5%	Joined the WTO in 2001
9	Developing Economies (avg.)	3–6%	More reliance on ad valorem for transparency.

Source: Author.

The concerns about equity and transparency were addressed by a series of academic works that highlighted that developed countries often maintain NAV tariffs across politically sensitive sectors, shielding them from scrutiny and transparent obligations. Meanwhile, developing countries,

pressured to bind tariffs in ad valorem terms, face greater exposure and less policy space. The global narratives have consistently emphasised the impact of ad valorem tariffs (bound and MFN applied), and the mainstream literature (WTO, WB, IMF, and UNCTAD) has never examined the effects of non-ad valorem duties or their actual trade barrier factor in terms of AVEs. (Diakantoni, A; Escaith, H, 2014). Also see Annexe Table 1.

The implications for the two mercantile sectors in the WTO Doha Round, similar to those in the NAMA negotiations, are significant. Developed countries advocated substantial tariff reductions under the "Swiss formula," but converting NAVs into AVEs became contentious. (WTO, 2007) Meanwhile, the agricultural sector in developing countries, which constitutes a larger share of their domestic economies, relies more heavily on it, with a higher prevalence of non-ad valorem tariffs; nearly 45% of EU agricultural tariff lines are subject to such tariffs. Many developing countries argued that biased AVE methodologies inflated their tariff profiles, leading to deeper cuts than justified. In agriculture, NAVs are common in sensitive products such as dairy, sugar, and meat, and AVE calculations directly influence market access commitments.

There are significant challenges in economic analysis conducted without AVEs; the extent of tariff lines omitted is shown in Table 1. These asymmetries hinder the Doha Round's developmental objectives, and unless NAVs are regulated, achieving development-oriented outcomes will remain unattainable. In the largest markets for raw agricultural products, approximately 1 in 10 tariff lines are NAVs, accounting for a significantly larger share of trade value (20-25%). These exportable products are primarily from developing countries with proven competitive advantages in agriculture and sensitive industrial goods. The six economies collectively imposed 2,537 unique non-ad valorem tariffs in 2023.

Non-Tariff Measures

The reduction and elimination of tariffs have remained the primary focus of global liberalisation efforts, compared with Non-Tariff Measures. Historical and institutional factors elucidate why tariffs evolved into the predominant "currency" of trade liberalisation, whereas non-tariff measures (NTMs) have been significantly more resistant to change. The predominance of tariffs was propelled by five principal characteristics of the trade policy instrument (TPI). The TPI is characterised by transparency and measurability, which facilitate negotiation and bargaining processes, as established in the General Agreement on Tariffs and Trade (GATT) of 1947. This framework is predicated on tariff bindings and reductions, aligning with the legal structures of the GATT/WTO system. Tariffs are publicly visible and negotiable, enabling governments to illustrate the "price" of liberalisation to domestic constituencies. Historically, tariff revenue was crucial for developing countries, rendering tariff reductions as tangible concessions. Tariffs are readily comparable across nations and products, and reductions can be systematically scheduled and bound within WTO schedules. Conversely, Non-Tariff Measures (such as quotas, standards, licensing, subsidies, and procurement rules) are qualitative, opaque, and diverse, complicating measurement and negotiation efforts.

These issues were extensively debated during the Tokyo Round of GATT, particularly concerning technical barriers and standards, which were addressed for the first time in that round. The negotiations culminated in the adoption of a Standards Code by the end of the Tokyo Round (1979). Such measures directly affected production costs, leading to higher export prices (which affected competitiveness) and were primarily enforceable within domestic jurisdictions. An international consensus subsequently emerged with the establishment of the World Trade Organisation (WTO), in which some were deemed non-trade barriers (WTO non-compatible) and the others were Non-Tariff Measures (WTO-compatible).

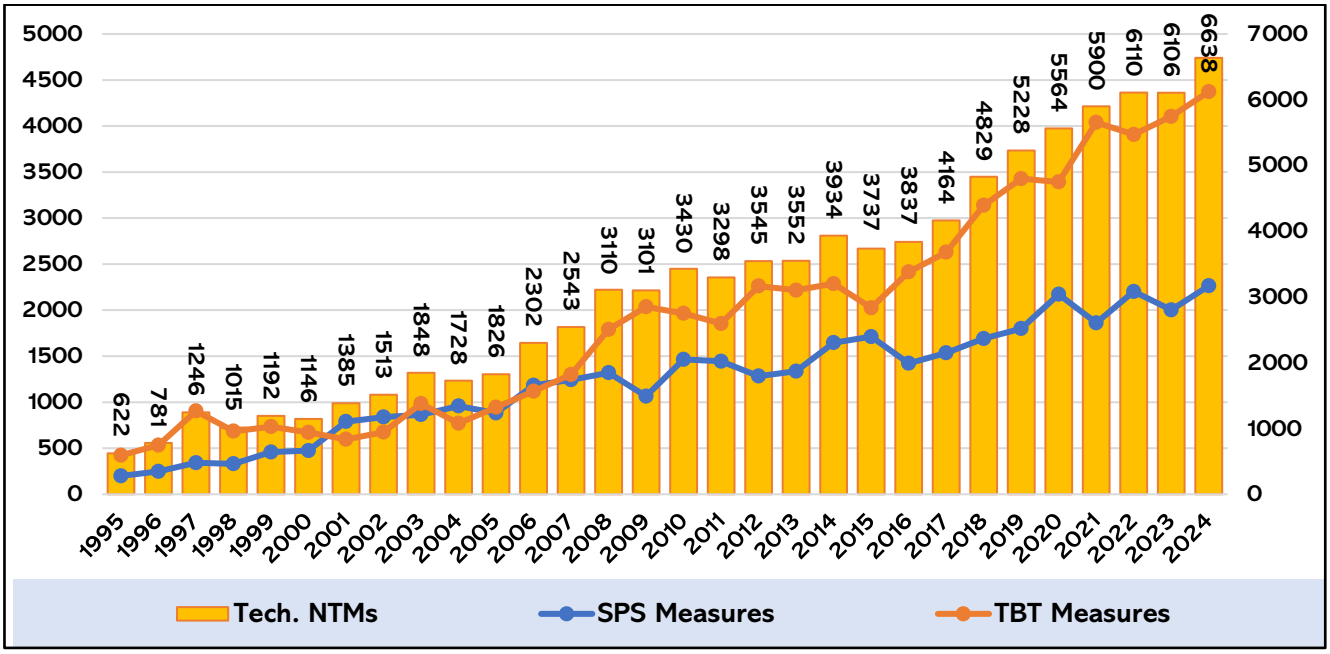
Non-tariff measures, such as sanitary and phytosanitary (SPS) measures and technical trade barriers (TBT), serve as essential instruments that nations employ to regulate food safety, animal and plant health, and product standards. These non-tariff measures operate along two principal dimensions: legitimate regulatory objectives centred on health and safety, and instrumental functionalities that may function as practical trade impediments when their design, implementation, or transparency are inadequate. The significance of harmonising with international standards is underscored; however, real-world discrepancies persist. Variations manifest through differing maximum residue limits, detection thresholds, and testing protocols, resulting in disparate market access outcomes. These disparities are often attributed to precautionary measures, domestic political and economic considerations, or limitations in regulatory enforcement.

Kallummal demonstrates that variations in detection thresholds and measurement units can turn otherwise comparable risks into different regulatory outcomes. For instance, varying detection limits for pesticide residues can transform value-based tariffs into more stringent non-tariff barriers for exporters unable to meet the stricter measurement standards. Transparency and notification practices remain relevant issues. Incomplete notifications and unclear technical justifications for SPS and TBT measures not only increase transaction costs but also create uncertainty among exporters, which hampers dispute resolution and collaborative risk assessments. Adequate transparency includes not only timely notifications but also accessible scientific explanations, testing methods, and conformity assessment procedures. Differences in capacity affect negotiation power. Developing countries face structural challenges in addressing complex SPS and TBT regulations, mainly due to limited laboratory infrastructure, weaker regulatory institutions, and gaps in participation in standards-setting. These disparities result in outcomes in which tariff liberalisation provides limited market access benefits, as mandatory SPS and TBT measures, such as technical regulations and conformity assessment procedures (CAPs), continue to act as significant barriers to exports. (Kallummal, M., 2022)

Policy prescriptions emphasise capacity building, regulatory cooperation, and calibrated negotiation strategies. They recommend targeted technical assistance for measurement and conformity assessment, mutual recognition arrangements for testing and certification, and structured dialogues that align domestic regulatory goals with international best practices. These steps help reduce unnecessary trade costs while maintaining legitimate health and safety protections. (Kallummal, M., 2021)

Strategic negotiation involves striking a balance between defensive and offensive interests. Kallummal recommends that negotiators meticulously identify sector-specific vulnerabilities, pinpoint critical bottlenecks in conformity assessment processes, and coordinate capacity-building initiatives with market access commitments. The importance of evidence-based bargaining is underscored, emphasising the use of traceable scientific justifications and regulatory impact assessments to differentiate protectionist measures from genuine safety initiatives. The SPS and TBT notifications to the WTO need to address six key issues identified to enhance transparency and alignment of Non-Tariff Measures (NTMs), mirroring observations from tariff negotiations. These issues are as follows: Issue 1 - the Secretariat frequently receives multiple notifications on the same day from a single WTO member, all concerning the same product with minimal variation in objectives; Issue 2 - the notifications are often submitted in languages other than the three official WTO languages, most commonly in the national language; Issue 3 - the notifications usually describe broad product categories that do not specify products according to the Harmonized System (HS) nomenclature; Issue 4 - the stated purpose or objective of the notifications is frequently vague or absent; Issue 5 in both routine and emergency Sanitary and Phytosanitary (SPS) notifications under Article 2, limited or insufficient time is allocated for comment submissions; Issue 6 some notifications incorrectly specify the Common Customs Classification and Nomenclature (CCCN) or HS nomenclature. (Kallummal, M., 2012)

Figure 2: Technical NTMs: SPS and TBT Measures (1995 to 2024



Note: Tech. = technical; SPS = Sanitary and Phytosanitary; and TBT = Technical Barriers to Trade.
Source: CWS online web portal and E-ping.

Institutional innovations complement bilateral and multilateral efforts. This can be achieved by strengthening coordination among trade ministries, standards bodies, and agricultural agencies, resulting in coherent domestic positions in negotiations. Furthermore, data-driven monitoring is crucial for NTMs to detect shifts in application and to inform rapid response mechanisms that protect exporters' interests without compromising public health goals.

Most often, these notifications lack a clear scientific rationale and risk assessment, and fail to provide a robust, evidence-based explanation linking the measure to specific health or phytosanitary risks. Detailed test methods and laboratory protocols the technical procedures used for detection and analysis are often unspecified or vague. Explicit detection limits and notifications of measurement units typically fail to state the limits of detection, units, or the scale used for measurements. Sampling procedures and frequency information such as how samples are selected, sample sizes, and testing frequency are commonly absent. Conformity assessment and certification details, including accreditation procedures, issuing authorities, and recognition of foreign or third-party labs, are not described. Phase-in schedules, transitional arrangements, timelines, grace periods, and capacity-building support for affected exporters are frequently missing. Lastly, trade impact data and notifications to contact points rarely include quantified impact assessments, considered alternatives, or precise technical contact details for follow-up. Analysis concludes that well-designed SPS and TBT regimes can coexist with open trade when transparency, harmonisation, and capacity are systematically addressed.

