EVALUATION OF SEBI'S REGULATORY FRAMEWORK FOR ARTIFICIAL INTELLIGENCE IN SECURITIES MARKETS

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INTRODUCTION:

The research turns to an evaluative analysis of SEBI's regulatory framework as a whole, assessing its legal adequacy, identifying systemic gaps, and situating the Indian regulatory response within a comparative international context.

The task of this research is not merely to describe the existing framework but to subject it to rigorous legal evaluation: whether SEBI's instruments are legally adequate in form, whether they are enforced with appropriate rigour, and whether they collectively constitute a coherent and proportionate response to the risks that AI poses to market integrity, investor protection, and systemic stability. The research argues that the Indian regulatory framework, while exhibiting commendable regulatory energy most recently through the landmark Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) (Amendment) Regulations, 2025 remains structurally incomplete, insufficiently enforceable, and inadequately aligned with international best practice.

The research critically analyses SEBI's 2025 Consultation Paper on Responsible AI/ML Usage. Also evaluates the legal adequacy of existing SEBI regulatory initiatives and examines investor protection and disclosure obligations in the AI context. It undertakes a comparative analysis of international regulatory frameworks. Finally, provides a comprehensive legal adequacy assessment identifying statutory, regulatory, accountability, systemic risk, and enforcement gaps.

CRITICAL ANALYSIS OF SEBI'S 2025 CONSULTATION PAPER ON RESPONSIBLE AI/ML USAGE

Overview and Objectives of the 2025 Consultation Paper

In 2025, SEBI published its Consultation Paper on Responsible Usage of AI/ML in Indian Securities Markets, representing the most comprehensive regulatory statement on AI governance that SEBI has issued to date.[1] The Consultation Paper acknowledges that AI and machine learning technologies are increasingly deployed across the securities market ecosystem by stock exchanges, clearing corporations, brokers, investment advisers, portfolio managers, and asset management companies and that this deployment creates risks that the existing regulatory framework does not adequately address.

The Consultation Paper identifies five core objectives: (i) to promote the responsible and ethical use of AI/ML in securities markets; (ii) to establish risk mitigation frameworks that reduce the probability and impact of AI-driven market disruptions; (iii) to strengthen investor protection mechanisms in respect of AI-driven services; (iv) to preserve market integrity through accountability and transparency requirements; and (v) to enable regulatory oversight through disclosure and reporting obligations.[2] These objectives are sound and well-grounded in SEBI's statutory mandate under Section 11 of the SEBI Act, 1992. The difficulty, as this section demonstrates, lies in the gap between the ambition of the objectives and the legal adequacy of the instruments proposed to achieve them.

Proposed Regulatory Principles: Substantive Assessment

Fairness and Non-Discrimination in Algorithmic Decision-Making

The Consultation Paper proposes that AI systems deployed in securities markets must be designed and operated to ensure fairness and non-discrimination in their outputs that is, they must not produce systematically biased outcomes that disadvantage particular categories of investors or market participants.[3] This principle is consistent with the constitutional guarantee of equality in Article 14 of the Constitution of India and with SEBI's investor protection mandate under Section 11(2)(g) of the SEBI Act.

The legal difficulty with the fairness principle, however, is that it presupposes the ability to define, measure, and enforce "fairness" in algorithmic outputs a task that is technically complex and legally underspecified. Multiple competing mathematical definitions of algorithmic

[1] SEBI, Consultation Paper on Responsible Usage of AI/ML in Indian Securities Markets (2025), available at www.sebi.gov.in.
[2] Ibid., paras 2–4 (statement of objectives).
[3] Ibid., para 5.1 (fairness and non-discrimination principle).

fairness exist in the literature, and the Consultation Paper does not adopt any specific definition or provide any methodology for assessment. Without a legally cognisable standard against which compliance can be measured, the fairness principle remains aspirational rather than operational.[4]

Transparency and Explainability

The Consultation Paper proposes transparency and explainability requirements for AI systems, building on the principle that market participants and investors should be able to understand the basis on which AI systems make decisions that affect them.[5] This principle engages the fundamental tension between the opacity of advanced AI systems and the transparency demands of securities regulation.

As Pasquale has observed, advanced AI systems operate as "black boxes" whose decision logic cannot be rendered intelligible in human terms without substantial simplification.[6] The Consultation Paper acknowledges this tension but does not resolve it: it proposes explainability as a requirement without specifying the level of explanation required, the audience to whom the explanation must be addressed, or the circumstances in which technical impossibility of explanation will constitute a defence to a regulatory obligation. This is a significant drafting gap that renders the explainability principle unenforceable in its current form.

Accountability and Mandatory Human Oversight

The accountability and human oversight principle proposed in the Consultation Paper requires that AI systems deployed in securities markets remain subject to meaningful human supervision, and that identifiable human actors bear legal responsibility for AI-driven outcomes.[7] This principle represents a sound doctrinal response to the accountability problem created by autonomous AI systems.

The practical implementation of this principle, however, raises questions about the minimum standard of human oversight required, the frequency and depth of human review of AI system

[4] Mehrabi, N. et al., "A Survey on Bias and Fairness in Machine Learning" (2021) 54(6) ACM Computing Surveys 1, at 3 (identifying 20 distinct mathematical definitions of fairness in the literature).
[5] SEBI Consultation Paper (n 1), para 5.2 (transparency and explainability principle).
[6] Pasquale, F., The Black Box Society: The Secret Algorithms That Control Money and Information (Harvard University Press, 2015), p. 3.
[7] SEBI Consultation Paper (n 1), para 5.3 (accountability and human oversight principle).

behaviour, and the circumstances in which human oversight will be deemed inadequate. The Consultation Paper does not specify these parameters. Without operationalised standards, the human oversight requirement is susceptible to being satisfied through nominal compliance the appointment of a "responsible officer" who lacks the technical capacity to meaningfully review the AI system's behaviour rather than through substantive engagement with the system's outputs and risks.

