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Algorithmic Compliance under the Prevention of Money Laundering Act, 2002: Efficiency Gains, Liability Gaps, and the Need for Explainable AI

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ABSTRACT

The rapid digitalisation of financial systems, along with the multi-fold increase of the volumes of transactions, has forced the reporting entities to resort to the algorithmic means of the Anti-Money Laundering (AML) compliance even more. The Prevention of Money laundering act 2002 (PMLA) has committed the financial institutions to monitor suspicious transactions and maintain records as well as reporting any potential money laundering transactions. In this respect, compliance systems based on Artificial Intelligence will offer considerable efficiency benefits of scoring risks automatically, real-time tracking, and a more effective identification of patterns. This paper explains how algorithmic compliance is implemented in the PMLA by examining both the benefits of operational uses of the system and the liability loopholes created by automated systems. It will identify if existing statutory provisions will be sufficient to address cases where AI-based tools misclassify, contain biases, or undertake their actions without much transparency. Specific focus is placed on the notion of Explainable AI and how it can help overcome the challenge of technological opacities in legal demands of due process, auditability, and regulatory supervision. The research is of mixed doctrinal and analytical approach. It conducts a theological division of the PMLA, the lesser regulations, and the guiding principles to determine the current compliance framework augmented by a comparative evaluation of AML and AI principles of governance worldwide. Another techno-legal framework is then utilized to review the interactions between algorithmic opacity, automation bias, and model risk and legal standards of responsibility and institutional oversight. It suggests that the future regulatory reform should be based not on the technological adoption, but on a systematic regulation system that guarantees responsible, explainable, and legally sound AI-driven compliance procedures under the PMLA regime.

Keywords: Algorithmic Compliance, Prevention of Money Laundering, Explainable AI, financial institutions, Artificial Intelligence, Regulatory Supervision.

1. Introduction

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Algorithms compliance, specifically in the context of Anti-Money laundering (AML) laws, including India Prevention of Money laundering act, 2002 (PMLA), has notable efficiency benefits but comes with huge liability risk, which can only be addressed through the use of Explainable Artificial Intelligence (XAI). The PMLA requires the implementation of effective AML systems by financial institutions, which composes of customer due diligence, monitoring transactions and suspicious activity reporting. The conventional rule-based systems fail to keep up with the rising level of financial crime characteristics resulting in high false positive and low efficiencies[3]. The technologies of Artificial Intelligence (AI) and Machine Learning (ML) offer a ground breaking means of these issues, as they can increase their detection rates, minimize false positives, and monitor them in real-time. XAI improves the level of transparency in algorithmic AML compliance provided by the PMLA[4]. It gives unambiguous explanations to AI decisions and as such, regulators such as FIU-IND can conduct compliance audits. The characteristics of XAI are the explanation of the transaction flagging with the description of contributing factors, the detection of risk indicators, including the PEP status and behavioural anomalies, and the display of risk score generation with weighted contributions[5]. This visibility creates trust and reduces the liability concerns, whereas this visibility allows such audits to be conducted to identify bias on the compliance processes. The trend of using AI and ML systems in AML compliance has largely altered the regulatory environment in the context of the Prevention of Money Laundering Act, 2002. Financial institutions are increasingly using algorithmic systems to conduct customer due diligence, transaction monitoring, and suspicious transactions reporting to enhance efficiency and to identify more sophisticated models of financial crime[6].

These systems can be used as black box models most of the time, and regulating, financial institutions and people who are subject of automated decisions may not comprehend how such decisions are made. This transparency also brings up the issue of accountability, due process, explainability, and liability of algorithmic systems that make incorrect classifications, discriminatory results, or unfair reporting of transactions[7]. Although the algorithmic method enhances the detection capacity and minimizes the operational load, the current regulatory framework within the PMLA lacks responsibility distribution, algorithm

[3] Rajpoot, Muhammad Hamza, and Muhammad Wajahat Raffat. "AI-Driven Compliance and Detection in Anti-Money Laundering: Addressing Global Regulatory Challenges and Emerging Threats." Journal of Computational Science and Applications (JCSA), vol. 1, no. 2, 2024, pp. —. Crossref, https://doi.org/10.51846/jcsa.v1i2.3886.

[4] Paripati, Lohith, et al. "The Impact of AI on Regulatory Compliance and Anti-Money Laundering Efforts in Payment Processing." Journal for Research in Applied Sciences and Biotechnology, vol. 2, no. 5, Oct. 2023, pp. 241–252. Crossref, https://doi.org/10.55544/jrasb.2.5.34.

