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Risk-based AML–CFT compliance in banking: A literature synthesis toward a compliance orchestration framework

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Abstract

This study examines the implementation of anti-money laundering and counter-terrorism financing (AML–CFT) compliance through the risk-based approach (RBA) in the banking sector and proposes a compliance orchestration framework to explain the interrelationship between regulatory, governance, operational, and technological dimensions of AML–CFT implementation. The study employs a systematic literature review (SLR) following PRISMA guidelines. From 243 identified articles, 31 articles satisfied the inclusion criteria and were analyzed through thematic synthesis and bibliometric mapping using VOSviewer to identify conceptual structure and thematic relationships within the literature. The findings demonstrate that RBA-based AML–CFT implementation operates as an integrated compliance orchestration system comprising six interrelated dimensions: regulatory anchoring, risk intelligence, operational controls, technology enablement, human and governance capacity, and supervisory interface. The analysis further reveals a significant shift in the AML–CFT literature from prescriptive rule-based compliance toward more adaptive, governance-oriented, and risk-intelligence-driven approaches, particularly in response to increasing financial digitalization, product complexity, and evolving customer risk profiles. This study contributes to the AML–CFT literature by developing a compliance orchestration framework that integrates regulatory interpretation, risk governance, operational controls, technological capability, and supervisory coordination within a unified analytical perspective. The framework provides a conceptual foundation for future empirical research and offers practical insights for banks and regulators in developing more adaptive, proportionate, and accountable AML–CFT compliance systems.

Introduction

Money laundering and terrorism financing pose significant threats to financial system stability, institutional integrity, and public trust in the banking sector (Ryder, 2025). These illicit financial activities may generate substantial economic losses while simultaneously increasing governance, reputational, and systemic vulnerabilities within banking institutions (Achek et al., 2026). In response to these risks, the anti-money laundering and counter-terrorism financing (AML–CFT) regime has emerged as the primary international regulatory framework aimed at safeguarding the integrity and stability of the global financial system (Bello & Harvey, 2017).

The increasing scale of global money laundering activities, combined with the growing complexity of digital financial transactions, has intensified regulatory pressure on financial institutions to strengthen AML–CFT compliance systems and detection technologies. This development has also accelerated the expansion of the global AML industry, particularly in areas related to compliance technology, transaction monitoring, and risk-based regulatory implementation, as illustrated in Figure 1.

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Figure 1. Global AML Market Growth Projection 2025–2035 (USD Billion)
Source: Precedence Research (2025)

Figure 1 illustrates the rapid expansion of the global AML market, increasing from approximately AUS$2.07 billion in 2025 to an estimated AUS$9.14 billion by 2035. This trend reflects the growing complexity of money laundering activities, particularly in relation to digital financial transactions, cross-border financial flows, and cryptocurrency-based transactions. Increasing regulatory pressure and stricter compliance standards have also accelerated institutional demand for AML technologies, transaction monitoring systems, and risk-based compliance infrastructures. The rapid growth of the AML industry therefore highlights the increasing strategic importance of governance-oriented AML–CFT systems in safeguarding financial system integrity.

In Indonesia, money laundering is regulated under Law Number 8 of 2010 concerning the Prevention and Eradication of Money Laundering Crimes, which adopts the "follow the money" approach to identify predicate crimes such as corruption, narcotics trafficking, human trafficking, and terrorism financing. The increasing complexity of financial transactions and digital financial instruments has further intensified the challenges of AML enforcement within the national financial system.

Figure 2 illustrates the dynamics of money laundering indictments in Indonesia during the 2020–2024 period. Although the number of indictments fluctuated annually, the trend remained relatively significant, indicating that money laundering continues to pose a substantial challenge to the national financial sector. This condition reinforces the urgency of strengthening AML–CFT governance, regulatory supervision, and risk-based compliance mechanisms, particularly within banking institutions.

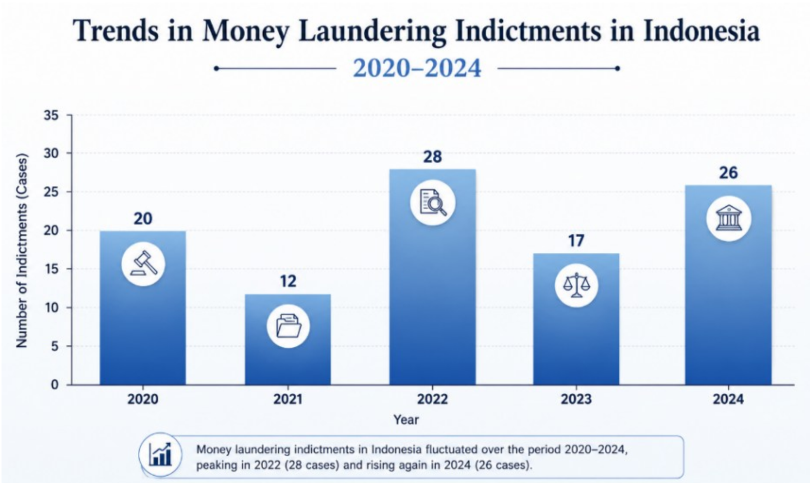

Figure 2. Trends in Money Laundering Indictments in Indonesia 2020–2024
Source: Databoks Katadata (2024)

Figure 2 illustrates the dynamics of money laundering crime indictments in Indonesia during the 2020–2024 period. Although the number of indictments fluctuated annually, the trend remained relatively significant, indicating that money laundering continues to pose a substantial challenge to the national financial system. This condition reinforces the urgency of strengthening AML–CFT governance, regulatory supervision, and risk-based compliance mechanisms within the financial sector.

In the banking sector, AML–CFT compliance represents a strategic institutional responsibility aimed at safeguarding financial system integrity from money laundering and terrorism financing risks (Panasenko & Hurochkina, 2026). Banks are therefore required to establish compliance systems aligned with Financial Action Task Force (FATF) standards and domestic regulations through internal policies, operational controls, and supervisory mechanisms (Styles, 2025). The effectiveness of AML–CFT implementation further depends on governance quality, human resource capacity, technological capability, and coordination with supervisory authorities in identifying and reporting suspicious financial transactions (Coshott, 2025; Hassan & Sajid, 2024; Marzouk & Hock, 2026).

With the growing complexity of financial risks and the limitations of uniform compliance mechanisms, international organizations such as the FATF increasingly promote the adoption of a risk-based approach (RBA) in AML–CFT implementation (Brand et al., 2025; Nel, 2025). The RBA emphasizes the identification, assessment, and mitigation of money laundering and terrorism financing risks proportionate to the level of risk faced by financial institutions (Jia & Said, 2025). Compared to traditional rule-based compliance approaches, RBA is considered more adaptive and effective in responding to the dynamic development of financial products, customer profiles, and financial technologies (Koker & Casanovas, 2024; Singh & Barot, 2026).

The increasing complexity of the banking industry further intensifies AML–CFT challenges. Financial product innovation, diversification of customer characteristics, and the rapid digitalization of financial services have significantly transformed money laundering risk patterns (Loice, 2025). These developments indicate that static rule-based compliance systems are increasingly insufficient to respond to evolving financial crime dynamics (AlQudah et al., 2025). Consequently, banking institutions are required to adopt more adaptive, proportionate, and risk-oriented compliance mechanisms capable of effectively identifying and managing emerging risks (Alhejaili, 2025).