Robustness, Security, and Resilience

The robustness, security, and resilience requirements proposed in the Consultation Paper address the risk that AI systems deployed in securities markets may malfunction, be compromised by cyber-attacks, or behave unpredictably under market stress conditions.[8] These requirements are particularly important in light of the systemic risk dimension of AI-driven trading: when multiple AI systems simultaneously malfunction or respond to the same adverse market signal, the resulting feedback loops can cause rapid and severe market dislocations, as demonstrated by the Flash Crash of May 6, 2010.

The Consultation Paper's robustness requirements overlap with the risk management obligations already imposed by SEBI's algorithmic trading circulars, but the Consultation Paper goes further in requiring that AI systems be specifically tested for resilience under adversarial and stress conditions. This is an appropriate and necessary addition to the regulatory framework. However, the absence of prescribed testing standards, certification requirements, or approved testing methodologies means that compliance with this requirement cannot be independently verified.

Legal Status Assessment: The Non-Binding Nature of the Consultation Paper

The most fundamental legal limitation of the 2025 Consultation Paper is its legal status: it is a consultation document, not a regulatory instrument. It has no statutory force, imposes no legally binding obligations, creates no enforceable rights, and provides no basis for SEBI enforcement action. Compliance with the principles proposed in the Consultation Paper is voluntary, and entities that disregard its recommendations face no legal consequence under the SEBI Act, the PFUTP Regulations, or any other applicable regulatory instrument.

[8] Ibid., para 5.4 (robustness, security and resilience principle).

This legal status is not unusual for consultation papers, which by their nature represent a pre-legislative and pre-regulatory stage of policy development. The concern is that, in the rapidly evolving AI landscape, the gap between the publication of a consultation paper and the notification of binding regulations may span several years, during which the risks identified in the paper continue to materialise without adequate legal remedy. The IOSCO has noted that "regulatory lags" in the AI context wherein the pace of technological development consistently outstrips the speed of regulatory response create windows of regulatory arbitrage that sophisticated market participants can exploit.[9]

A further legal concern is that the voluntary nature of the Consultation Paper's framework creates a collective action problem: entities that incur costs to comply with its recommendations are placed at a competitive disadvantage relative to those that do not, creating an incentive structure that rewards non-compliance. This is precisely the type of market failure that mandatory regulation is designed to correct, and it cannot be addressed through a voluntary framework however well-intentioned.

Critical Legal Gaps in the Consultation Paper

Four specific legal gaps in the 2025 Consultation Paper require identification. First, the Consultation Paper lacks statutory backing: its principles have not been promulgated as regulations under Section 30 of the SEBI Act, and they therefore do not have the force of subordinate legislation. Second, the Consultation Paper provides no enforcement mechanisms: it does not specify how compliance will be verified, what investigative powers SEBI will exercise in respect of AI systems, or what evidence will be required to establish a breach. Third, the Consultation Paper provides no penalties or sanctions for non-compliance: even if a breach were identified, there is no legal basis in the Consultation Paper itself for imposing a penalty, as penalties under the SEBI Act require specific statutory authority under Sections 15A through 15HB. Fourth, the Consultation Paper's voluntary compliance framework is inadequate for managing the systemic risks posed by AI in securities markets: systemic risk, by definition, affects the entire market rather than individual participants, and its management requires mandatory participation by all relevant entities rather than voluntary adoption by those that

[9] IOSCO, The Use of Artificial Intelligence and Machine Learning by Market Intermediaries and Asset Managers (2021), p. 35.

choose to comply.[10]

EXISTING SEBI REGULATORY INITIATIVES: LEGAL ADEQUACY ASSESSMENT

The Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) (Amendment) Regulations, 2025: A Landmark Development

Against the backdrop of the non-binding Consultation Paper, the notification of the Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) (Amendment) Regulations, 2025 (the 2025 Amendment Regulations) on 6 February 2025, with effect from 10 February 2025, represents a landmark development in Indian securities regulation.[11] The 2025 Amendment Regulations introduce a new Regulation 18-DA headed "Responsibility for the Use of Artificial Intelligence" into the Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) Regulations, 2018. This is the first instance of a binding, notified regulation in Indian securities law that specifically and expressly addresses the governance of AI systems.

Regulation 18-DA provides that where any recognised stock exchange or clearing corporation uses AI or machine learning tools and techniques, it shall be solely responsible for: (i) the privacy, security, and integrity of investors' and stakeholders' data, including data maintained in a fiduciary capacity, throughout all processes involved; (ii) all outputs arising from the use of such tools or techniques that it relies upon or deals with; and (iii) compliance with all applicable laws in force.[12] The Regulation further specifies that AI tools may be designed by SEBI or procured from third-party technology service providers, and provides a comprehensive definition of "AI and machine learning tools and techniques" that encompasses any application, software program, or executable system, or combination thereof, offered to investors and stakeholders or used internally to facilitate trading, settlement, compliance, or other business activities.[13]

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[10] Financial Stability Board, Artificial Intelligence and Machine Learning in Financial Services (November 2017), pp. 45–47 (on systemic risk and mandatory participation requirements).
[11] Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) (Amendment) Regulations, 2025, notified 6 February 2025, effective 10 February 2025, available at www.sebi.gov.in.
[12] Regulation 18-DA(1)(a)–(c), Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) Regulations, 2018 (as amended by the 2025 Amendment Regulations).
[13] Regulation 18-DA(2) (definition of "AI and machine learning tools and techniques"), Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) Regulations, 2018 (as amended).