[5] Gelle, Venkata Raja Ravi Kumar. "Enhancing Financial Security: AI-Driven Anti-Money Laundering (AML) and Compliance Monitoring in the Banking Sector." World Journal of Advanced Research and Reviews, vol. 25, no. 1, 2025, pp. 2462–2476. Crossref, https://doi.org/10.30574/wjarr.2025.25.1.0365.

[6] Husnaningtyas, Nadia, et al. "A Systematic Review of Anti-Money Laundering Systems Literature: Exploring the Efficacy of Machine Learning and Deep Learning Integration." JEMA: Jurnal Ilmiah Bidang Akuntansi dan Manajemen, vol. 20, no. 1, 2023, pp. 91–116. Crossref, https://doi.org/10.31106/jema.v20i1.20602.

[7] Kumar, Surender, and Anjali Dixit. "Prevention of Money Laundering Act, 2002 (PMLA): Critical Review of Key Provisions." International Journal for Multidisciplinary Research, vol. 5, no. 6, 2023. Crossref, https://doi.org/10.36948/ijfmr.2023.v05i06.9437.

auditability, and clarification of the need of explainability in the automated compliance procedures. This introduces gaps in accountability so that it is not clear that the financial institution, the software developers, or the regulatory bodies are to be held accountable when there are errors in the algorithm. Thus, the research question of the given study is to investigate whether the existing PMLA compliance framework is effective enough to regulate algorithmic AML systems and to discuss the possibility of integrating XAI into the AML compliance systems in order to make them efficient, transparent, and legally responsible.

The PMLA, 2002 is the law that provides a framework against money laundering in India that defines the offenses, as well as obligating the entities to report any suspicious activity. The important provisions are mainly the Section 3, though, which is a penalty of money laundering that imposes imprisonment and fines, and the Section 12, that requires the keeping of records and reporting to the Financial Intelligence Unit. The PMLA Rules 2005 are the procedures of Customer Due Diligence and the timely submission of Suspicious Transaction Reports. Financial institutions are increasingly tapping AI to increase compliance efficiency as transaction volumes continue to increase.

Objectives of the study:

- To examine the efficiency and operational impact of algorithmic Anti-Money Laundering (AML) compliance under the Prevention of Money Laundering Act, 2002, and to analyse the liability gaps arising from automated compliance decision-making.

- To evaluate the legal and regulatory necessity of Explainable Artificial Intelligence (XAI) in AML enforcement and to propose a normative regulatory framework for governing algorithmic compliance under the PMLA.

The study looks at the legal and regulatory aspects of algorithmic compliance systems in the Anti-Money Laundering framework in the Prevention of money laundering act of 2002. It dwells upon the application of artificial intelligence and machine learning in financial organizations to monitor their transactions, evaluate risks, and identify suspicious activities. The study presents the efficiency benefits of having an algorithmic system and also discusses the issue of transparency and accountability. It also discusses Explainable AI in order to make the automated compliance decisions more interpretable.

The study also features a comparative perspective on the international standards of AML and AI regulations as a means to spot regulatory loopholes in India, relying on a doctrinal and techno-legal perspective of statutory interpretation and the legal literature. This research is limited by the fact that it is not an empirical study but a doctrinal and analytic one that draws on statutory interpretation and the scholarly literature as opposed to an empirical study. The fact that AI-based AML systems in financial institutions are proprietary restricts access to information about the operation of financial institutions. Moreover, the blistering development of AI technologies and regulations can lead to the need to revise the observations or recommendations. It lays more emphasis on the Indian legal system under the PMLA, which limits the scope of international regulatory examination.

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2. Literature Review

The increasing intricacy of financial crimes, along with the swift digital transformation of financial systems, prompted researchers to seek technologically advanced solutions to improve AML frameworks. Preliminary conversations about the adoption of technology had been initiated by Vanbrackle et al. (2023)[8], They emphasized the potential of emerging technologies like machine learning, natural language processing, biometrics, blockchain, and geolocation, among others, for AML compliance. Their research indicated that, through those technologies, detection and monitoring of suspicious transactions could be greatly enhanced. Beginning from a techno-centric perspective, Ziade et al. (2024)[9] pointed out that conventional rule-based AML solutions were no longer capable of effectively countering highly sophisticated financial crimes. They claimed that to a large extent, utilizing artificial intelligence had improved AML procedures like customer due diligence, transaction monitoring, and risk assessment. Similarly, Rajpoot and Raffat (2024)[10] assisted in the implementation of AI-powered AML solutions by demonstrating how machine learning, network analysis, and natural language processing were used to detect suspicious financial activities and address new challenges such as laundering through cryptocurrency and cross-border financial crimes. Balaji (2024)[11] further supported this point by stating that AI-driven predictive analytics enabled banks to review massive amounts of transaction data instantly, found irregularities more accurately, and minimized the number of false alarms in activity reports.

