Anti-Money Laundering (AML) and Regulatory Technology: A Systematic Literature Review

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Abstract

The study explores the critical field of Anti Money Laundering (AML) and the significant role of Regulatory Technology (RegTech) in addressing AML Compliance challenges. The significance of anti-money laundering (AML) measures for maintaining economic stability has been underscored by international financial regulators and the Financial Action Task Force (FATF). The banking sector has substantially invested in advanced Regulatory Technology (RegTech) solutions. This comprehensive literature analysis, encompassing 94 publications released till November 2022, investigates the dynamic nature of difficulties in anti-money laundering (AML) compliance and the possibility of transformation through regulatory technology (RegTech). The present analysis reveals that the prevailing body of literature mainly concentrates on the issues associated with anti-money laundering (AML), regulatory frameworks, conventional rule-based monitoring, and flaws in AML systems within banking institutions. However, there needs to be more attention given to the effectiveness of artificial intelligence (AI) and blockchain-based regulatory technology (RegTech) solutions. The results of our study emphasize the need for further investigation in domains such as artificial intelligence (AI)-driven anti-money laundering (AML) solutions, the legal and ethical aspects of regulatory technology (RegTech) implementation, and the promotion of collaborative endeavors among relevant parties to strengthen the AML framework. This study offers significant contributions to improving anti-money laundering (AML) strategies and using advanced technologies to combat money laundering while also providing a direction for future studies in the domain of AML and RegTech.

Keywords: Systematic Literature Review, Anti Money Laundering, Technology, Reg Tech.

Introduction

Money laundering has a history as long as money itself (Jackson, 2000). The phrase "money laundering" initially appeared in the context of the Watergate incident in 1973 (Simwayi & Guohua, 2011). Money laundering initially came to public attention in 1995 when Australian criminologist John Walker of the University of Wollongong assessed its monetary value at USD 2.8 trillion (Walker & Unger, 2009). It was reinforced in 1998 when Mr. Michel Camdessus, Managing Director of the International Monetary Fund (IMF), stated that the current magnitude of money laundering is considered to be between two and five percent of the world's GDP (Tiwari et al., 2020). The IMF estimate was further corroborated by a UNODC research study completed in 2009, which claims that around USD 1.6 trillion has been laundered by criminals, which is approximately 2.7% of the world's GDP in 2009 (Trafficking, 2011). The 9/11 catastrophe exacerbated the severity of the problem. As a result, terrorism financing has been intertwined with money laundering.

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The FATF defined "Money Laundering" as processing criminal proceeds to conceal their illegal origin. *Money laundering* is defined by the United Nations Office on Drugs and Crimes (UNODC) as a mechanism by which criminals conceal the source of their illegal money to safeguard their asset base while avoiding the suspicion of law enforcement agencies. Money laundering and terrorism financing are linked phrases, although their substance can differ (Al-Suwaidi & Nobanee, 2020). Money laundering seeks to give filthy money a legal veneer, but terrorism financing entails providing cash for terrorist actions from both illegal and legal sources (Thony, 2002). Because of the importance of Regulatory Technology (RegTech), the globe has spent a significant amount of $ 9.5 billion on RegTech firms over five years (2014-2018) (Fintech Global, 2019). "RegTech" refers to technical solutions that aid in regulatory compliance, AML procedures, and organizations with competence in the industry (Becker et al., 2020). The phrase regulatory technology (RegTech) refers to technology that aids in implementing, monitoring, and reporting Money Laundering regulatory obligations (Arner et al., 2016).

Though anti-money laundering is a significant topic with plenty of literature, the relevance of AML/CFT Compliance difficulties in banks and RegTech efficacy is unique, challenging, and intriguing. There have been very few empirical investigations in this domain, and there is still much to be discovered in this innovative and challenging field. Future research studies should investigate the role of machine learning and artificial intelligence in detecting money laundering (Al-Suwaidi & Nobanee, 2020). Excessive AML reporting by banks, dubbed "crying wolf," is compromising the substance of AML reporting (Takáts, 2011). Despite the adoption of high-cost technological solutions, there is a more significant proportion of false positive alerts (95%) (IBM, 2019) (Joshua, 2018) that Compliance Experts in the banking industry should investigate. Because academic research studies on these topics are sparse, there is still a need to investigate and identify the causes and recommend corrective actions.