Legal Significance of Regulation 18-DA

The legal significance of Regulation 18-DA is substantial in several respects. First, it is the first binding normative provision in Indian securities law that creates a specific, legally enforceable obligation in relation to AI governance: the obligation of sole responsibility for data integrity, AI outputs, and legal compliance. This represents a move from the aspirational principles of the Consultation Paper to a legally operative standard of accountability. Second, the Regulation adopts a strict accountability model "solely responsible" attributing all legal consequences of AI system outputs to the deploying entity, regardless of whether the AI was designed in-house or procured from a third-party provider. Third, the Regulation's comprehensive definition of "AI and machine learning tools and techniques" is broader than any previous SEBI definition of regulated AI systems and reflects a deliberate policy choice to regulate the function rather than the form of AI deployment.[14]

Limitations of Regulation 18-DA

While Regulation 18-DA is a significant step forward, its scope is limited in three important respects. First, it applies only to recognised stock exchanges and clearing corporations not to brokers, investment advisers, portfolio managers, or other market intermediaries who deploy AI systems. The regulatory gap for non-exchange AI deployment remains unaddressed by binding regulation. Second, Regulation 18-DA establishes accountability without providing enforcement mechanisms, investigative procedures, or penalty provisions specific to AI governance violations: the enforcement of the Regulation must rely on the general powers available to SEBI under the SEBI Act, it faces significant challenges in the AI context, particularly in relation to proof of intent and attribution of liability. Third, the Regulation does not address the explainability, pre-deployment approval, or systemic risk dimensions of AI governance that the Consultation Paper identifies as important regulatory concerns.[15]

Algorithmic Order Tagging Requirements: Scope and Limitations

The requirement under SEBI's 2012 Algorithmic Trading Circular that all algorithmic orders

[14] Cf. Regulation 3, SEBI (Prohibition of Fraudulent and Unfair Trade Practices) Regulations, 2003 (functional approach to the definition of prohibited conduct).
[15] Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) (Amendment) Regulations, 2025 (n 11), Regulation 18-DA; see also SEBI Consultation Paper (n 1), paras 6–8 (on pre-deployment approval and explainability—not yet enacted as binding requirements).

carry a unique identifier for audit trail purposes is the principal transparency mechanism in the existing framework for algorithmic trading.[16] The tagging requirement enables SEBI and the exchanges to distinguish algorithmic from manual orders in post-trade surveillance and to reconstruct the sequence of algorithmic activity in enforcement proceedings.

The legal limitation of the tagging requirement is that it addresses the identification of algorithmic orders rather than the governance of the AI systems that generate them. A tag identifies that an order was generated algorithmically; it does not disclose the nature of the algorithm, the decision logic that produced the order, the training data on which the AI was based, or the risk parameters within which it operates. For surveillance and enforcement purposes, the tag is a necessary but insufficient instrument: it enables SEBI to identify algorithmic orders in a reconstructed trading sequence, but it does not provide the causal insight needed to distinguish a manipulative algorithmic strategy from a legitimate one without extensive further investigation.[17]

Risk Management Frameworks for Algorithmic Trading: Legal Enforceability

The minimum risk control requirements established by the 2012 Circular price checks, quantity limit checks, order value checks, and automated execution safeguards have the status of regulatory directions under Section 11(1) of the SEBI Act, compliance with which is mandatory for all recognised stock exchanges and their members.[18] Their legal enforceability is thus established, subject to the general limitations of the circular as a regulatory instrument.

The practical limitation of these risk controls is that they were designed for a regulatory environment in which algorithmic trading systems operated according to pre-programmed, static rules. Self-learning AI systems can modify their trading strategies in response to market conditions in ways that may push them beyond the pre-configured risk parameters, or that may produce trading patterns that individually comply with each risk control but collectively constitute a manipulative strategy. The risk management framework thus requires dynamic, adaptive monitoring mechanisms rather than the static parameter checks that the 2012 Circular

[16] SEBI Circular No. CIR/MRD/DP/09/2012 dated 30 March 2012, para 6(vi) (unique identifier requirement for audit trail).
[17] Kirilenko, A.A. et al., "The Flash Crash: High Frequency Trading in an Electronic Market" (2017) 72(3) Journal of Finance 967, at 970 (on the limitations of order-level data in reconstructing algorithmic intent).
[18] Section 11(1), SEBI Act, 1992; SEBI Circular No. CIR/MRD/DP/09/2012 dated 30 March 2012, para 6(i)–(v).

prescribes a gap that the 2025 Consultation Paper identifies but does not, in the absence of binding authority, resolve.[19]

Disclosure Requirements for Robo-Advisors Under the SEBI (Investment Advisers) Regulations, 2013

The SEBI (Investment Advisers) Regulations, 2013 (IA Regulations) require registered investment advisers including robo-advisory platforms to provide clients with detailed disclosure documents covering the adviser's regulatory status, qualifications, fees, conflicts of interest, and the nature of the advisory services provided.[20] The IA Regulations, however, were drafted before robo-advisory services became prevalent in India and do not contain disclosure requirements specifically tailored to AI-driven advisory services.

SEBI's 2016 Consultation Paper on Robo-Advisory Services acknowledged that robo-advisors must comply with the IA Regulations and proposed that they disclose to clients that their advice is generated by an algorithm, the nature and limitations of the algorithm, and the risks associated with automated advice.[21] These proposals have not been incorporated into the IA Regulations by way of formal amendment, and the current legal position is that AI-specific disclosure obligations for robo-advisors remain voluntary best-practice recommendations rather than binding regulatory requirements.