Despite the advantages highlighted in those studies, there were also concerns regarding transparency and accountability in AI-driven AML systems. Gupta Nikhil (2025)[12] argued that many AI systems acted like black boxes. It had been hard to understand how they decided things. This made rules and checks tough. Some researchers pointed to explainable AI as a fix. Tools such as SHAP, LIME, and counterfactuals helped to illustrate why a model

[8] Vanbrackle, Barrie, et al. "Potential Applications of Emerging Technologies to Anti-Money Laundering Compliance Programmes." Journal of Financial Compliance, vol. 6, no. 3, Mar. 2023, p. 248. Crossref, https://doi.org/10.69554/olbl7888.

[9] Ziade, Fouad M., et al. "Artificial Intelligence for Money Laundering Detection." Advances in Computational Intelligence and Robotics, IGI Global, 2024, pp. 58–69. Crossref, https://doi.org/10.4018/979-8-3693-1046-5.ch003.

[10] Rajpoot, Muhammad Hamza, and Muhammad Wajahat Raffat. "AI-Driven Compliance and Detection in Anti-Money Laundering: Addressing Global Regulatory Challenges and Emerging Threats." Journal of Computational Science and Applications (JCSA), ISSN: 3079-0867 (Onilne), vol. 1, no. 2, Dec. 2024. Crossref, https://doi.org/10.51846/jcsa.v1i2.3886.

[11] Balaji, K. "Artificial Intelligence for Enhanced Anti-Money Laundering and Asset Recovery: A New Frontier in Financial Crime Prevention." 2024 Second International Conference on Intelligent Cyber Physical Systems and Internet of Things (ICoICI), IEEE, 2024, pp. 1010–1016. Crossref, https://doi.org/10.1109/icoici62503.2024.10696100.

[12] Gupta, Nikhil. "Explainable AI for Regulatory Compliance in Financial and Healthcare Sectors: A Comprehensive Review." International Journal of Advances in Engineering and Management, vol. 7, no. 3, Mar. 2025, pp. 489–494. Crossref, https://doi.org/10.35629/5252-0703489494.

made a choice. It appeared that these methods made decisions clearer. Roy et al. (2025)[13] extended this discussion to the Indian regulatory context and argued that the integration of XAI could increase trust, reduce false positives, and strengthen compliance within India's AML framework governed by the Prevention of Money Laundering Act 2002 along with regulatory oversight from the Reserve Bank of India (RBI) and the Financial Intelligence Unit-India (FIU, IND).While those studies highlighted the importance of technological advancement, Agarwal (2025)[14] and Yadav et al. (2025)[15] presented a contrasting perspective by focusing on the legal and institutional dimensions of AML enforcement in India. Agarwal (2025) despite having aligned its AML framework with international standards prescribed by the Financial Action Task Force (FATF), India faced some key challenges to address, such as enforcement inefficiencies, technological adaptation, and inter-agency coordination, which, in the author's view, remained significant obstacles. Similarly, Yadav et al. (2025) found that the effectiveness of India's cyber and AML legal regime was limited by jurisdictional complexities, technical skill gaps, and out-dated legislative provisions.

The literature revealed that the overall consensus was that artificial intelligence and the newest technologies would be potent means of AML detection and compliance. But there had been a dissonance between the elevated degree of optimism about technology discourses in AI-related papers and the practical regulatory challenges that were highlighted in the legal and policy reports. Despite the fact that the technological fixes had provided the promise of being more productive and possessing superior detection capabilities, the successful implementation of the fixes continued to depend largely on transparent models, a well-designed regulatory landscape, and a well-established institutional capacity. This indicated the need to be holistic in the approach by combining the technological growth with sound law-making and regulation systems to effectively combat the emerging types of financial crimes.

Research gap: Scholars have studied how AI functions in AML systems since recent years; yet, there remain substantial research gaps which concern both algorithm accountability and the legal responsibility of algorithms especially under PMLA 2002. Different researches, such as those by Ziade et al. (2024) and Gupta (2025), have emphasized the technical potential of AI in AML but frequently underestimate the legal aspect of the use of an algorithm in decision-making. Rajpoot and Raffat (2024) were concerned with the performance of AI-based compliance systems, but they made no mention of accountability or legal liability concerns. On the same note, Balaji (2024) also talked about AI usage in monitoring and never raised the issue of regulation risks due to algorithmic errors. Vanbrackle et al. (2023) presented the opportunities and challenges in AML compliance without considering the legal aspects of algorithmic accountability.