Although AML is a global concern, country-specific tendencies and mitigation actions cannot be generalized. Every country and financial industry has unique characteristics, and money laundering concerns differ appropriately. Developed countries like the United Kingdom and the United States have recorded economies and financial sectors using advanced fintech. In contrast, the economy of a developing country like Pakistan is undocumented, and technology growth in the financial industry is also low. Therefore, AML difficulties in Pakistan are expected to differ from those in developed countries. Kurum (2020) suggested assessing the use of RegTech for AML compliance, particularly in financial institutions (Kurum, 2020). Al Suwaidi and Nobanee (2020) advised that future research be focused on more targeted AML technologies such as AI, Machine Learning, DLT, and a descriptive study to collect data on available RegTech solutions and firms offering such solutions.

Existing literature focuses primarily on AML challenges, regulatory framework and changes, traditional rule-based techniques for transaction monitoring, deficiencies in bank AML compliance systems, and assessments of countries' AML frameworks following FATF recommendations (Schneider & Enste, 2000; Argentiero et al., 2008; Walker & Unger, 2009; Schneider et al., 2010; Ferwerda et al., 2013; Hassan & Schneider, 2016). However, only some studies on RegTech improvements, such as Blockchain and Artificial Intelligence advancements, were discovered about their usefulness for anti-money laundering. The investigation of regulatory technologies' rising role in effective AML measures is entirely restricted, and much remains to be discovered about the development of AI-infused RegTech solutions and their efficacy. Though this field has recently piqued the interest of scholars, and many new studies have been published, there is a need to offer a comprehensive overview of these publications and to recommend future research possibilities. Given this, the study aims to accomplish the following objectives:

1. Using a technologically enabled systematic literature review supplemented with a bibliographic technique, investigate and summarize the existing literature on anti-money laundering and the role of regulatory technologies.
2. To assess the current direction of existing literature and offer future research directions relevant to this rapidly emergent, innovative, and significant study area.

The current systematic literature review poses the following research issues addressing anti-money laundering and the role of regulatory technology (RegTech).

1. What is the present state of research in this domain: significant themes, top countries, journals, articles, and authors?
2. What future research opportunities exist in anti-money laundering and the role of regulatory technology (RegTech)?

The study consists of 05 sections. After the introduction, Section 02 of the study follows immediately, explaining the methodology of the investigation and citing some literature. Section 03 discusses the analysis and results of the Systematic Review (SPAR-4-SLR). The fourth section identifies themes based on the findings of the systematic literature review. The fifth and last section of the study is the conclusion, which covers gap identification, future direction, and conclusion.

Methodology

The study is a technologically advanced systematic literature review in which a single scientific database, SCOPUS, is used to find published research publications. Furthermore, VOSviewer and Bibliometric R were utilized to conduct bibliometric analysis to provide a more holistic and objective literature picture. The PRISMA Framework has been used in most previous systematic literature review research (Kumar et al., 2022). Researchers began and established a different protocol for studies in social sciences and business studies, namely the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR), in recognition of the social sciences as a distinct field of science. In contrast to the PRISMA Protocol, the SPAR-4-SLR outlines the criteria for the procedure used to include and exclude relevant articles, hence increasing transparency for relevant rationale based on the inclusion and exclusion of various publications. The bibliometric technique is objective-focused among the available types of systematic literature reviews (theme, bibliometric, framework, method reviews, and theory). Because the bibliometric approach is technologically empowered, it is more efficient and can manage large amounts of data, unlike other techniques that rely on manual coding. The goal was to pick and analyze significant publications that dealt with both subjects simultaneously: AML and Regulatory technology. This study allowed us to describe and evaluate the current body of knowledge on the junction of these two issues. The process used at each of the three stages is described in full below, and a summary of the same is shown in figure0-1.

Assembling

The SPAR-4-SLR technique divides the assembly procedure into two sub-stages: identification and acquisition (Paul et al., 2021). The identification research review focused on anti-money laundering and regulatory technology (RegTech) literature. Publications appearing in Scopus-indexed journals are given legitimacy for obvious reasons, such as meeting the required rigor, such as peer review. Furthermore, this identification criterion is consistent with the approach described in SPAR-4-SLR by Paul et al. (2021) and similar works such as by Kumar et al. (2022).

This review uses Scopus as the central database for acquisition since it is extensive and covers all bibliometric information about all papers it indexed. It is also helpful for quickly downloading pertinent information, such as the complete text of articles (Kumar et al., 2022). When compared to other databases such as WoS, Scopus allows researchers to have a more comprehensive selection of quality papers with a more significant number of publications (Paul et al., 2021). The start date of the research was purposefully left open to include all articles in the research domain, regardless of period, and the closing date was placed in the software as November 2022, the date of research. Concerning the keyword, a Google Scholar-based search for well-known terms such as Anti Money Laundering, AML, Countering Financial Terrorism, CFT, Regulatory Technology, and RegTech was conducted. After reviewing the relevant studies, a good idea about the Keywords and final keyword strings used were ("Anti Money Laundering" OR "AML" OR "Countering Financial Terrorism" AND "Regulatory Technology" OR "RegTech"). As a result, 94 journal publications were published.

