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THE JURISPRUDENCE OF SUSTAINABILITY: INTEGRATING TECHNOLOGICAL SOVEREIGNTY AND ESG MANDATES IN INDIA'S 2047 DEVELOPMENTAL VISION

~ *Dr Shazila Shajahan*

Abstract

This research paper examines the legal and regulatory architecture necessary to achieve sustainable development within the framework of India's "Viksit Bharat" 2047 vision. Drawing from a comprehensive interdisciplinary discourse, the paper analyses the legal imperatives of Artificial Intelligence (AI) sovereignty, the shift toward mandatory Environmental, Social, and Governance (ESG) compliance in the corporate and banking sectors, and the integration of international treaties—specifically the Paris Agreement and the Sendai Framework—into domestic law. Furthermore, it explores the intersection of indigenous ecological wisdom, specifically Sanatan philosophy, with modern environmental jurisprudence to propose a culturally grounded legal framework. Ultimately, the study concludes that a robust legal framework must move beyond symbolic gestures toward enforceable standards that prioritise digital privacy, disaster resilience, and intergenerational equity through sovereign technological deployment.

Keywords: Artificial Intelligence, Law, Privacy, Sustainable Development, Jurisprudence

Introduction

Sustainable development, recognized universally as a foundational legal and developmental concept, is defined by the principle that current needs must be met without compromising the ability of future generations to meet theirs. In the 21st century, this definition has expanded from mere environmental protection to a multidimensional philosophy that integrates economic growth, social justice, digital autonomy, and ethical governance. For India, the legal roadmap toward sustainability is inextricably linked to the national goal of becoming a fully developed

nation by 2047, an initiative often termed "Viksit Bharat." This transition demands a radical departure from traditional industrial models that prioritize unfettered profit at the expense of ecological health, shifting instead toward a holistic approach that recognizes the deep interconnectedness of human, animal, environmental, and technological welfare.

The problem at hand is how to rapidly scale national development and digital infrastructure while simultaneously enforcing stringent environmental and ethical standards under a unified legal umbrella. The scope of this challenge encompasses defining the legal contours of AI sovereignty, enforcing mandatory ESG compliance in financial markets, and translating international climate treaties into enforceable domestic policy. As the state apparatus increasingly relies on complex computational systems to govern public health, environmental monitoring, and economic forecasting, the very infrastructure of governance becomes a site of intense legal and ethical scrutiny. Balancing indigenous ecological philosophies with modern algorithmic governance requires a highly structured, interdisciplinary jurisprudence that safeguards national interests while fulfilling global climate obligations.

Existing regulatory and technological approaches to sustainable development are fundamentally insufficient to meet these multidimensional challenges for several reasons. First, contemporary policy frameworks tend to treat technological governance, financial regulation, and environmental protection in isolated silos, leading to contradictory regulatory mandates that confuse stakeholders and hinder compliance. Second, current ESG frameworks rely heavily on voluntary disclosures or soft-law guidelines, which lack the punitive enforceability required to prevent greenwashing and corporate malfeasance. Third, emerging national technology strategies often depend on foreign-owned computational infrastructure and foundational models, which inherently compromises a nation's digital sovereignty and exposes sensitive institutional data to extraterritorial jurisdictions (Moës et al. 2026).

To address these critical gaps, this paper proposes a unified legal-technological doctrine that aligns computational autonomy with environmental sustainability. The core contributions of this paper are as follows:

- We formulate a comprehensive "Sovereign Sustainability Integration Framework" (SSIF) that structurally unites AI infrastructure regulations, algorithmic ESG enforcement mechanisms, and international climate obligations within a cohesive domestic legal context.

- We propose a hypothetical evaluation methodology designed to measure institutional compliance, algorithmic precision in predicting environmental violations, and the retention of data sovereignty within domestic borders.