[13] Roy, Sourodip, Ankan Bhattacharya, and Victor Nayak. "Enhancing India's Anti-Money Laundering Framework: Transforming Integration of Explainable AI for Better Transparency and Compliance." *International Ethical Hacking Conference*. Singapore: Springer Nature Singapore, 2025.

[14] Agarwal, Bijay. "Decoding Money Laundering: A Comprehensive Analysis of India's Regulatory Framework." *Indian Journal of Legal Review* (2025).

[15] Yadav, Akhilesh, Vineet Pratap Singh, and Nishant Kumar Arjun. "Cyber Laws and Money Laundering in India: Unraveling Legal Challenges in the Digital Era.", International Research Journal of Multidisciplinary Scope (IRJMS),2025;6(4):1441-1459

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Roy, Bhattacharya, and Nayak (2025) suggested applying Explainable AI to the AML models in the Indian setting, which put an emphasis on transparency, yet did not provide a detailed legal interpretation. Agarwal (2025) has reviewed the development of the AML regulatory framework of India, but he made no reference to algorithmic compliance tools. Yadav, Singh, and Arjun (2025) identified the opportunities of AI and blockchain yet did not examine how algorithmic decision-making can interact with the current AML laws. This literature demonstrates a severe gap in research, which underlies this study aimed at examining the way in which algorithmic systems transform the process of compliance under the PMLA, determining the issues of liability, and suggesting the incorporation of Explainable AI as a regulatory protective measure.

3. Methodology

The research methodology utilized in the study is the mixed doctrinal and analytical research which involves the legal analysis and a techno-regulatory approach. It is mainly based on research doctrines by studying the Prevention of Money Laundering Act, 2002, subordinate regulations, regulatory circulars, and judicial rulings, to establish the current compliance and liability system. This is further complemented with a comparative and policy-based study of the global AML and AI regulatory frameworks (including the FATF guidelines and developing AI regulatory principles) to help define the gaps in the Indian framework. Moreover, the study applies the techno-legal analytical approach to assess the interaction of the issue of algorithmic decision-making, model obscurity, and explain-ability with the concepts of accountability, due process, and regulatory oversight. The research is a qualitative one and based on statutory interpretation, regulatory texts, literature, and institutional practice in coming up with normative suggestions to be used in explainable and accountable algorithmic compliance in the PMLA regime.

4. Impact of algorithmic Anti-Money Laundering (AML) compliance under the Prevention of Money Laundering Act, 2002

The adoption of algorithmic AML compliance, especially in the context of legislation like the PMLA, 2002 in India, brings about major changes in effectiveness and operational performance and leaves complex liability gaps in automated decision-making. Conventional AML systems, which are commonly rules-based and operate in silted business processes, have become more ineffective in identifying more complex financial offenses, and therefore have created high false positives and weak operational capabilities[16]. Such inefficiency has prompted financial institutions to consider new high-tech solutions such as AI and ML to improve their AML programs. The main benefits algorithmic AML solutions have over traditional ones include the capacity to handle large quantities of data, identify the smallest trends that may be related to money laundering, and, possibly, decrease the number of people who have to do compliance-related tasks manually[17]. AML systems are being enhanced with

[16] Nadia Husnaningtyas, et al. "A Systematic Review of Anti-Money Laundering Systems Literature: Exploring the Efficacy of Machine Learning and Deep Learning Integration." JEMA: Jurnal Ilmiah Bidang Akuntansi Dan Manajemen, vol. 20, no. 1, Mar. 2023, pp. 91–116. Crossref, https://doi.org/10.31106/jema.v20i1.20602.

[17] Lokesh, R., and Rashmita Khilar. "An Approach to Reduce False Positive Rate in Analyzing Red Flag Gap for Anti Money Laundering System Using Recurrent Neural Network in Comparison with Decision Tree

AI technologies such as machine learning, natural language processing, and deep learning to enhance effectiveness and efficiency.

As an example, deep learning techniques have been demonstrated to be useful in money laundering detection in financial transaction networks as a complement or alternative to standard rule-based systems. Nevertheless, the advanced technology currently deployed tends to be on top of legacy systems and it is mostly aimed at minimizing the false positive as opposed to rethinking the nature of financial crime detection. Although AI is good at identifying patterns, it might not be able to handle complex, risk-based, and context-dependent requirements as required by regulatory provisions such as PMLA Section 12, which asserts due diligence[18]. Compliance automation, though efficient in processing, may result in over-reliance on black-box systems, which may lead to the loss of human accountability and a reduction in the speed of redressing the grievances through the procedure.