The result is that a retail investor receiving investment advice from a robo-advisory platform may not be legally entitled to know that the advice is AI-generated, that the algorithm has technical limitations, or that the platform has a financial interest in recommending particular investment products. This gap is particularly acute for retail investors, who are less likely than institutional clients to independently investigate the nature of the advisory service they are receiving.[22]

Market Surveillance and Monitoring: Technological Capability Versus Regulatory Requirement

SEBI and the stock exchanges operate automated market surveillance systems that monitor

[19] SEBI Consultation Paper (n 1), para 7 (dynamic risk monitoring requirements proposed).
[20] Regulation 19 and Schedule III (Disclosure Document), SEBI (Investment Advisers) Regulations, 2013.
[21] SEBI, Consultation Paper on Robo-Advisory Services in Securities Market (2016), paras 4–6.
[22] Baker, T. and Dellaert, B., "Regulating Robo Advice Across the Financial Services Industry" (2018) 103 Iowa Law Review 713, at 730.

trading activity in real time and flag suspicious patterns for further investigation. The effectiveness of these surveillance systems in detecting AI-driven manipulation depends critically on the sophistication of the AI employed in the surveillance system relative to the AI employed in the manipulative trading strategy.[23]

This is the "surveillance arms race" problem: as AI trading systems become more sophisticated in designing manipulative strategies that mimic legitimate trading patterns, surveillance systems must become correspondingly more sophisticated to detect them. The resources available to private trading firms for AI development substantially exceed those available to SEBI and the exchanges for AI-powered surveillance. Lin's observation about "resource asymmetries" between regulators and private firms is directly applicable here: large financial institutions have vast resources to develop innovative AI capable of evading detection, while regulators often struggle with outdated technology and limited budgets.[24] This asymmetry represents a structural enforcement challenge that cannot be resolved solely through regulatory reform and requires dedicated public investment in regulatory technology (RegTech).

Regulatory Inadequacies: A Systemic Assessment

The evaluation of SEBI's existing regulatory initiatives discloses five systemic inadequacies. First, the framework is fragmented: AI governance obligations are dispersed across multiple circulars, consultation papers, and regulations issued at different times and directed at different categories of regulated entity, without a coherent overarching framework. Second, there is no comprehensive AI-specific regulatory instrument: Regulation 18-DA is a significant step but is limited to exchanges and clearing corporations; the broader market ecosystem lacks equivalent binding AI governance standards. Third, the regulatory approach is reactive rather than proactive: SEBI's interventions have been triggered by observable market events the NSE co-location controversy, the growth of robo-advisory services, the 2025 Consultation Paper responding to international regulatory developments rather than anticipatory risk assessment. Fourth, there are jurisdictional gaps: AI systems used in cross-border securities transactions may involve technology providers, data sources, and trading strategies that fall outside SEBI's regulatory perimeter. Fifth, the penalty framework is inadequate: the penalties available under the SEBI Act for breaches of regulatory directions are, in many cases, insufficient to deter AI

[23] Lin, T.C.W., "Artificial Intelligence, Finance, and the Law" (2019) 88(2) Fordham Law Review 531, at 551.
[24] Ibid., at 553.

operators whose trading strategies may generate profits far in excess of the maximum penalty.[25]

INVESTOR PROTECTION AND DISCLOSURE OBLIGATIONS: LEGAL EVALUATION

Disclosure Obligations for AI-Driven Services: Legal Adequacy Assessment

Effective disclosure is a cornerstone of investor protection in securities regulation, premised on the principle that informed investors can make rational decisions and thereby discipline the behaviour of market participants. The application of this disclosure model to AI-driven financial services raises fundamental questions about the adequacy of existing disclosure norms and, more deeply, about whether disclosure is a legally and practically adequate investor protection mechanism in the AI context.

Current disclosure requirements under the IA Regulations and the SEBI (Portfolio Managers) Regulations, 2020, require regulated entities to disclose the nature of their services, fee structures, conflicts of interest, and risk factors.[26] They do not specifically require disclosure of: the fact that advice or portfolio management decisions are generated by an AI system; the type of AI model used and its training data; the inherent limitations of the AI system, including its performance under abnormal market conditions; the extent of human oversight exercised over AI outputs; or the data governance practices of the entity in relation to client information used to train or calibrate the AI.

This disclosure gap is legally significant for two reasons. First, the absence of AI-specific disclosure requirements means that investors cannot exercise meaningful informed consent to AI-driven services, undermining the foundational principle of autonomy on which the disclosure model of investor protection rests. Second, the absence of mandatory AI disclosure creates information asymmetries between AI-deploying entities and their clients that are incompatible with the fiduciary obligations imposed by the IA Regulations.[27]

[25] Sections 15A–15HB, SEBI Act, 1992 (penalty provisions); see also SEBI Annual Report 2023–2024 (documenting enforcement statistics and penalty amounts).
[26] Regulation 19 and Schedule III, SEBI (Investment Advisers) Regulations, 2013; Regulation 22, SEBI (Portfolio Managers) Regulations, 2020.
[27] Regulation 17(a), SEBI (Investment Advisers) Regulations, 2013 (fiduciary duty to act in the best interest of the client).

The Explainability Paradox: Disclosure Requirements and Technical Impossibility

The concept of explainability in AI refers to the capacity of an AI system to generate human-intelligible explanations for its outputs. The legal demand for explainability in securities regulation most directly expressed in the transparency principle of the 2025 Consultation Paper presupposes that such explanations are technically feasible. This presupposition is challenged by the reality of modern deep learning systems.

Advanced AI models particularly deep neural networks and transformer-based architectures operate through mathematical transformations across millions of parameters that do not map onto human-interpretable concepts. Post-hoc explanation techniques such as SHAP (Shapley Additive Explanations) and LIME (Local Interpretable Model-Agnostic Explanations) provide approximate, localised explanations of specific outputs but do not render the overall decision logic of the model intelligible.[28] A requirement that AI systems deployed in securities markets be fully explainable would effectively prohibit the deployment of the most powerful AI architectures, creating a tension between regulatory compliance and technological capability.