Arranging

According to the SPAR-4-SLR technique, the arranging stage was separated into two sub-stages: Organization and Purification. The organization of the Review is based on the category filters assigned by Scopus, including but not limited to document type, source type, language, and subject area, as Paul et al. (2021) recommended. Purification begins with stage one: only articles published in peer-reviewed journals are considered. It yields a total of 95 articles. The resulting studies were then narrowed down to only include research and review journal articles published in English.

Furthermore, a manual review filtering review was carried out to assess the relevance of these publications for study domains. The abstracts of 95 identified papers were reviewed for the first time. Studies with a primary focus other than anti-money laundering and RegTech were eliminated. As a result, 21 items were removed from the Review owing to non-relevance. The Review then moved on to the remaining 74 items.

Assessing

Like Assembling and Arranging, the Assessing part is divided into two sub-stages: Evaluation and Reporting. For evaluating stage reviews, 74 publications were reviewed for their overall performance and contribution to anti-money laundering and regulatory technology knowledge maps. Excel and bibliometric R, together with its package Biblioshiny, were used to describe the publication trend, Top Countries, Journals, and articles on the subject, and scientific mapping to explain the various metrics. This analysis is relevant to answering the study's research questions. This Review adheres to the convention established in previous evaluations to proceed with the reporting part. For reporting reasons, it summarizes the findings using various tables, figures, and words (Paul et al., 2021; Kumar et al., 2022).

Figure 1 To review Anti Money Laundering & Regulatory Technology (Regtech) procedure adopted: The SPAR-4-SLR protocol (adopted from Paul, Lim, et al. 2021)

Arranging

Organization

Organizing Codes: Language, Source Type, Subject Area, Document type, Source Quality

Purification

Language: English
Source Type: Research and review articles
Subject Area: Management, Business, Finance, Banking, Accounting.
Document Type: Articles
Source Quality: Journal publications
Initial scrutiny including through reading abstract of 95 identified articles was conducted. The studies where the primary focus was not the anti-money laundering and RegTech were excluded.
Total Documents retained from Arranging Stage: 74

↓

Assembling

Identification

Domain: Anti Money Laundering and Regulatory Technology (RegTech)
Research Question: Ant Money Laundering (AML) and Regulatory Technology (RegTech)-RQ: 01-02
Source Type: Journals Source Quality: Scopus

Acquisition

Search Period: Up to November 2022 Material Acquisition: Scopus
Search Key Word: "Anti Money Launder*" OR "AML" OR "Countering Financial Terrorism" AND "Regulatory Tech*" OR "RegTech".
Total Document returned from Assembling/identification Stage: 95

↓

Assessing

Evaluation

Total Documents for evaluation: 74
Performance Analysis: (RQ-01) Publication Trend Analysis, Top Journal, Countries, Authors, And Articles to evaluate the Performance of Anti Money Laundering & Regulatory Technology Research.
Science Mapping: Co-authorship analysis and countries with enriched publication on the subject area and Co-occurrence of keyword and theme analysis knowledge cluster type analysis (RQ0-01)
Software: Bibliometric R, VOS viewer, Microsoft Excel
Future Research: Research Gap Analysis for future directions (RQ-2)

Reporting

Convention: Tables, Figures, and words
Source Support: NO Finance Support for this Study sort from anywhere.
Limitation: Bibliometric data accuracy, Scope, and completeness as available at Scopus

