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Original Article

Beyond the Algorithm: Emerging Market Pathways to Ethical AI Governance in Digital Capital Markets - A Comparative Study of Nigeria, India, and the European Union

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Abstract

Introduction: Algorithmic decision-making systems increasingly govern capital market operations, yet regulatory frameworks struggle to ensure accountability and protect consumer rights. This study examines Nigeria's emerging algorithmic accountability framework through comparative analysis with India and the European Union.

Methods: Employing doctrinal legal methodology, we systematically analyzed Nigeria's Data Protection Act 2023, General Application and Implementation Directive 2025 (GAID), and Investments and Securities Act 2025, and compared them with India's Digital Personal Data Protection Act 2023 and the EU's General Data Protection Regulation, Artificial Intelligence Act, and Markets in Financial Instruments Directive II. India was selected as a common-law peer comparator on the basis of shared legal tradition, market characteristics, and developmental stage, while the European Union was selected as a normative and aspirational regulatory benchmark on the strength of its regulatory maturity and documented influence on Nigeria's data protection architecture. Comparison was structured using an eight-dimension analytical framework synthesized from established comparative data-protection and AI-governance scholarship and applied through a consistent four-step protocol across all three jurisdictions.

Results: While Nigeria's GAID 2025 represents significant advancement through emerging technologies provisions, critical gaps persist. These include incomplete operationalization of automated decision-making safeguards, absent sector-specific capital market guidance, inadequate explicability obligations, weak anti-discrimination provisions, and deficient enforcement coordination between regulatory bodies. India demonstrates moderate provisions through grievance mechanisms, while the EU provides comprehensive accountability through explicit algorithmic constraints and risk-based classifications.

Conclusion: Nigeria requires specific legislative amendments, including explicit automated decision-making provisions, mandatory impact assessments for high-risk systems, sector-specific capital market regulations, and formalized inter-agency coordination mechanisms. A transparent, criteria-based prioritization exercise, scoring each legislative gap on the cost of inaction and the difficulty of reform, supports a three-tier reform roadmap distinguishing provisions for immediate adoption, medium-term adaptation, and long-term aspiration. These recommendations balance Nigeria's developmental context with robust governance standards.

Categories: Law and Economics, Corporate Governance & Business Ethics

Keywords: algorithmic accountability, ai governance, fintech, data protection law, regulation

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Introduction

Algorithmic decision-making systems fundamentally transform the capital markets legal landscape. Robo-advisory platforms, automated trading systems, algorithmic credit scoring, and blockchain-based virtual asset exchanges now constitute core infrastructure, processing vast quantities of personal and financial data through opaque computational processes (Aldboush and Ferdous, 2023). This technological transformation generates novel legal challenges regarding the governance of automated decisions affecting fundamental economic rights and the need to balance innovation with consumer protection in resource-constrained emerging markets (IOSCO, 2024).

The rapid proliferation of artificial intelligence (AI) in financial services has been extensively documented in recent studies. Aldboush and Ferdous demonstrated that trust, privacy, and ethical AI governance are foundational to sustainable fintech ecosystems (Aldboush and Ferdous, 2023). The International Monetary Fund (IMF) has noted that AI adoption in capital markets is accelerating across both advanced economies and emerging market and developing economies (EMDEs), with specific applications in asset management, wholesale trading, robo-advisory services, and crowdfunding (International Monetary Fund, 2025). However, adoption rates diverge significantly across jurisdictions, with regulatory capacity being a key differentiating factor (International Monetary Fund, 2025).

Nigeria's capital market exemplifies these challenges. The Investments and Securities Act (ISA) 2025 modernized regulatory architecture to encompass digital assets and algorithmic trading operations (Federal Republic of Nigeria, 2025a). Concurrently, the Nigeria Data Protection Act (NDPA) 2023 established comprehensive privacy principles (Federal Republic of Nigeria, 2023), subsequently operationalized through the General Application and Implementation Directive (GAID) 2025 (NDPC, 2025). However, their intersection reveals substantial algorithmic accountability gaps despite GAID 2025's explicit provisions on emerging technologies.

Recent literature has identified the research gap this study seeks to address, and, as detailed further below, that gap has two specific components that this study is designed to close: the absence of a systematic post-GAID 2025 comparative assessment and the absence of any capital-markets-specific application of such an assessment. Nwatu, Arum, and Chime found that Nigerian securities regulation continues to face recurring structural challenges requiring realignment (Nwatu et al., 2024). Olusegun documented that AI-enabled financial services in emerging markets operate within inadequate regulatory frameworks, particularly for rural and underserved populations (Olusegun, 2024). Aloamaka specifically critiqued the NDPA 2023 as requiring operational elaboration to be effective, a finding this study extends by showing concretely, through Table *1*, exactly which operational elements are missing (Aloamaka, 2025). These studies collectively reveal a need for systematic comparative analysis of Nigeria's algorithmic governance gaps and specific legislative recommendations.

India represents an ideal peer comparator as both are large emerging market democracies with common law traditions, rapidly digitalizing economies, recent comprehensive data protection legislation, and similar developmental priorities. India's Digital Personal Data Protection Act (DPDPA) 2023 provides valuable comparative insights (Government of India, 2023). Husain, Mishra, and Bansal have analyzed the legal and regulatory challenges of AI in India's fintech sector under the DPDPA, noting that its innovation-facilitative orientation creates gaps in algorithmic accountability that require specific legislative attention (Husain et al., 2025).

The European Union (EU) is included in this study not as a peer jurisdiction but as a normative and aspirational benchmark. Unlike Nigeria and India, the EU is not itself a common law jurisdiction, it comprises predominantly civil law member states operating within a supranational regulatory architecture and legal-family similarity is accordingly not the basis for its inclusion. Rather, the EU is included because it has developed the world's most comprehensive algorithmic accountability framework through the GDPR, the AI Act, and MiFID II (Regulation (EU) 2016/679, 2016), and because Bradford identifies the Brussels Effect (the diffusion of EU regulatory standards globally) as directly relevant to Nigeria, whose NDPA is structurally GDPR-inspired (Bradford, 2020). The EU therefore functions in this study as a ceiling of regulatory ambition against which the adequacy of Nigeria's and India's common-law frameworks can be assessed, rather than as a jurisdiction Nigeria is expected to replicate wholesale.

