

Navigating the Green Tape: How Emerging SDG Regulations are Reshaping Supply Chain Compliance

Dr.S. Sujatha, Associate Professor, Faculty of Management, SRM Institute of Science and Technology, Tamil Nadu, India.

sujathas@srmist.edu.in

A Trade Perspective on Policy, Practice, and the Road Ahead

Whereas lean manufacturing has transformed the global supply chain to a certain degree, it is one of the most complete changes to the supply chain in recent years. This time, however, it is not happening due to geopolitical shocks or logistics failures caused by the pandemic — it's happening because of regulation. In virtually all parts of the European Union, the United States, China, India, and more, governments are incorporating Sustainable Development Goal (SDG) requirements into the compliance ecosystem in which multinational corporations operate on a day-to-day basis [6]. Out of this comes a growing wall of "green tape" that procurement, legal and C-suites are just starting to comprehend.

The Regulatory Surge: From Voluntary to Mandatory

In the past 20 years, corporate sustainability has been associated with the annual ESG report submitted to the GRI framework, the carbon-offset commitment at Davos, and the

supplier code of conduct included in a procurement manual voluntary reporting was the name of the game as shown in figure 1. These days are coming rapidly to a close. In January 2024, a new EU Corporate Sustainability Reporting Directive (CSRD) took effect, requiring companies to provide comprehensive sustainability disclosures following the European Sustainability Reporting Standards (ESRS), with around 50,000 companies, including non-EU companies listed on EU-regulated markets, impacted [1]. These disclosures cover climate change, biodiversity, human rights and supply chain due diligence what Brussels calls "double materiality", meaning that companies must not only report on how climate, biodiversity, human rights and supply chain risks affect the company financially, but also how the company impacts society and the environment. Importantly, the CSRD also supports the Corporate Sustainability Due Diligence Directive (CSDDD), which will expand the legal liability for human rights and environmental harms too deep into global value chains. Germany went ahead with the EU curve by introducing the Lieferkettensorgfaltspflichten gesetz (LkSG) in 2023 for companies with over 3,000

employees and in 2024 for companies with over 1,000 employees. All those affected by the LkSG such as Volkswagen, BASF and Siemens have stated that they have invested tens of millions of euros in new supplier monitoring infrastructure [2].

The U.S. Securities and Exchange Commission (SEC) launched its climate-disclosure rule in March 2024, after years of debate, that will mandate material climate-related risks be reported by public companies and for large accelerated companies, include Scope 1 and 2 GHG emissions [5]. California took a step further, with SB 253 and SB 261 mandating that all businesses with revenue exceeding \$1 billion that conduct business in the state report emissions that are Scope 1, 2 and 3 emissions starting in 2026. California's economy is the fifth largest in the world, and so for many multinationals, these rules are in effect worldwide. The China Securities Regulatory Commission (CSRC) has also announced that ESG disclosures will be mandatory for companies with shares traded on the Shanghai, Shenzhen and Beijing exchanges from 2024, and SEBI Business Responsibility and Sustainability Report

(BRSR) has also rolled out mandatory supply-chain disclosure requirements for the top 250 listed companies in India from 2024. Similar to the B3 exchange, the JSE has also implemented a "comply or explain" disclosure regime [4].

Data compiled from GRI State of Progress Report (2023), KPMG Survey of Sustainability Reporting (2023), and corporate disclosure databases.

Figure 2 shows the speed of uptake of disclosure requirements by region. 81% of large companies in the EU are now required to make mandatory disclosures regarding their supply chains for sustainability, compared to 61% in 2021, representing a 33% increase in only two years. The increase from 35% to 52% for China is related to CSRC mandate and India's is due to BRSR expansion from 22% to 38%. Even markets where the regulations are lighter such as Brazil and South Africa have shifted. The data mirror the worldwide trend: Voluntary compliance no longer a competitive differentiator but rather a soon-to-become legally mandated standard.