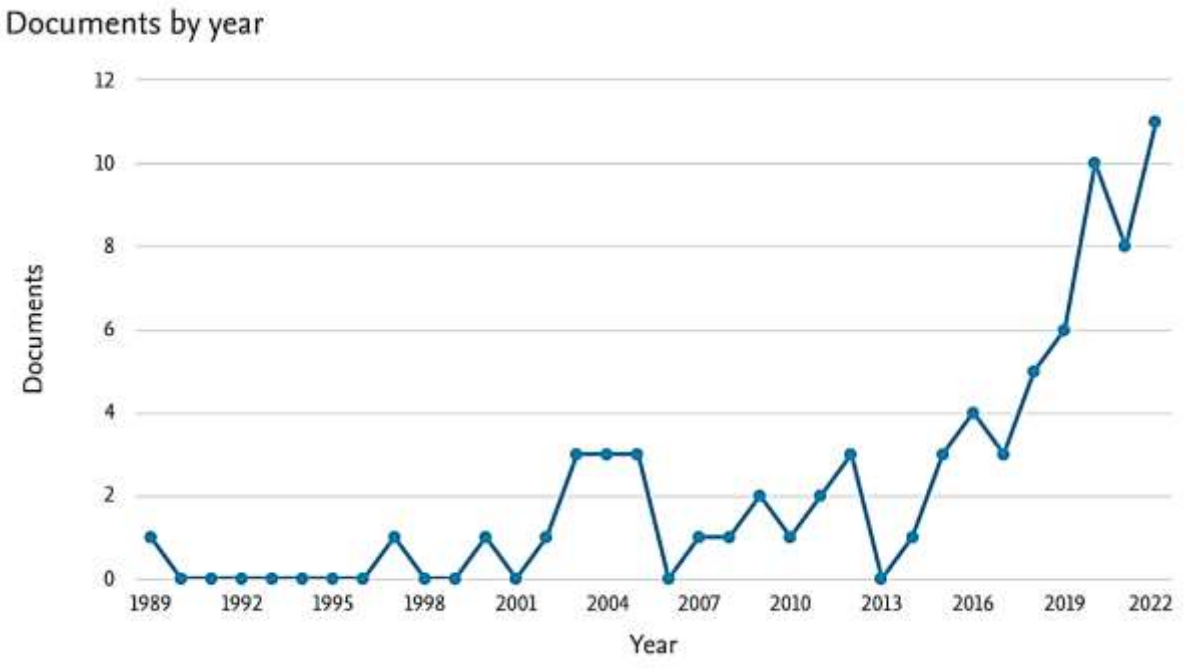
Performance of Anti Money Laundering (AML) and Regulatory Technology (RegTech) Research

Figure 01 Publication at a Glance

Publication Trend of AML and RegTech Research (RQ-01)

Figure 02 depicts the publishing trend of AML and RegTech Research from 1989 to 2022. A simple examination reveals that the first year when researchers began to write on the research area was 1989, which remained essentially non-existent for the next few years until 1996. The pattern marginally improved from 2002 to 2005, with an average of 03 publications per year, but the most recent trend, which began in 2013, has been steadily increasing year after year, with the maximum number of publications 11 in 2022. The tendency is congruent with the rising trend of AML and international Bodies' participation in the international arena, particularly the FATF as a Money Laundering watchdog. The international world, particularly in the last ten years, has seen the most rapid growth in money laundering and terrorist financing. As a result, in line with the growth of AML, Regulatory Technology solutions emerged to combat these money laundering practises.

Figure 02 Publication trend of AML and RegTech research. Source of data = Scopus. Period of coverage = 1989 to Nov 2022. Total number of publications = 74



Top Journal on AML & RegTech (RQ-2)

The top journal for AML and RegTech research is represented in Table 02 below. The top of the list is the Journal of Money Laundering Control, which published 125 articles with a 07 h_index over the time, followed by the Journal of Financial Crime, which produced 22 articles with a 04 h_index. Crime, technology predictions, and accounting are ranked third, fourth, and fifth in the rankings, respectively. Journals ranked 6th to 10th have less than 08 publications but more than 05 with the same h-index as 01.

Table 1 Top Journal for AML and RegTech research

S. No	Sources	Articles	h_index
1	Journal of money laundering control	125	7
2	Journal of financial crime	22	4
3	Crime	15	1
4	Technological forecasting and social change	14	1
5	Accounting	8	1
6	Abacus	7	1
7	Indonesia	7	1
8	International consortium of investigative journalists	7	1
9	Managerial auditing journal	7	1
10	Entrepreneurship and sustainability issues	6	1

Table 01. Top Journal on AML & RegTech Source of data = Scopus. Period of coverage = 1989 to Nov 2022. Total number of publications = 74

Top Articles on AML & RegTech Research Work

The articles retrieved from the Scopus database have been categorized as top to most cited in the table below. The article with the most citations is listed at number 01, with 49 citations, followed by 25 citations at numbers 2, 3, and 4. The article ranked 10 has the lowest citations (15).