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Research gap

Notwithstanding this body of literature, prior peer-reviewed studies have not applied a systematic, multi-dimensional comparative legal framework to Nigeria's post-GAID 2025 algorithmic governance architecture. Specifically: (1) no existing study has assessed the adequacy of Nigeria's algorithmic governance framework against international comparators following the issuance of GAID 2025 in March 2025, and (2) no existing study has done so with specific reference to the capital markets context created by ISA 2025. The GAID 2025 represents the most significant regulatory development in Nigeria's AI governance landscape to date, yet its adequacy and gaps have not been systematically assessed against international comparators. This study addresses that two-part gap directly.

Objectives

The study's objectives are as follows:

1. To systematically analyze Nigeria's existing algorithmic governance framework under the NDPA, GAID 2025, and ISA 2025.

2. To compare this framework with India's DPDPA 2023 and the EU's GDPR/AI Act/MiFID II.

3. To formulate context-appropriate legislative recommendations for closing identified gaps in Nigeria's algorithmic governance.

Research Method

Research design

This study employs doctrinal legal methodology, which involves systematic analysis and critical synthesis of primary legal sources including statutes, regulations, and directives. This approach is appropriate for comparative legal research examining the substantive content and structural features of legislative frameworks across jurisdictions. The doctrinal method has been widely employed in comparative law research on data protection and algorithmic governance (Habibulloh, 2025) (Fenwick et al., 2018).

The three jurisdictions were selected under two distinct comparator logics, which are kept analytically separate throughout the study. India functions as a peer comparator, selected because Nigeria and India share a common law tradition, large and rapidly digitalizing emerging-market economies, recent comprehensive data protection legislation enacted within months of one another, and comparable developmental priorities; the comparison with India is therefore designed to identify feasible, resource-appropriate reforms. EU functions as a benchmark comparator, selected on the basis of regulatory maturity and documented diffusion influence (the Brussels Effect) rather than legal-family similarity; the EU is a civil law-oriented supranational system, and the comparison with it is designed to identify the outer bound of regulatory ambition rather than a directly transplantable model. This distinction is applied consistently in the Recommendations, where India's provisions inform the medium-term reform tier and EU provisions inform the aspirational long-term tier.

Data collection process

Data were collected from three categories of primary sources. First, Nigerian primary legislation and regulations, namely the Nigeria Data Protection Act 2023, the General Application and Implementation Directive 2025, and the Investments and Securities Act 2025 (Federal Republic of Nigeria, 2023) (Federal Republic of Nigeria, 2025a) (NDPC, 2025). Second, Indian primary legislation and regulatory instruments, namely the Digital Personal Data Protection Act 2023 and Securities and Exchange Board of India (SEBI) circulars on algorithmic trading and robo-advisory services (Government of India, 2023) (SEBI, 2020) (SEBI, 2023). Third, EU primary legislation and regulatory guidance, namely the GDPR (Regulation 2016/679), the EU AI Act (entered into force in 2024), Directive 2014/65/EU (MiFID II), and European Securities and Markets Authority (ESMA) guidelines (Regulation (EU) 2016/679, 2016) (Regulation (EU) 2024/1689, 2024) (Directive 2014/65/EU, 2014) (ESMA, 2018).

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Secondary sources include peer-reviewed journal articles published between 2017 and 2026, legal commentaries, and reports from international regulatory bodies including the IMF, IOSCO, and the Bank for International Settlements (BIS). Database searches were conducted in Westlaw, HeinOnline, Social Science Research Network (SSRN), and Google Scholar using search terms including "algorithmic accountability," "automated decision-making regulation," "capital markets AI governance," and "emerging market data protection."

Data analysis method

Data analysis employed a structured comparative framework across eight legislative dimensions: (1) automated decision-making provisions, (2) impact assessment requirements, (3) transparency and explicability obligations, (4) human oversight requirements, (5) risk-based classification systems, (6) sector-specific capital market provisions, (7) enforcement architecture, and (8) legislative philosophy. This framework was applied consistently across all three jurisdictions to enable systematic cross-jurisdictional comparison. Findings were synthesized into a gap analysis and legislative recommendations calibrated to Nigeria's developmental context.

These eight dimensions are not ad hoc; they are an author-synthesized adaptation of recurring categories in the comparative data-protection and AI-governance literature, consolidated into a single protocol because no single source addresses all eight jointly with a capital-markets application in mind. Dimensions (1) and (4) derive from the automated-decision-making and human-oversight structure of GDPR Article 22 and its secondary literature (Wachter et al., 2018) (Selbst and Barocas, 2018); dimension (5) derives from the risk-tiering structure of the EU AI Act (Ebers, 2024); dimensions (2) and (6) derive from the impact-assessment and sector-specific-regulation categories emphasized in the IOSCO (2024) and IMF (2025) capital-markets AI risk reports; and dimensions (3), (7), and (8) were added by the authors to capture, respectively, operational explicability, institutional enforcement capacity, and overarching regulatory philosophy, none of which is fully captured by the ADM/oversight/risk-tiering categories alone.

Collectively, the eight dimensions are organized to track the regulatory lifecycle of an algorithmic system: dimensions (1), (4), and (5) address ex-ante design constraints; dimension (2) addresses ex-ante process requirements; dimensions (3) and (6) address ongoing obligations; and dimensions (7) and (8) address ex-post accountability and overarching orientation. The framework is not exhaustive: dimensions such as cross-border data transfer restrictions, competition or antitrust interaction, and data localization requirements fall outside its scope and are noted as a limitation rather than an oversight (see Limitations and Future Directions).