The legal resolution of the explainability paradox requires a calibrated approach: rather than requiring full algorithmic transparency which is technically impossible for advanced AI systems regulators should require process transparency (documentation of model development, testing, and governance) and outcome transparency (disclosure of the categories of data and factors that influence AI outputs), with full algorithmic transparency required only where the AI system is used for high-stakes individual decisions, such as automated credit assessment or suitability determination for complex investment products[29] This approach is broadly consistent with the EU AI Act's risk-based explainability framework, which calibrates explanation requirements to the risk classification of the AI system.[30]

Informed Consent in AI-Driven Services: Legal Analysis

The principle of informed consent requires that a person who agrees to receive a service

[28] Lundberg, S.M. and Lee, S.-I., "A Unified Approach to Interpreting Model Predictions" (2017) 30 Advances in Neural Information Processing Systems 4765 (SHAP); Ribeiro, M.T. et al., "Why Should I Trust You? Explaining the Predictions of Any Classifier" (2016) KDD 1135 (LIME).
[29] Wachter, S., Mittelstadt, B. and Russell, C., "Counterfactual Explanations Without Opening the Black Box: Automated Decisions and the GDPR" (2017) 31(2) Harvard Journal of Law and Technology 841, at 866.
[30] Regulation (EU) 2024/1689 (AI Act), Articles 13 and 50 (transparency obligations calibrated to AI risk classification).

understands the nature of that service and the material risks it entails. In the context of AI-driven investment advisory and portfolio management services, the question is whether retail investors can give legally effective informed consent to AI-driven services without a meaningful understanding of how the AI system operates and what risks it introduces.

The legal framework governing informed consent in financial services is contained in the suitability and appropriateness obligations of the IA Regulations and the Portfolio Managers Regulations, which require regulated entities to assess each client's financial situation, risk tolerance, and investment objectives before providing services.[31] These suitability obligations presuppose a human advisory process in which the adviser communicates meaningfully with the client and exercises professional judgment. Where the suitability assessment is itself conducted by an AI system, the quality of the consent obtained is dependent on the adequacy of the AI's assessment which, , may be subject to algorithmic bias and data limitations that the client is not informed of.

A legally adequate informed consent framework for AI-driven financial services requires, at minimum: plain language disclosure that the service is AI-driven; disclosure of the key parameters that the AI uses to assess suitability; disclosure of the known limitations of the AI's suitability assessment capability; and a mechanism for the client to request human review of AI-generated recommendations. The current Indian regulatory framework provides none of these elements as mandatory requirements.[32]

Grievance Redressal Mechanisms: Legal Effectiveness for AI-Related Losses

The SEBI Complaints Redress System (SCORES) portal is the primary mechanism through which retail investors can lodge complaints against regulated entities. SCORES enables investors to file complaints online, track their status, and escalate unresolved complaints to SEBI.[33] The portal has been credited with improving the accessibility of the grievance redressal process for retail investors.

The legal limitation of SCORES in the AI context is that the complaint mechanism was

[31] Regulation 17, SEBI (Investment Advisers) Regulations, 2013; Regulation 21(1), SEBI (Portfolio Managers) Regulations, 2020.
[32] Cf. MAS, FEAT Principles for the Use of Artificial Intelligence and Data Analytics in Financial Services (2018), Principle A3 (informed consent requirements for AI-driven financial services).
[33] SEBI, SCORES (SEBI Complaints Redress System), available at https://scores.sebi.gov.in.

designed for disputes arising from human conduct a broker who fails to execute an order, an investment adviser who provides unsuitable advice and is not equipped to handle the specific challenges of AI-related losses. When an investor suffers a financial loss as a result of an AI-driven investment recommendation or an AI-enabled market manipulation, the causal chain between the AI's conduct and the investor's loss may be technically complex and difficult to establish without access to the AI system's decision logs and training data information that the investor will not possess.[34]

Further, the remedies available through SCORES are limited to investor complaints against regulated entities; they do not extend to losses caused by AI-driven market manipulation by third parties, such as spoofing or momentum ignition strategies that harm retail investors who are not clients of the manipulating entity. For such losses, the investor's only remedy is through SEBI's enforcement and investor protection fund mechanisms, which as discussed above face significant challenges in proving and remedying AI-driven market harm.

Suitability and Appropriateness Obligations for Robo-Advisors: Compliance and Enforcement Gaps

The suitability obligation under Regulation 17 of the IA Regulations requires investment advisers to ensure that their advice is appropriate to the client's financial situation, risk tolerance, and investment objectives.[35] For robo-advisors, compliance with this obligation depends on the quality of the AI's risk profiling mechanism specifically, on whether the questionnaire-based data collection process and the AI's analysis of responses adequately capture the client's true risk profile.

SEBI has not published any technical standards or minimum requirements for the quality of AI-driven risk profiling systems used by robo-advisors, nor has it published any enforcement actions against robo-advisors for inadequate AI-driven suitability assessments. The practical result is a compliance gap: robo-advisors are nominally subject to the same suitability obligations as human advisers, but the specific obligations that flow from those norms in the

[34] Pasquale, F., The Black Box Society (Harvard University Press, 2015), p. 110 (on the inaccessibility of AI decision logs to affected parties).
[35] Regulation 17(d), SEBI (Investment Advisers) Regulations, 2013 (suitability obligation).

AI context are undefined and unenforced.[36]

COMPARATIVE ANALYSIS: INTERNATIONAL REGULATORY FRAMEWORKS

United States: SEC Regulatory Framework

Regulation Systems Compliance and Integrity (Reg SCI)

The United States Securities and Exchange Commission's Regulation Systems Compliance and Integrity (Reg SCI), adopted in 2014 and substantially expanded in 2023, requires specified entities national securities exchanges, registered clearing agencies, alternative trading systems, and plan processors to maintain comprehensive policies and procedures to ensure that their automated trading systems operate with adequate capacity, integrity, resiliency, and security.[37] Reg SCI mandates annual assessments, penetration testing, business continuity planning, and mandatory notification to the SEC of system disruptions and intrusions.