Although the literature on AML–CFT compliance and risk-based approaches continues to expand, existing studies remain fragmented and demonstrate limited conceptual integration regarding the orchestration of compliance mechanisms within banking institutions. Previous studies have primarily focused on specific dimensions of AML–CFT implementation, such as the relationship between money laundering and audit practices (Achek et al., 2026), gaps in AML–CFT prevention mechanisms at the country level (Al-Suwaidi & Nobanee, 2021), and methodological developments involving machine learning and network analysis (Castelao-López et al., 2025). Other studies emphasize the importance of AML–CFT from the perspectives of economic stability and national security (Thakkar et al., 2024), the risks associated with disruptive technologies (Isolauri & Ameer, 2022), and the convergence between terrorism financing and organized crime (Farber, 2025; Ramasubramanian, 2025).

Khelil et al. (2023) highlight the need for further research examining the economic implications of AML–CFT disclosures within the banking sector. Despite these growing discussions, limited studies have comprehensively examined how regulatory structures, risk governance, operational controls, technological capability, and supervisory coordination interact as an integrated compliance orchestration system within risk-based AML–CFT implementation. Therefore, the mechanism of compliance orchestration at the organizational level of banking institutions remains underexplored and requires further conceptual investigation (Allegrezza & Bruzzese, 2025).

Based on these gaps, this study offers novelty by developing a conceptual synthesis that positions risk-based AML–CFT compliance as a compliance orchestration process within the banking sector. This study is guided by the following research questions: (1) how has risk-based AML–CFT implementation evolved within the banking literature; (2) what regulatory, governance, operational, and technological factors shape the effectiveness of risk-based AML–CFT implementation; and (3) how can the existing AML–CFT literature be conceptually synthesized into a compliance orchestration framework for the banking sector?

Although the AML–CFT literature has expanded significantly, existing discussions remain fragmented across perspectives such as auditing, state policy, detection technology, economic stability, and the convergence of terrorism financing and organized crime. Consequently, limited studies have attempted to conceptually integrate these dimensions into a unified governance-oriented framework explaining how AML–CFT compliance operates within banking institutions. This study therefore contributes by positioning AML–CFT compliance and the RBA within the broader trajectory of compliance orchestration in the banking sector.

The study provides both theoretical and practical contributions. Theoretically, it strengthens the integration of regulatory, technological, and organizational perspectives within the AML–CFT literature through the proposed compliance orchestration framework. Practically, the findings offer strategic insights for banking institutions and regulators in developing more adaptive, proportionate, and governance-oriented AML–CFT compliance systems capable of responding to financial digitalization, evolving risk patterns, and the increasing complexity of contemporary financial crime.

Literature Review

Risk-based AML–CFT compliance approach in banking

The RBA in AML–CFT emerged in response to the limitations of prescriptive compliance models that apply uniform controls without considering risk heterogeneity across customers, products, and jurisdictions. In the banking sector, the RBA enables institutions to adjust compliance measures proportionately according to identified risks. Juntunen and Teittinen (2022) show that risk-based AML implementation is embedded in daily banking practices through know your customer (KYC) procedures, customer risk classification, and internal operational controls. This indicates that AML–CFT effectiveness depends on regulatory policies, and on the alignment between governance structures, operational procedures, information systems, and institutional accountability. The mechanical application of RBA may encourage "tick-box compliance" and excessive suspicious transaction reporting (over-reporting), thereby reducing substantive compliance effectiveness. These findings suggest that successful RBA-based AML–CFT implementation requires proportional risk calibration, governance quality, and institutional judgment within banking organizations (Kovalchuk et al., 2026).

AML-CFT compliance as an organizational implementation and orchestration issue

A major challenge in AML–CFT implementation lies in the effectiveness of organizational execution rather than merely the existence of regulatory frameworks. Jayasekara(2021) argues that AML–CFT effectiveness is primarily determined by implementation quality and institutional capacity. Haq et al. (2021) find that banks' compliance with AML–CFT regulations depends on the alignment between internal procedures, governance structures, and organizational capability to implement compliance consistently. AML–CFT implementation requires a cross-functional compliance orchestration approach that integrates governance, operational controls, and institutional coordination. Naheem (2020) highlights the existence of an agency dilemma in AML–CFT regulation, where banks are positioned as extensions of law enforcement without adequate alignment of incentives and responsibilities. This condition may encourage defensive compliance behaviors such as de-risking and excessive risk avoidance. Naheem (2019) shows that AML–CFT risk assessment in banking remains largely reactive, limiting banks' ability to anticipate emerging financial crime risks.

Technology, RegTech, and the challenges of risk-based compliance integration

Technological development and RegTech adoption are increasingly viewed as strategic solutions to the complexity of AML–CFT compliance. However, the literature suggests that technology alone is insufficient to ensure effective compliance implementation. Douaihy and Row (2023) find that RegTech adoption in banking is primarily driven by regulatory pressure, while its effectiveness depends heavily on the integration between technological systems, governance structures, and compliance team competencies. This indicates that technology is only effective when embedded within mature organizational and operational frameworks. An integrative perspective is further proposed by Bui (2026), who develops a high-tech crime risk assessment framework that combines AML–CFT obligations, cybersecurity, and data governance within a structured and auditable system. The framework emphasizes that risk-based compliance should be understood as an orchestration process involving regulatory obligations, operational controls, technological capability, and supervisory oversight rather than merely improving detection accuracy. Kakebayashi et al. (2024) demonstrate that AML–CFT compliance mechanisms are increasingly integrated into central bank digital currency (CBDC) architectures through layered KYC systems and real-time transaction monitoring.

Fragmentation of the AML-CFT regime and the need for multilevel coordination

Leonardi (2025) highlights variations in regulatory implementation and the growing challenges arising from technological innovation and evolving financial crime risks. Manning et al. (2021) further show that compliance with FATF recommendations is associated with lower money laundering risk, although their analysis primarily focuses on the country level and provides limited explanation regarding compliance orchestration within banking institutions. Several studies emphasize the importance of multilevel coordination in strengthening AML–CFT effectiveness. Bures (2025) illustrates this through the establishment of the anti-money laundering authority (AMLA) in the European Union, which aims to reduce implementation fragmentation across member states. The persistence of over-reporting and de-risking practices suggests that institutional harmonization alone does not automatically ensure effective implementation. Firas (2022) argues that AML–CFT effectiveness depends on alignment with FATF standards, and on the utilization of National Risk Assessments and institutional implementation capacity. Nduka and Sechap (2021) show that weak AML–CFT supervision within designated non-financial businesses and professions (DNFBPs) reflects broader limitations in coordination and supervisory mechanisms.

Behavioral dimensions, biases, and risk of maladaptive compliance

Tarmizi et al. (2022) argue that compliance behavior is influenced by perceptions of non-compliance risk and the level of regulatory awareness within organizations. Hassan and Sajid (2024) find that terrorism financing reporting by compliance officers depends heavily on policy clarity and the understanding of risk indicators. The literature also identifies individual bias as a major challenge in risk-based AML–CFT implementation. Haffke (2023) demonstrates that money laundering reporting officers (MLROs) may experience better-than-average bias, causing organizations to underestimate their own compliance risks. These findings suggest that the effectiveness of the RBA depends on formal regulatory structures, and on governance and orchestration mechanisms capable of minimizing individual bias through oversight systems and collective decision-making processes. Several studies further indicate that poorly coordinated RBA implementation may produce maladaptive compliance outcomes. Rose (2021) and Aguele (2025) show that de-risking and over-compliance practices can conflict with financial inclusion objectives. Pavlidis (2023) emphasizes that these problems often arise from weaknesses in organizational interpretation and coordination of AML–CFT standards. Consequently, the effectiveness of risk-based AML–CFT compliance in banking depends on the institutional ability to coordinate governance, operational controls, technological systems, and behavioral dimensions within a coherent and adaptive compliance framework.