Architecture of SDG-Driven Supply Chain Compliance Framework

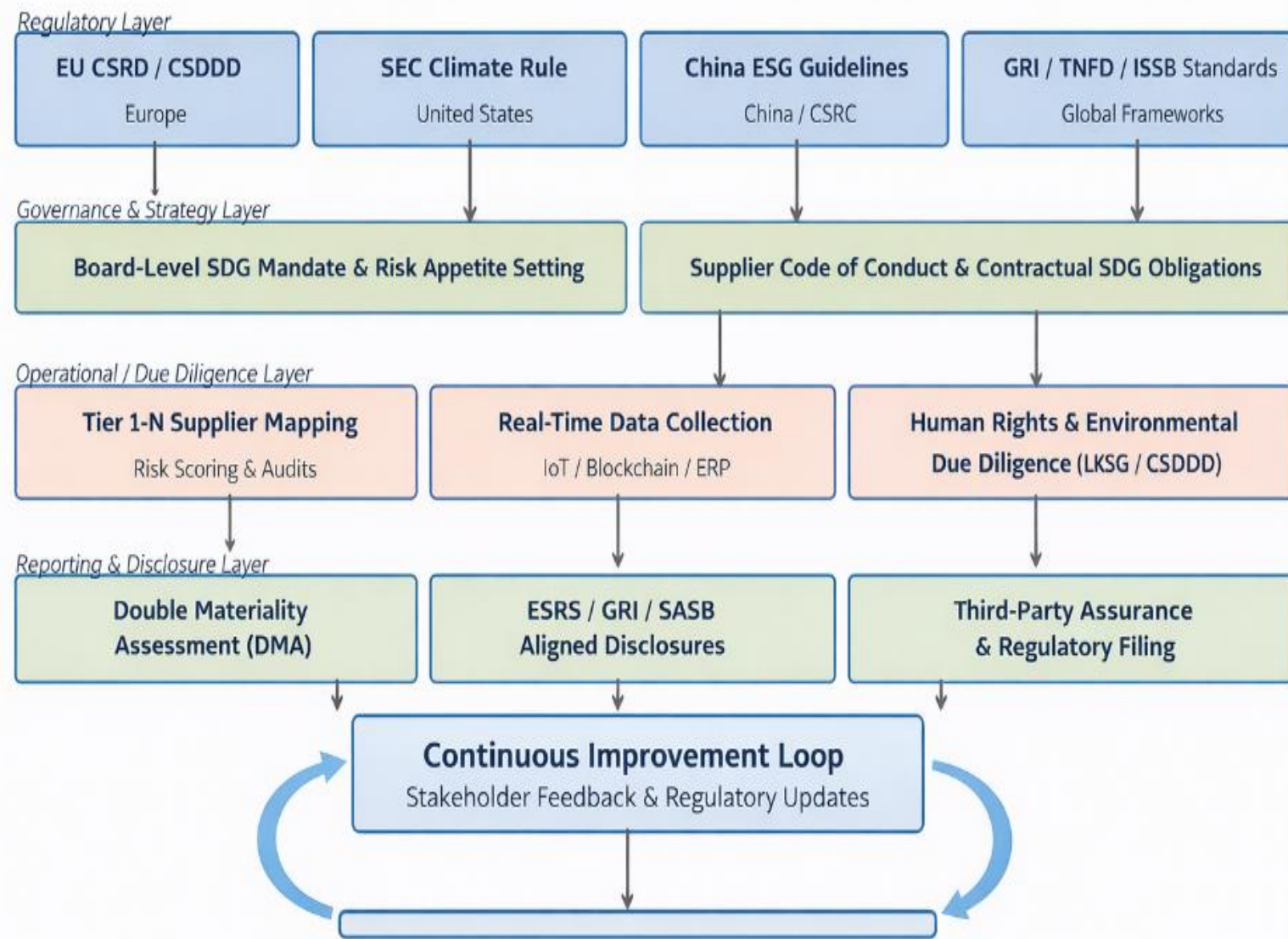


Figure 1: Architecture of an SDG-driven supply chain compliance framework

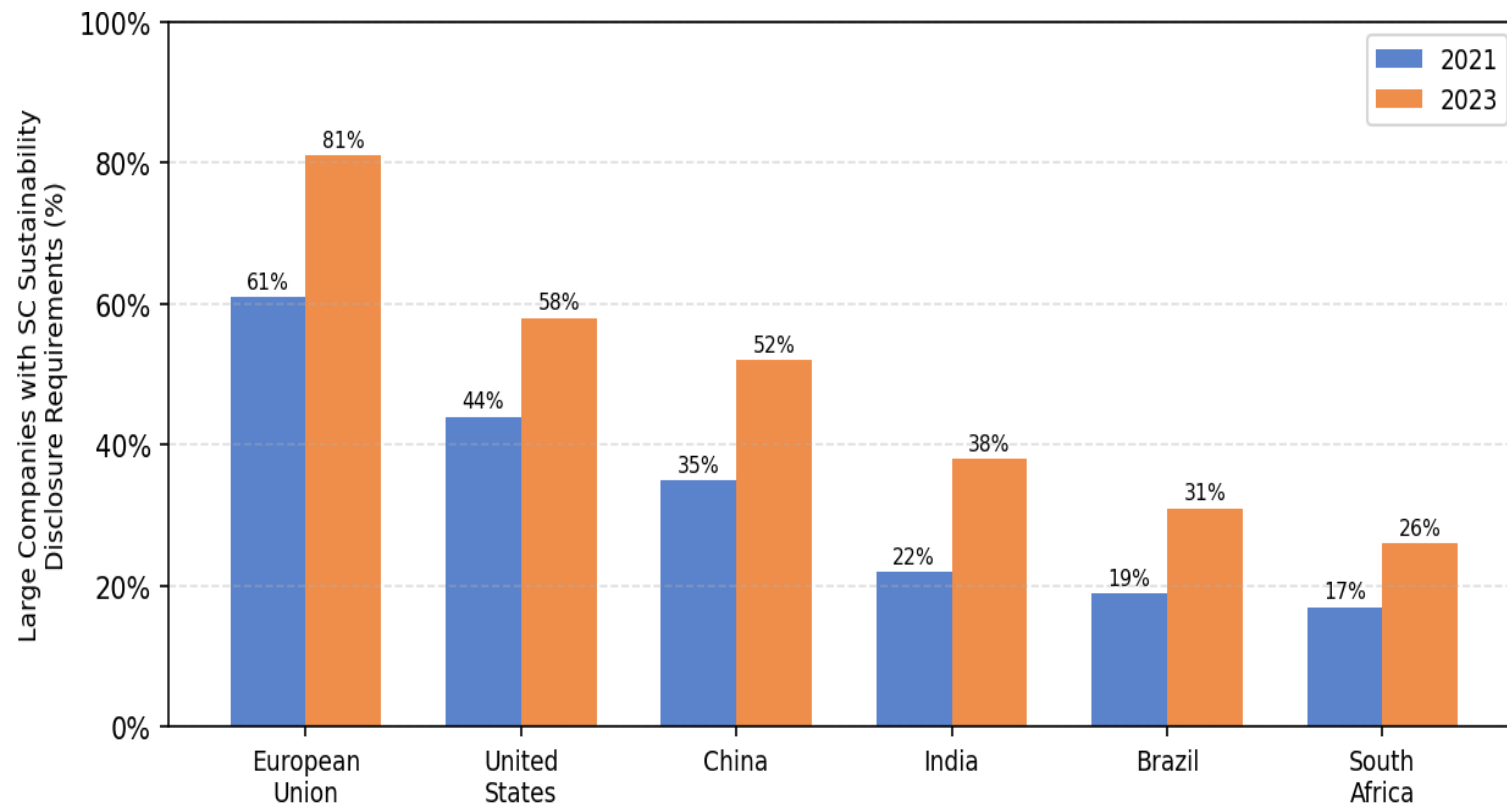


Figure 2: SDG-aligned supply chain disclosure rates by region, 2021 vs. 2023

Mapping Compliance onto the Supply Chain: A Four-Layer Architecture

A Four-Layer Architecture for Mapping Compliance onto the Supply Chain A compliance architecture is required to make sense of the regulatory patchwork. The obligations are grouped in the following framework, which consists of four layers, all of which are interdependent.

Regulatory Layer. The legal requirements stand at the very pinnacle and include the EU's CSRD and CSDDD, the SEC climate rule, China's CSRC guidelines, India's BRSR and the global standard setters (GRI, TNFD – Taskforce on Nature-related Financial Disclosures, ISSB – International Sustainability Standards Board). The range of each jurisdiction varies, as do the timeframes and enforcement rules, and hence the obligations on firms whose operations span jurisdictions are complex.