The legal model of Reg SCI is instructive for India because it imposes specific, mandatory, technically detailed obligations on automated trading systems including AI systems as a condition of operating in regulated markets. Unlike SEBI's consultation-paper-based approach, Reg SCI creates legally enforceable compliance obligations whose breach attracts enforcement action and civil penalties. The 2023 amendments to Reg SCI specifically expanded its scope to cover alternative trading systems that use AI, reflecting the SEC's recognition that AI-specific regulation requires distinct treatment within the broader framework of systems compliance.[38]

Form ATS-N and Algorithmic Trading Disclosure

Form ATS-N, required of alternative trading systems under the SEC's Regulation ATS, mandates comprehensive public disclosure of trading system operations, including the nature of any automated or algorithmic trading mechanisms used, fee structures, access criteria, and order interaction logic.[39] This disclosure framework enables market participants to make

[36] SEBI Consultation Paper on Robo-Advisory Services (2016) (n 21), para 7 (acknowledging absence of technical standards for AI-driven risk profiling).
[37] Regulation SCI, 17 CFR Sections 242.1000–1007, adopted by the SEC on 19 November 2014; amendments effective 11 December 2023 (expanding scope to AI systems).
[38] SEC, Amendments to Regulation Systems Compliance and Integrity (2023), Release No. 34-98202.
[39] Form ATS-N, 17 CFR Section 242.304, filed with the SEC under Regulation ATS, as amended by the SEC's ATS Regulation Amendments (2018), Release No. 34-83663.

informed decisions about using a particular trading venue and enables the SEC to exercise targeted oversight of ATS operations.

The Indian equivalent SEBI's algorithmic order tagging requirement is considerably narrower: it identifies that an order was generated algorithmically but does not require comprehensive disclosure of the algorithmic trading system's operations to SEBI or to the public. A mandatory disclosure regime modelled on Form ATS-N, adapted to the Indian market structure, would significantly enhance SEBI's oversight capability and market transparency.

SEC Enforcement in Algorithmic Trading

The SEC has brought numerous enforcement actions for algorithmic market manipulation, including spoofing, layering, and wash trading. In SEC v. Avalon FA Ltd. (2019), the SEC and DOJ successfully prosecuted algorithmic spoofing across multiple markets, establishing that AI-driven spoofing strategies fall within the prohibition on fraudulent and deceptive devices under Rule 10b-5 of the Securities Exchange Act, 1934.[40] The SEC's enforcement approach has demonstrated that the inferential attribution of intent from algorithmic trading patterns consistent with SEBI's approach is legally defensible, but has also illustrated the resource-intensity of such enforcement actions in the AI context.

European Union: MiFID II, the EU AI Act, and ESMA Guidelines

MiFID II Algorithmic Trading Provisions

The Markets in Financial Instruments Directive II (MiFID II), implemented across EU member states in 2018, contains the most comprehensive mandatory framework for algorithmic trading of any major jurisdiction.[41] MiFID II requires investment firms engaged in algorithmic trading to: obtain prior authorisation from their national competent authority; implement pre- and post-trade controls and risk management systems; conduct annual self-assessment of algorithmic trading systems; notify the competent authority of any significant changes to algorithmic systems; maintain comprehensive records of all algorithmic activity; and ensure that their

[40] SEC v. Avalon FA Ltd. et al., Civil Action No. 19-cv-4131 (S.D.N.Y. 2019).
[41] Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments (MiFID II), OJ L 173/349.

systems do not contribute to disorderly market conditions.[42]

The MiFID II framework is instructive for India for three reasons. First, its mandatory pre-authorisation requirement for algorithmic trading represents a qualitatively different regulatory model from SEBI's post-registration monitoring approach: requiring authorisation before deployment creates an opportunity for regulatory scrutiny of the AI system's design and risk management framework at a stage when intervention is most effective. Second, MiFID II's obligation to ensure that systems do not contribute to disorderly markets creates a systemic risk management obligation that goes beyond the individual firm-level risk controls prescribed by SEBI's 2012 Circular. Third, MiFID II's annual self-assessment requirement provides a regular compliance audit mechanism that the Indian framework lacks.[43]

The EU Artificial Intelligence Act, 2024

The Regulation (EU) 2024/1689 on Artificial Intelligence (EU AI Act), which entered into force in August 2024, is the world's first comprehensive regulatory framework specifically designed for AI systems.[44] The EU AI Act adopts a risk-based classification approach: AI systems are classified as unacceptable risk (prohibited), high risk, limited risk, or minimal risk, with regulatory obligations calibrated to the risk classification. AI systems used for credit scoring, insurance risk assessment, and certain financial market applications are classified as high-risk AI systems and are subject to mandatory conformity assessment, technical documentation requirements, data governance standards, transparency obligations, human oversight requirements, and accuracy and robustness standards.

The EU AI Act's approach is directly relevant to the Indian regulatory debate on several dimensions. Its risk-based classification provides a model for identifying which categories of AI application in securities markets require the most stringent regulatory treatment. Its mandatory conformity assessment requirement analogous to the pre-deployment approval mechanism that the SEBI Consultation Paper proposes but does not mandate would substantially enhance SEBI's ability to prevent harmful AI systems from entering the market.

[42] Article 17, MiFID II; Articles 7–10, Commission Delegated Regulation (EU) 2017/589 supplementing MiFID II (RTS 6 on algorithmic trading).
[43] ESMA, Guidelines on Systems and Controls in an Automated Trading Environment (ESMA/2012/122), Guideline 7 (annual self-assessment obligation).
[44] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 (AI Act), OJ L, 2024/1689.

Its explainability requirements, calibrated to the risk level of the AI system, provide a workable model for resolving the explainability paradox discussed above[45]

ESMA Guidelines on Algorithmic Trading

The European Securities and Markets Authority (ESMA) has published Guidelines on Systems and Controls in an Automated Trading Environment for Trading Platforms, Investment Firms and Competent Authorities, which provide detailed technical guidance on the minimum organisational, risk management, and compliance requirements for entities engaged in algorithmic trading.[46] The ESMA Guidelines address algorithm testing requirements, the governance of algorithm development and deployment, real-time monitoring obligations, and the escalation procedures to be followed when algorithmic systems produce anomalous behaviour.

The ESMA Guidelines represent the kind of operationalised, technically detailed regulatory standard that SEBI's AI governance framework currently lacks. They provide a useful template for translating the high-level principles of the 2025 Consultation Paper into specific, verifiable compliance obligations.