Research Methods

This study employs a systematic literature review (SLR) approach adapted from Aivaz et al. (2024) with several methodological adjustments, particularly in the application of thematic analysis through companion word analysis to identify and map major themes related to compliance orchestration and risk-based AML–CFT implementation in the banking sector. The methodological adjustment was undertaken to accommodate the integrative and governance-oriented characteristics of the research problem, which require descriptive literature synthesis, conceptual interpretation, and thematic categorization. The study follows the descriptive review procedure proposed by (Tiwari et al., 2020), consisting of literature extraction, screening, analysis, synthesis, and conceptual interpretation stages. The research adopts the core principles of systematic literature review suggested by (Azarian et al., 2023) including transparency in article selection, clarity of research objectives, systematic screening procedures, conceptual synthesis, and structured interpretation of findings.

To ensure the quality and credibility of the knowledge mapping process, this study utilizes scientific articles indexed in the Scopus database. Scopus was selected due to its global coverage, high-quality indexing standards, and recognition as one of the most reputable bibliographic databases for academic research. The literature search focused on studies within the fields of business, management, accounting, economics, and finance, which are directly relevant to AML–CFT governance and compliance implementation in the banking sector.

The search process employed several primary keywords, including "anti-money laundering," "anti-money laundering and counter-terrorism financing," "risk-based approach," and "compliance governance." These keywords were combined using Boolean operators to improve search relevance and coverage. The search process focused on peer-reviewed journal articles published in English and relevant to AML–CFT compliance, governance mechanisms, banking supervision, and risk-based regulatory implementation.

Following the identification stage, inclusion and exclusion criteria were applied systematically to ensure the relevance and quality of the selected literature. The inclusion criteria consisted of: (1) peer-reviewed journal articles, (2) studies discussing AML–CFT implementation, compliance governance, or risk-based approaches in the banking and financial sector, (3) articles indexed in Scopus, and (4) studies providing conceptual, governance, operational, or technological perspectives related to AML–CFT implementation. Meanwhile, articles unrelated to banking compliance, conference abstracts, non-English publications, duplicate records, and studies lacking sufficient methodological relevance were excluded from the review process.

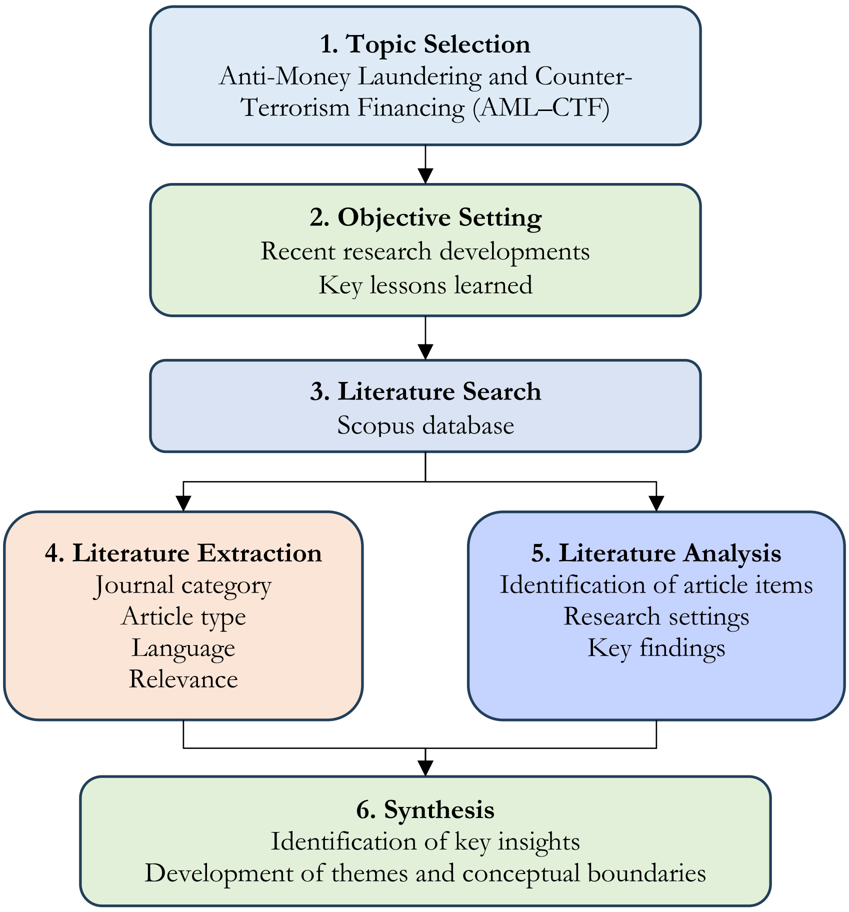

Figure 3. Flow of Systematic Literature Review Method

The selected articles were subsequently analyzed using thematic categorization and companion word analysis to identify relationships among recurring concepts, governance dimensions, and implementation mechanisms within the AML–CFT literature. The analysis process emphasized six interrelated thematic dimensions comprising regulatory anchoring, risk intelligence, operational controls, technology enablement, human and governance capacity, and supervisory interface. These dimensions were synthesized to construct the proposed compliance orchestration framework for risk-based AML–CFT implementation.

The final stage involved conceptual synthesis and interpretative analysis to develop an integrated understanding of how compliance orchestration mechanisms shape the effectiveness of risk-based AML–CFT implementation in the banking sector. Through this approach, the study maps the evolution of AML–CFT literature and develops a governance-oriented analytical framework capable of explaining the interrelationship between regulation, risk governance, operational controls, technological capability, and supervisory coordination in contemporary banking environments.

Results and Discussion

To ensure transparency and traceability of the article selection process, this study applies a systematic literature review procedure that follows the PRISMA guidelines. Figure 2 presents the systematic flow of article selection, starting from the stage of identification, screening, feasibility assessment, to the determination of articles included in this study.

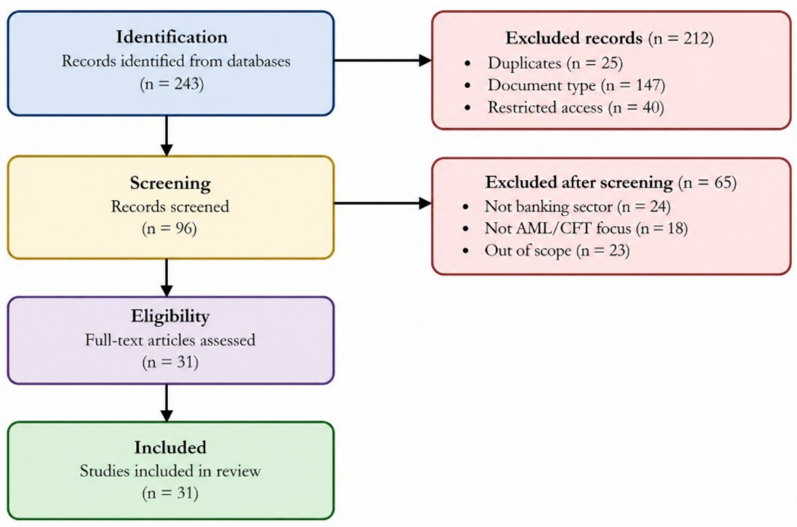

Figure 4. PRISMA Flow Diagram

Figure 4 illustrates the article selection process in the systematic literature review based on the PRISMA framework. At the identification stage, a total of 243 articles were retrieved from scientific databases. Of these, 212 articles were excluded: 25 duplicate records, 147 articles with inappropriate document types, and 40 articles with restricted access, leaving 96 articles for the screening process. During the screening stage, titles and abstracts were assessed, resulting in the exclusion of 65 articles. These articles were excluded because they did not focus on the banking sector (24 articles), did not specifically discuss AML–CFT issues (18 articles), or were outside the scope of the study (23 articles). Subsequently, 31 articles underwent full-text eligibility assessment, and all satisfied the inclusion criteria. Therefore, these 31 articles were included as the basis for the literature synthesis in this study.