Table 02

Rank	Authors	Title	Year	Cited
1	Gill M., Taylor G.	Preventing money laundering or obstructing business? Financial companies' perspectives on 'Know your customer procedures	2004	49
2	Demetis D.S.	Fighting money laundering with technology: A case study of Bank X in the UK	2018	25
3	Reynolds P., Irwin A.S.M.	Tracking digital footprints: anonymity within the Bitcoin system:	2017	25
4	Naheem M.A.	Trade-based money laundering: towards a working definition for the banking sector	2015	25
5	Arner D.W., Zetzsche D.A., Buckley R.P., Barberis J.N.	The Identity Challenge in Finance: From Analogue Identity to Digitized Identification to Digital KYC Utilities	2019	24
6	Hardouin P.	Banks governance and public-private partnership in preventing and confronting organized crime, corruption, and terrorism financing	2009	23

7	Shanmugam B., Thanasegaran H.	Combating money laundering in Malaysia	2008	23
8	de Smet D., Mention A.-L.	Improving auditor effectiveness in assessing KYC/AML practices: A case study in a Luxembourgish context	2011	20
9	Naheem M.A.	Regulating virtual currencies – the challenges of applying fiat currency laws to digital technology services	2018	15
10	Webb L.	A survey of money laundering reporting officers and their attitudes toward money laundering regulations	2004	15

Top Authors on AML & RegTech Research Work

The review looked through the database for top authors who expressed interest during the review period and authored the most papers. The graph below depicts the top writers who wrote at least one and up to three publications during the review period. Norman Mugarura is the list's top author, having written three publications on anti-money laundering and regulatory technologies.

Figure 03 Document by Author

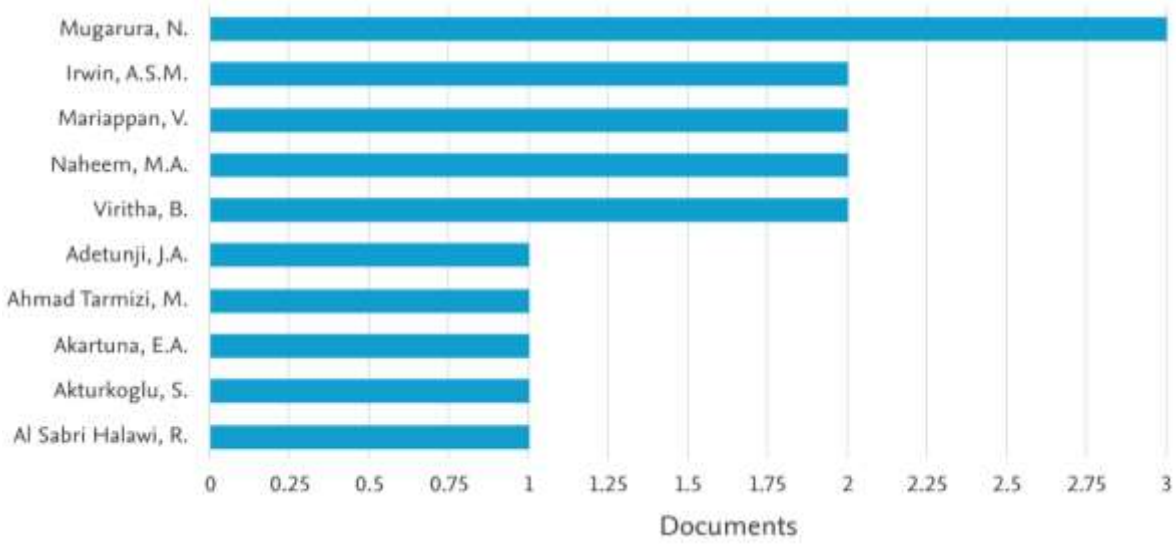
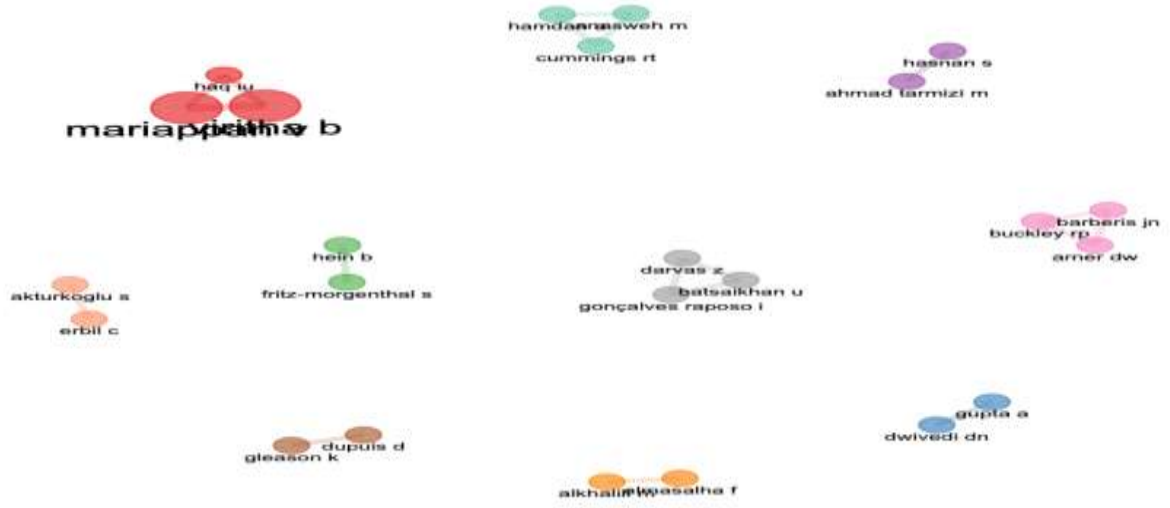