With the efficiencies in operations, the implementation of algorithmic AML systems creates huge liability gaps, especially in the attribution of criminal liability and responsibility of making wrong decisions. India, among others, provides in the PMLA, 2002 penalties on persons, whom Indian courts define (e.g. Vijay Madanlal Choudhary v. Union of India, 2022 SCC OnLine SC 929). This interpretation normally takes natural or juridical persons, as opposed to algorithms or automated systems. Therefore, automated decisions of AI systems do not have direct legal personhood, which leaves attribution gaps that make it more difficult to hold financial institutions, software vendors, and compliance officers responsible. The Master Direction on Know Your Customer (KYC) by the Reserve Bank of India (RBI) regulates human supervision in the AML procedures[19]. This imposes vicarious liability on entities in tort and contractual law, but has no statutory safe harbours of reasonable reliance on certified AI tools. It is, thus, a precarious situation in which the financial institutions are embracing the advanced technologies in order to comply with the regulatory requirements only to be exposed to increase and ill-defined legal risks[20]. The lack of necessary legal frameworks that deals with the criminal abuse of AI makes this situation more complicated and it is necessary to change the current legal frameworks such as the Information Technology Act of 2000. AML compliance using algorithms generates high efficiency improvements by providing superior detection scores and lowering false positive; it also generates complicated liability holes. These gaps can be solved by formulating strong legal

Algorithm." AIP Conference Proceedings, vol. 3150, AIP Publishing, 2024, p. 050012. Crossref, https://doi.org/10.1063/5.0227878.

[18] Dr. Amitabh Sharma. "Machine Learning for Risk Compliance Automation in India's Financial Sector." Innovative Research Thoughts, vol. 8, no. 4, Dec. 2022. Crossref, https://doi.org/10.36676/irt.v8.i4.1509.

[19] Chaudhary, Shraddha, and Shreedhar Kale. "Vijay Madanlal Choudhary v Union of India: A Systematic Breakdown of Protections against Testimonial Compulsion during Criminal Investigations." Jindal Global Law Review, vol. 15, no. 1, June 2024, pp. 89–117. Crossref, https://doi.org/10.1007/s41020-024-00220-8.

[20] Unagar, Ekta, and Bhavesh Borisaniya. "Survey on Detection of Cryptocurrency Money Laundering and Its Explanation Using XAI." SN Computer Science, vol. 6, no. 3, Mar. 2025. Crossref, https://doi.org/10.1007/s42979-025-03828-2.

frameworks that take into consideration the autonomous operation of AI, with accountability, transparency and moral regulations in the dynamic world of financial crime prevention[21].

5. Explainable Artificial Intelligence (XAI) in AML enforcement and to propose a normative regulatory framework

The black box character of most AI algorithms suggests that XAI will become an important part of the AML enforcement under the PMLA of India as it becomes more and more necessary to build trust in the system. Although AI has numerous advantages in fraud detection, credit scoring, and risk assessment, its transparency is a major obstacle to regulatory compliance, accountability, and trust, especially in high-stakes areas of finance, healthcare, and the justice system[22]. The XAI is not an explicit requirement of the PMLA, 2002, but its statutory framework, especially Section 12, 12A, and 50 imply the need to be transparent, accountable, and make decisions based on reasonable grounds in the AML processes. The existence of the black box problem inherent to advanced AI models, where decisions are made without clear, human-understandable reasons, warrants the need of transparency and accountability[23]. The regulatory frameworks of the world, including the EU AI Act and GDPR, emphasize the significance of explainability in AI systems, which require decisions to be traceable to third parties and allow right to explanation. In the case of AML enforcement in India, the inclusion of XAI corresponds to the principles of administrative law and due process. Cases Laws, Judicial precedents, e.g. K.S. Puttaswamy v. Union of India, procedural fairness, which is ensured by intelligibility and contestability of automated decisions that affect fundamental rights, such as freezing or black listing accounts[24]. Guidelines on Technology Risk Management of Reporting Entities, 2023 from the Financial Intelligence Unit-India (FIU-IND) also support the need to have an auditable and human-understood process, indirectly supporting XAI.

XAI does not just offer transparency; it is also aimed at building trust, learning, and AI system fairness. XAI can be utilized in the financial sector, in which AI is becoming more advanced in fraud detection and AML compliance, to detect abnormal behavior and can give understandable information about AI-based decision making. XAI is crucial to the process of turning a black box model into a glass box model to resolve bias in algorithmic models and

[21] Kute, Dattatray Vishnu, et al. "Deep Learning and Explainable Artificial Intelligence Techniques Applied for Detecting Money Laundering–A Critical Review." IEEE Access, vol. 9, 2021, pp. 82300–82317. Crossref, https://doi.org/10.1109/access.2021.3086230.