Governance & Strategy Layer. Board-level governance is only made possible by regulatory requirements when they are embedded in a company's strategic planning process through SDG risk appetite. Some of the global leading companies such as Unilever, Maersk and Samsung have set up dedicated board committees to monitor sustainability, incorporated SDG KPIs in executive compensation schemes, and included contractual obligations regarding SDGs in supplier agreements [3]. This governance architecture is essential if compliance is not a risk-management process, but a checklist.

Operational / Due Diligence Layer. This is not just compliance, but commerce. For companies bound by the LkSG or CSDDD, supplier mapping from Tier 1 to Tier N is now a practical necessity, from blockchain-based tracking of a product's provenance, to the use of AI to help score the risks. By integrating ERP systems and using IoT data sensors in production facilities, a new class of "living" supply chain risk dashboards is possible. For example, IKEA has implemented supplier auditing technology in over 1,800 supplier locations in 50 countries, or BMW expects battery suppliers to supply carbon footprint data at the cell level, ahead of EU battery regulation requirements.

Reporting & Disclosure Layer. On the output side of the architecture are disclosure, which in turn includes the Double Materiality Assessment according to ESRS, the sustainability report (ESG reporting according to GRI or SASB) and the third-party assurance engagement. The frontier of third-party assurance is a new one: The CSRD guidelines provide for limited assurance for the first few years of reporting, followed by reasonable assurance, gradually introducing the rigor of a financial audit to sustainability data [1].

The Business Case: Compliance Costs vs. Non-Compliance Penalties

In addition to avoiding penalties, there is a business case for SDG compliance, such as access to capital, customer retention and talent attraction. The three asset management firms that hold more than \$20 trillion in assets between them have all indicated that they will consider SDG alignment in their proxy voting and capital allocation processes. The EU Taxonomy Regulation also includes a connection between sustainable finance labels and sustainable finance disclosures, which could exclude companies from the green bond market or EU-labelling sustainable investment funds if they cannot prove compliance with the requirements of the taxonomy for their supply chain [3].