The policy challenge is to convert technical cooperation into durable institutional reforms that lower compliance costs, enhance predictability, and ensure that health-based regulations do not become covert instruments of protectionism. Tariffs and non-tariff measures jointly shape market access, emphasising technical design, institutional capacity, and strategic negotiation. Highlights specific problems that convert legitimate regulation into effective barriers and proposes practical policy responses.

Trade in Services vs. Goods

While goods trade is well documented through customs data and tariff schedules, services trade, especially digital services, lacks granular, cross-border tracking mechanisms. (Kallummal, Murali, 2020) WTO's Trade in Services database relies heavily on member self-reporting, which varies in quality and frequency. (WTO, N.D.) Even in these times of economic and political volatility, services have been a beacon of growth. Services account for anywhere from 40% to 70% of a nation's GDP. They have also accounted for a greater share of employment in both low- and high-income countries – from low-paid barbers to sectors such as tourism, finance, insurance, and real estate. (BCG, N.D.) A credible estimate of the services' share is attainable. It typically accounts for 20–25% of global trade by value, but precision requires careful definition that combines official statistics with modelled and firm-level evidence. A downside for cross-border trade in the service sector, particularly when it has large service export surpluses, is that it is exposed to potential retaliation in trade disputes. The GATT/WTO framework is primarily designed for the movement across borders. Unlike goods, it is inherently difficult to assess tariffs on services. They are harder to define, measure, and track as they move across borders. They are also intangible and often delivered digitally, bypassing ports and customs stations.

Typical data sources and methods in the services sector encompass four primary categories: official statistics derived from the balance of payments (BoP) and national accounts for cross-border services flows; international compilations such as those from the WTO, OECD, and IMF,

including aggregated and harmonised datasets; trade in value-added and input-output tables that delineate services embedded in goods and global value chain (GVC) contributions; and firm-level as well as customs-linked data that facilitate the estimation of mode-specific or cross-border services related to goods shipments. Furthermore, surveys and data sourced from commercial providers are employed, particularly for digital services, platform revenues, and niche business-to-business (B2B) service lines. The integration of the service sector has heightened the importance of surveys over traditional methods, accentuating the predominance of the public sector, which has subsequently led to an increasing role for the private sector. (IMF;, 1995)

Structural Imbalances in Data Capture

In governance and institutional contexts, data gathering is not just a technical exercise it is a structured process designed to promote transparency, accountability, predictability, inclusiveness, and integrity. These principles can be applied across disciplines, from economics to regulatory systems; however, for this paper, we focus on key aspects related to the cross-border movement of goods and services. These become increasingly important as the world shifts toward data-driven mathematical economic modelling and various types of artificial intelligence, such as Narrow AI, which is specialized in a single task and cannot go beyond its programmed scope, and General AI, a more robust and hypothetical form of AI capable of performing any intellectual task a human can, such as reasoning, learning, and adaptability. We are still far from achieving Superintelligence AI, which would surpass human intelligence in all domains, including creativity, problem-solving, and emotional intelligence.

Disproportionateness of the Informal Sector

One of the most frequently overlooked segments is the informal sector, owing to structural issues that remain unaddressed by both national and international entities. Gaps in the political economy and representation that have existed have neither been harmonised nor effectively channelled; consequently, informal producers and traders possess limited collective influence in trade negotiations and policymaking. Their dispersed interests are less prominent than those of exporters' associations or large retailers, resulting in reforms that seldom accommodate their constraints. Additionally, this has led to fragmentation and increased heterogeneity within the informal sector, as well as among regions and firm sizes. Developing a uniform policy applicable to all in such a diverse framework presents significant challenges, thereby diminishing incentives to invest in comprehensive sector-wide solutions. Furthermore, sustainability has introduced another fundamental shift in production practices, moving from a focus solely on price competitiveness to a paradigm driven by sustainability considerations. These transformations pose a significant threat to numerous economies and necessitate adjustments in their value chains. Micro, Small, and Medium Enterprises have experienced considerable pressure as a consequence of this transition.

The MSMEs are mainly operated in the informal sector and often operate outside formal domestic taxation and customs channels, especially in developing countries. Their contributions to trade are

underrepresented, which skews policy focus toward large firms and formal sectors. This is a critical blind spot in global trade governance with significant implications for equity, data integrity, and policy development.

MSMEs are indeed nationally legislated, and their definitions, thresholds, and support frameworks are deeply rooted in domestic socio-economic considerations. This national discretion reflects the diversity of economic and social structures, legislative requirements, development priorities, and institutional capacities across WTO members. (Kallummal, M.; Khosla, S., 2022) A significant share of informal MSMEs is led by women or based in rural areas, especially in sectors such as handicrafts, agro-processing, and textiles. Their exclusion from formal data channels means gender-sensitive trade policy remains underdeveloped. (Kallummal, Murali; Khosla, Simran; Singh, Keerti, 2022) MSME trade is often underrepresented in WTO Data Systems for two main reasons: MSMEs, particularly in developing countries, frequently bypass formal domestic taxation and customs channels. Their cross-border trade activities are through e-commerce, informal exports, and barter arrangements, which are rarely captured in WTO databases or national trade statistics. Therefore, it leads to a skewed picture of trade flows, favouring large, formal enterprises. (WTO, n.d.) The implications for trade policy making and negotiations in the context of market access often overlook the significant barriers MSMEs face, including gaps in digital infrastructure, regulatory complexity, and a lack of financing. Trade facilitation measures usually benefit formal firms, while informal MSMEs often remain excluded from capacity-building programs and dispute resolution mechanisms. Rules of origin and certification requirements are frequently too complex or costly for MSMEs to comply with, further marginalising them.

Table 2: MSMEs Reform Areas and Strategic Actions

S.N.	Reform Area	Strategic Action
1	Data Capture	Nationally legislated, we develop hybrid models that combine customs data with platform analytics and surveys. (Kallummal *et al.*, 2021, 2022)
2	WTO Reporting	Encourage voluntary reporting of MSME activity through simplified templates. (WTO, n.d.)
3	Trade Facilitation	Tailor WTO TFA implementation to address the needs of the informal sector. (WTO, n.d.)
4	Capacity Building	Develop MSME-specific modules within the Aid for Trade and Enhanced Integrated Framework. (WTO, n.d.)
5	Gender & Inclusion Metrics	Integrate MSME data with gender-disaggregated indicators. (WEF, 2024)

Source: Author based on various sources.

Trade Governance Shifting: Public to Private Sector

Historically, the public sector, including national governments and international organisations, has remained the primary source of data and secondary reports. In the GATT/WTO era, trade data was primarily collected by customs authorities, national statistical offices, and international organisations (WTO, UNCTAD, World Bank, IMF). Hence, the data was treated as a public good

with all the related characteristics, such as being open, standardised, and used for multilateral negotiations, development planning, and transparency.

Table 3: Comparative Assessment of Public Vs Private Data Coverages

S.N.	Dimension	Public Sector (WTO, NSOs, and Customs)	Private Sector (Platforms, Fintechs, and MNCs)
1	Coverage	Goods trade, tariffs, formal flows	Digital trade, services, MRLs data and consumer behaviour
2	Timeliness	Periodic, lagged	Real-time, continuous
3	Granularity	Aggregate, sectoral	Transaction-level, user-level
4	Accessibility	Open/public (though uneven)	Proprietary, paywalled, restricted
5	Governance	Multilateral norms	Corporate standards, data monetisation

Source: Author based on Various sources.

The concerns that are increasingly shaping the strategic directions of various processes include public–private data partnerships. These structured collaborations, exemplified by initiatives like the WTO–ITC platform data sharing, (WTO, N.D.) Aim to bridge existing gaps. Products can be categorised into public and private goods, which are fundamental to understanding trade policy, market behaviour, and institutional design. The social impact of these initiatives is paramount, with public goods encompassing defence, telecommunications, governance, healthcare, and other essential services. Private goods are those that directly benefit consumers. Digital public goods models, such as India Stack, are being adopted globally to strengthen data infrastructures within the public domain. The development of international standards involves creating WTO-compatible frameworks that promote data transparency, interoperability, and accountability. Additionally, inclusive metrics are vital to ensure that micro, small, and medium-sized enterprises (MSMEs), women-led enterprises, and developing countries are adequately represented in both public and private datasets.

Growing Trade in Digital Products and Services

The rise of Private Data Infrastructures is evident in both cross-border and domestic trade in digital products, as platforms and private companies such as Amazon, Alibaba, Google, Mastercard, and shipping/logistics firms now collect real-time, detailed trade and consumer data. These companies often have broader access and faster analytics than governments, especially in digital trade, e-commerce, and cross-border payments. The UPI in India provides nearly complete domestic coverage; however, when cross-border flows are processed through private fintech or card networks, visibility shifts away from public regulators. The Unified Payments Interface (UPI) has not only digitised payments but has also changed the structure of digital trade in India, earning it global recognition. Its influence is both systemic and transformative, impacting micro-enterprises, consumers, platforms, and regulators.

Digital trade has experienced significant growth since 1998, primarily in developed countries. However, its rapid growth brings new cross-border problems not covered by traditional trade rules. By 2008, global trade extended beyond developed nations to include most developing and some less developed countries. The changing nature of digital trade creates significant challenges

for products traded online. Unlike traditional goods that go through ports and customs, products traded online such as digital services, software, or physical items ordered through platforms face unique issues. These include classification uncertainties, customs and tariff concerns, data collection issues, the digital divide, and tax-related concerns. (Kallummal M., 2020); (Kallummal, M., 2021)

While many stakeholders focus on privacy regulations, intellectual property (IP) concerns, cybersecurity, and trust, it is equally essential to consider platform dependence. This issue has significant implications for policymakers, as digital trade challenges traditional classifications within trade law, such as distinguishing between goods and services. For businesses, compliance, IP protection, and reliance on platforms pose strategic risks. Lastly, consumers remain deeply concerned with trust, privacy, and access. Most traditional economic models do not account for trade conducted via digital or electronic methods, as these transactions are recorded at bank payment gateways beyond customs ports at borders. Historically, trade statistics were designed to measure tangible goods items that physically cross borders and can be recorded at ports through customs declarations. Consequently, neither domestic nor international trade is fully captured as a trade metric, similar to the case with services trade. A large portion of cross-border digitally delivered services (such as software downloads, cloud computing, consulting via virtual platforms like Zoom, and fintech transactions) bypass traditional ports altogether. These transactions are recorded, if at all, through balance-of-payments statistics (classified under "trade in services"), which rely on surveys and payment data that are privately stored and often incomplete. Many transactions are routed through platforms and payment gateways (such as PayPal, Stripe, and UPI cross-border transactions), which do not always report in a way that aligns with official trade statistics.