[22] Chaudhary, G. "Explainable Artificial Intelligence (xAI): Reflections on Judicial System." Kutafin Law Review, vol. 10, no. 4, Jan. 2024, pp. 872–889. Crossref, https://doi.org/10.17803/2713-0533.2023.4.26.872-889.

[23] Khan, Farhina Sardar, et al. "Model-Agnostic Explainable Artificial Intelligence Methods in Finance: A Systematic Review, Recent Developments, Limitations, Challenges and Future Directions." Artificial Intelligence Review, vol. 58, no. 8, May 2025. Crossref, https://doi.org/10.1007/s10462-025-11215-9.

[24] Zmarialy, Yousufi, and P. N. Harikumar. "An Overview of Anti-Money Laundering Practice in the Indian Financial System." I-Manager's Journal on Economics & Commerce, vol. 3, no. 3, 2023, p. 33. Crossref, https://doi.org/10.26634/jecom.3.3.20219.

enforce regulations[25]. Such change enables the stakeholders such as regulators to see the causal elements of AI decisions, which would be important to the auditability and the establishment of trust on automated systems. Explainability is especially required in those areas where there is a high level of social, ethical, and privacy concerns. The legal aspects of AI in controlled jurisdictions, like the detection of financial crimes, require the perspective of the supervisors in order to make the models justifiably. Regulators need tools and transparency that can be used to check compliance[26]. This is enhanced by the XAI methods which provide information that aids in the explanation of the predictive process of algorithmic models. Money launderers continue to focus on the financial system, and AI has a potential to mitigate this risk since it can be more effective in adding compliance. The XAI framework on AML enforcement in India should not just look at its technical nature but also look at legal, ethical, and societal ramifications of the issue and make comparisons to international laws and regulations[27].

6. Discussion

The findings of this study show that algorithmic AML compliance as per PMLA 2002 has remarkably changed the nature in which financial institutions operate. Increase in the use of AI and machine learning in monitoring transactions, running customer due diligence, and suspicious activities has enhanced efficiency of compliance processes. In the analysis, Husnaningtyas et al. (2023) believe that machine learning and deep learning can improve the capacity of financial institutions to study large datasets and detect complicated financial trends, which is superior to conventional AML systems. Balaji (2024) also notes that AI systems enhance compliance with AML by predictive modeling and anomaly detection, so that the processing of financial data can be performed more efficiently. Nevertheless, the combination of such algorithmic systems poses significant legal and regulatory issues especially the black-box problem, as reported by Gupta (2025). The AI models are opaque and this makes it hard to understand automated decisions and this creates an issue of accountability when it comes to the regulation of PMLA. Kumar and Dixit (2023) note that the reporting requirements of the PMLA are strict, which becomes a problem in cases when the institutions base their suspicious transaction reporting on opaque algorithms. According to Rajpoot and Raffat (2024), the liability gap in algorithmic decision-making lies in the fact that, at the moment, even the existing regulations do not define what happens to the human error made by AI systems. According to Vanbrackle et al. (2023), upcoming technologies, such as blockchain, biometric identification, etc., make AML regulation even harder, as they are implemented at a pace much faster than the legal accountability frameworks.

[25] Chiamaka Daniella Okenwa., et al. “Exploring the Role of Explainable AI in Compliance Models for Fraud Prevention.” International Journal of Latest Technology in Engineering Management & Applied Science, vol. 13, no. 5, June 2024, pp. 232–239. Crossref, https://doi.org/10.51583/ijltemas.2024.130524.

[26] Morato de Andrade, Otavio, and Marco Antônio Sousa Alves. “Using Explainable Artificial Intelligence (XAI) to Reduce Opacity and Address Bias in Algorithmic Models.” Revista Thesis Juris, vol. 13, no. 1, June 2024, pp. 03–25. Crossref, https://doi.org/10.5585/13.2024.26510.

[27] Thommandru, Abhishek, and Dr Benarji Chakka. “Recalibrating the Banking Sector with Blockchain Technology for Effective Anti-Money Laundering Compliances by Banks.” Sustainable Futures, vol. 5, Dec. 2023, p. 100107. Crossref, https://doi.org/10.1016/j.sftr.2023.100107.

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Agarwal (2025) points out the progress achieved in AML regime within the Indian regulatory framework, specifically the modification of the Prevention of Money laundering act (PMLA) and in alignment with global regulatory norms such as the financial action task force (FATF). This paper also examines the new challenge of algorithmic AML compliance that is not properly covered by the current laws. One of the potential solutions that have been discovered is implementation of XAI in AML frameworks. According to Roy, Bhattacharya, and Nayak (2025), XAI helps to improve the transparency and trustworthiness of the AI-based AML systems by giving interpretable reasons to the algorithmic decisions based on the methods of SHAP values and LIME models. Khan et al. (2025) also suggest that explainability generates regulatory trust and provides auditable and contestable automated systems.