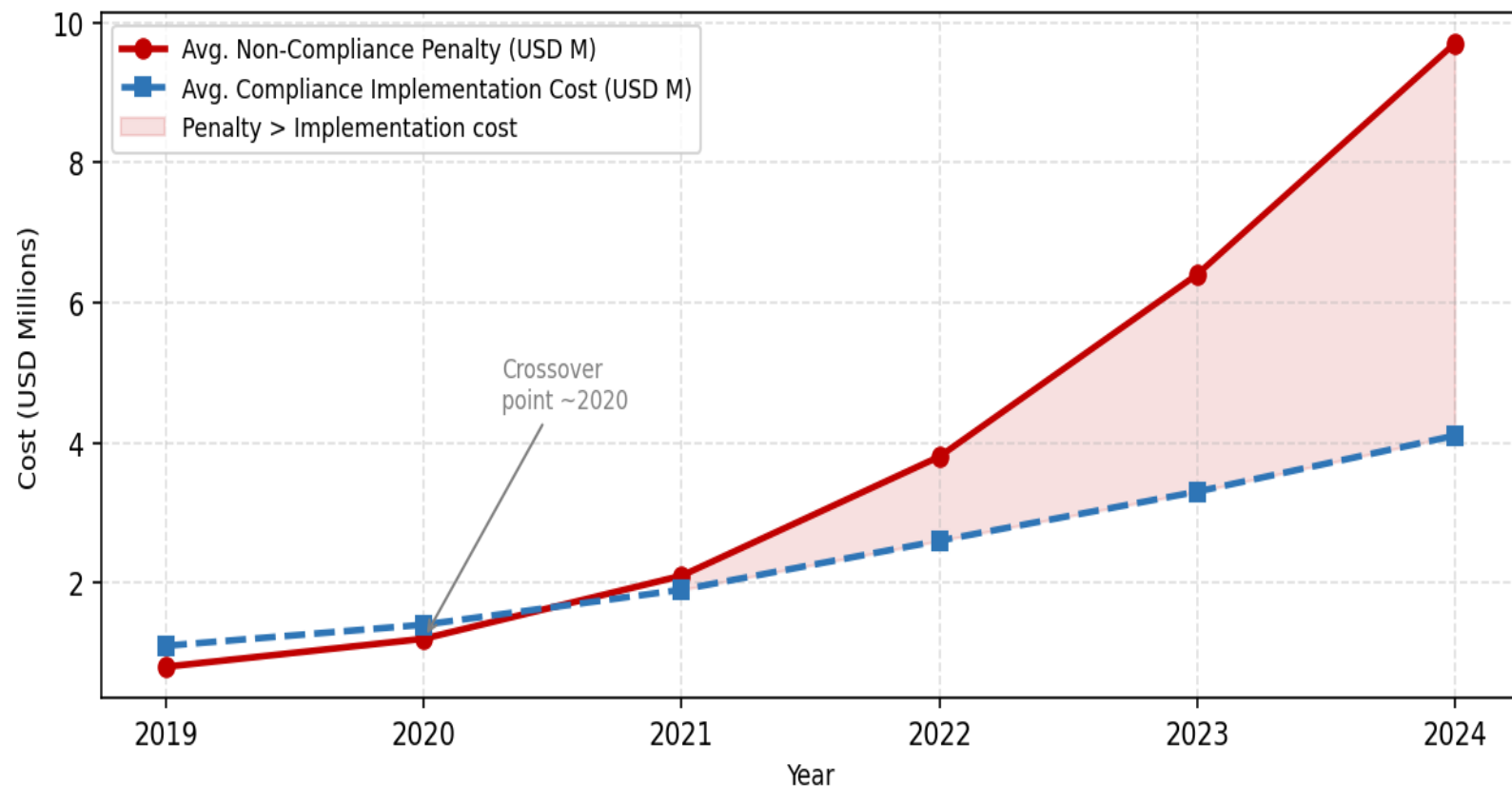


Figure 3: Average non-compliance penalties vs. implementation costs per large firm (USD Millions), 2019–2024

(Sources: SEC enforcement data (2024), EU CSRD impact assessment (2023), KPMG compliance benchmarking survey (2023)).