The framework was applied to each jurisdiction using a consistent four-step protocol. First, the relevant statutory or regulatory anchor text for each dimension was identified in each jurisdiction's primary sources. Second, each jurisdiction's position on that dimension was classified using a consistent three-point scale - absent, partial or implicit, or explicit and operationalized - rather than a binary presence/absence determination. Third, the classification was recorded in the corresponding comparative table (Tables *1*-*8*). Fourth, the cross-jurisdictional pattern emerging from each table was synthesized and linked to the relevant secondary literature, with particular attention to enforceability and operationalizability rather than the mere textual presence of a provision, so that, for example, a general transparency principle is distinguished from an actionable algorithmic-logic disclosure obligation even where both might loosely be described as "transparency" provisions.

Results And Discussion

Nigeria's Legislative Framework

Nigeria Data Protection Act 2023 (NDPA)

The NDPA, receiving Presidential assent on June 12, 2023, established Nigeria's first comprehensive data protection legislation (Federal Republic of Nigeria, 2023), repealing the 2019 Regulation and transitioning to primary legislation with enhanced enforcement powers (Aloamaka, 2025). Aloamaka situates the NDPA within the global data protection convergence trend, noting its structural alignment with GDPR while observing that operational gaps remain particularly acute in algorithmic governance (Aloamaka, 2025).

Section 24 establishes seven data protection principles: lawfulness, fairness, and transparency; purpose limitation; data minimization; accuracy; storage limitation; integrity and confidentiality and accountability (Federal Republic of Nigeria, 2023). These principles apply universally but required operational clarification through GAID 2025. Sections 34-38 establish data subject rights, but notably absent is any equivalent to GDPR Article 22's right not to be subject to solely automated decision-making (Regulation (EU) 2016/679, 2016). Section 29 imposes general security obligations, and Section 39 requires processing activity records but does not mandate algorithmic impact assessments (Federal Republic of Nigeria, 2023).

General Application and Implementation Directive 2025 (GAID)

The GAID 2025, issued March 20, 2025, pursuant to NDPA Sections 61 and 62, represents Nigeria's most comprehensive regulatory response to emerging technology challenges (NDPC, 2025). Article 43 specifically addresses AI, Internet of Things, and Blockchain deployment for personal data processing. Article 43(2) requires that data controllers deploying emerging technologies establish technical and organizational parameters, recognizing the right of data subjects not to be subject to decisions solely based on automated processes or algorithms (NDPC, 2025). Article 43(4) mandates Data Privacy Impact Assessments (DPIAs) assessing disparate outcomes and Data Subjects' Vulnerability Indexes (DSVIs) as stated in Schedule 6. Article 44 requires data controllers to benchmark with global consensus instruments such as the UN Resolution on Artificial Intelligence (NDPC, 2025).

Investments and Securities Act 2025 (ISA)

The ISA 2025, repealing the 2007 Act, modernizes Nigeria's capital market regulatory framework (Federal Republic of Nigeria, 2025a), significantly expanding the regulatory perimeter to include virtual asset service providers, digital asset operators, virtual asset exchanges, and credit enhancement facility providers. However, ISA 2025 contains minimal specific algorithmic governance requirements beyond general regulatory principles. Section 357 expands regulated entities but does not address algorithmic decision-making (Federal Republic of Nigeria, 2025a). Sections 198-223 establish investor protection mechanisms but do not address algorithmic transparency, explicability requirements, human oversight mandates, or rights to contest algorithmic decisions (Federal Republic of Nigeria, 2025a).

Critical Legislative Gaps

Comprehensive doctrinal analysis reveals five critical gaps persisting despite GAID 2025's provisions. First, incomplete operationalization of Article 43(2)(a) - the right not to be subject to solely automated decisions - lacks definitions, thresholds, exceptions, and enforcement mechanisms. This gap also leaves Nigeria without the anti-discrimination safeguards attached to automated decision-making in more developed frameworks; EU law, for example, permits controllers to use protected attributes such as sex or race to affirmatively increase algorithmic fairness, treating this as lawful positive action rather than prohibited discrimination - a doctrinal safeguard entirely unavailable in Nigeria absent any anti-discrimination-specific algorithmic provision (Hoch et al., 2024). Third, insufficient transparency and explicability mandates, with no existing requirements for ongoing transparency reports, model explicability documentation, or consumer-facing explanations. Fourth, weak enforcement coordination, where no formal protocols exist between the NDPC and the Securities and Exchange Commission (SEC) for information sharing, joint investigations, or jurisdictional clarity regarding algorithmic systems. Fifth, limited human oversight requirements found in Article 43, which does not mandate human review for consequential decisions, qualification standards for human reviewers, or decision override authority.

India's Legislative Framework

Digital Personal Data Protection Act 2023 (DPDPA)

India's DPDPA (Act No. 22 of 2023), receiving Presidential assent on August 11, 2023, represents an evolution from sectoral to comprehensive data protection legislation (Government of India, 2023). Husain et al. observe that the DPDPA deliberately adopts a streamlined, innovation-facilitating orientation, reflecting India's developmental priorities, but identify this as creating accountability gaps for AI-driven fintech that remain unaddressed in the current framework (Husain et al., 2025). Sections 4-11 establish data processing obligations including purpose limitation, notice

requirements, consent mechanisms, and data accuracy obligations (Government of India, 2023). However, India's DPDPA does not contain provisions equivalent to GDPR Article 22 regarding automated decision-making. The Act lacks explicit rights for data subjects to contest or obtain human review of automated decisions.

Section 13 requires Data Fiduciaries to establish grievance redressal mechanisms providing acknowledgment and resolution within prescribed periods. However, these mechanisms do not specifically address algorithmic explicability, contestation of automated outputs, or human oversight requirements (Government of India, 2023).

Significant Data Fiduciary Provisions

Sections 10-11 establish enhanced obligations for Significant Data Fiduciaries (SDFs) designated based on processing volume, sensitivity, and potential impact (Government of India, 2023). Section 10(3) requires SDFs to appoint data protection officers, conduct data protection impact assessments, perform periodic audits, and undertake cybersecurity measures (Government of India, 2023). India's tiered approach provides a model Nigeria could adapt, focusing intensive requirements on high-risk algorithmic systems while maintaining a lighter touch for lower-risk applications.