Currently, even the UN IMTS does not include digital trade such as digitally delivered services (e.g., cloud computing, streaming, software downloads). However, by design, IMTS focuses on merchandise physical goods that can be tracked at ports and borders. It therefore lacks a provision for digital trade flows, which often bypass customs entirely and fall outside its scope. As a result, a fifth trade flow, routed through bank payment gateways, was recommended. (Kallummal, M., 2020) Currently, most legacy economic models fail to capture trade flows through digital products, as these (apps, SaaS, streaming, cloud storage) bypass customs checkpoints entirely.

Additionally, the Digital Trade coverage of the Informal sector may be obscured by MSMEs engaging in digital trade through platforms like Instagram, WhatsApp, or local marketplaces. These transactions are hidden from customs authorities, yet they represent vibrant cross-border economic activity. The WTO's current frameworks (e.g., GATS, E-commerce JSI) do not sufficiently account for this informal digital trade. Enhanced Integrated Framework helps address this gap, particularly through the MSME-specific modules under Aid for Trade. The coverage gap in digital trade data is not just a statistical flaw; it's becoming a systemic risk as digital trade rapidly surpasses the institutional mechanisms designed to measure it.

The implications of transparency gaps in WTO notifications may compel national governments to rely on private datasets for evidence-based policymaking. Certain Original Equipment

Manufacturers (OEMs) possess market capitalisations exceeding the gross domestic product (GDP) of small nations, potentially accentuating existing power asymmetries and giving private firms that control data flows leverage to shape standards often outside the scope of multilateral frameworks. There are substantial concerns about equity, as micro, small, and medium-sized enterprises (MSMEs) and developing countries may be excluded if they lack access to proprietary datasets. Lastly, an accountability challenge arises because private data is not always subject to the same auditability, neutrality, or disclosure obligations as public statistics.

The Case of India

The digital trade landscape in India is integrated through the India Stack framework, with the Unified Payments Interface (UPI) establishing one of the most comprehensive domestic digital trade ecosystems globally. However, the development of the cross-border aspect continues to be ongoing. Within the country, these platforms boast extensive coverage; UPI's widespread adoption extends to street vendors and major corporations alike, rendering it the default payment method. The India Stack provides the foundational infrastructure for Aadhaar (digital identification), e-KYC, DigiLocker, and UPI, thereby ensuring identity verification, fostering trust, and enabling transaction traceability. Consequently, this infrastructure has significantly advanced financial inclusion in India, even among micro and informal enterprises, providing nearly complete visibility into domestic digital transactions, a level that few economies can rival.

Despite this domestic success, cross-border integration remains fragmented due to the lack of harmonisation of regulatory frameworks across partner countries. Each partner country has its own Anti-Money Laundering (AML) and Combating the Financing of Terrorism (CFT) rules, as well as data localisation and consumer protection regulations. This poses a significant challenge to creating harmonised standards, which, in turn, hinders UPI's global interoperability. There have been limited bilateral successes, such as efforts that led to the linking of UPI with Singapore's PayNow, and pilot projects are ongoing with the UAE, France, Bhutan, and Nepal. However, these are isolated corridors and do not constitute a systemic WTO-level framework.

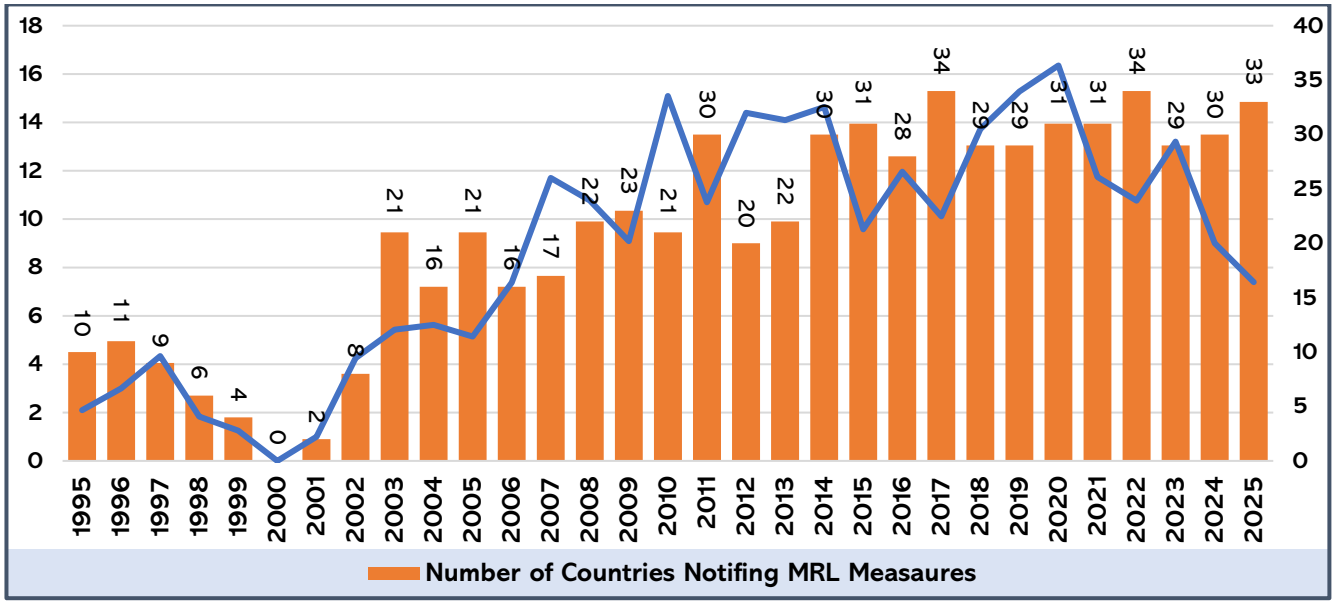
Mandatory SPS-based MRL Data

The SPS notification on MRL (Maximum Residue Limit) restrictions is essential for safeguarding food safety in international trade. It functions both as a regulatory safeguard and a transparency mechanism, enabling countries to protect public health while ensuring predictable trade flows. Members are required to ensure that SPS-based MRL notifications are grounded in scientific evidence and, where applicable, reference Codex Alimentarius standards, rather than relying on arbitrary thresholds. Any deviation from the Codex standards should be evaluated through a comprehensive process (Equal to Codex, Less than Codex, More Stringent than Codex, Non-Codex, and Default MRLs or Zero Tolerance). Universal access to MRL data and information is imperative for this evaluation. (Kallummal, M,; Gurung,H. M., 2020)

The number of notifying members has increased by almost 11% from 1995 to 2025, rising from 10 in 1995 to 33 in 2025, which is one less than in 2017 and 2022. Therefore, a country

exporting agricultural products requires information regarding MRL levels on agricultural commodities across numerous nations. From Figure 3, it is evident that there has been a significant increase in SPS-based MRL notifications over the years from 1995 to 2025; hence, information on MRLs has become essential. Consequently, there exists a substantial need for an open-access database of the MRLs of nearly 34 WTO Members who have been actively submitting MRL notifications.

Figure 3: Yearly Number of MRL Notifications and Participating Countries.

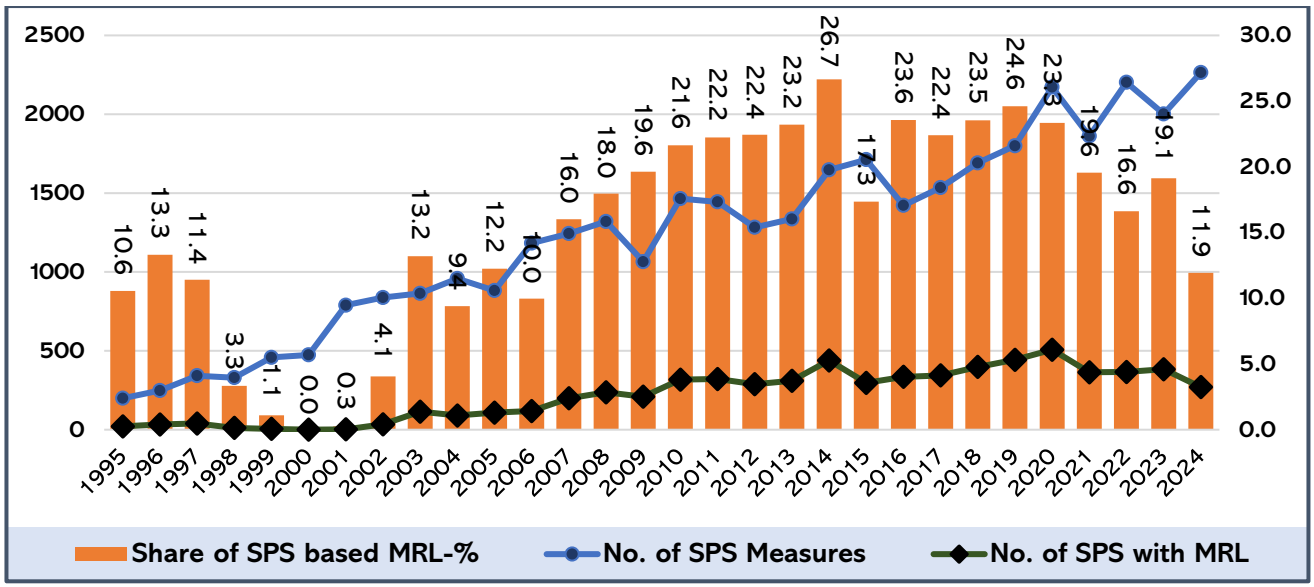


Source: CWS online database and WTO's E-ping database.

All SPS notifications are mandatory, and such measures can be traced back to 1995–1996, when early discussions in the SPS Committee began focusing on how MRLs accounted for an average of 12% of the total SPS notifications by members. These discussions focused on those that were not aligned with Codex standards and, therefore, could act as trade barriers. Developing countries increasingly raised concerns about the lack of harmonisation, transparency, and scientific justification for stringent MRLs imposed by importing countries.

The period from 2000 to 2009 saw a significant rise in the share of MRL notifications, with an exponential increase of 105%. Later, from the 2010s through 2019, the trend was marked by two sharp peaks, with an overall growth rate of 0.5%. The issue gained increased attention as countries like India, Brazil, and others began submitting formal trade concerns, arguing that overly strict or default MRLs disproportionately affected their agricultural exports. (Kallummal, Murali, 2020a) In the 2020s, the share fell from 24.6% in 2019 to nearly 12% in 2025. India and other countries have called for clearer standards on default MRLs and better alignment with Codex Alimentarius, emphasising the need for scientific risk assessment and transparency in notifications. See Figure 4

Figure 4: SPS Measures, SPS-Based MRLs and Shares of MRLs -1995 to 2024



Source: CWS online database and WTO's E-ping database.

Currently, the universal availability of MRL information is provided by two sources: the first was a publicly available source, but it stopped providing this information in 2015. The second source is a private company called Bryant Christie LLP, which provided a diverse set of analyses and data for a substantial fee.