IOSCO: International Principles and Best Practices

The International Organization of Securities Commissions (IOSCO) has published a series of reports and principles addressing AI in securities markets, including its 2021 Report on The Use of Artificial Intelligence and Machine Learning by Market Intermediaries and Asset Managers, its Guidance on Crypto-Asset Markets (2020), and its Principles for Financial Market Infrastructures.[47]

IOSCO's 2021 report identifies five key governance and oversight principles for AI deployment by market intermediaries: (i) a senior management accountability structure for AI systems; (ii) robust testing and ongoing monitoring; (iii) data governance and management; (iv) robust and

[45] Ibid., Articles 6, 9–15 (high-risk AI obligations including conformity assessment, data governance, transparency, and human oversight).
[46] ESMA, Guidelines on Systems and Controls in an Automated Trading Environment for Trading Platforms, Investment Firms and Competent Authorities (ESMA/2012/122).
[47] IOSCO, The Use of Artificial Intelligence and Machine Learning by Market Intermediaries and Asset Managers (2021); IOSCO, Principles for Financial Market Infrastructures (2012).

transparent disclosure to clients and regulators; and (v) third-party risk management.[48] These principles are substantially consistent with the objectives of SEBI's 2025 Consultation Paper but are more specific in their operational content. IOSCO's endorsement of these principles reflects an international regulatory consensus that provides important legitimacy for SEBI's proposed reform agenda and a measure of peer pressure for its implementation.

Other Jurisdictions: Australia, Singapore, United Kingdom, and Hong Kong

Several jurisdictions have developed regulatory frameworks for AI in securities markets that offer comparative lessons for India. The Australian Securities and Investments Commission (ASIC) has issued regulatory guidance on the use of AI in financial services, emphasising a technology-neutral approach in which existing regulatory obligations including licensing, conduct, and disclosure requirements apply to AI-driven services in the same way as to human-provided services, with AI-specific guidance provided where the application of general principles requires clarification.[49]

The Monetary Authority of Singapore (MAS) has developed a comprehensive FEAT (Fairness, Ethics, Accountability, and Transparency) framework for AI in financial services, which provides detailed guidance on the governance, testing, and disclosure of AI systems used in financial markets.[50] The MAS approach is particularly notable for its emphasis on accountability: regulated entities are required to designate a senior management owner for each AI system deployed in regulated activities, creating a clear human accountability trail for AI-driven decisions.

The United Kingdom Financial Conduct Authority (FCA) has adopted a principles-based approach to AI regulation, relying on existing regulatory principles Principle 6 (treating customers fairly), Principle 7 (communications must be clear, fair and not misleading), and Principle 11 (open and cooperative relationship with regulators) to address AI-specific risks without creating AI-specific regulations.[51] The FCA's regulatory sandbox has been used to test

[48] IOSCO (2021) (n 47), pp. 11–28 (five governance principles for AI deployment by market intermediaries).
[49] ASIC, Regulatory Guide 264: Regulatory Sandbox (2020); ASIC, Information Sheet 225: Artificial Intelligence in Financial Services (2019).
[50] MAS, Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector (2018).
[51] FCA, Principles for Business (PRIN), Principles 6, 7 and 11; FCA, Guidance on Artificial Intelligence and Machine Learning (FG16/5, 2016).

AI-driven financial products in a controlled regulatory environment, providing a model for proportionate innovation facilitation that SEBI could adapt.

The Securities and Futures Commission of Hong Kong (SFC) has issued circulars specifically addressing the use of AI in investment management, requiring licensed managers to ensure that AI systems used in portfolio management are fair, explainable, and subject to adequate human oversight.[52] The SFC's approach is notable for its explicit recognition that AI-specific obligations may supplement, rather than replace, the general conduct obligations applicable to licensed managers.

COMPARATIVE LESSONS FOR INDIA

The comparative analysis of international regulatory frameworks yields seven lessons for India's approach to AI governance in securities markets. First, binding regulations are more effective than principles-based guidance: the EU's MiFID II, the US Reg SCI, and the MAS FEAT framework all demonstrate that mandatory, technically specific obligations produce higher levels of compliance and regulatory deterrence than voluntary principles. Second, pre-deployment approval is a critical regulatory tool: requiring AI systems to be approved before deployment gives regulators an opportunity to identify risks at the design stage, when corrective action is least costly. Third, mandatory audits provide ongoing compliance assurance: annual self-assessment and third-party audit requirements, as in MiFID II, ensure that algorithmic trading systems remain compliant as they evolve. Fourth, senior management accountability creates effective deterrence: the MAS approach of requiring designated senior management owners for AI systems ensures that accountability is not diffused through organisational complexity. Fifth, a risk-based approach calibrates regulatory burden to risk: the EU AI Act's risk classification model avoids imposing disproportionate compliance burdens on low-risk AI applications while subjecting high-risk AI to rigorous oversight. Sixth, international regulatory coordination is essential: cross-border AI trading strategies require coordinated oversight among regulators, through IOSCO and bilateral MoU frameworks. Seventh, RegTech investment is indispensable: the resource asymmetry between private AI developers and public regulators can only be addressed through sustained public investment in

[52] SFC, Circular to Licensed Corporations on the Use of Artificial Intelligence in the Investment Process (2019), available at www.sfc.hk.

regulatory technology.[53]

COMPREHENSIVE LEGAL ADEQUACY ASSESSMENT

Statutory Gaps

The most fundamental gap in India's AI regulation in securities markets is statutory. Neither the SEBI Act, 1992, nor the SCRA, 1956, contains any definition of artificial intelligence, algorithmic trading, high-frequency trading, or machine learning. The absence of statutory definitions has three consequences. First, the regulatory perimeter of AI governance is defined by circular rather than statute, making it vulnerable to legal challenge and creating definitional uncertainty. Second, SEBI's enforcement powers are constrained by the absence of specific statutory prohibitions and penalty provisions directed at AI-driven misconduct. Third, the courts in adjudicating challenges to SEBI enforcement actions and in developing the common law of securities regulation lack statutory guidance on the nature and legal character of AI systems in securities markets.[54]

Legislative reform to introduce a chapter on AI governance in the SEBI Act providing statutory definitions, establishing a pre-deployment approval regime, and creating specific penalty provisions for AI-related misconduct is the foundational reform required to address the statutory gap. This reform should be accompanied by amendments to the SCRA to clarify the applicability of the contracts framework to AI-generated transactions and to specify the regulatory consequences of AI-driven market disruptions.