Figure 04 shows Collaboration Network Authors and the review further analysed the collaboration network of authors in the research domain of Anti Money laundering and regulatory technology. This collaboration network shows the social connectivity of authors who have the same area of research interest. Though segregated but there are ten such collaborative author groups. In one group the three authors collaborate namely: Mariappa, V, Viritha, B., and Haq Lu. In other group authors: Darvas Z, Baitsaikhan U, and Gancalves Raposo collaborates. Similarly, Ahmad Tarmizi, M, and Hasnan S. jointly research the subject area. A few other collaborators groups are Gupta A. and Dwivedi Dn, Dupuls, D. and Gleason K.

Figure 04 shows Collaboration Network Authors



Top Countries on AML & RegTech Research Work

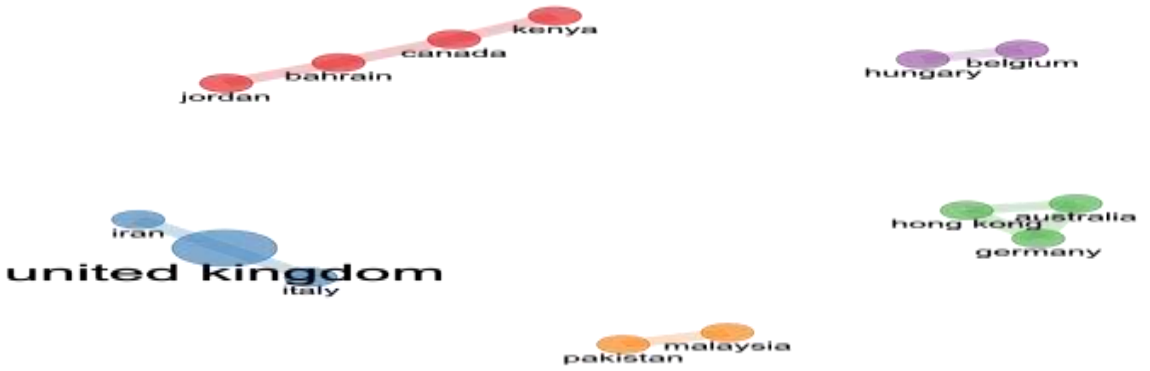
The review analysis of 74 articles under review revealed that the top country where the highest number of articles on Anti Money laundering and Regulatory technology authored is the UK with 21 publications followed by India with 13 publications, Australia with 09, Germany with 08, and Malaysia and USA with 05 each. The lowest in the top countries list is Egypt where 04 publications appeared during the review period**.**

Table 04

S. No.	Country	Freq/Articles
1	UK	21
2	India	13
3	Australia	9
4	Germany	8
5	Malaysia	7
6	USA	7
7	Lithuania	6
8	Turkey	6
9	Bahrain	5
10	Egypt	4

Figure 05 shows collaborative countries to further deep dive into the review, the author also investigated the collaborative countries where top research publications appeared on the subject. In this analysis, 05 major collaborative groups of countries appeared highlighted in Red, Green, Sky Blue, Purple, and yellow. Red Collaborative group consists of 05 countries namely: Kenya, Canada, Bahrain, and Jordan. Sky Blue Collaborative group is the UK, Italy, and Iran, the Yellow Group is Malaysia and Pakistan, the purple colour collaborative group represents Hungary and Belgium, and last but not least green Collaborative group consists of Hong Kong, Germany, and Australia.