SEBI Regulations

SEBI has issued various circulars addressing technology in capital markets but provides limited specific algorithmic governance provisions (SEBI, 2020) (SEBI, 2023). The Master Circular on Stock Brokers (2023) addresses algorithmic trading through risk management system requirements but does not establish specific algorithmic transparency, fairness testing, or consumer protection requirements (SEBI, 2023). Like Nigeria, India lacks comprehensive sector-specific capital market algorithmic governance despite advanced market digitalization.

European Union Framework

General Data Protection Regulation (GDPR)

The GDPR (Regulation (EU) 2016/679, 2016), effective May 25, 2018, established the world's most comprehensive data protection framework. Article 22(1) establishes the right not to be subject to decisions based solely on automated processing, including profiling, producing legal effects or similarly significantly affecting the data subject (Regulation (EU) 2016/679, 2016). Article 22(3) requires controllers to implement suitable safeguards including the right to obtain human intervention, express a viewpoint, and contest the decision (Regulation (EU) 2016/679, 2016). Articles 13(2)(f) and 15(1)(h) specifically require provision of meaningful information about the logic involved, as well as the significance and the envisaged consequences of such processing. Article 35 requires impact assessments where processing using new technologies is likely to result in high risk to natural persons (Regulation (EU) 2016/679, 2016).

EU AI Act

The EU AI Act (Regulation 2024/1689, 2024), entering into force in 2024, establishes comprehensive horizontal AI regulation (Regulation (EU) 2024/1689, 2024). Articles 6-7 establish risk-based classification across four tiers. Annex III specifically lists AI systems for evaluating creditworthiness as high-risk, directly addressing algorithmic credit scoring in capital markets (Regulation (EU) 2024/1689, 2024). Article 14 specifically requires high-risk systems to be designed to enable effective human oversight, including ability to fully understand system capacities, remain aware of automation bias, interpret system outputs correctly, and override system outputs (Regulation (EU) 2024/1689, 2024). Lazcoz, de Miguel Beriain, and Muñoz-Aranguren have analyzed human oversight under both GDPR and the AI Act, concluding that mandatory human intervention represents a procedural right that is part of a culture of accountability, rather than merely an individual entitlement (Lazcoz et al., 2023).

MiFID II and ESMA Guidelines

MiFID II (Directive 2014/65/EU) establishes comprehensive capital market regulation including algorithmic trading provisions (Directive 2014/65/EU, 2014). Article 17(1) requires investment firms engaged in algorithmic trading to have effective risk control systems (Directive 2014/65/EU, 2014). ESMA Guidelines on MiFID II Suitability Requirements (2018)

address automated investment advice, requiring human oversight of algorithmic recommendations, transparency regarding methodology, and regular algorithm testing and validation (ESMA, 2018). This sectoral guidance provides operational detail entirely lacking in Nigeria's and India's frameworks.

Comparative Synthesis and Gap Analysis

The following tables present a structured cross-jurisdictional comparison across eight analytical dimensions. Findings are linked to existing literature in each section.

Legislative Feature	Nigeria	India	European Union
Explicit restrictions	Limited (GAID Art. 43(2)(a))	None	Art. 22 (prohibition with exceptions)
Human review rights	None	Implicit (s. 13 grievance)	Explicit (Art. 22(3))
Explanation rights	None	None	Explicit (Arts. 13, 15)
Contestation mechanisms	None	Grievance mechanism (s. 13)	Explicit (Art. 22(3))

TABLE 1: Automated Decision-Making Provisions

GAID, General Application and Implementation Directive; Art./Arts., Article/Articles; S., Section

Summary: Table *1* reveals the starkest disparity across jurisdictions. The EU's GDPR Article 22 creates a default prohibition on solely automated decisions with significant effects and provides explicit rights to human review, explanation, and contestation. India occupies an intermediate position through general grievance redressal mechanisms. Nigeria presents the weakest posture, with no operationalized explanation rights, human review rights, or contestation mechanisms, creating a practical legal vacuum in which algorithmic systems may render consequential decisions affecting credit, investment suitability, and access to financial services without any specific regulatory constraint requiring transparency, human oversight, or recourse.

Applying the enforceability criterion from the four-step protocol: India's Section 13 mechanism is classified as "partial or implicit" rather than "explicit and operationalized," because it establishes a general grievance channel without conferring an algorithm-specific right to contest an automated output or to demand human review of one - a materially weaker entitlement than GDPR Article 22(3), even though both might loosely be labelled "contestation mechanisms".

Linkage to Literature: Wachter, Mittelstadt, and Russell analyze Article 22's right to explanation and find it remains insufficiently defined even in the most advanced framework (Wachter et al., 2018). For Nigeria, where the right is not yet formally enacted, this ambiguity problem is compounded. Goodman and Flaxman document the fundamental tension between algorithmic opacity and transparency obligations, concluding that explanation rights require sector-specific elaboration to be meaningful - a gap Table *1* confirms is absent in Nigeria (Goodman and Flaxman, 2017). Selbst and Barocas highlight that without explanation and contestation rights, individuals harmed by algorithmic decisions in financial markets have no meaningful legal recourse (Selbst and Barocas, 2018).

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Legislative Feature	Nigeria	India	European Union
General high-risk processing	None	Significant Data Fiduciaries (s. 10(3)(b))	Mandatory (Art. 35)
Algorithmic-specific	None	None	Explicit (Art. 35(3)(a))
Pre-deployment requirement	None	Yes (for SDFs)	Yes (mandatory)

TABLE 2: Impact Assessment Requirements

Art., Article

Summary: Table *2* demonstrates that Nigeria is the only jurisdiction entirely without any form of impact assessment requirement for algorithmic systems. The EU mandates DPIAs for high-risk automated processing under GDPR Article 35, with Article 35(3)(a) specifically identifying automated profiling as triggering mandatory DPIA obligations. India requires SDFs to conduct data protection impact assessments under DPDPA Section 10(3)(b). Nigeria's NDPA and ISA 2025 contain no equivalent provisions, meaning harmful algorithmic systems may be deployed in capital markets without any prior regulatory scrutiny.