AI Infrastructure and Strategic Sovereignty

The conceptualization of AI has rapidly evolved from a software-centric paradigm to a deeply infrastructure-driven system that relies on data centers, optical networks, and massive energy resources (Cruzes 2026). Scholars emphasize that true AI sovereignty cannot be achieved merely through algorithmic control; it requires the physical capacity to deploy and operate infrastructure under strict constraints of energy availability and network reach (Cruzes 2026). Furthermore, literature mapping AI as an instrument of national power highlights that nations are competing fiercely for sovereign AI to enhance their economic situations and competitive advantage, utilizing both kinetic and non-kinetic leverage points such as energy, water, and data sets (Clancy and Naugle 2026). The European context serves as a cautionary tale, illustrating how structural dependence on foreign hyperscale computing severely limits political and economic self-determination (Moës et al. 2026). Moreover, viewing AI sovereignty merely as an asset has led to its commodification, where private tech monopolies sell "sovereign" AI solutions to governments, effectively allowing private actors to define national autonomy on their own commercial terms, much like the historical privatization of global oil production (Yew et al. 2026). While these studies effectively identify the physical and geopolitical constraints of AI sovereignty, they often lack a prescriptive legal methodology for integrating these infrastructural constraints into an enforceable domestic sustainability agenda, an oversight this paper seeks to rectify for the Indian context.

Computational Methods for ESG and NFR Compliance

The financial and corporate sectors are increasingly relying on advanced computational models to enforce ESG standards and mitigate Non-Financial Risks (NFR). Researchers have developed sophisticated methodologies, such as Bayesian optimization, to maximize stock portfolio performance while strictly adhering to complex, multi-category ESG soft constraints (Garrido-Merchán et al. 2023). To proactively avoid interactions with inappropriate entities, financial institutions utilize vast heterogeneous information networks—comprising millions of nodes and edges derived from curated and open datasets—to accurately predict which firms will likely be added to investment exclusion lists due to ESG violations (Hisano et al. 2018). In parallel, automated adverse media mining utilizing real-time machine learning approaches enables institutions to screen negative news based on relevance, sentiment analysis, and risk

encoding, addressing the severe financial penalties associated with inadequate compliance controls (Khandpur et al. 2021). The strength of these computational approaches lies in their ability to process massive volumes of unstructured data to enforce market discipline. However, their primary weakness is that they remain largely localized within private risk management departments rather than being codified into statutory legal obligations for corporate governance, a gap that our proposed framework bridges by mandating such algorithmic checks within domestic law.

Decolonial Frameworks and Cultural Survivance in Technology

The intersection of emerging technologies and traditional cultural paradigms has sparked a critical discourse on decoloniality and human-AI entanglement. Studies focusing on intangible cultural heritage, such as nomadic improvisational music in Central Asia, illustrate the tensions between human creative agency and computational hegemony (Alimujiang 2025). In these contexts, empirical observations reveal that practitioners actively modulate their interactions with AI, selectively embracing or rejecting algorithmic suggestions to preserve their creative identity and enact cultural survivance (Alimujiang 2025). Similarly, addressing AI sovereignty at a national level requires moving beyond mere techno-optimism or regulation-first caution to understand a nation as a complex "AI learning system" that must balance the injection of technological information with the entropy of institutional and cultural dissipation (Tran 2026). These decolonial and human-centered perspectives highlight the necessity of embedding localized wisdom into technological design. While highly effective in cultural studies, these concepts must be translated into robust environmental jurisprudence. By integrating India's Sanatan philosophy of ecological reverence (Panchamahabhuta) with algorithmic governance, this paper operationalizes decolonial theory into a pragmatic legal mandate for sustainable development.

Approaches

To bridge the gap between abstract policy aspirations and enforceable domestic jurisprudence, this paper introduces the Sovereign Sustainability Integration Framework (SSIF). The SSIF is a structured, multi-layered regulatory architecture designed to enforce sustainable development by legally binding technological deployment, financial compliance, and environmental stewardship.