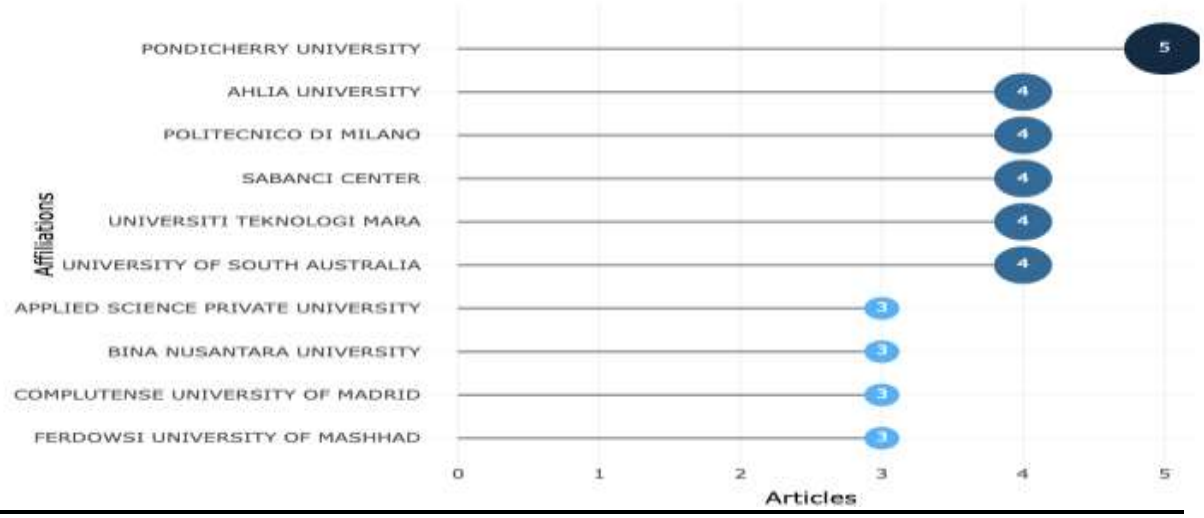
Figure 05 Collaborative Countries



Top Institutions on AML & RegTech Research Work

The review investigates the top institutions that participated in research in the domain of anti-money laundering and regulator technology. In this data, as Figure 06 explains below, Pondichery University is at the top with 5 publications, followed by Ahlia University, Politecnico Di Milano, Sabanci Center, University Teknologi Mara, and University of South Australia with 04 publications each in the list. Applied Science Private University till the end each has published 03 articles.

Figure 06 Top Institutions



Theme Identification & Categorization

The 74 publications that were nominated were reviewed for major theme identification and categorization in these research articles. The following snapshot displays the primary categories addressed in the referred research studies using the significant keywords utilised in the literature.

Figure 07 Keyword Map

The 74 works that were chosen were then analysed and classified into several clusters of topics. The authors reviewed the papers and shared notes in order to categorise the articles into 5 thematic clusters in order to give a more comprehensive picture of the content analysis of the selected articles, which is presented in the following sections.

Cluster-01: Emerging Money Laundering Trends and Threats

Shanmugam (2008) investigated the money laundering danger to the Malaysian economy and the efforts made by relevant players to address these concerns. Although authorities have taken significant steps, such as establishing a centralized financial monitoring authority and developing a regulatory framework, the study concludes that in order to deal with emerging trends, banks must heavily invest in the most advanced automated systems and devices for transaction monitoring and reporting of suspicious transactions (Shanmugam & Thanasegaran, 2008). Due to its vast volume and unpredictability, trade-based money laundering is another crucial area for stakeholders to monitor. To combat trade-based money laundering, Naheem (2025) investigated the inherent risk and effectiveness of existing traditional anti-money laundering methods. According to studies, there is a critical need for innovative techniques and models for combating trade-based money laundering because it is a cross-border complex and a high-volume remittance system that money launderers can use to integrate their dirty funds into the financial system under the guise of trade business.

Akurtuna et al. (2022) conducted a Delphi study with 52 experts from various businesses and countries to analyze new trends and risks in money laundering and terrorist funding. The expert comment continues to be helpful in understanding that new dangers in AML will emerge as distributed ledger technology advances, e-payment innovations, and digital currencies become available. Detective methods must be reinforced with more sophisticated and advanced technical tools to combat money laundering and terrorist financing. A single set of regulations cannot be effective for all topologies money launderers utilize. Because money laundering strategies constantly evolve, counter-measuring technological progress is also essential. The study provided a framework based on the future requirements of digital financial services breakthroughs (Akartuna et al., 2022). With shifting banking dynamics, banks must update their AML compliance monitoring systems. The case study "Where is the risk in transaction monitoring" investigated why a new system is required. The author investigated ERASE (Efficient Risk Analysis System Enhancement), a transactional monitoring system provided by the Netherlands Net Economy. The study looks into why such a monitoring system is required. What are the goals of adopting an institution's mind, and what are the benefits and drawbacks of such a system (Veyder, 2003)? McKenzie (2005) proposed a different approach to change the topologies of money laundering. The food stamp program is a food assistance program for the needy, but the study addressed how criminals might use such social programs to launder

money. The investigation recorded six incidents of food stamps being used to launder money (McKenzie, 2005).