Article distribution by year

To illustrate the development of academic attention to the topic studied, the analysis further presents the distribution of articles by year of publication. Figure 3 illustrates the publication trend over time, reflecting the dynamics and growing scholarly interest in AML–CFT compliance and risk-based implementation within the banking sector.

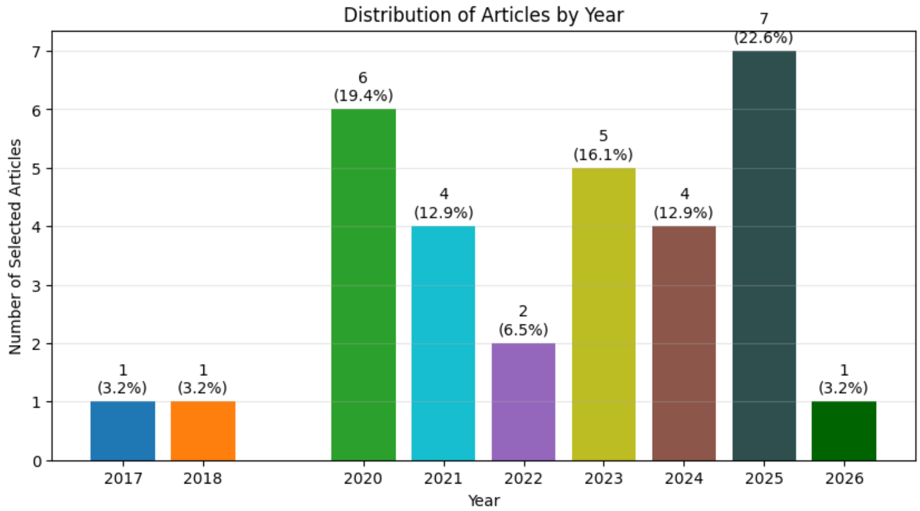

Figure 5. Article Distribution by Year

Figure 5 illustrates the distribution of publications over time and indicates an increasing trend in research on risk-based AML–CFT implementation in the banking sector. Among the 31 selected articles, one article (3.2%) was published in both 2017 and 2018, followed by a significant increase in 2020 with six articles (19.4%). The number of publications remained relatively consistent in subsequent years, including four articles each in 2021 and 2024 (12.9%), five articles in 2023 (16.1%), and seven articles in 2025 (22.6%). This trend reflects the growing academic interest in risk-based AML–CFT compliance and governance within the banking sector, particularly in response to increasing financial digitalization and evolving financial crime risks.

Distribution of articles by journal

To provide an overview of publication outlet distribution, the analysis further presents the distribution of articles based on the journals in which the studies were published. Figure 4 illustrates the concentration and diversity of journals serving as the primary publication sources in this study.

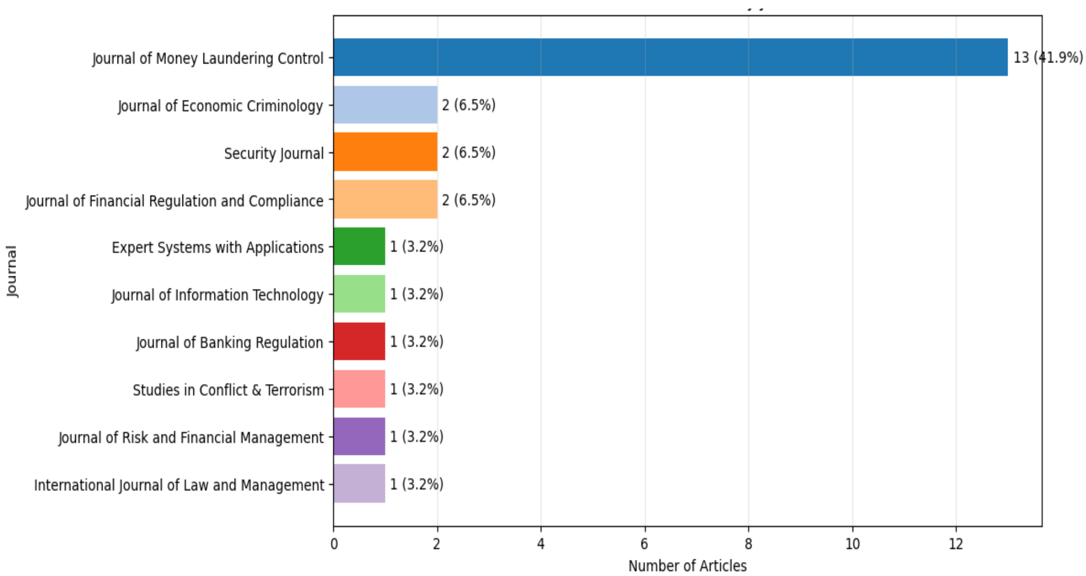

Figure 6. Distribution of Articles by Journal

Figure 6 demonstrates a strong concentration of publications within journals specializing in compliance and money laundering studies. Of the 31 selected articles, the *Journal of Money*

Laundering Control contributed the largest share with 13 articles (41.9%). Meanwhile, the *Journal of Economic Criminology*, *Security Journal*, and *Journal of Financial Regulation and Compliance* each contributed two articles (6.5%), reflecting the relevance of criminology, security, and financial regulation perspectives in AML–CFT research. Several other journals, including *Expert Systems with Applications*, *Journal of Information Technology*, *Journal of Banking Regulation*, *Studies in Conflict & Terrorism*, *Journal of Risk and Financial Management*, and *International Journal of Law and Management*, each contributed one article (3.2%). This distribution indicates that research on risk-based AML–CFT compliance remains concentrated within specialized compliance journals, although the topic is increasingly expanding across interdisciplinary fields such as technology, banking regulation, risk management, and security studies.

Article distribution by country

To illustrate the geographical context of the reviewed studies, the analysis further presents the distribution of articles based on the country or region examined in the literature. Figure 7 shows the distribution of countries and regions that constitute the primary focus of research in the risk-based AML–CFT literature.