The USAD database contains the maximum acceptable levels of pesticides and veterinary drugs in food and agricultural products in the United States, as well as in 70 other countries, the European Union, and the Codex Alimentarius Commission. It had a coverage of more than 300 fruit, vegetable and nut commodities, as well as more than 270 pesticides approved for use on those commodities by the U.S. Environmental Protection Agency and more than 425 pesticide and veterinary drug residue tolerances in major export markets for hay, feed, grains, oilseeds, poultry, eggs, meat and dairy. (Service, Foreign Agriculture, N.D.) The USDA Foreign Agricultural Service provides basic access to the database for all individuals with a United States-based IP address, enabling U.S. agricultural producers, businesses, and exporters to access this information.

BCI builds customised databases of regulatory information specific to agricultural products and those markets, maintaining the maximum residual levels/limits imposed on imported products and those sold domestically. It is a user-friendly online database available as a customised output from the Resource Centre, a one-stop resource. These claims are an overstatement, as the same resource was also available at the USDA Foreign Agricultural Service before November 2015. (Christie, N.D.) The information provided by BCI includes tariffs and quotas, sanitary/phytosanitary requirements, microbiological testing standards, documentation requirements, food product standards, product labelling, packaging requirements for food safety and sustainability, a proprietary document library, and competitive intelligence. These were available on various websites, but almost all of them were offered transparently at no cost, helping MSMEs and small exporters.

After November 2015, the database was transferred to Bryant Christie Inc., a private-sector LLP providing subscription-based access. The MRL data was integrated into Regulatory Intelligence

Services, which included proprietary analytics, customised dashboards, and market-specific regulatory tools. Although technically more advanced, these changes limited open access, creating information gaps between well-resourced exporters and smaller or informal actors.

Table 4: A Comparison of Access to MRL Data and Information (Open and Paid Sources)

Region/ Institution	Access Model	Ownership/Control	Coverage	Cost & Usability	Transparency & Update Frequency
USFDA (pre-2015)	Public, open-access	U.S. Government	- U.S. and selected global MRLs	Free, user-friendly	High transparency, regular updates
Bryant Christie Inc. (Post-2015)	Private Subscription-based, proprietary	Private LLP (Food Chain ID)	- 70+ countries, Codex, EU; - (U.S. freely)	Paid access, advanced analytics	High accuracy, but limited public transparency
Codex Alimentarius	Public, open-access	FAO/WHO	- International reference standards; - only up to 11 thousand (as of 2024)	Free, but limited search functionality	Periodic updates, consensus-based
EU (EFSA)	Public, semi-structured	European Commission/EFSA	- EU-wide MRLs for food and feed; - limited MRLs applicable to EU imports	Free, technical interface	Transparent, but complex navigation
India (FSSAI)	Public, domestic focus	Government of India (FSSAI)	- Indian MRLs for domestic and import standards; - limited nearly 10 thousand plus Indian MRLs	Free, but fragmented across portals	Moderate transparency, slower updates
Japan (MHLW)	Public, structured	Ministry of Health, Labour and Welfare	- Japan-specific MRLs	Free, detailed PDFs and tables	High transparency, language barrier
China (MOA)	Public, partial access	Ministry of Agriculture	- China-specific MRLs	Free, but limited English interface	Moderate transparency, frequent revisions
Canada (PMRA)	Public, structured	Health Canada	- Canadian MRLs for pesticides	Free, searchable database	High transparency, regular updates

Source: Author based on various websites.

The SPS-based MRL information has lost its public good character due to the privatisation of nearly 100 countries' MRL data, which was once a shared regulatory resource but has now become a commercial asset. This shift limits its ability to promote inclusive trade. Barriers to participation impose higher costs on small exporters, especially those from developing countries, who face increased expenses and reduced visibility into the requirements of their destination markets. It can also lead to negotiating disadvantages: without open access to comparative MRLs, countries struggle to challenge unjustified SPS measures or align domestic standards. Additionally, the privatisation of regulatory data erodes transparency, undermining WTO principles of predictability and non-discrimination, particularly in SPS/TBT contexts. MRLs and international regulations are frequently revised every 5 to 7 years by the CODEX international standardisation organisation and annually by countries such as the EU, the US, and Japan. (Kallummal, Murali; Shetty, Malvika; Gurung, Hari Maya, 2022) Kallummal et al. exemplified a broader trend where technical trade data, once part of public infrastructure, are increasingly privatised, reinforcing structural inequities in global trade. Therefore, it recommends restoring open-access databases, establishing public–private partnerships with tiered access models, building capacity for data interpretation and regulatory alignment, and implementing institutional safeguards to maintain transparency in trade-critical information. It could serve as a valuable tool to promote an inclusive regulatory framework.

He also emphasised the importance of WTO-based open-access databases, scientific equivalence, and regulatory cooperation to ensure MRLs are prioritised.

Over-Capacities in the Manufacturing Sector

The private sector's increased role in the governance of nation-states also meant it expanded its involvement in industrial planning and the development of capacities in third-world countries. In the 1980s, the public sector took an active role in industrial planning and capacity expansion, a trend that reversed as markets began to assume many of these tasks. But with the rise of liberalisation, privatisation, and globalisation, the state's role shifted from producer to facilitator, opening the door for private consultancy firms to shape industrial and trade policy behind the scenes. These changes led to an increased role for seven consultancy firms at the international level: McKinsey & Company, Boston Consulting Group (BCG), PricewaterhouseCoopers (PwC), KPMG, Deloitte, Ernst & Young (EY), and Bryant Christie Inc.[4] Another dimension is that nearly all seven firms operated in market-led economies such as the US and the UK.

The UNFCCC also recognised this within the sustainability framework and set a specific goal to address the intersection of cross-border trade and industrial policy, emphasising concerns about over-capacities in the context of sustainability, as outlined in SDG 12, Responsible Consumption and Production. The creation of manufacturing overcapacity is a structural problem affecting industries ranging from steel and cement to automobiles and semiconductors. Consultancy agencies play a crucial role in how this issue is acknowledged, measured, and communicated to inform policy and corporate responses. These agencies, driven by profit, have contributed to this global issue by applying the same demand and supply data to multiple firms' expansion strategies within a sector. Profit-driven, the practice of recycling demand-supply data makes consultancy agencies multipliers of overcapacity risk.

Overcapacity is no longer just a cyclical issue but a structural one, reshaping trade flows, industrial policies, and even the legitimacy of global trade rules. It also highlights the link between consultancy agencies' business models and the ongoing global overcapacity problem. Pursuing profit within consultancies may cause them to shift from impartial advisors to, sometimes unintentionally (or occasionally intentionally), co-creators of overcapacity. The trade policy effects of creating overcapacities are discussed in Table 5, including price distortions and dumping across many sectors. Excess supply results in below-cost exports, often seen as dumping, which can lead to increased anti-dumping duties, countervailing measures, and safeguard actions under WTO rules. Trade tensions over capacity in steel, solar, and autos have repeatedly triggered WTO disputes, safeguard measures, and anti-dumping cases.

Table 5: Overcapacities Across Key Sectors and Their Impacts on Trade Agreements

[4] McKinsey & Company (established in1926; United States); Boston Consulting Group (established in 1963; United States; Bain & Company (1973; United States); Deloitte (1845; United Kingdom - origin as accounting practice); PricewaterhouseCoopers (PwC) (1998 - merger of Price Waterhouse 1849 and Coopers & Lybrand 1854); United Kingdom; Ernst & Young (EY) (1989 (merger of Ernst & Whinney 1979 and Arthur Young firms; predecessor firms date to 1849); United Kingdom); and KPMG (1987 (merger forming KPMG; predecessor firms date to 1870s and 1890s) in United Kingdom).

S.N.	Industry	Overcapacity Driver	Trade Impact	Policy Response
1	Steel & Metals	Subsidies, state-owned firms	Dumping cases, tariffs, and WTO disputes	Anti-dumping, bilateral quotas
2	Solar Panels	Industrial policy, scale	Price collapse, global market exit of firms	EU/US safeguard duties
3	EVs & Batteries	Subsidised credit, green push	Export surges, EU anti-subsidy probes	Carbon border adjustments
4	Semiconductors	Strategic rivalry	Overinvestment, cyclical gluts	Export controls, reshoring subsidies

Source: Author based on various Sources.

The structural entanglement between consultancy agencies' business models and the persistence of global overcapacity highlights how the profit motive of consultancies can unintentionally (or sometimes deliberately) turn them into neutral assessors, thereby inadvertently contributing to overcapacity. This overcapacity, combined with the consultancies' profit-driven approach, leads to the repeated use of the same data across different clients, resulting in similar demand–supply projections that are relied upon across multiple clients within the same sector. Competition among consultancies further impedes the sharing of capacity-expansion data, even though it could benefit the global industry. Although consultancies often invest in capacity expansion, assuming they hold a unique strategic advantage, in reality, they all operate based on the same optimistic assumptions. The overall effect at the sector level is the overbuilding of plants, facilities, or production lines.

Table 6: Comparative View: Consultancy Role in Overcapacity

S.N.	Consultancy Function	Neutral Role (Ideal)	Profit-Motivated Role (Observed)
1	**Data & Forecasting**	Objective demand–supply analysis	Optimistic projections to justify expansion, not factoring in demand and supply data.
2	**Client Advisory**	Tailored restructuring advice	Recycled strategies across multiple firms
3	**Policy Input**	Independent assessment of industrial policy	Validation of subsidy-driven expansion Ignoring uncomfortable policy changes
4	**Investor Reports**	Balanced risk–return analysis	Growth-heavy narratives to attract capital
5	**Narrative Framing**	Highlight structural risks	Downplay risks to sustain client optimism

Source: Author based on various Sources.

The profit motive and client dependence mean that consultancy revenues depend on satisfying clients, such as governments, firms, or investors. Reports are often created to support policy goals (e.g., industrial parks, subsidies) or corporate expansion plans rather than to challenge them. This can turn consultancies into echo chambers for aggressive growth strategies. Investor signalling reports are widely shared among banks, private equity, and sovereign funds. When multiple firms and financiers act on the same consultancy-driven optimism, capital quickly flows into the sector, fuelling simultaneous expansions. Overcapacity becomes a permanent issue rather than a temporary fluctuation. By framing overcapacity as a short-term imbalance instead of a structural surplus, consultancies can delay corrective actions. This prolongs excess capacity and worsens global trade tensions (e.g., steel, solar panels, EV batteries).

Strategic implications include systemic overcapacity when multiple firms expand simultaneously based on similar consultancy-driven assumptions, resulting in persistent surpluses in global

markets. Unlike public statistical agencies, consultancies are not bound by transparency or neutrality obligations, and their methodologies remain proprietary. There is an imbalance in which large firms and governments can afford consultancy services, while MSMEs and smaller economies cannot skew the priorities of whose interests are prioritised. Consultancy agencies, by recycling data, embedding optimism, and aligning with client incentives, have not only assessed but also contributed to the creation of overcapacity. Their profit motives encourage them to validate expansion strategies rather than promote caution. In effect, they act as amplifiers of industrial ambitions, often without being held accountable for the systemic imbalances they help produce. Therefore, the Anglo-Saxon economic and corporate governance model significantly contributed to consolidating and expanding the extensive professional services and strategy firms. (Mueller, Dennis C, 2006). Still, it was one of several complementary drivers rather than the sole cause.