Challenges on the Ground: Data Gaps, Fragmentation, and SME Burden

The data gap, fragmentation and SME burden come with a big challenge. Enforcement of the regulations is not yet equitable. There are three challenges that stand out. First, data

fragmentation: supply chains are often spread across dozens of countries and hundreds of sub-suppliers, many of which don't have the systems to provide the granular environmental and social data required by CSRD, BRSR and SEC rules. A tier 3 cotton producer in Bangladesh or a cobalt processor in the Democratic Republic of Congo might not be saying anything about their environmental, social, and governance (ESG) efforts, but in a sense, that is now the responsibility of the European retailer or American electric vehicle manufacturer at the top of

the value chain. Second, jurisdictional fragmentation leads to real conflicts of compliance. There are four different reporting periods, three different definitions of materiality, and at least two different sets of sector-specific metrics for a multinational operating in four countries: Germany, Texas, Shanghai, and Mumbai. The ISSB IFRS Sustainability Disclosure Standards (IFRS S1 and S2) mark a genuine attempt at a global baseline, but uptake has been inconsistent, having been adopted in the UK & Australia, under consultation in the EU (as an addition to ESRS), and not formally adopted yet in the US & China [4]. Third, the tax load on small and medium size enterprises (SMEs) will run the risk of introducing a two-tier supply chain. Compliance costs are absorbed by big buyers of the anchors, such as Walmart, Apple, Toyota. Their SME suppliers cannot – and many European business federations have already warned that excessively prescriptive due-diligence requirements may make SME suppliers completely inaccessible to regulated markets, curbing competition and resilience, instead of enhancing it in terms of sustainability [2].

Looking Ahead: Convergence, Technology, and Strategic Opportunity

The challenges of convergence, technology and strategic opportunity. The winds of change are blowing in the direction of deeper SDG regulation, not lessening. EU standard due diligence will be expanded to companies that do not consider

themselves regulated by the CSDDD, as the phased in implementation of the CSDDD will phase in the requirement to companies that are mid-sized by 2029. By 2026, India's BRSR is likely to be expanding its scope to cover more companies than just the top 250. Also, at the multilateral level, the SDG Ambition benchmarks established by the UN Global Compact are now increasingly referred to in bilateral trade agreements, thus making SDG compliance the market-access condition [6]. Technology will play a key enabling role. Clauses in supplier contracts can be extracted and SDG obligation gaps identified for automated analysis using natural-language processing models trained on supplier contracts. Distributed ledger platforms that have already been used for diamond provenance, food safety and luxury goods authentication by De Beers, Walmart, and LVMH are being expanded to environmental and social data. AI-powered satellite imagery is now helping to detect deforestation events within supply footprints, and regulators in the EU and UK are starting to include this in deforestation enforcement tools introduced through their EU Deforestation Regulation, which will mandate evidence of deforestation-free sourcing for cattle, soy, palm oil, wood, cocoa, coffee and rubber from December 2024. The strategic opportunity is for those in the supply chain leadership to think about compliance as a capability building exercise and not a cost centre. Businesses that take proactive steps today with supplier data infrastructure, materiality assessment processes and

third-party assurance relationships will be ready to enter new markets, access sustainable finance and keep institutionally important customers and investors, who are increasingly demanding evidence of responsible sourcing. In the long run, though, the green tape is beginning to work as a trade operating system.

References

1. European Commission. (2023). *Corporate Sustainability Reporting Directive (CSRD): Frequently asked questions*. European Commission Publications.
https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en
2. R. Grabosch. (2021). *The German Supply Chain Act: A practitioner's guide*. Springer Gabler.
3. P. Molnár, A. Suta, B. Lukács, et al. (2025). Linking sustainability reporting and energy use through Global Reporting Initiative standards and Sustainable Development Goals. *Clean Technologies and Environmental Policy*, 27, 8659–8667.
4. KPMG. (2023). Survey of sustainability reporting 2022: Big shifts, small steps. KPMG International.
<https://kpmg.com/xx/en.html>
5. SEC, U. (2024). *The enhancement and standardization of climate-related disclosures for investors*.
<https://www.sec.gov/rules/final/2024/33-11275.pdf>
6. United Nations. (2023). *The Sustainable Development Goals report 2023: Special edition*. United Nations Department of Economic and Social Affairs.
<https://unstats.un.org/sdgs/report/2023/>