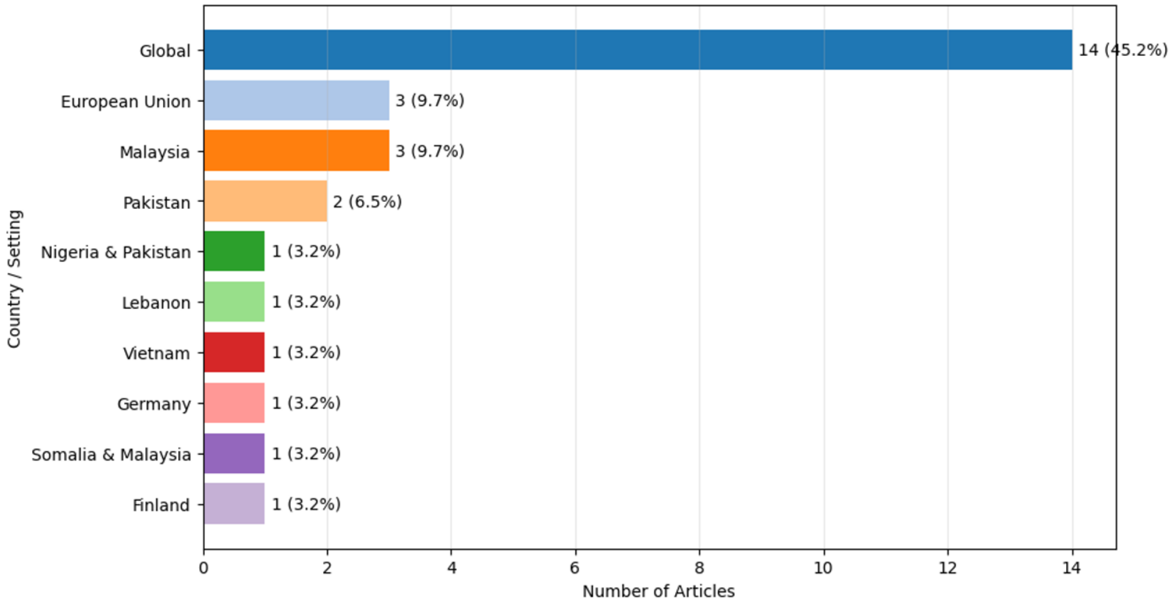

Figure 7. Article Distribution by Country

Figure 7 shows that the literature is dominated by studies with a global scope, accounting for 14 articles (45.2%), which generally discuss international standards, FATF recommendations, and cross-border AML–CFT frameworks. At the regional and national levels, the European Union and Malaysia each contributed three articles (9.7%), followed by Pakistan with two articles (6.5%). Several other countries, including Lebanon, Vietnam, Germany, Somalia, and Finland, appeared only once (3.2%) in the reviewed literature. This distribution indicates that existing AML–CFT studies remain heavily oriented toward global regulatory frameworks and international compliance regimes. In contrast, context-specific studies at the national and regional levels remain relatively limited.

VOSviewer analysis results: identification of the AML–CFT compliance orchestration framework

To identify the conceptual structure and thematic relationships within the risk-based AML–CFT compliance literature in the banking sector, a keyword co-occurrence analysis was conducted using VOSviewer. This analysis enables the visualization of relationships among key concepts that frequently appear together in the literature, thereby illustrating how various dimensions of AML–CFT compliance are interconnected. The resulting mapping demonstrates the central position of

AML–CFT and the RBA within the literature, as well as their relationships with regulatory frameworks, risk intelligence, operational controls, technological capability, governance mechanisms, and supervisory coordination. These interconnected themes indicate that risk-based AML–CFT implementation operates not as an isolated compliance function, but as an integrated compliance orchestration system involving multiple institutional and operational dimensions.

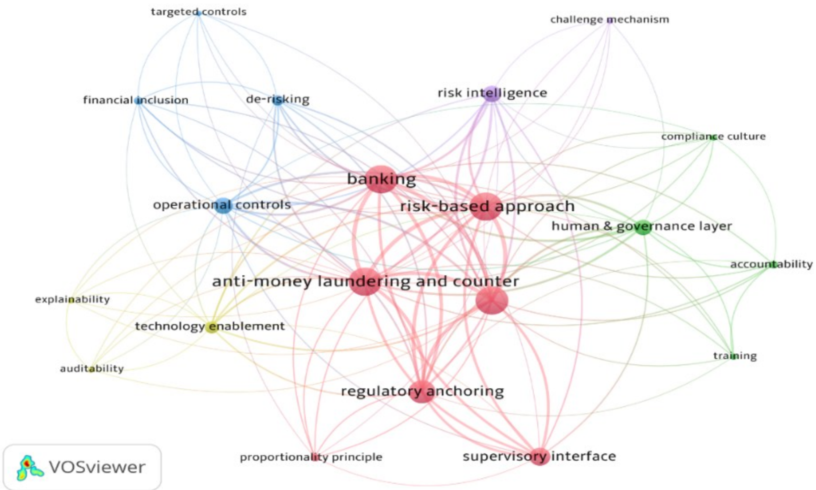

Figure 8. Co-Occurrence Map of Risk-Based AML-CFT Compliance Keywords in the Banking Sector

The VOSviewer mapping presented in Figure 8 shows that AML–CFT and the RBA constitute the most central concepts connecting the major compliance themes within the literature. From these core concepts, six interrelated thematic clusters emerge: regulatory anchoring, risk intelligence, operational controls, technology enablement, human and governance capacity, and supervisory interface. The close interconnection among these clusters indicates that AML–CFT compliance in the banking sector operates as an integrated compliance orchestration system in which regulation, risk assessment, operational implementation, technological capability, governance mechanisms, and supervisory coordination interact dynamically.

To provide a comprehensive overview of the characteristics and focus of the analyzed studies, this research further presents a summary of the risk-based AML–CFT compliance literature in the banking sector. Table 1 summarizes the selected studies based on research topics, country or regional context, primary research focus, and article characteristics, thereby facilitating a clearer understanding of the thematic distribution and scholarly contributions underpinning this literature synthesis.

Table 1. Summary of Risk-Based AML–CFT Compliance in the Banking Sector

No	Researcher	Topics	Country Setting	Key Focus	Article Status
1	(Bello & Harvey, 2017)	Criticism of Risk-Based Approach AML	Global	Limitations of RBA & tick-box compliance	Core – Conceptual
2	(Jayasekara, 2020)	Effectiveness of the AML-CFT Global Standard	Multi-country	Implementation vs legal framework	Core – Conceptual
3	(Al-Suwaidi & Nobanee, 2021)	AML/ATF Literature Survey	Global	AML/ATF literature gap	Supporting
4	(Bures, 2025)	EU AML Authority (AMLA)	European Union	AML-CFT coordination and harmonization	Supporting