Regulatory responses to market distortions caused by overcapacity are being implemented across major economies. Four key sectors have been identified in this context, as previously discussed under trade remedies and safeguards. These sectors include competition and antitrust regulation, industrial and environmental policy adjustments, and transparency and reporting rules.

Further, the over-capacities[5] China needs to be assessed in the context of the Chinese joint venture policy and its linkages with U.S. and OEM firms in the 1980s, as well as the strong links between U.S. OEMs and the seven consultancy firms.

Businesses and Trade: Growing Complexities

At the global level, a fundamental shift in business practices has occurred, as evidenced by the transition from efficiency-oriented to compliance-oriented production processes. It is essential to distinguish the primary differences between Global Value Chains (GVCs), Regional Value Chains, and Global Supply Chains/Resilient Supply Chains (GSC/RSCs). The primary economic principle underpinning GVCs is comparative advantage, which, in simpler terms, refers to a country or region's efficiency and competitiveness. Accordingly, GVCs were predominantly driven by Original Equipment Manufacturers (OEMs), who aimed to reduce production costs to enhance the efficiency and competitiveness of final products. Typically, companies employed these strategies with minimal involvement from national governments. The establishment of the World Trade Organisation (WTO), supporting multilateralism, facilitated the acceleration of this process from the mid-1980s through 2019 and 2020.

Following the Doha debacle in early 2010, a correction occurred. The lack of consensus between developed and developing countries was the main reason for the loss of trust in multilateral processes, as both groups controlling markets in sectors such as agriculture and manufacturing refused to accept negotiated outcomes that already favoured developed countries. This led to a series of non-trade issues being included in multilateral negotiations. The Anglo-Saxon Model and

[5] Except for China, wherein the political economy of growth, local incentives, and global strategic ambitions had a role over and above the role of consultancy. Wu, Chia-Hsuan. (2025). Analysing the Causes and Trends of China's Overcapacity. March. The First Research Division. Chung-Hua Institution for Economic Research. CIER https://www.cier.edu.tw/en/publish/cier-economic-outlook-no-218/.

approaches to financing also fuelled this shift. (Murali K., 1999) Additionally, it led to a shift away from multilateralism, with countries increasingly adopting unilateral approaches and raising tariffs, a trend that became more evident in developed nations. These countries maintained higher product standards, making it harder for traditional trade strategies, such as GVCs, to persist.

The profit motive and client dependence mean that consultancy revenues depend on satisfying clients, such as governments, firms, or investors. Reports are often created to support policy goals (e.g., industrial parks, subsidies) or corporate expansion plans rather than to challenge them. This can turn consultancies into echo chambers for aggressive growth strategies. Investor signalling reports are widely shared among banks, private equity, and sovereign funds. When multiple firms and financiers act on the same consultancy-driven optimism, capital quickly flows into the sector, fuelling simultaneous expansions. Overcapacity becomes a permanent issue rather than a temporary fluctuation. By framing overcapacity as a short-term imbalance instead of a structural surplus, consultancies can delay corrective actions. This prolongs excess capacity and worsens global trade tensions (e.g., steel, solar panels, EV batteries). This new strategy was adopted by developed markets such as the European Union, emphasising ecology as the primary focus. The United States of America has focused on Americanism and local manufacturing, leading to concepts such as Global and Resilient Supply Chains, which were established through enforced national regulation and a shift away from the multilateral approach used during the WTO era.

Table 7: Transitions in the top Global Mercantile Markets (Imports Only)

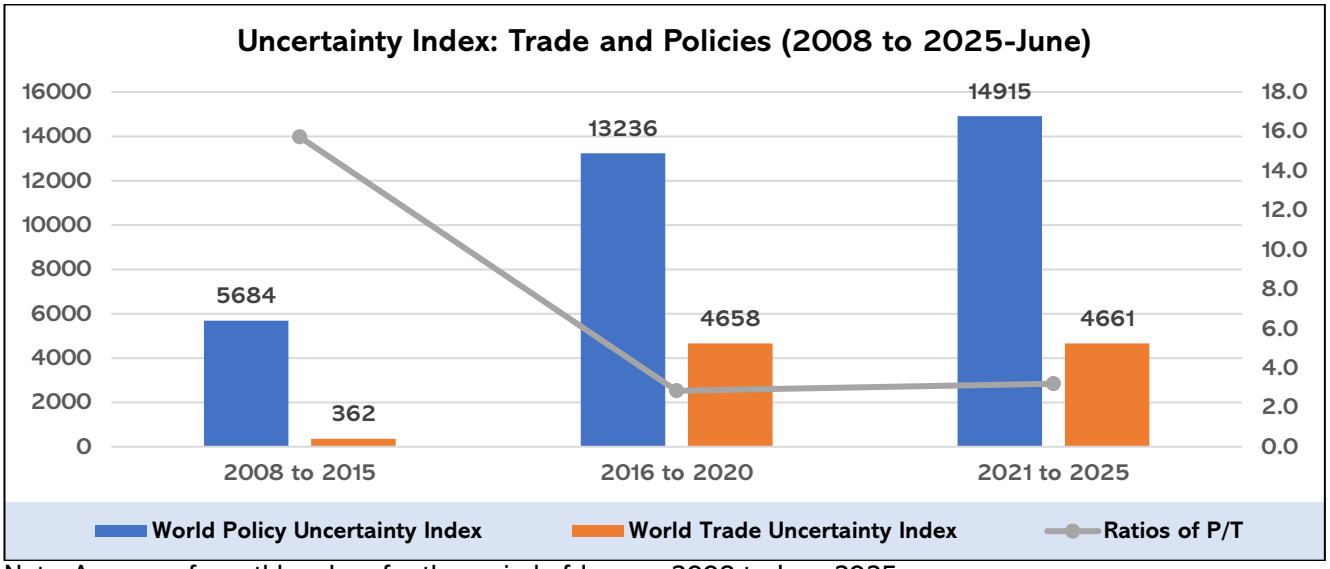
S.N.	Top 10 Importers in the World	2007	2024	Delta in 2024
1	2	3	4	5 = (3-4)
1	Canada	6	10	- 4
2	China	3	3	~
3	European Union	1	2	- 1
4	Hong Kong, China	7	6	+1
5	India		7	In
6	Japan	5	5	~
7	Korea, Rep.	8	8	~
8	Mexico		9	In
9	Russian Federation	10		Out
10	Singapore	9		Out
11	United Kingdom	4	4	~
12	United States	2	1	+1

Source: WITS online database.

Some of these regulations originate from the US Infrastructure Investment and Jobs Act (IIJA), the CHIPS and Science Act, the American Manufacturing Competitiveness Act, the Inflation Reduction Act, and Section 232 and 301 Tariffs, which promote localisation. Similar initiatives by the EU, including the Waste Shipment Directive, Eco-design for Sustainable Products Regulation (ESPR), Packaging and Packaging Waste Regulation (PPWR), and the Carbon Border Adjustment Mechanism, all emphasise localisation. This would mark the end of the WTO and trade negotiations based on economic principles, forcing policymakers, industrialists, academicians, and trade negotiators from developing countries into uncharted territory of constantly monitoring regulatory changes by large-market developed national governments.

Table 7 displays the global ranking of countries from 2007 to 2024, with the last column indicating the change in ranking since 2007. The table lists 12 countries, indicating their relative positions compared to 2007, and whether the change was positive, negative, or unchanged. Four countries China, Japan, Korea, and the Republic of Korea maintained their rankings since 2007. Canada and the EU experienced a decline in their ranks. India and Mexico have improved to 7th and 9th, respectively. The United States and Hong Kong each advanced by one place, securing first and sixth, respectively. With no changes among the three most significant players the EU, the US, and China this confirms that the real economy has remained more predictable.

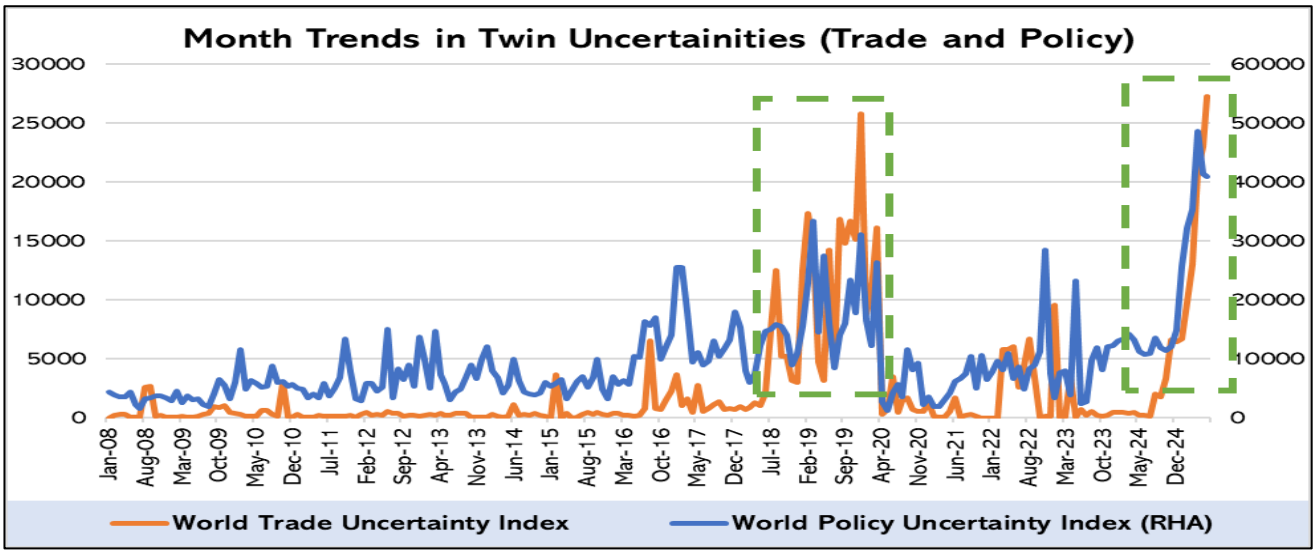
Figure 5: Uncertainty Index of Policy and Trade (2008 to 2025)



Note: Average of monthly values for the period of January 2008 to June 2025.
Source: https://unctad.org/news/uncertainty-new-tariff-costing-global-trade-and-hurting-developing-economies.

The increased uncertainties stem from policy shifts by these and other major players. See figure 5, which shows the growing gaps between the real sector (production, consumption, and cross-border trade) and the policy sector, driven by a series of global regulations. (UNCTAD, 2025)

Figure 6: Trends in the Monthly Uncertainty Index of Policy and Trade (2008 to 2025)



Source: https://unctad.org/news/uncertainty-new-tariff-costing-global-trade-and-hurting-developing-economies.