Sovereign AI Gateway and Infrastructure Layer

The first module of the SSIF addresses the physical and digital requirements of AI sovereignty, operating on the principle that national governance cannot rely on opaque, extraterritorial computational models. Drawing inspiration from institutional gateway architectures, this layer mandates a state-governed digital gateway that provides access to advanced AI capabilities while ensuring transparent risk management and alignment with domestic law (Huijts and Suilen 2025). Legally, this layer requires that all critical state and corporate AI workloads concerning environmental data, public health, and financial regulation be hosted on domestic data centers. To mitigate the immense energy and water footprint of these data centers, the law will impose strict environmental constraints on AI infrastructure, recognizing that factors such as carbon intensity are hard physical limits on technological deployment (Cruzes 2026). By establishing localized infrastructure, the state prevents the commercial commodification of its sovereign capabilities by private entities (Yew et al. 2026) and builds a robust national learning capacity that balances technological expansion with ecological limits (Tran 2026).

Algorithmic ESG Enforcement Module

The second module transforms ESG from a voluntary ethical guideline into a strictly monitored, legally enforceable mandate for the corporate and banking sectors. This module legally requires financial institutions to deploy vast heterogeneous information networks to conduct continuous negative screening and predict which entities are likely to commit environmental or labor violations (Hisano et al. 2018). Furthermore, the framework mandates the integration of adverse media mining systems to conduct real-time sentiment analysis and risk encoding on corporate activities, ensuring that Non-Financial Risks (NFR) such as supply chain exploitation or localized pollution are immediately flagged (Khandpur et al. 2021). Under this legal regime, capital deployment will be gated by algorithmic compliance checks. For instance, institutional investments and sustainable lending portfolios will be evaluated using Bayesian optimization techniques that dynamically balance financial returns against a matrix of environmental and social constraints (Garrido-Merchán et al. 2023).

Climate Jurisprudence and Cultural Integration

The final module embeds international obligations and indigenous philosophical wisdom directly into the algorithmic governance structure. The Paris Agreement's Net Zero 2070 targets and the Sendai Framework's proactive disaster risk reduction rules are coded as non-negotiable legal thresholds within the ESG Enforcement Module. Furthermore, the framework incorporates the Sanatan philosophy of the Panchamahabhuta (the reverence for earth, water,

fire, air, and space) as a guiding legal doctrine. This implies that predictive algorithms mapping urban development or industrial expansion are legally constrained from suggesting pathways that violate the sanctity of natural carbon sinks, such as wetlands protected under the Ramsar Convention, or that exacerbate the microplastic and antimicrobial resistance crises.

Numbered Operational Pipeline

To operationalize the SSIF, regulatory bodies will mandate the following continuous compliance pipeline:

1. **Data Ingestion & Sovereignty Check:** Corporate and environmental data are ingested exclusively through the state-sanctioned AI Gateway, verifying that data processing remains within sovereign geographical boundaries.
2. **Adverse Media & Network Screening:** The system deploys heterogeneous network analysis and real-time adverse media mining to detect potential ESG violations, supply chain NFRs, or ecological damage.
3. **Algorithmic Constraint Evaluation:** The detected risks are cross-referenced against codified legal thresholds (e.g., Net Zero trajectory, disaster resilience codes, wetland protection limits) using multi-objective optimization algorithms.
4. **Juridical Output & Enforcement:** If a project violates these integrated thresholds, the system automatically triggers a regulatory hold, freezing sustainable lending approvals and alerting human legal oversight committees for punitive action.

Evaluation Plan

Because the SSIF represents a novel legal-computational paradigm, we propose a hypothetical evaluation plan utilizing a simulated benchmark termed the "Bharat-ESG-2047 Benchmark." This hypothetical dataset will consist of ten years of simulated corporate financial data, environmental impact reports, and media metadata. The evaluation will measure three specific metrics. First, *Predictive Precision*: evaluating how accurately the heterogeneous network component predicts ESG violations before they result in catastrophic environmental damage. Second, *Sovereignty Retention*: measuring the percentage of critical data processed entirely within domestic data centers without relying on external APIs. Third, *Deployment Latency*: assessing the time required for the automated system to freeze capital flow to an entity flagged for severe NFR or climate treaty violations, compared to traditional human-led judicial injunctions.

Discussion

The integration of technological sovereignty, ESG mandates, and cultural jurisprudence into a singular framework carries profound implications for the future of Indian governance.