Neither India's nor the EU's provision is merely aspirational: both attach a pre-deployment trigger with a designated responsible party (the SDF or the controller), which is what elevates them from "partial" to "explicit and operationalized" under the classification protocol. Nigeria's GAID 2025 Article 43(4) DPIA requirement, discussed above, is not reflected in this table because it currently lacks a defined algorithmic-specific trigger and is accordingly treated under Table *1* rather than as a general impact-assessment regime.

Linkage to Literature: Kaminski and Malgieri demonstrate that mandatory algorithmic impact assessments serve a preventive governance function qualitatively distinct from ex-post enforcement, shifting the burden of harm identification to developers before deployment (Kaminski and Malgieri, 2021). Mittelstadt et al. identify pre-deployment bias testing as a critical safeguard against discriminatory outcomes, particularly in credit and financial services (Mittelstadt et al., 2016). Demirguc-Kunt, Klapper, and Singer found that algorithmic exclusion disproportionately affects low-income and underserved populations - a risk Table *2* confirms is unaddressed in Nigeria (Demirguc-Kunt et al., 2017).

Legislative Feature	Nigeria	India	European Union
General transparency	Principle (NDPA s. 24(2)(c))	Notice requirement (DPDPA s. 5)	Comprehensive (Arts. 13–15)
Algorithmic logic disclosure	None	None	Explicit (Arts. 13(2)(f), 15(1)(h))
Public reporting	None	None	Not mandated; widely practiced

TABLE 3: Transparency and Explicability

Art./Arts., Article/Articles; S., Section; NDPA, Nigeria Data Protection Act

Summary: Table *3* illustrates the critical distinction between general transparency principles and actionable explicability obligations. Both Nigeria and India articulate general transparency as a data protection principle but neither mandates disclosure of algorithmic logic, significance, or consequences when automated decision-making occurs. The EU uniquely requires that data subjects receive meaningful information about the logic involved in automated processing. In capital market contexts, this absence means that consumers in Nigeria have no legal entitlement to understand the logic behind algorithmic decisions affecting their financial outcomes.

This is the clearest illustration in the framework of the presence/enforceability distinction: Nigeria's Section 24(2)(c) and India's Section 5 both satisfy "general transparency" as a textual matter, yet neither is operationalized into a disclosure obligation a data subject could invoke against a specific algorithmic outcome, and both are accordingly classified as "partial" rather than "explicit and operationalized" on the algorithmic-logic-disclosure row.

Linkage to Literature: Floridi et al. establish explicability as a foundational principle of AI ethics, emphasizing that meaningful governance requires operationalizable disclosure obligations rather than abstract principles (Floridi et al., 2018). Cheong systematically confirms in a widely cited review that the lack of transparency and accountability in AI systems is a central governance challenge, and that effective frameworks must translate ethical principles into binding technical and legal requirements, a step Nigeria has not yet taken (Cheong, 2024). Pasquale warns that without mandatory logic disclosure, individuals cannot contest or understand algorithmic decisions affecting their lives - the current legal reality for Nigerian capital market participants (Pasquale, 2015). Bradford contextualizes these findings through the Brussels Effect: Nigeria's NDPA has been structurally influenced by EU standards, but the operational specificity required for algorithmic explicability has not been transposed (Bradford, 2020). Calvi and Van Looveren further demonstrate that algorithmic impact assessments conducted in a participatory and transparent fashion can bridge legal, social, and technical domains to produce fairer AI outcomes - an approach currently unavailable in Nigeria due to the absence of any such requirement (Calvi and Van Looveren, 2023).

Legislative Feature	Nigeria	India	European Union
Design requirements	None	None	Explicit (AI Act Art. 14)
Review procedures	None	None	Required (GDPR Art. 22(3))
Override capabilities	None	None	Required (AI Act Art. 14)

TABLE 4: Human Oversight Requirements

Art., Article; GDPR, General Data Protection Regulation

Summary: Table *4* reveals that the EU stands alone in mandating human oversight. GDPR Article 22(3) mandates human review procedures for significant automated decisions, and AI Act Article 14 requires that high-risk AI systems be designed to enable effective human oversight including override capabilities. Both Nigeria and India record "None" across all three dimensions, indicating that neither jurisdiction has legislated any requirement for meaningful human involvement in algorithmic decision-making systems.

This is the one table in which Nigeria and India are classified identically across every row; the equivalence is genuine rather than an artifact of coarse coding, since neither jurisdiction's primary sources contain any anchor text on design requirements, review procedures, or override capability for automated systems.

Linkage to Literature: Calo argues that automation bias - the documented human tendency to over-rely on algorithmic outputs - makes mandatory human oversight provisions not merely advisable but essential for meaningful consumer protection in AI-driven markets (Calo, 2017). Lazcoz et al. examine human oversight under GDPR and the AI Act, concluding that mandatory human intervention represents a procedural right that is part of a culture of accountability rather than merely an individual entitlement (Lazcoz et al., 2023). The absence of human oversight requirements in Nigeria creates unaddressed systemic risk in high-stakes algorithmic financial decisions.

Legislative Feature	Nigeria	India	European Union
Tiered obligations	None	SDFs (Sections 10–11)	Comprehensive (AI Act Arts. 6–7)
High-risk categories	None	Based on SDF designation	Explicitly defined (AI Act Annex III)
Proportionate requirements	None	Yes (enhanced for SDFs)	Yes (graduated by risk)

TABLE 5: Risk-Based Classification

Arts., Articles; SDF, Significant Data Fiduciary

Summary: Table *5* examines whether each jurisdiction applies proportionate regulatory requirements calibrated to risk level. The EU's AI Act establishes four risk tiers with Annex III specifically listing algorithmic credit scoring as a high-risk application. India's DPDPA creates a binary SDF/non-SDF distinction providing a functional proportionality mechanism. Nigeria records "None" across all three dimensions, meaning all algorithmic systems - from basic data portals to sophisticated credit scoring engines - face the same minimal regulatory requirements, creating dangerous under-regulation of genuinely high-risk capital market applications.