Figure 6 displays an average score of 362 for the Trade Uncertainty Index (W_TUI), while the World Policy Uncertainty Index (W_PUI) was 5,684. This clearly indicates that policies worldwide were more uncertain than trade, which remained more grounded in reality during 2008-2015; however, the W_PUI/W_TUI ratio reached a high of 16. The W_PUI/W_TUI ratios were three times higher in the latter two phases, 2016 to 2020 and 2021 to 2025. While W_PUI remained nearly stable compared to the 2008-2015 period during these phases, it marginally increased in the last phase of analysis. Conversely, W_TUI increased 13-fold from 362 to 4,658 and 4,661during 2016 to 2020 and 2021 to 2025.

The policy uncertainties indicated (on the right-hand axis in Figure 6) by the blue line have persisted throughout monthly trends from 2008 to 2025. Meanwhile, the W_TUI surpassed the values observed in W_PUI solely in 2018, 2019, the early 2020s, and again in the final period of 2025. Consequently, from 2008 to 2017, the global environment experienced relatively elevated W_PUI levels, predominantly concentrated within a limited number of dominant economies. However, following the COVID-19 pandemic and subsequent modifications in trade relations, uncertainties similarly impacted W_TUI. The evidence shows an increase in uncertainty across both indices. As a result, behaviours previously confined to major markets are now affecting a broader spectrum of global participants.

The primary causes of rapid fluctuations encompass geopolitical shocks, regional conflicts, significant shifts in trade policies enacted by major economies, such as the implementation of new or abrupt tariff measures and uncoordinated unilateral actions, including the Carbon Border Adjustment Mechanism (CBAM). Additionally, increased cross-border digital trade, technological advancements (such as additive manufacturing and artificial intelligence-driven disruptions), and export-control regimes targeting critical sectors have further contributed to these fluctuations. Moreover, fragmentation within global value chains and the ascent of nearshoring have shifted the focus from efficiency to compliance, deviating from the traditional emphasis on efficiency as a primary objective of trade. Collectively, these factors lead to heightened import regulations, thereby imposing additional conditions and restrictions.

Critique of Legacy Trade Modelling

International trade theory evolved from descriptive, policy-driven ideas (mercantilism) to welfare-focused classical/neoclassical models, and then to more comprehensive modern frameworks that explain firm heterogeneity, scale economies, product differentiation, institutions, and global value chains. Models across the trade and economic sectors have played a key role in shaping the international story of trade liberalisation. Since the 1930s, each model, Partial, General, and Dynamic, has influenced not only academic discussions but also trade policy structures and multilateral negotiations. These legacies of economic models from the 1930s to today have significantly influenced the global narrative on trade liberalisation. At the same time, it is argued that these models cover nearly all possibilities at the micro, macro, and cross-country levels.

The legacy of trade and economic models in shaping trade liberalisation involves the use of Partial Equilibrium Models based on Marshallian microeconomics, which analyse individual markets in

isolation. These models provided early insights into how tariffs affect domestic prices and welfare and were widely used in sector-specific trade negotiations and impact assessments. A significant limitation is that they overlook inter-sectoral linkages and macroeconomic feedback loops. The subsequent development was the creation of General Equilibrium Models, originating with Walras and later formalised in computable general equilibrium (CGE) frameworks. The Walras model provides a formal framework for analysing how prices and quantities are determined simultaneously across all markets, ensuring that supply equals demand everywhere. It captures the economy-wide effects of trade liberalisation, including factor mobility and income distribution, and has become essential for WTO accession studies, structural adjustment programs, and regional trade agreements. These models enable the simulation of policy scenarios across multiple sectors and countries. The most advanced models incorporate intertemporal choices, investment behaviour, and technological change. They allow long-term analysis of how trade liberalisation impacts growth, innovation, and capital accumulation, providing insights into reform sequencing and the sustainability of liberalisation. Such models are also used to evaluate the role of trade in endogenous growth and global value chains.

Table 8: SAM vs. I/O: Relationship in a Nutshell

Features	Input–Output Table	Social Accounting Matrix
Core focus	Inter-industry transactions	Full circular flow of income & expenditure
Accounts	Industries, commodities, and final demand	Industries + factors + households + government + Rest of the World
Balance	Supply = Use	RoW = Column for every account
Role	Production structure backbone	Extended framework for distributional & institutional analysis

Source: Author.

During the early period, from the formation of GATT in the 1930s to the 1950s, the most common method of assessing a nation's welfare was based on Input–Output tables supported by Linear Programming. This approach evolved from the 1950s to the 1970s, when more advanced methods were introduced, based on the work of early economists, such as macro-econometric and Partial Equilibrium models, with the latter incorporating Armington's assumptions. The 1970s are characterised by the widespread adoption of Social Accounting Models (SAMs) as a bridge between accounting and trade agreement modelling. From the 1980s to the present, CGE models (both static and dynamic) have dominated trade agreement analysis. These models have provided answers to various macroeconomic and directional questions, leading to the integration of microeconomic theory (Consumer Behaviour, Firms, Market Structures, Factor Markets, Equilibrium and Welfare, Game and Strategic Interactions, Information, and New Frontiers), substitution, and SAM data; however, some of these claims may be overstated. One of the most notable shifts in the global knowledge economy is the transfer of data collection and analysis capabilities from public institutions to private actors. This has significant implications for trade governance, digital sovereignty, and equity.

Based on observed data gaps, information asymmetry, and structural issues in trade modelling outputs, the findings suggest that partial equilibrium models, including tools like the Global Simulation Model (GSIM), are designed to analyse specific markets in isolation. They tend to focus only on import-side effects and changes in consumer surplus from tariff adjustments, as well as their impact on domestic prices. A significant limitation of these PEMs is that exports are not modelled, often assuming fixed export conditions or ignoring cross-market feedback. Consequently, they do not capture producer welfare, which is modelled via supply curves, but broader welfare aspects such as profits, employment, and investment are not fully addressed. It is also argued that they often assume perfect markets and overlook informal sectors, gendered impacts, and ecological constraints. Recent efforts aim to incorporate behavioural economics, institutional dynamics, and heterodox perspectives. (Jeyarajah, S., 2019) Thus, they fail to consider inter-sectoral linkages, exchange rate effects, and macroeconomic adjustments. As a result, these models do not provide a realistic assessment of the broader impact on global trade narratives within the context of policy-driven liberalisation as a pathway to efficiency, growth, and poverty reduction. The second limitation is their limited adoption by institutions such as the IMF, the World Bank, and the WTO, which have integrated these models into their analytical toolkits.

CAG-type models often rely on Ricardian or Heckscher-Ohlin frameworks. They are used to justify liberalisation on efficiency grounds, which prioritise consumer welfare by lowering prices and expanding the variety of goods. As these CAGs are not incorporated into producer dynamics, especially in export sectors, they are viewed as residual outcomes of comparative advantage rather than strategic tools for enhancing competitiveness. They may also underestimate structural constraints, such as supply chain bottlenecks, regulatory burdens, or geopolitical risks.

These issues related to trade policies, such as design concordances and strategic dashboards, are vital. These models overlook export potential or producer incentives. They risk misjudging the effects of trade agreements, undervaluing strategic sectors (e.g., electronics and engineering), and failing to account for the welfare of rural producers involved in GI-linked exports. While the Computable General Equilibrium (CGE) models are more comprehensive, they simulate the entire economy using a Social Accounting Matrix (SAM); in India's case, the 2005 I-O table was used.[6] They incorporate exports and producer behaviour, examine economy-wide linkages across sectors, and address producer and consumer welfare through utility and profit functions. The export-import flows are modelled using Armington assumptions (differentiated goods by origin). **Elasticity assumptions** can distort results (e.g., by leading to implausible substitution between domestic and foreign goods). Producer welfare is often under-theorised, especially in strategic sectors.

[6] A detailed report entitled "Input-Output Transactions Table, 1973-74" was published by the CSO in September 1981. Thereafter, the Reports on IOTT for the reference years 1978-79, 1983-84, 1989-90, 1993-94 and 1998-99 were published in June 1989, September 1990, November 1997, July 2000 and March 2005, respectively. The latest published IOTT was for 2007-08, published by the Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India, in 2012 (https://new.mospi.gov.in/sites/default/files/reports_and_publication/cso_national_accounts/input_output_transactions_table/2007_08/Binder1.pdf).

Additionally, there is an overemphasis on consumer gains from liberalisation, sometimes ignoring structural constraints such as underemployment or informal economies.

Claims made by most CGE and Dynamic Trade models may be misplaced, as we found in earlier sections that many critical aspects of the market access variables, such as tariffs and non-tariff measures, were not captured, and across a large segment, there are growing vulnerabilities. The digital trade, non-ad valorem tariffs, and the non-availability of trade links for non-tariff measures have introduced additional potential for missing trade value and volume in cross-border trade.

Future with AI – Carrying Forward All the Asymmetries

One of the advancements of the digital era is the widespread use of Artificial Intelligence across a range of fields, including international trade and governance architecture. However, existing assessments (Legacy Economic Models) are increasingly focused on market access and other aspects, with blind spots in trade flows, compliance, logistics, and market access that could hinder equitable and efficient global commerce. AI cannot "predict" trade governance in the sense of foretelling WTO rulings or political bargains; it would limit its use to modelling scenarios (again to a limited extent), anticipating regulatory shifts, and highlighting governance risks by building on existing data gaps.

These gaps manifest in potential trade flows of developing countries, under the assumption of liberalised trade, when in reality trade was only partially liberalised. Therefore, assuming that AI-powered customs analytics can detect anomalies, underreporting, and misclassification in import/export data. Tall claims are made about the regulatory intelligence, such as the ability of AI to parse complex trade agreements, harmonise tariff schedules, and flag non-tariff barriers across jurisdictions. Moreover, the NLP (Natural Language Processing) tools can translate and standardise regulatory texts, making compliance easier for SMEs and developing countries. However, evidence from existing databases that provide transaction-level data on exports and imports does not provide sufficient confidence to support the claim that AI can address regulatory harmonisation. **Table 9: Emerging AI Architectures for Trade Intelligence**

S.N.	AI Type	Role in Trade Data Gap	Example
1	Large Language Models (LLMs)	Interpret trade laws, agreements, and customs codes	WTO annexe parsing
2	Graph Neural Networks	Map complex trade relationships and dependencies	Supply chain risk modelling
3	Federated Learning	Train models across borders without sharing sensitive data	Cross-country customs optimisation
4	Reinforcement Learning	Optimise trade routes and logistics under dynamic conditions	Port congestion management

Source: Author based on various assessments.

There are eleven types of possible errors, like incomplete or inconsistent tokenisation, poor handling of non-standard words and orthography, incorrect or lossy case folding and accent removal, over-aggressive stemming/lemmatisation, inadequate language and script detection, lossy removal of punctuation, symbols and special tokens, wrong or inconsistent normalisation of numbers, dates and units, poor handling of named entities and rare/OOV tokens, inconsistent

whitespace, encoding and control characters, data leakage and label-leakage during cleaning, and overfitting normalisation to a single domain or time period.