No	Researcher	Topics	Country Setting	Key Focus	Article Status
5	(Manning et al., 2021)	FATF Compliance & Basel AML Index	Global	FATF compliance & ML risks	Core – Operational
6	(Hersi, 2024)	AML-CFT regime Somalia vs Malaysia	Somalia, Malaysia	Disadvantages of AML-CFT regimes	Supporting
7	(Nduka & Sechap, 2021)	AML-CFT DNFBPs West Africa	West Africa	Preventive implementation of AML-CFT	Supporting
8	(Ismail et al., 2025)	Risk-Based AML-CFT & MER	South Africa	Institutionalization of the RBA	Supporting
9	(Naheem, 2020)	Risk Assessment AML: Action vs Reaction	Banking sector (global)	Bank AML risk assessment strategy	Core – Operational
10	(Southworth & Levi, 2024)	RBA in Banks (Operational)	Banking	Bank-level RBA implementation	Core – Operational
11	(Rose, 2020)	De-risking & Escalation of AML Regulation	European Union	De-risking, off-boarding, non-compliance behavior	Supporting – Behavioral/Regulatory
12	(Klimova et al., 2020)	Risk-Based AML-CFT & Automation in Banks	Commercial banks	ML/TF risk assessment & automation	Core – Operational
13	(Ringgaard et al., 2025)	Boundary System in AML Risk Management	Bank (Scandinavia)	AML as a boundary system & management control	Core – Operational
14	(Aguele, 2025)	RBA, CDD & De-risking International Students	UK (Nigeria & Pakistan)	Over-compliance, de-risking, implementation conflicts	Supporting – De-risking & Inclusion
15	(Mekpor et al., 2018)	FATF Country AML-CFT Compliance Determinants	155 FATF member states	Technology, regulation & AML compliance	Supporting – Macro Determinants
16	(Alexandre & Balsa, 2023)	ML & Risk-Based AML Multiagent System	Bank (real data)	ML-based detection & risk strategy	Core – Operational (Technology Enabler)
17	(Tarmizi et al., 2022)	Professional Accountant's AML Compliance Determinants	DNFBPs – Malaysia	AML compliance and awareness behavior	Supporting – DNFBPs/Behavioral
18	(Korpela, 2025)	Managing AML–FI Conflicts in Banks	Banking – Finland	Least-harm principle, maturity risk management, shared responsibility	Core – Operational (AML–FI trade-off)
19	(Hassan & Sajid, 2024)	The Role of the Compliance Officer in TF Reporting	Banking – Pakistan	TF policy, red flags, officer competence	Supporting – Officer-Level Compliance
20	(Pavlidis, 2023)	Dark Side FATF & Unintended Consequences	Global (FATF governance)	De-risking, financial exclusion, proportionality	Supporting – FATF & Unintended Effects

No	Researcher	Topics	Country Setting	Key Focus	Article Status
21	(Leonardi, 2025)	Systems Thinking for AML Enhancement	National – Argentina	Leverage points, systemic coordination, institutional reform	Core – Conceptual (Systems Thinking)
22	(Gaviyau & Sibindi, 2023)	Criticism of the AML-CFT Global Framework	Global/cross-country	Variations in implementation, technology, risk dynamics	Supporting – Global Regulatory Critique
23	(Kamaruddin et al., 2025)	Corporate Gatekeepers AML Compliance	DNFBPs – Malaysia	KYC, CDD, STR, compliance challenges	Supporting – Corporate Gatekeepers
24	(Jaffery & Mughal, 2020)	AML Preventive Measures & ML Risk	Banking – Pakistan	CDD, correspondent banking, technology, internal controls	Core – Operational
25	(Juntunen & Teittinen, 2022)	Accountability & Daily AML Practices in Banks	Banking – Finland	KYC, RBA, work routine, accountability	Core – Operational
26	(Pontes et al., 2021)	Compliance with AML Procedures by Banks	Banking – Mauritius	National AML compliance & international standards	Core – Operational
27	(Kakebayashi et al., 2024)	AML-CFT by Design in Retail CBDC	CBDC – a two-tier system	Embedded AML-CFT, tiered KYC, transaction limits	Supporting – Digital Currency Policy
28	(Haffke, 2023)	MLRO Bias in AML Risk Assessment	EU – Germany (cross-industry)	Better-than-average bias, RBA quality	Core – Operational (Behavioral)
29	(Douaihy & Rowe, 2023)	RegTech & Institutional Pressures AML-CFT	Banking – Lebanon	RegTech, screening, monitoring, human–technology orchestration	Core – Operational
30	(Bui, 2026)	Banking AML-CFT & Cybercrime Risk Framework	Banking – Vietnam	Risk governance, auditability, AML–cyber integration	Core – Conceptual–Operational
31	(Rose, 2021)	Non-compliance behavior of de-risking forces AML regulation	Financial/banking sector in the European Union	Off-boarding practices of corporate customers de-risking AML	Core – Operational

Compliance orchestration framework: thematic categorization of SLR findings

The synthesis of the literature demonstrates that the effectiveness of risk-based AML–CFT compliance in the banking sector is not generated through isolated compliance mechanisms, but rather through the orchestration of six interdependent dimensions: (1) regulatory anchoring, (2) risk intelligence, (3) operational controls, (4) technology enablement, (5) human and governance capacity, and (6) supervisory interface. These dimensions collectively form an integrated compliance orchestration framework that enables banks to adapt AML–CFT implementation to evolving risk environments while maintaining regulatory accountability.

Regulatory anchoring

Regulatory anchoring constitutes the normative foundation of AML–CFT implementation. The literature consistently identifies FATF recommendations and national AML–CFT regulations as the primary basis for institutional policy formation and risk governance in banking (Al-Suwaidi &

Nobanee, 2020; Manning et al., 2021). The RBA enables proportional compliance mechanisms by allowing banks to calibrate control intensity according to risk exposure (Bello & Harvey, 2017; Rose, 2020). However, the findings also reveal that excessive regulatory pressure may trigger over-compliance and de-risking practices, potentially undermining financial inclusion and distorting the original objectives of the AML regime (Pavlidis, 2023). This indicates that regulation alone is insufficient without balanced orchestration across institutional and operational dimensions.

Risk intelligence

Risk intelligence acts as the strategic bridge connecting regulatory expectations with organizational implementation. The literature emphasizes the importance of enterprise-wide risk assessment integrated with national risk assessment frameworks to contextualize macro-level threats within institutional environments (Naheem, 2020; Mekpor et al., 2018). More importantly, recent studies highlight the significance of challenge mechanisms in mitigating cognitive and organizational bias during risk evaluation processes, particularly at the MLRO and compliance management levels (Haffke, 2023). These findings suggest that risk assessment should not be understood merely as a technical exercise, but as a governance-driven decision-making process shaped by institutional judgment and organizational accountability.

Operational controls

Operational controls represent the practical manifestation of AML–CFT compliance implementation. The literature consistently identifies KYC, CDD, enhanced due diligence, and transaction monitoring as the core operational instruments for detecting and mitigating money laundering risks (Jaffery & Mughal, 2020; Southworth & Levi, 2024). Nevertheless, the findings demonstrate a gradual transition from standardized blanket controls toward more targeted and risk-sensitive approaches. This shift emerged largely in response to criticism that generalized de-risking practices may contribute to systemic exclusion and financial marginalization (Aguele, 2025; Rose, 2021). Therefore, the effectiveness of operational controls depends heavily on the quality of regulatory interpretation and risk intelligence integration.

Technology enablement

Technology enablement functions as a supporting infrastructure that strengthens compliance orchestration rather than replacing institutional judgment. The literature demonstrates increasing adoption of RegTech, machine learning, and automated transaction monitoring systems to improve detection capability and compliance efficiency (Alexandre & Balsa, 2023; Klimova et al., 2020). However, several studies emphasize that technological effectiveness remains contingent upon explainability, auditability, and regulatory transparency (Castelao-López et al., 2025; Bui, 2026). These findings indicate that technology-driven AML–CFT systems may generate regulatory legitimacy challenges when algorithmic decisions cannot be adequately interpreted or justified. Consequently, technological advancement must remain aligned with governance, accountability, and human oversight.

Human and governance capacity

The human and governance dimension highlights the central role of organizational actors in sustaining AML–CFT integrity. The literature consistently positions MLROs, compliance officers, and senior management as key actors responsible for translating regulatory expectations into operational decision-making (Juntunen & Teittinen, 2022; Hassan & Sajid, 2024). Factors such as accountability structures, compliance culture, continuous training, and organizational commitment significantly influence implementation quality, even among institutions operating under similar regulatory environments (Tarmizi et al., 2022; Kamaruddin et al., 2025). These findings reinforce the argument that AML–CFT effectiveness is fundamentally shaped by institutional behavior and governance culture rather than solely by formal regulation.