India's SDF designation is classified as "explicit and operationalized" notwithstanding its binary (rather than graduated) structure, because it attaches concrete, triggerable obligations (Section 10(3)) to a defined threshold; it is therefore treated in this framework as a minimum viable - if coarse - proportionality mechanism, consistent with Prabha's assessment cited below (Prabha, 2025).

Linkage to Literature: Ebers argues that risk-based regulation is the correct approach to AI governance, as it avoids over-regulation and respects legislative proportionality by concentrating requirements on the highest-harm applications - precisely the framework Nigeria has yet to adopt (Ebers, 2024). Zetzsche, Buckley, and Arner identify risk-proportionate oversight as the defining characteristic of effective fintech regulation, with blanket uniform requirements representing a suboptimal regulatory model (Zetzsche et al., 2018). Prabha concludes that India's SDF framework is an incomplete but minimum viable risk differentiation mechanism for an emerging market - a benchmark Table *5* shows Nigeria has not reached (Prabha, 2025).

Legislative Feature	Nigeria	India	European Union
Legislative provisions	Minimal (ISA 2025)	None explicit	Comprehensive (MiFID II)
Regulatory guidance	Limited (SEC rules)	Limited (SEBI circulars)	Extensive (ESMA guidelines)
Algorithmic trading rules	None specific	General requirements	Detailed (MiFID II Art. 17)
Robo-advisory governance	None	Basic disclosure only	Comprehensive (ESMA, 2018)

TABLE 6: Sector-Specific Capital Market Provisions

ISA, Investments and Securities Act; SEC, Securities and Exchange Commission; SEBI, Securities and Exchange Board of India; ESMA, European Securities and Markets Authority; MiFID II, Markets in Financial Instruments Directive II; Art., Article

Summary: Table *6* examines capital market-specific algorithmic governance. The EU leads comprehensively: MiFID II Article 17 imposes specific obligations on algorithmic trading firms, and ESMA's 2018 guidelines provide detailed requirements for robo-advisory services covering transparency, human oversight, and algorithm validation. India's SEBI offers only basic disclosure circulars. Nigeria presents the weakest posture: ISA 2025 contains no specific provisions for algorithmic trading oversight, robo-advisory governance, or credit scoring standards - a critical gap, as capital markets present systemic and investor protection risks that general data protection frameworks cannot address.

Consistent with the enforceability criterion, India's "basic disclosure only" classification for robo-advisory governance reflects that SEBI's 2020 circular requires disclosure of the advisory process but does not require independent validation of the underlying algorithm, which is what distinguishes it from the EU's comprehensive ESMA framework rather than a difference in disclosure alone.

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Linkage to Literature: Schwarcz demonstrates that sector-specific algorithmic trading governance is essential for preventing systemic failures documented in markets without specific oversight frameworks (Schwarcz, 2021). Steennot concludes that disclosure-only frameworks are insufficient; effective robo-advisory governance requires algorithm verification by supervisors and investor compensation rights (Steennot, 2021). Fenwick, Vermeulen, and Corrales argue that absent sector-specific fintech regulation creates regulatory arbitrage in emerging markets (Fenwick et al., 2018). Birahim further shows that effective algorithmic governance requires institutional safeguards - including human-in-the-loop review and independent oversight - that are absent in Nigeria's ISA 2025 (Birahim, 2025). IOSCO confirms EMDEs face heightened AI risks due to regulatory capacity constraints (IOSCO, 2024).

Legislative Feature	Nigeria	India	European Union
Regulatory authority	NDPC (general), SEC (capital markets)	Data Protection Board, SEBI	DPAs, national regulators, ESMA
Coordination mechanisms	None explicit	None explicit	Established (cooperation procedures)
Maximum penalties	₦10M or 2% revenue	₹250 crore (~$30M)	€20M or 4% revenue
Enforcement track record	Nascent (2023 legislation)	Nascent (2023 legislation)	Established (since 2018)

TABLE 7: Enforcement Architecture

NDPA, Nigeria Data Protection Act; SEC, Securities and Exchange Commission; SEBI, Securities and Exchange Board of India; DPA, Data Protection Authority; ESMA, European Securities and Markets Authority

Summary: Table *7* examines the institutional and enforcement architecture. All three jurisdictions have split regulatory authority between a data protection body and a capital market regulator, but only the EU has developed formal coordination mechanisms. In Nigeria, the NDPC and SEC operate without any formal coordination protocol, creating jurisdictional ambiguity for algorithmic systems that simultaneously raise data protection and capital market governance concerns. Nigeria's maximum penalty of ₦10 million or 2% of annual revenue is substantially lower than both India's and the EU's penalties, raising questions about the deterrence effect.

Linkage to Literature: Cavoukian and Chibba demonstrate that regulatory frameworks without adequate enforcement mechanisms fail to change organizational behavior regardless of their substantive sophistication (Cavoukian and Chibba, 2018). Rubinstein and Good specifically examine regulatory coordination challenges in dual-authority frameworks and conclude that the absence of formal coordination protocols creates regulatory white spaces in which regulated entities exploit jurisdictional ambiguity to avoid accountability (Rubinstein and Good, 2012). Voss and Castets-Renard analyze GDPR enforcement sanctions and conclude that truly dissuasive administrative fines are essential for deterrence - a cautionary lesson for Nigeria's nascent enforcement architecture (Voss and Castets-Renard, 2021). Sivan-Sevilla further confirms through cross-national comparative analysis that resource constraints inhibit the translation of deterrence strategy into practice - precisely the risk Nigeria faces (Sivan-Sevilla, 2022).

Legislative Feature	Nigeria	India	European Union
Regulatory approach	Comprehensive, GDPR-inspired	Streamlined, innovation-focused	Precautionary, rights-protective
Specificity level	Moderate detail	Concise principles	Extensive granularity
Innovation-rights balance	Unclear (no algorithmic provisions)	Innovation-leaning	Rights-prioritized

TABLE 8: Legislative Philosophy

GDPR, General Data Protection Regulation

Summary: Table *8* examines overarching philosophical orientation. The EU adopts a precautionary, rights-protective philosophy. India has deliberately adopted a streamlined, innovation-focused approach. Nigeria's position is characterized as unclear in its innovation-rights balance: its NDPA is structurally GDPR-inspired and moderately detailed, suggesting a rights-protective orientation, but the complete absence of algorithmic provisions means its practical stance on the innovation-rights trade-off remains undefined. This philosophical ambiguity creates compliance uncertainty that itself functions as a governance failure.