According to the techno-legal analysis in the study, including XAI in the compliance with AML may balance the technological innovation with legal responsibility and turn the opaque black-box models into the transparent glass-box ones. The change enables regulators to have a more thorough evaluation of the algorithmic decisions and such automated compliance should comply with the concept of due process and fairness, which keeps the regulation legitimate and supported by the people. The current PMLA model lacks a direct regulation of AI-based compliance processes and therefore, regulatory change is needed to guarantee the responsible use of technologies.

7. Conclusion

This study examines how algorithmic compliance can support the AML machinery set up by the PMLA 2002 the study also points out that the use of AI and machine learning could make to compliance efficiency. Such technologies can instantly track transactions and identify complex crime patterns, thereby mostly removing the reliance on manual compliance processes. However, the study points out that heavy dependence on automatic systems gives rise to major legal and regulatory issues, mainly related to transparency, accountability, and fairness of procedures. The PMLA scheme which was set up for manual compliance does not mention AI systems governance and auditing standards at all. The research investigates methods to establish governing frameworks which enable auditing processes for AI-driven systems. The research team recommends XAI implementation together with AML compliance tools because it improves decision-making through better understanding and transparent results.

Transparency is the key to achieving regulatory accountability and avoiding algorithmic bias. The study suggests that next regulatory changes aimed at India should consider setting rules for algorithmic AML compliance, such as requirements for auditability, human supervision, and the use of explainable AI models. Besides, it points out the importance of creating certification systems for AI compliance tools and finally clear distribution of liabilities among stakeholders. The responsible implementation of algorithmic compliance which has potential to transform financial regulation requires establishment of a comprehensive regulatory system that ensures legal responsibility and open operations and fair legal procedures.

References

1. Agarwal, Bijay. "Decoding Money Laundering: A Comprehensive Analysis of India's Regulatory Framework." *Indian Journal of Legal Review* (2025).

2. Balaji, K. "Artificial Intelligence for Enhanced Anti-Money Laundering and Asset Recovery: A New Frontier in Financial Crime Prevention." 2024 Second International Conference on Intelligent Cyber Physical Systems and Internet of Things (ICoICI), IEEE, 2024, pp. 1010–1016. Crossref, https://doi.org/10.1109/icoici62503.2024.10696100.

3. Chaudhary, G. "Explainable Artificial Intelligence (xAI): Reflections on Judicial System." Kutafin Law Review, vol. 10, no. 4, Jan. 2024, pp. 872–889. Crossref, https://doi.org/10.17803/2713-0533.2023.4.26.872-889.

4. Chaudhary, Shraddha, and Shreedhar Kale. "Vijay Madanlal Choudhary v Union of India: A Systematic Breakdown of Protections against Testimonial Compulsion during Criminal Investigations." Jindal Global Law Review, vol. 15, no. 1, June 2024, pp. 89–117. Crossref, https://doi.org/10.1007/s41020-024-00220-8.

5. Chiamaka Daniella Okenwa., et al. "Exploring the Role of Explainable AI in Compliance Models for Fraud Prevention." International Journal of Latest Technology in Engineering Management & Applied Science, vol. 13, no. 5, June 2024, pp. 232–239. Crossref, https://doi.org/10.51583/ijltemas.2024.130524.

6. Dr. Amitabh Sharma. "Machine Learning for Risk Compliance Automation in India's Financial Sector." Innovative Research Thoughts, vol. 8, no. 4, Dec. 2022. Crossref, https://doi.org/10.36676/irt.v8.i4.1509.

7. Gupta, Nikhil. "Explainable AI for Regulatory Compliance in Financial and Healthcare Sectors: A Comprehensive Review." International Journal of Advances in Engineering and Management, vol. 7, no. 3, Mar. 2025, pp. 489–494. Crossref, https://doi.org/10.35629/5252-0703489494.

8. Khan, Farhina Sardar, et al. "Model-Agnostic Explainable Artificial Intelligence Methods in Finance: A Systematic Review, Recent Developments, Limitations, Challenges and Future Directions." Artificial Intelligence Review, vol. 58, no. 8, May 2025. Crossref, https://doi.org/10.1007/s10462-025-11215-9.

9. Kute, Dattatray Vishnu, et al. "Deep Learning and Explainable Artificial Intelligence Techniques Applied for Detecting Money Laundering–A Critical Review." IEEE Access, vol. 9, 2021, pp. 82300–82317. Crossref, https://doi.org/10.1109/access.2021.3086230.