Supervisory interface

The supervisory interface reflects the external coordination between banking institutions and supervisory authorities. The literature identifies FIU reporting mechanisms, documentation systems, audit trails, and traceability procedures as critical components for ensuring accountability and regulatory legitimacy (Pontes et al., 2021; Bures, 2025). The studies indicate that ineffective coordination between banks and regulators may reduce institutional trust, create compliance ambiguity, and increase the likelihood of additional regulatory intervention (Hersi, 2024). Thus, supervisory relationships should be viewed not merely as reporting obligations, but as collaborative governance mechanisms that shape the sustainability of risk-based compliance systems.

To enhance the clarity of the literature synthesis and reduce descriptive fragmentation, the findings of the systematic literature review are categorized into six interrelated dimensions that collectively shape risk-based AML–CFT compliance in the banking sector (Figure 9).

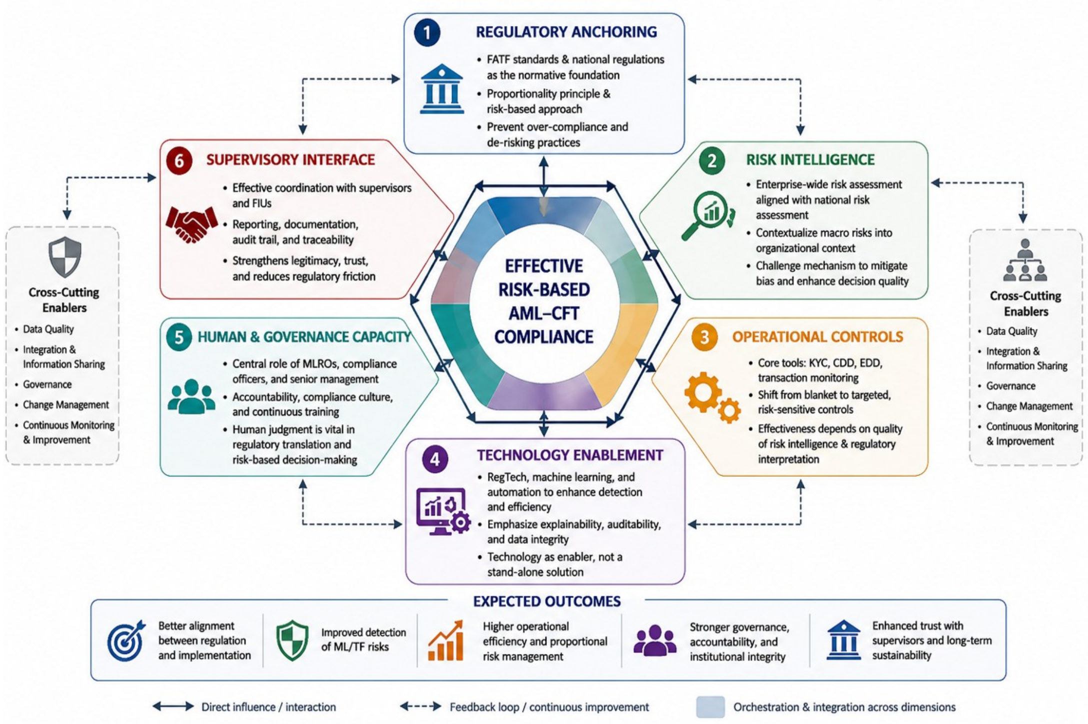

Figure 9. Compliance Orchestration Framework in Risk-Based AML–CFT Implementation

Figure 9 demonstrates that effective risk-based AML–CFT implementation is constructed through the interaction between six interconnected dimensions: regulatory anchoring, risk intelligence, operational controls, technology enablement, human and governance capacity, and supervisory interface. The framework highlights that AML–CFT effectiveness depends on regulatory compliance and on the institutional ability to orchestrate governance, risk assessment, technological capability, and supervisory coordination in an integrated and adaptive manner. The model further indicates that weaknesses in one dimension may reduce the effectiveness of the overall compliance system, thereby reinforcing the importance of holistic compliance orchestration in the banking sector.

Discussion

Regulatory anchoring

The findings demonstrate that regulatory anchoring serves as the normative foundation of risk-based AML–CFT implementation in the banking sector. FATF recommendations and national AML–CFT regulations function as the primary institutional references guiding internal compliance policies and risk governance structures (Al-Suwaidi & Nobanee, 2020; Manning et al., 2021). The literature further indicates that the proportionality principle embedded within the RBA allows banks to calibrate compliance intensity according to actual risk exposure, thereby moving beyond rigid rule-based compliance mechanisms (Bello & Harvey, 2017; Rose, 2020). This reflects a broader transformation from procedural compliance toward adaptive risk governance. The excessive regulatory pressure may unintentionally encourage over-compliance and blanket de-risking practices. Such practices may reduce financial inclusion and create operational inefficiencies without necessarily improving risk mitigation outcomes (Pavlidis, 2023).

In practice, this condition shows that the effectiveness of AML–CFT implementation cannot be assessed solely through the level of formal regulatory compliance. Banking institutions are increasingly required to balance regulatory expectations with operational flexibility and proportional risk management. An overly rigid interpretation of compliance obligations may encourage institutions to prioritize procedural conformity rather than substantive risk mitigation, particularly in environments characterized by rapid financial innovation and evolving transaction patterns. Regulatory anchoring should function as a governance framework capable of supporting adaptive, context-sensitive, and institutionally sustainable compliance practices.

Risk intelligence

Risk intelligence emerges as a strategic mechanism connecting regulatory expectations with operational implementation. The literature consistently highlights the importance of enterprise-wide risk assessment aligned with national risk assessments in enabling banks to contextualize macro-level money laundering and terrorism financing risks within organizational environments (Naheem, 2020; Mekpor et al., 2018). This alignment supports more efficient allocation of compliance resources and enhances institutional responsiveness toward emerging risks. Nevertheless, the findings indicate that risk assessment processes remain vulnerable to cognitive bias and inconsistent interpretation, particularly in suspicious transaction classification and reporting decisions. Recent literature increasingly emphasizes the role of challenge mechanisms and governance oversight in mitigating such biases (Haffke, 2023).

These findings suggest that risk intelligence should not be understood merely as a technical assessment process, but as an organizational capability that integrates data interpretation, governance judgment, and strategic decision-making. In many cases, the effectiveness of risk intelligence depends on the institution's ability to continuously update risk indicators, improve interdepartmental coordination, and adapt analytical models to evolving financial crime patterns. Without adequate governance oversight and institutional learning mechanisms, risk assessments may become reactive and fragmented, thereby limiting the effectiveness of risk-based AML–CFT implementation.

Operational controls

Operational controls represent the practical manifestation of AML–CFT implementation within banking institutions. KYC, CDD, enhanced due diligence, and transaction monitoring remain the core instruments used to detect and mitigate financial crime risks (Jaffery & Mughal, 2020; Southworth & Levi, 2024). The literature confirms that the effectiveness of these controls depends heavily on the quality of risk calibration and the proportionality of implementation. Importantly, the findings reveal a gradual transition from standardized blanket controls toward more targeted and risk-sensitive approaches. This shift reflects criticism toward generalized de-risking practices that may generate inefficiency, compliance burdens, and financial exclusion (Aguele, 2025; Rose, 2021). Operational effectiveness is increasingly determined by the precision and contextual relevance of risk mitigation mechanisms.