Linkage to Literature: Bradford traces how the EU's rights-protective regulatory philosophy has diffused to jurisdictions worldwide, including Nigeria's NDPA, while noting that the philosophical transplant rarely includes the operational specificity that makes the original effective (Bradford, 2020). Al-Maamari provides cross-regional evidence confirming that effective AI governance requires frameworks that are globally informed yet context-sensitive, balancing rights protection with technological progress - exactly the balance Nigeria must consciously calibrate (Al-Maamari, 2025). Vuković, Dekpo-Adza, and Matović conclude in their systematic review that the critical gap across regulatory models is the lack of standardized frameworks for explainable AI and algorithmic governance, precisely the philosophical gap Table *8* identifies in Nigeria's framework (Vuković et al., 2025). Nigeria must consciously define its philosophical position on this spectrum as a prerequisite to developing coherent algorithmic governance provisions.

Recommendations

Prioritization Methodology

The three-tier reform roadmap presented below (immediate, medium-term, and aspirational) is derived from a transparent scoring exercise rather than an unstated normative judgment. Each of the eight legislative features analyzed in Tables *1*-*8* was scored on two five-point scales: (a) the cost or risk of leaving the current gap unaddressed, reflecting both the breadth of governance dimensions the gap affects and the severity of potential harm (1 = low cost/risk, 5 = high cost/risk); and (b) the cost or difficulty of legislative or regulatory reform, reflecting the institutional, technical, and political resources required (1 = low cost/difficulty, 5 = high cost/difficulty). Features combining a high gap-cost score with a low reform-cost score are prioritized for immediate action; features with moderate scores on both dimensions are assigned to the medium-term; and features with high reform-cost relative to gap-cost are treated as aspirational long-term benchmarks. The resulting scores and tier assignments are set out in Table *9*. This transparency is not a mere formality: regulatory impact assessment scholarship shows that expert judgments embedded in an RIA are themselves vulnerable to the same cognitive biases RIA is meant to correct for, entering both through the production of the assessment and through how its results are later read and used; making the scoring criteria explicit, as in Table *9*, is one documented safeguard against this source of bias (Drummond and Radaelli, 2024).

Legislative Feature	Cost/Risk of Status Quo Gap (1–5)	Cost/Difficulty of Reform (1–5)	Resulting Priority Tier
Automated decision-making rights (ADM)	5	1	Immediate
Mandatory impact assessments	4	2	Immediate
Human oversight requirements	4	1	Immediate
Explicability obligations	4	2	Immediate
Risk-based classification system	3	3	Medium-term
Sector-specific capital market rules	4	3	Medium-term
NDPC–SEC coordination protocols	3	2	Medium-term
Comprehensive AI Act–style technical annexes	2	5	Aspirational

TABLE 9: Reform Prioritization Matrix

NDPC, Nigerian Data Protection Commission; SEC, Securities and Exchange Commission; AI, Artificial Intelligence

ADM provisions score 5 on gap-cost because their absence creates the legal vacuum identified in Table *1* and simultaneously affects three to five other governance-critical dimensions (Tables *2*, *3*, and 4), while scoring 1 on reform-cost because they require statutory language modeled on an existing template (GDPR Article 22) rather than new institutional capacity. By contrast, comprehensive AI Act-style technical annexes score only 2 on gap-cost, since their absence is partially mitigated by the narrower immediate-tier reforms, but score 5 on reform-cost because they require sustained technical, supervisory, and institutional capacity that a nascent regulatory architecture is unlikely to possess in the short term. This scoring logic and not an unstated preference, is what determines the tier assignments below.

Immediate Priority: What Should Be Adopted

Explicit Automated Decision-Making Provision: Nigeria's ISA should adopt a provision modeled on GDPR Article 22, establishing a clear legal framework with defined exceptions, contestation rights, and explanation entitlements. This requires minimal additional resources and provides the critical rights foundation currently absent. Wachter et al. confirm that any meaningful data protection framework must address automated decision-making explicitly rather than relying on general transparency principles (Wachter et al., 2018).

Mandatory Impact Assessments for High-Risk Systems: Following India's tiered approach and the EU's targeted requirements, Nigeria should mandate algorithmic impact assessments for high-risk capital market applications, specifically robo-advisory platforms, credit scoring systems, and automated trading systems. This is consistent with

Kaminski and Malgieri's findings on the preventive governance value of pre-deployment assessment requirements (Kaminski and Malgieri, 2021).

Human Oversight Requirements: Legislative provisions requiring minimum human review mechanisms for consequential algorithmic decisions are resource-efficient and critical for accountability. Calo's research on automation bias confirms that regulatory mandates are necessary to overcome systematic over-reliance on algorithmic outputs (Calo, 2017).

Explicability Obligations: Requirements to disclose algorithmic logic to affected data subjects can be implemented through operational procedures without major cost. Floridi et al. argue that explicability is not merely a technical aspiration but a governance obligation that distinguishes responsible from irresponsible AI deployment (Floridi et al., 2018).

Medium-Term: What Should Be Adapted

Risk-Based Classification System: Nigeria should adopt graduated requirements following India's SDF framework rather than the EU's comprehensive AI Act taxonomy. This focuses intensive obligations on genuinely high-risk systems, consistent with Ebers's analysis that risk-based regulation is the correct approach because it respects proportionality and avoids unnecessary compliance burdens on lower-risk applications (Ebers, 2024).

Sector-Specific Capital Market Rules: The SEC should develop targeted algorithmic governance rules pragmatically focused on highest-risk applications. As Steennot demonstrates, disclosure-only frameworks for algorithmic financial advice are insufficient and must be supplemented by algorithmic validation requirements and enforceable investor compensation rights (Steennot, 2021).