Regulatory Gaps

At the regulatory level, five specific gaps require attention. First, there is no mandatory pre-deployment approval regime for AI systems used in securities markets: unlike MiFID II and Reg SCI, Indian regulations permit the deployment of AI trading systems without prior regulatory authorisation, limiting SEBI's ability to prevent harmful AI from entering the market. Second, there is no algorithm registration requirement: SEBI does not maintain a register of AI systems deployed in Indian securities markets, making it impossible to conduct market-wide risk assessment of AI deployment. Third, the enforcement mechanisms for

[53] Financial Stability Board, Artificial Intelligence and Machine Learning in Financial Services (November 2017), pp. 52–55 (comparative regulatory lessons).
[54] Scherer, M.U., "Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies" (2016) 29 Harvard Journal of Law and Technology 353, at 365.

existing AI-related regulatory obligations are weak: the penalty provisions of the SEBI Act do not specifically address AI governance violations, and the maximum penalties for breach of SEBI directions are, in many cases, disproportionately low relative to the profits that AI-driven manipulation can generate. Fourth, there is no mandatory incident reporting requirement: regulated entities are not required to report AI system failures, anomalous AI behaviour, or AI-related market incidents to SEBI. Fifth, there is no regulatory sandbox framework for AI in securities markets: unlike the FCA, SEBI does not provide a structured framework for testing innovative AI applications in a controlled regulatory environment.[55]

Accountability Gaps

The accountability framework for AI-driven misconduct in Indian securities markets contains three significant gaps. First, liability attribution remains unclear: while Regulation 18-DA establishes that exchanges and clearing corporations are "solely responsible" for their AI outputs, no equivalent provision addresses the liability of brokers, investment advisers, and portfolio managers for AI-driven harm, and the general liability framework of the SEBI Act does not provide adequate guidance on attribution between AI developers, deploying entities, and supervising intermediaries. Second, there is no strict liability provision for AI deployment, the inherently hazardous nature of AI deployment in securities markets justifies a strict liability regime, but no such regime exists in Indian law, requiring SEBI to prove intent or negligence in enforcement proceedings that may be technically difficult and resource-intensive. Third, the intermediary accountability framework is inadequate: the Code of Conduct obligations of brokers and investment advisers under their respective SEBI regulations do not contain AI-specific conduct standards, creating a normative gap between the general standard of "due skill, care and diligence" and the specific obligations that AI deployment requires.[56]

Systemic Risk Concerns

The management of AI-driven systemic risk is the area in which the Indian regulatory framework is most visibly inadequate. Three specific systemic risk scenarios require regulatory attention. First, algorithmic herding the simultaneous adoption of similar AI trading strategies by multiple market participants creates the risk of correlated market movements that can cause

[55] SEBI Consultation Paper (n 1), paras 9–12 (proposed pre-deployment approval and algorithm registration requirements, not yet implemented as binding regulations).
[56] Schedule II, Code of Conduct, SEBI (Stock Brokers) Regulations, 1992; Regulation 17, SEBI (Investment Advisers) Regulations, 2013 (general conduct standards without AI-specific elaboration).

severe price dislocations. The Indian framework does not contain any mechanism for monitoring the aggregate market footprint of similar AI strategies, such as a market-wide stress test of algorithmic trading concentration. Second, flash crashes caused by AI feedback loops represent a systemic risk that SEBI's existing circuit breaker mechanisms were not designed to address and may be insufficiently rapid to prevent. Third, the interconnection between AI trading systems across exchanges and asset classes creates cross-market systemic risk that extends beyond SEBI's regulatory perimeter and requires coordination with RBI, IRDAI, and PFRDA.[57]

The 2025 Consultation Paper acknowledges systemic risk as a concern but does not propose a specific systemic risk management framework. The Financial Stability Board's framework for AI-related financial stability risks which recommends scenario analysis, stress testing, and cross-sector regulatory coordination as the primary tools for systemic AI risk management provides a useful template for SEBI to adapt.[58]

Enforcement Limitations

SEBI's enforcement capability in the AI context is constrained by four limitations. First, investigative powers: SEBI's powers under Section 11C of the SEBI Act to call for records and information may not be sufficient to compel disclosure of the proprietary AI source code, training data, and model architecture that are necessary to investigate AI-driven manipulation, particularly where these are held by third-party AI vendors. Second, evidentiary challenges: establishing that a specific AI output constitutes a prohibited act under the PFUTP Regulations requires technical expert evidence about the AI system's decision logic that is difficult and expensive to obtain and that may be contested by the respondent's own expert witnesses. Third, resource constraints: SEBI's enforcement division may lack the technical AI expertise necessary to investigate complex AI-driven misconduct without external specialist support. Fourth, cross-border enforcement: AI systems developed and operated outside India may cause harm to Indian investors and markets without being subject to SEBI's investigative jurisdiction, requiring SEBI to rely on IOSCO's Multilateral Memorandum of Understanding for cross-border regulatory cooperation.[59]

[57] Financial Stability Board (n 10), p. 43 (on algorithmic herding and cross-sector systemic risk).
[58] Ibid., pp. 49–51 (recommended tools for systemic AI risk management).
[59] Section 11C, SEBI Act, 1992 (investigative powers); IOSCO, Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information (MMoU) (2002, as amended).