Practical Implications and Deployment Considerations

Deploying the SSIF across India's vast federal structure requires navigating significant practical challenges. The framework must be institutionalized within key regulatory bodies such as the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI). By automating the screening of adverse media and ESG compliance, the state can vastly reduce the burden on its notoriously backlogged judicial system, addressing corporate malfeasance proactively rather than reactively. Furthermore, establishing a sovereign AI infrastructure ensures that India treats AI not merely as software, but as a critical instrument of national power that safeguards its economic trajectory and competitive advantage on the global stage (Clancy and Naugle 2026). By maintaining control over the computational gateway, the government democratizes access to advanced tools for academic and civic institutions, providing a sovereign alternative to the unequal access generated by commercial AI subscriptions (Huijts and Suilen 2025).

Limitations and Failure Modes

Despite its robust architectural design, the proposed framework faces several critical limitations and potential failure modes:

- **Infrastructural Constraints:** The requirement to localize AI processing severely strains domestic energy grids and cooling water supplies, potentially clashing with the very environmental sustainability goals the framework seeks to protect, as scaling physical AI data centers is inherently resource-intensive (Cruzes 2026).
- **Data Scarcity and Algorithmic Blind Spots:** The predictive accuracy of the heterogeneous information networks heavily relies on high-quality, curated datasets. In regions where local media coverage is sparse or corporate reporting is heavily manipulated, the system may fail to identify emerging NFRs or environmental violations (Hisano et al. 2018).
- **Regulatory Fragmentation:** In a federal system, state-level environmental regulations often conflict with central economic mandates. The algorithms enforcing the SSIF might struggle to reconcile contradictory legal definitions of sustainable development across

different jurisdictions, leading to systemic paralysis or excessive false positives in compliance flagging.

Ethical Considerations and Risks

The deployment of an integrated algorithmic governance system introduces significant ethical risks that must be carefully managed:

- **Surveillance and Privacy Infringement:** The continuous use of adverse media mining and real-time network screening to assess corporate and individual behavior borders on ubiquitous surveillance, potentially infringing upon digital privacy rights if the parameters of NFR monitoring are not strictly constrained by civil liberties (Khandpur et al. 2021).
- **Algorithmic Bias and Marginalization:** Utilizing complex Bayesian models to enforce ESG standards could inadvertently marginalize small and medium enterprises (SMEs) that lack the resources to maintain perfect digital compliance footprints, thereby concentrating economic power in the hands of massive conglomerates capable of algorithmically masking their violations.

Future Work

Future research must build upon the foundational elements of the SSIF in several critical directions.

- **Cross-Jurisdictional Comparative Analysis:** Researchers should conduct detailed comparative studies examining how sovereign AI infrastructure models operate under different constitutional frameworks, particularly contrasting India's proposed model with the European Union's struggles against structural technological dependence (Moës et al. 2026).
- **Expansion of Decolonial Frameworks:** Future iterations of the legal-technological model should explore how the decolonial approach utilized in preserving cultural heritage (Alimujiang 2025) can be mathematically encoded into broader ecological algorithms, expanding the influence of indigenous philosophies beyond Sanatan thought to include diverse global South traditions.

Conclusion

The transition toward a fully developed, sustainable nation by 2047 requires India to fundamentally reimagine the intersection of law, technology, and ecology. This research has demonstrated that achieving sustainable development cannot rely on isolated environmental

policies or voluntary corporate disclosures; it necessitates a comprehensive legal architecture that operationalizes sustainability through technological sovereignty. The proposed Sovereign Sustainability Integration Framework (SSIF) effectively bridges this gap by intertwining localized AI infrastructure, mathematically optimized ESG enforcement, and deeply rooted indigenous ecological ethics into a cohesive regulatory pipeline.

Ultimately, true national power and developmental resilience in the 21st century depend on a nation's ability to maintain sovereign control over its computational resources while strictly adhering to the physical and ethical limits of its environment. By adopting a jurisprudence that penalizes digital dependency and environmental degradation with equal severity, India can pioneer a decolonial, forward-looking model of governance. This integrated approach ensures that the pursuit of economic growth does not compromise the inalienable rights of future generations, embedding the moral philosophy of sustainability directly into the algorithms that will dictate the future of human governance.

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