The analysis further indicates that operational controls are most effective when supported by continuous monitoring, adaptive decision-making, and strong coordination between compliance units and frontline operational functions. In practice, banks are required not only to implement procedural controls, but also to ensure that such mechanisms remain responsive to changing customer behavior, transaction patterns, and emerging financial crime typologies. Consequently, operational controls increasingly function as dynamic governance instruments rather than static procedural requirements within risk-based AML–CFT implementation.

Technology enablement

The findings highlight the increasingly strategic role of technology enablement in supporting AML–CFT compliance amid growing financial digitalization and transaction complexity. RegTech, machine learning, and automated monitoring systems are widely recognized as important decision-support tools capable of improving detection capability, operational efficiency, and reducing false positives (Alexandre & Balsa, 2023; Klimova et al., 2020). The literature also demonstrates that technological effectiveness remains dependent on explainability, auditability, and regulatory transparency (Castelao-López et al., 2025; Bui, 2026).

Algorithmic decision-making processes that lack transparency may reduce institutional legitimacy and create regulatory concerns regarding accountability and traceability. Consequently, technology should not be positioned as a stand-alone compliance solution, but rather as an enabling mechanism that must remain integrated with governance structures and human oversight. The findings reveal an important tension between efficiency and accountability within technology-driven compliance systems. While automation improves transaction monitoring capability and operational speed, excessive dependence on algorithmic systems may reduce institutional transparency and weaken human interpretative judgment.

Human & governance capacity

The human and governance dimension highlights the central role of institutional actors in sustaining AML–CFT integrity. MLROs, compliance officers, and senior management function as technical compliance actors, and as strategic interpreters of regulatory expectations and organizational risk priorities (Juntunen & Teittinen, 2022; Hassan & Sajid, 2024). The literature demonstrates that accountability structures, leadership commitment, compliance culture, and continuous training significantly influence implementation quality across banking institutions (Tarmizi et al., 2022; Kamaruddin et al., 2025).

These findings reinforce the argument that AML–CFT effectiveness is fundamentally shaped by organizational governance capacity rather than solely by formal regulatory structures. Without strong governance commitment and institutional accountability, the RBA may deteriorate into symbolic or administrative compliance practices lacking substantive effectiveness. This finding further confirms that compliance effectiveness depends on procedural adequacy, and on institutional culture and behavioral commitment within banking organizations.

Supervisory interface

The supervisory interface dimension reflects the importance of coordination between banks and supervisory authorities in ensuring regulatory legitimacy and implementation consistency. Reporting systems, documentation procedures, audit trails, and decision traceability are consistently identified as critical components in maintaining accountability within the risk-based AML–CFT framework (Pontes et al., 2021; Bures, 2025). The literature further suggests that weak supervisory coordination may generate ambiguity in regulatory interpretation and increase institutional exposure to compliance uncertainty and regulatory sanctions (Hersi, 2024).

The findings further indicate that the six dimensions operate in a mutually reinforcing manner. Regulatory anchoring shapes the direction of risk intelligence, while operational controls depend on the quality of risk assessment and technological support. The governance capacity and supervisory coordination determine the legitimacy and sustainability of technology-enabled compliance systems. This interrelationship confirms that AML–CFT implementation should be understood as an integrated compliance orchestration system rather than as fragmented compliance activities.

Future research agenda

Future studies should move beyond procedural compliance analysis toward more integrated governance and institutional perspectives capable of addressing the complexity of digital financial systems and evolving money laundering risks.

Table 2. Future Research Agenda

Thematic Category	Future Research Opportunities
Regulatory Anchoring	Comparative studies on proportionality implementation, de-risking practices, and regulatory harmonization across jurisdictions.
Risk Intelligence	Development of governance-based risk calibration models and bias mitigation mechanisms in AML decision-making.
Operational Controls	Evaluation of targeted versus blanket controls in different institutional and risk environments.
Technology Enablement	Explainable AI, algorithmic accountability, and governance frameworks for RegTech implementation.
Human & Governance Capacity	The influence of compliance culture, leadership commitment, and organizational behavior on AML–CFT effectiveness.
Supervisory Interface	Cross-border supervisory coordination, FIU collaboration effectiveness, and adaptive regulatory governance models.

The future AML–CFT scholarship may particularly benefit from interdisciplinary approaches integrating governance studies, organizational behavior, digital technology, and regulatory compliance perspectives. Such approaches are necessary to better understand how banks can maintain effective and adaptive compliance systems in increasingly complex financial environments. The study further contributes to the AML–CFT literature by proposing compliance orchestration as an integrated governance perspective that moves beyond fragmented procedural compliance approaches.

Conclusion and Implications

This study employed a PRISMA-based systematic literature review to examine the implementation of risk-based AML–CFT in the banking sector. From 243 identified articles, 31 articles satisfied the inclusion criteria and were systematically synthesized to develop a conceptual understanding of compliance orchestration in AML–CFT implementation. The findings demonstrate that the adoption of risk-based AML–CFT contributes to improving detection effectiveness, enhancing resource efficiency, and strengthening institutional risk governance within banking organizations.

The study further reveals that the effectiveness of risk-based AML–CFT implementation cannot be understood solely as a procedural compliance exercise. Instead, effective implementation depends on the coordinated interaction between regulatory structures, risk intelligence mechanisms, operational controls, technological capability, organizational governance, and supervisory coordination. This finding confirms the ongoing transformation of AML–CFT implementation from rule-based compliance toward governance-oriented and risk-intelligence-driven approaches capable of responding adaptively to increasingly complex financial crime risks.

The proposed compliance orchestration framework identifies six interrelated dimensions shaping AML–CFT effectiveness, namely: (1) regulatory anchoring, (2) risk intelligence, (3) operational controls, (4) technology enablement, (5) human and governance capacity, and (6) supervisory interface. The framework demonstrates that weaknesses in one dimension may reduce the effectiveness of the overall compliance system, thereby reinforcing the importance of integrated and adaptive compliance orchestration in the banking sector. The findings also indicate several critical tensions within AML–CFT implementation, particularly between regulatory strictness and proportionality, automation and explainability, and compliance effectiveness and financial inclusion.

From a theoretical perspective, this study contributes to the AML–CFT literature by developing the compliance orchestration framework as an integrated governance perspective that extends beyond fragmented procedural compliance approaches. The framework provides a conceptual explanation of how institutional governance, technological capability, operational controls, and supervisory relationships interact dynamically in shaping the effectiveness and legitimacy of risk-based AML–CFT implementation. Practically, the findings highlight the importance for banks and regulators to strengthen governance quality, improve enterprise-wide risk intelligence mechanisms, develop explainable and accountable technology systems, and enhance collaborative supervisory relationships between financial institutions and regulatory authorities. These elements are essential for maintaining effective, proportionate, and adaptive AML–CFT systems amid increasing financial digitalization, cross-border financial activities, and the growing complexity of money laundering and terrorism financing risks.

This study is limited by its reliance on a literature-based conceptual approach and its primary focus on the banking sector, which may not fully capture the rapidly evolving dynamics of fintech ecosystems and non-bank financial institutions. Therefore, future studies are recommended to empirically validate the proposed framework through quantitative, qualitative, or mixed-method approaches across different jurisdictions. Further research may also examine algorithmic accountability, explainable artificial intelligence, governance bias in automated compliance systems, and emerging digital financial risks in AML–CFT implementation.

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