The claims related to market access & demand forecasting can utilise predictive models to simulate demand shifts based on climate, policy, or geopolitical changes. It is said that AI can identify underserved markets by analysing fragmented consumption data and trade restrictions. See Table 9, which provides a detailed assessment of four different approaches to AIs and their applications, along with probable examples.

The challenges ahead in the usage of AI include data sovereignty, specifically, who owns trade data in cross-border AI models. We have seen that most of this data is flowing to support the private sector, and that the bias and exclusion that can enter models trained on skewed data may reinforce inequalities. Hence, a significant portion of global governance standards for AI in trade remains in development.

Conclusion

This paper highlights four factors that contributed to the global economic situation, which is a legacy of trade negotiations. These factors include the shift from “single-undertaking” to “low-hanging-issues” in multilateral talks. The negotiations were conducted under the framework of the “single-undertaking” principle, which led members to concede to specific, non-negotiable concerns as well. This eased the intense pressures of committee-level negotiations and the understandings that accompanied them.

The fundamental transformations are among the legacy issues that have gained momentum over the past three decades of multilateral trade negotiations. This has led to an increase in data gaps, primarily as a direct result of non-compliance with the transparency obligations of the legal agreement and ministerial rounds. The second issue arises from the simultaneous pace of negotiations on the primary drivers of cross-border trade: agriculture, manufacturing (NAMA), and services. Additionally, there was initial stress on the single-undertaking principle until 2013 (Bali Ministerial), when, for the first time, a deviation from this principle was observed as WTO members agreed on straightforward deals like the Trade Facilitation Agreement (TFA), a decision on Public Stockholding for Food Security, and issues related to Development and LDCs (such as the simplification of preferential rules). Developed partners often provided nuanced legal or economic justifications for not fully adhering to transparency obligations.

The second major systemic challenge is the data-related issues between the goods and services sectors, which may require an overhaul of the global trade agreement. While detailed information on quantities and values involved in cross-border trade between countries is available under the 'free on board' (FOB) or 'cost, insurance, and freight' (CIF) headings for merchandise goods, the same is not true for the services sector. The impact of such an imbalance has escalated as some erstwhile physical trade products have been digitised, and trade flows have extended beyond the four modes of the UNMTS. (Kallummal, 2021)

> *1.34 Goods in electronic commerce. The term “goods in electronic commerce” refers to goods that physically move across country borders as the result of transactions executed entirely, or to a significant*

> *extent, by electronic means (e.g., goods ordered and paid for via the Internet). Such goods are in the scope of IMTS 2010 for both exports and imports. It is recognized that data collection under this item may be challenging (for example, when goods are shipped through parcel or letter post or courier service; see para. 1.25 above for details and recommendations); however, countries are encouraged to develop over time the necessary data-collection and/or estimation procedures.* (United Nations, 2011)

The third issue, leading to non-transparency, is the digital divide, which is exacerbated by the increased role of the private sector in trade aspects, such as cross-border trade and diplomacy, as well as the creation of databases not usable by small companies and countries.

These developments help explain why the United States and the European Union have shown diminished confidence in multilateral trade agreements, as these arrangements shift from a state-led approach to one dominated by private firms. Furthermore, the influence of the Anglo-Saxon financial model introduced during the 1980scharacterised by deregulation, liberalised finance, flexible labour markets, and shareholder primacy has played a pivotal role in this evolution. This model preceded other economic systems and forms of capitalism that tend to be more state-centric, coordinated, and socially embedded. Such market-led systems have precipitated changes, including the reformation of data collection methods related to cross-border trade flows. Additionally, there is an increasing lack of transparency in market access solutions that favour dominant market players. Ultimately, while the movement of tangible goods across borders remains trackable, trade in services was largely neglected, resulting in the integration of digital trade into conventional economic models. Many of these developments have undermined GATT/WTO frameworks and market access solutions, which are increasingly tailored to established actors, thereby disadvantaging newcomers. Trade is transitioning from customs-based tracking of goods to fragmented and opaque digital transaction data. Those above are profound historical transformations that require detailed examination.

References

BCG. (N.D.). Services Are the New Fault Lines in Global Trade. Retrieved from https://www.bcg.com/publications/2025/services-are-the-new-fault-lines-in-global-trade

Brühl, Volker;. (2023). Big Tech, the Platform Economy and the European Digital Markets. *Intereconomics, 58*(5), 274–282.

CCI. (2025, October 12). Retrieved from https://www.cci.gov.in/economics-research/market-studies

Christie, B. (N.D.). *Customized Resource Center for Regulatory Intelligence*. Retrieved from https://bryantchristie.com/regulatory-databases

Diakantoni, A; Escaith, H;. (2014). Trade in Tasks, Tariff Policy and Effective Protection Rates. Retrieved from World Trade Organization: https://www.wto.org/english/res_e/statis_e/wtp2015_special_topic_e.pdf

Hoekman, Bernard M. ; Mavroidis, Petros C.;. (2007). *World Trade Organization (WTO): Law, Economics, and Politics (Global Institutions)*. London, New York: Routledge, Taylor & Francis.

IBEF. (N.D.). *India's Export Ambitions:Trade Strategy to Achieve US$ 2 Trillion by 2030*. Retrieved from https://ibef.org/download/1723547507_indias_export_ambitions.pdf

IMF;. (1995). *Balance of Payment Complilation Guide*. International Monetary Fund. Washington: International Monetary Fund, Publications Services. Retrieved from https://www.imf.org/external/np/sta/bop/bopcg.pdf

ISO. (N.D.). *Conformity assessment bodies – Accreditation*. Retrieved from https://casco.iso.org/files/live/sites/cascoregulators/files/PDF/Annex%203%20-%20Conformity%20assessment%20techniques%20-%20Accreditation.pdf

Jeyakumar, M., & Senthilkumar, U. (2025, July - December). CHALLENGES FACED BY INDIAN EXPORTERS IN COMPLYING WITH INTERNATIONAL TRADE REGULATIONS. *International Journal of Multidisciplinary Research and Modern Educatio, 11*(2), 36-40. Retrieved from https://ijmrme.crystalpen.in/uploads/687a8a1a5b9ba_842.pdf

Jeyarajah, S. (2019, Nov - Dec). A Survey of the Evolution of International Trade Theories. *Journal of Economics and Finance, 10*(6), 66-70. Retrieved from https://www.iosrjournals.org/

Kallummal M. (2020, February 27). Global Digital Trade and Implications for Trade Negotiation: Deciphering the Data Flows and Implications on Revenues Losses. *INTERNATIONAL TRADE eJOURNAL, 12*(32). Retrieved from https://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalbrowse&journal_id=1504387

Kallummal, Murali. (2020a, October 12). Urgent Need for Market Access Disciplining of Agriculture Trade: Profiling of Stringent and Non-Codex SPS based MRL Standards. *POLITICAL ECONOMY - DEVELOPMENT: DOMESTIC DEVELOPMENT, 8*(161).

Kallummal, M,; Gurung,H. M. (2020). *Urgent Need for Market Access Disciplining of Agricultural Trade:Profiling of Stringent and Non-Codex Based MRL Standards*. Indian Institute of Foreign Trade (IIFT), Centre for WTO Studies (CWS). Centre for Research on International Trade (CRIT). Retrieved 2025, from https://wtocentre.iift.ac.in/workingpaper/MRL%20standards.pdf

Kallummal, M. (2012, July). SPS measures and possible market access implications for agricultural trade in the Doha Round: An analysis of systemic issues. *ARTNeT Working Paper Series, 116*. (UNESCAP, Ed.) Bangkok. Retrieved 2025, from https://www.unescap.org/sites/default/files/AWP%20No.%20116.pdf

Kallummal, M. (2013). *Imbalance in Doha Round Market Access Outcomes in Trade in Agricultural and Allied Sectors: Evidences from Select Developed and Developing Coutrries*. Indian Institute of Foreign Trade (IIFT), Centre for WTO Studies (CWS). New Delhi: Centre for Research on International Trade (CRIT). Retrieved September 10, 2025, from https://wtocentre.iift.ac.in/workingpaper/CWS-WP%20Agricultural%20Tariff%20Simplification%20and%20AoA.pdf

Kallummal, M. (2015). North–South Imbalances in the Doha Round: The Use of Specific Duties as a Trade Policy Instrument. *Agrarian South: Journal of Political Economy*, 85–124. doi:https://doi.org/10.1177/2277976015574052

Kallummal, M. (2020). Catching-up in the Digital Economy: Identifying India's Policy Gaps and Challenges. New Delhi: Institute for Studies in Industrial Development (ISID) jointly by ISID and Shiv Nadar University. Retrieved from https://isid.org.in/wp-content/uploads/2020/03/ISID_Digital_Economy_Workshop_Report.pdf

Kallummal, M. (2021, September 23). Digital Trade Possibilities in South Asia's Manufacturing Sector: Data Challenges and Methodological concerns. *DEVELOPMENT ECONOMICS: REGIONAL & COUNTRY STUDIES eJOURNAL, 10*(153).

Kallummal, M. (2021). Trade Negotiations Strategy for India: Capacity building in addressing the NTMs. (ResearchGate, Compiler) Retrieved from https://www.researchgate.net/publication/348690403_Trade_Negotiations_Strategy_for_India_Capacity_building_in_addressing_the_NTMs

Kallummal, M. (2022). Changing the Scale of Detection and the NTMs (SPS and TBT Measures):Applicational differences in MRLs by Canada, the EC, Japan and the USA. *ResearchGate*. (ResearchGate, Compiler) Retrieved from https://www.researchgate.net/publication/362265373_Changing_the_Scale_of_Detection_and_the_NTMs_SPS_and_TBT_MeasuresApplicational_differences_in_MRLs_by_Canada_the_EC_Japan_and_the_USA

Kallummal, M.; Khosla, S. (2022). *Legislated Endowments and Size Matter for MSMEs: An Enquiry of the Heterogeneity of National Definitions*. CRIT/CWS Working Paper Series. Retrieved September 2025, from https://wtocentre.iift.ac.in/workingpaper/WP-67-13-9-22.pdf

Kallummal, Murali. (2015, April). North-South Imbalance in the Doha Round: The Use of Specific Duties as a Trade Policy Instrument. *Agrarian South: Journal of Political Economy, 4*(1), 85 - 124.