NDPC-SEC Coordination Protocols: Formal inter-agency coordination mechanisms are essential to close the regulatory white spaces identified by Rubinstein and Good (Rubinstein and Good, 2012).

Aspirational Long-Term

Comprehensive Technical Requirements: EU AI Act's detailed technical specifications (Articles 8-15) likely exceed Nigeria's current regulatory capacity to enforce, though they provide long-term aspirational standards consistent with the trajectory of international AI governance as documented by IOSCO (IOSCO, 2024).

Limitations and Future Directions

This section distinguishes methodological limitations inherent to the study's design from the practical policy implications those limitations carry for Nigerian regulators.

Methodological Limitations

This study has several methodological limitations. First, as a doctrinal legal analysis, it does not examine empirical compliance rates, regulatory enforcement outcomes, or market participant behavior; quantitative research on Nigerian fintech operators' algorithmic governance practices would complement these findings. Second, GAID 2025 is very recent legislation with limited secondary literature, requiring reliance primarily on primary text analysis. Third, comparative legal analysis across three jurisdictions necessitates some level of abstraction that may obscure nuances within each legal system, particularly given that the EU functions as a benchmark comparator drawn from a different legal family rather than a like-for-like peer (see Research Design). Fourth, the eight-dimension analytical framework, while synthesized from established literature, is not exhaustive; it does not separately assess dimensions such as cross-border data transfer restrictions, competition or antitrust interaction with algorithmic markets, or data localization requirements, each of which may independently affect algorithmic accountability in capital markets. Fifth, the reform prioritization matrix in Table *9* reflects the authors' scoring of gap-cost and reform-difficulty; while the criteria and scoring logic are now stated explicitly, the underlying scores remain an expert judgment rather than an empirically derived metric, and future work could validate or recalibrate them through structured stakeholder consultation with NDPC, SEC, and industry participants.

Policy Implications

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Each limitation carries a corresponding practical implication for Nigerian regulators. The absence of empirical compliance data (methodological limitation one) means that the gaps identified here should be treated as a legal-textual ceiling on protection rather than a measure of actual harm currently occurring; NDPC and SEC would benefit from commissioning a compliance audit of existing robo-advisory and algorithmic trading operators to establish a baseline against which the immediate-tier reforms in Table *9* can be assessed. The absence of formal NDPC-SEC coordination protocols (Table *7*) is, unlike the ADM and impact-assessment gaps, an institutional rather than purely legislative deficiency: it implies that Nigerian regulators could pursue a memorandum of understanding or joint supervisory framework administratively, without waiting for NDPA or ISA amendment, offering a faster path to closing that specific gap than the statutory reforms required elsewhere. Finally, the developmental-context calibration underlying Table *9* implies that Nigerian policymakers should resist pressure to adopt the EU's full technical annex regime (Articles 8-15) in the near term, since doing so would divert scarce regulatory capacity away from the immediate-tier reforms that this study's scoring identifies as offering the greatest accountability gain at the lowest implementation cost.

Future research could apply empirical methodologies to assess market participant compliance and could extend the comparative framework to additional EMDE jurisdictions to produce more generalized findings on emerging market algorithmic governance. In particular, the United Kingdom is noted as a valuable candidate additional common-law comparator for future work: unlike the EU, the UK shares Nigeria's and India's common law tradition, while its post-Brexit regulatory approach - including FCA and ICO guidance on algorithmic financial decision-making - has diverged from the EU's AI Act model in ways that could offer Nigeria a second, more directly transplantable common-law reference point alongside India's.

Contributions to Knowledge

This study makes three original contributions to literature. First, it provides a systematic comparative analysis of Nigeria's post-GAID 2025 algorithmic governance framework against India and the EU, covering eight legislative dimensions. Second, it identifies and taxonomizes five critical gaps that persist in Nigeria's framework despite GAID 2025's provisions, with specific attention to how those gaps manifest in capital market applications including robo-advisory platforms, algorithmic credit scoring, and automated trading systems. Third, it proposes a three-tier reform roadmap, distinguishing provisions that should be immediately adopted, adapted to Nigeria's developmental context in the medium term, and treated as aspirational long-term benchmarks - enabling policymakers to chart a proportionate reform pathway without requiring wholesale transplantation of resource-intensive EU standards.

Conclusions

Nigeria stands at a critical juncture regarding algorithmic governance in capital markets. Rapid digitalization under ISA 2025, encompassing virtual asset exchanges, algorithmic trading, and robo-advisory platforms, proceeds largely without a specific legal framework for algorithmic accountability. This creates risks in discriminatory credit scoring, opaque investment advice, manipulative behavioral profiling, and biased risk assessment, all documented internationally and likely present in Nigerian markets.

A transparent, criteria-based prioritization exercise, scoring each legislative gap on the cost of inaction and the difficulty of reform, supports a three-tier reform roadmap distinguishing provisions for immediate adoption, medium-term adaptation and long-term aspiration. These recommendations balance Nigeria's developmental context with robust governance standards.

This comparative study demonstrates that Nigeria's legislative framework exhibits five interconnected deficits relative to India and the EU: absent core algorithmic governance provisions; no pre-deployment impact assessment or bias testing requirements; insufficient sector-specific capital market provisions; weak enforcement architecture and coordination between NDPC and SEC and no risk-based proportionality framework. These gaps compound one another: without risk classification, no assessment requirement can be appropriately targeted; without explicit provisions, no enforcement action can be coherently brought.

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The study demonstrates that robust algorithmic accountability and market innovation need not be opposing objectives. Through appropriately designed legislation drawing from comparative best practices while respecting developmental realities, Nigeria can protect fundamental rights while facilitating beneficial technological advancement. India's pragmatic approach demonstrates feasible emerging market pathways. The EU's comprehensive standards provide aspirational benchmarks. The choice is not between innovation and regulation, but between thoughtful, prospective governance and reactive responses to algorithmic harms after they manifest.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

- **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work.
- **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.
- **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Data Availability Statements

The datasets (and/or code) supporting this study are available from the corresponding author upon reasonable request.

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