10. Lokesh, R., and Rashmita Khilar. "An Approach to Reduce False Positive Rate in Analyzing Red Flag Gap for Anti Money Laundering System Using Recurrent Neural Network in Comparison with Decision Tree Algorithm." AIP Conference Proceedings, vol. 3150, AIP Publishing, 2024, p. 050012. Crossref, https://doi.org/10.1063/5.0227878.

11. Morato de Andrade, Otavio, and Marco Antônio Sousa Alves. "Using Explainable Artificial Intelligence (XAI) to Reduce Opacity and Address Bias in Algorithmic Models." Revista Thesis Juris, vol. 13, no. 1, June 2024, pp. 03–25. Crossref, https://doi.org/10.5585/13.2024.26510.

12. Nadia Husnaningtyas, et al. "A Systematic Review of Anti-Money Laundering Systems Literature: Exploring the Efficacy of Machine Learning and Deep Learning Integration." JEMA: Jurnal Ilmiah Bidang Akuntansi Dan Manajemen, vol. 20, no. 1, Mar. 2023, pp. 91–116. Crossref, https://doi.org/10.31106/jema.v20i1.20602.

13. Paripati, Lohith, et al. "The Impact of AI on Regulatory Compliance and Anti-Money Laundering Efforts in Payment Processing." Journal for Research in Applied Sciences and Biotechnology, vol. 2, no. 5, Oct. 2023, pp. 241–252. Crossref, https://doi.org/10.55544/jrasb.2.5.34.

14. Rajpoot, Muhammad Hamza, and Muhammad Wajahat Raffat. "AI-Driven Compliance and Detection in Anti-Money Laundering: Addressing Global Regulatory Challenges and Emerging Threats." Journal of Computational Science and Applications (JCSA), ISSN: 3079-0867 (Onilne), vol. 1, no. 2, Dec. 2024. Crossref, https://doi.org/10.51846/jcsa.v1i2.3886.

15. Roy, Sourodip, Ankan Bhattacharya, and Victor Nayak. "Enhancing India's Anti-Money Laundering Framework: Transforming Integration of Explainable AI for Better Transparency and Compliance." *International Ethical Hacking Conference*. Singapore: Springer Nature Singapore, 2025.

16. Surender Kumar, and Dr. Anjali Dixit -. "Prevention of Money Laundering Act, 2002 (PMLA) Critical Review of Key Provisions." International Journal for Multidisciplinary Research, vol. 5, no. 6, Nov. 2023. Crossref, https://doi.org/10.36948/ijfmr.2023.v05i06.9437.

17. Thommandru, Abhishek, and Dr Benarji Chakka. "Recalibrating the Banking Sector with Blockchain Technology for Effective Anti-Money Laundering Compliances by Banks." Sustainable Futures, vol. 5, Dec. 2023, p. 100107. Crossref, https://doi.org/10.1016/j.sftr.2023.100107.

18. Unagar, Ekta, and Bhavesh Borisaniya. "Survey on Detection of Cryptocurrency Money Laundering and Its Explanation Using XAI." SN Computer Science, vol. 6, no. 3, Mar. 2025. Crossref, https://doi.org/10.1007/s42979-025-03828-2.

19. Vanbrackle, Barrie, et al. "Potential Applications of Emerging Technologies to Anti-Money Laundering Compliance Programmes." Journal of Financial Compliance, vol. 6, no. 3, Mar. 2023, p. 248. Crossref, https://doi.org/10.69554/olbl7888.

20. Venkata Raja Ravi Kumar Gelle. "Enhancing Financial Security: AI-Driven Anti-Money Laundering (AML) and Compliance Monitoring in the Banking Sector." World Journal of Advanced Research and Reviews, vol. 25, no. 1, Jan. 2025, pp. 2462–2476. Crossref, https://doi.org/10.30574/wjarr.2025.25.1.0365.

21. Yadav, Akhilesh, Vineet Pratap Singh, and Nishant Kumar Arjun. "Cyber Laws and Money Laundering in India: Unraveling Legal Challenges in the Digital Era.", International Research Journal of Multidisciplinary Scope (IRJMS),2025;6(4):1441-1459

22. Ziade, Fouad M., et al. "Artificial Intelligence for Money Laundering Detection." Advances in Computational Intelligence and Robotics, IGI Global, 2024, pp. 58–69. Crossref, https://doi.org/10.4018/979-8-3693-1046-5.ch003.

23. Zmarialy, Yousufi, and P. N. Harikumar. "An Overview of Anti-Money Laundering Practice in the Indian Financial System." I-Manager's Journal on Economics & Commerce, vol. 3, no. 3, 2023, p. 33. Crossref, https://doi.org/10.26634/jecom.3.3.20219.