Kallummal, Murali. (2020). Global Digital Trade: Emerging Challenges from the Transformation of Trade Flows Moratorium on E-commerce. *Catching-up in the Digital Economy: Identifying India's Policy Gaps and Challenges*. New Delhi: ndustrial Studies in Industrial Development (ISID) and South Asian University (SAU). Retrieved from https://www.researchgate.net/publication/338886804_Global_Digital_Trade_Emerging_Challenges_from_the_Transformation_of_Trade_Flows_Moratorium_on_E-commerce

Kallummal, Murali; Khosla, Simran; Singh, Keerti. (2022, June 2). Multilateral Negotiations on MSMEs and the Challenges for the Survival of Labour-Intensive Firms: A Case of China, EU, India and the US. *DEVELOPMENT ECONOMICS: MACROECONOMIC ISSUES IN DEVELOPING, 11*(64). Retrieved from hq.ssrn.com/journals/

Kallummal, Murali; Shetty, Malvika; Gurung, Hari Maya. (2022). India's Initiatives in Addressing Food Satety: The Concerns with Maximum Residue Levels. In J. J. Nedumpara, S. Shekhar, & A. Venkataraman, *Handbook on Product Standards and International Trade: Navigating the Regulation Landscape in India* (Vol. 35, pp. 273 - 305). Wolters Kluwer. doi:ISBN 978-94-035-3415-2

Mavroidis, Petros. (2008). *Trade in Goods: The GATT and the Other Agreements Regulating Trade in Goods*. Oxford University Press. Retrieved from https://doi.org/10.1093/acprof:oso/9780199552139.001.0001

Mendez-Parra, M., Agarwal, P., Luke, D., Vutula, N., Magooa, A., El-Aidi, I., . . . Chapman, F. (2025). *Impact of Geopolitical Dynamics on Global Trade*. ODI, LSE, and University of Cape Town. Retrieved from https://media.odi.org/documents/ODI_-_Impact_of_geopolitical_dynamics_on_global_trade_on_the_African_automotiv_WXrE8CO.pdf

Mueller, Dennis C. (2006, July). The Anglo-Saxon Approach to Corporate Governance and its Applicability to Emerging Markets. Retrieved from https://www.researchgate.net/publication/4745912_The_Anglo-Saxon_Approach_to_Corporate_Governance_and_its_Applicability_to_Emerging_Markets

Murali K. (1999). Disintermediation and Private Corporate Financing: An Analysis of the New Issues (Primary) Market in India. *Ph.D Thesis*.

Service, Foreign Agriculture. (N.D.). *Maximum Residue Limits (MRL) Database*. Retrieved from United States Foreign Agriculture Services: https://www.fas.usda.gov/maximum-residue-limits-mrl-database

UNCTAD. (2025, September 01). Uncertainty is the new tariff, costing global trade and hurting developing economies. Retrieved from https://unctad.org/news/uncertainty-new-tariff-costing-global-trade-and-hurting-developing-economies

UNIDO. (2017). *Setting up Accredition Bodies in Developing Countries*. UNIDO, ILAC and IAF. Retrieved 2025, from https://www.unido.org/sites/default/files/2017-07/Accreditation_Bodies_final_0.pdf

United Nations. (2011). *International Merchandise Trade Statistics Concepts and Definitions 2010*. Statistical Papers , United Nations, Department of Economic and Social Affairs, Ney York. Retrieved 2025, from https://unstats.un.org/unsd/trade/eg-imts/IMTS%202010%20(English).pdf

Verma, R., Kallummal, M., & Varma, P. (2013, Septermber 12). Doha Round Sectoral Negotiations: A Study on Health-care Sector in India. *Foreign Trade Review, 48*(3). doi:https://doi.org/10.1177/0015732513496

WEF. (2024). *Strengthening the Gender Dimension in the Trade Policy Review Mechanism*. Global Future Council on the Future of Trade and Investment. Geneva: World Economic Forum. Retrieved from https://www3.weforum.org/docs/WEF_Strengthening_the_Gender_Dimension_in_the_Trade_Policy_Review_Mechanism_2024.pdf

WTO. (2007). *DRAFT GUIDELINES FOR THE CONVERSION OF NON-AD VALOREM DUTIES OF NON AGRICULTURAL PRODUCTS IN AD VALOREM EQUIVALENT*. Retrieved from World Trade Organisation: https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=Q:/TN/MA/20.pdf&Open=True

WTO. (n.d.). *Informal Working Group on Micro, Small and Medium-sized Enterprises (MSMEs)*. Retrieved from World Trade Organisation: https://www.wto.org/english/tratop_e/msmes_e/msmes_e.htm

WTO. (N.D.). *I-TIP Services*. Retrieved from https://itip-services-worldbank.wto.org/default.aspx

WTO. (n.d.). *The Enhanced integrated Framework*. Retrieved from World Trade Organisation: https://www.wto.org/english/tratop_e/devel_e/a4t_e/enhance_if_e.htm

WTO. (N.D.). The WTO and the International Trade Centre (ITC). *WORK WITH OTHER INTERNATIONAL ORGANIZATIONS*. World Trade Organization. Retrieved 2025, from https://www.wto.org/english/thewto_e/coher_e/wto_itc_e.htm

WTO. (n.d.). *Trade Topics: Small business and trade*. Retrieved from World Trade Organisation: https://www.wto.org/english/tratop_e/msmesandtra_e/msmesandtra_e.htm

Wu, Chia-Hsuan. (2025). Analyzing the Causes and Trends of China's Overcapacity. The First Research Division. Chung-Hua Institution for Economic Research. CIER https://www.cier.edu.tw/en/publish/cier-economic-outlook-no-218/.

Annexe Table 1: Comparative Matrix of AVE Methodologies

S.N.	Institution / Approach	Methodology	Strengths	Weaknesses / Biases	Illustrative Effect
1	**WTO Secretariat (Doha NAMA negotiations)**	Uses **unit values of imports** (CIF values) to convert NAVs into AVEs. Formula: AVE = (NAV duty ÷ Import unit value) × 100.	Transparent, based on actual trade data, allows comparability across members.	Highly sensitive to the **choice of reference year** and **import composition**; Low-value imports inflate AVEs dramatically.	A $100 specific duty on low-value imports ($200/ton) = 50% AVE; on high-value imports ($1,000/ton) = 10% AVE.
2	**UNCTAD / World Bank (TRAINS, WITS)**	Uses **multi-year averages of import unit values**; Sometimes applies **world reference prices** to smooth volatility.	Reduces distortions from year-to-year fluctuations, making it more stable.	May not reflect **country-specific realities**; Protection can be understated if reference prices exceed actual import prices.	Same $100 duty: if world reference price = $500/ton AVE = 20% (vs. 50% under the WTO method).
3	**OECD Approach**	Uses **tariff-line level concordances** with HS codes and applies **econometric models** to estimate price effects.	More sophisticated, as it accounts for substitution effects and product heterogeneity.	Complex, **less transparent; requires strong statistical capacity**; Results vary by model specification.	The same $100 duty may yield an AVE between 15 and 25% depending on the elasticity assumptions.
4	**Academic / Independent Studies**	Hybrid methods: combine **survey data, customs values, and econometric estimates.** Creating more **complexities and tracing linkages** is more difficult.	Flexible, can be tailored to sectoral studies (e.g., agriculture, steel).	Lack of standardisation means that results are **not always accepted in WTO negotiations**.	Can show AVEs much higher for sensitive products (e.g., dairy, sugar) than official WTO figures.

Note: An imposition of NAV discouragement by a country would discourage exporters from venturing into products that are imposed with a NAV duty. These duties are highly non-transparent in the application of technical specifications, which impose obligations on the % of identified substances, such as salt, sweetness, fat, or alcohol content. In countries like India, where agricultural products are sourced from multiple smallholdings, their technical specifications can vary.
Source: Author.

Annexe Table 2: Ad Valorem Equilivants (2023)

S.N.	MTN Product Group	Canada	China	European Union	India	Japan	Korea, Rep.	Switzerland	United States	Max AVEs
1	Beverages and tobacco	256.0	65.0	118.4	150.0	54.5	270.0	674.3	350.0	674.3
2	Cereals and cereal preparations	274.5	65.0	50.7	150.0	715.1	800.3	296.9	49.0	800.3
3	Chemicals	15.5	341.0	12.8	30.0	6.5	30.0	907.8	11.6	907.8
4	Clothing	18.0	12.0	12.0	37.2	13.4	13.0	108.3	32.0	108.3
5	Coffee, tea, cocoa and spices	265.0	30.0	27.3	100.0	193.7	513.6	238.3	23.5	513.6
6	Cotton, silk and wool	0.0	40.0	0.0	30.0	111.9	51.7	0.0	14.2	111.9
7	Dairy products	313.5	20.0	188.5	60.0	669.6	176.0	1220.8	110.8	1220.8
8	Electrical machinery and electronic equipment	9.0	20.0	14.0	40.0	4.8	13.0	23.5	30.0	40.0
9	Fish and fish products	11.0	15.0	26.0	30.0	15.0	30.0	44.3	35.0	44.3
10	Fruits and vegetables	17.0	30.0	124.6	105.0	546.4	887.4	1112.0	131.8	1112.0
11	Live animals and meat	253.0	25.0	339.8	100.0	424.2	89.1	2211.3	40.0	2211.3
12	Mechanical, office and computing machinery	9.0	25.0	8.0	20.0	0.0	13.0	58.2	9.9	58.2
13	Minerals and metals	15.5	21.0	12.0	40.0	10.0	8.0	145.6	38.0	145.6
14	Oilseeds, fats and oils	482.6	30.0	58.3	100.0	335.6	630.0	159.0	163.8	630.0
15	Other agricultural products	270.0	30.0	250.1	60.0	498.7	754.3	676.6	77.2	754.3
16	Other manufactures	18.0	20.0	42.0	60.0	16.0	13.0	39.1	288.3	288.3
17	Petroleum	5.0	9.0	4.7	10.0	7.9	8.0	0.0	46.9	46.9
18	Rubber, leather and footwear	20.0	25.0	17.0	70.0	415.2	16.0	62.0	48.0	415.2
19	Sugars and sugar confectionery	12.5	50.0	91.5	100.0	127.8	243.0	243.1	61.6	243.1
20	Textiles	18.0	38.0	12.0	40.6	16.0	13.0	152.4	25.0	152.4
21	Transport equipment	25.0	45.0	22.0	125.0	0.0	10.0	14.7	25.0	125.0
22	Wood, paper, furniture	11.0	12.0	10.0	25.0	10.0	8.0	32.8	18.0	32.8
Maximum AVEs		**482.6**	**341.0**	**339.8**	**150.0**	**715.1**	**887.4**	**2211.3**	**350.0**	**2211.3**

Source: WITS.

Author

Dr Murali Kallummal is Head of Administration at CRIT and a Professor at the Centre for WTO Studies. He has been associated with the Centre since 2003. He specialises in market access issues both under the WTO and Regional Trade Agreements and has extensively worked on tariffs and non-tariff measures (NTMs). He has published papers in peer-reviewed journals and has been a reviewer for several international and Indian journals. He has also been consulted by several bodies/international organisations for conducting training programmes.

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His pioneering work has been conceiving and executing India's first web-based portal on SPS and TBT measures. The database provides trade links for all WTO-notified SPS and TBT measures since 1995.

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India's Foreign Trade Policy (FTP) Statement 2015-20 suggested the need to create a global institution that can provide a counter-narrative on key trade and investment issues from the perspective of developing countries, such as India. To fill this vacuum, a new institute, the Centre for Research on International Trade (CRIT), was established in 2016. The vision and objective of the CRIT were to significantly deepen existing research capabilities and broaden them to encompass new and specialised areas amid the growing complexity of globalisation and its spillover effects in domestic policymaking. Secondly, enhancing the capacity of government officers and other stakeholders in India and other developing countries to deepen their understanding of trade and investment agreements.

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