Cluster 02: FATF, AML Regulatory Framework and Standards

As an international money laundering monitoring agency, FATF constantly assesses member countries' compliance with its 40+ recommendations (Molla et al., et al. 2021). Relevant laws in member nations and the regulatory AML environment are constantly changing to handle emerging money laundering threats. To stay ahead of money launderers, the regulatory system must be revisited regularly (Rosdol, 2007). These restrictions apply to exchange businesses and financial institutions (Clavijo, 2020). Roule et al. (2004) investigated the case of Naurou to determine why FATF placed the country on the grey list, and apart from the KYC-know your customer sector, what remained non-compliant was its supervision enhancement to 400 offshore centers or "shell banks." According to the study, the Secretariat Act of 1976 established Nauru as one of the safest havens for illegal and filthy money.

Furthermore, the banking and corporation laws have the same flaws as the FATF suggestion (Roule & Salak, 2004). Yu-Feng (2005) examined Taiwan's history of money laundering control from opening its financial markets in 1980. The study also looked at the 1996 Money Laundering Control Act and the requirements of the 2003 Act. Despite significant progress, AML laws are still needed (Lokanan & Nasimi, 2020), including increased training of financial industry staff for more vigorous AML regulatory enforcement in Taiwan (YuFeng, 2005). According to the author, the ideal AML framework best curbs anti-money laundering while enhancing financial inclusion (Liang, 2002). Esoimeme (2020) studied the UK and Nigerian banking industries to understand the best AML framework. According to the study, the UK AML framework is considerably more severe and beneficial for both targeted outcomes (Sciurba, 2018; Esoimeme, 2020). Given rising money laundering trends, financial institutions' ability to limit these actions and the involvement of public sector organizations in prosecuting and executing the collaboration is strongly encouraged (Kumar, 2020). Hardouin (2009) proposed that public-private partnerships for integrated systems would be excellent for collaborative efforts to curb money laundering trends and activities.

Cluster-03: AML System effectiveness evaluations.

Gill and Taylor (20024) investigated the usefulness and effectiveness of a critical phase in AML compliance: the financial institution's customer identification process. According to the survey, while financial institutions agree with the regulator on the necessity of understanding your client, they are equally concerned about the consumer's unwillingness to disclose such information (Mugarura, 2010). In a few cases, previously opened accounts complied with the then-current KYC requirement, but as regimes changed, new enforcement and requests for extra information provoked unrest among customers (Pellerano & Jorge, 1997; Tuba et al., 2014). The survey also got bank comments that the client identification laws are not linked with the risk proportion. The author also advised that authorities evaluate the regulation to adopt a more risk-based approach. Gill and Taylor, 2004. Webb (2004) interviewed respective Money Laundering Reporting Officers (MLROs) to assess their attitudes toward AML Regulations, their benefits, and the compliance costs to banks (Loh, 2020). According to the interview data, 27% of MLROs were highly favorable about AML compliance. Activities within the bank as required by regulators, 40% provided balanced or neutral responses to AML compliance regulation and benefits, and 33% were pessimistic about KYC requirements, benefits, and the applicable cost of AML Compliance to banks. The study also discovered that, in comparison to smaller banks, larger institutions are more interested in implementing AML requirements (Webb, 2004). Demetis (2018) did a case study to evaluate the bank's AML framework to analyze the AML system's efficiency in the UK banking sector. This study

applied structural coupling from system theory to analyze the bank's efforts for money laundering detection and customer profiling for estimating the risk of money laundering connected with the customer profile (Demetis, 2018). Customer identification (KYC) or customer profiling is the foundation for all anti-money laundering actions, as most are based on client profiles (Segovia-Vargas, 2021). Traditional consumer profiling and identification hurdles can be overcome by utilizing cutting-edge technologies and cyber security software for data protection (Laundering, 2016). It also addresses cross-border client identification and establishes harmonized KYC systems (Arner et al., 2019).

The UK's New Money Laundering framework dates back to 2004, when a new AML legislation was enacted. The regulatory framework requires handling vast amounts of customer identity data and transaction monitoring, patterns, and trends. After analyzing significant data alerts, bank experts and professionals select which transactions should be classed and reported as suspicious. According to studies, automation is critical for handling massive amounts of data and effective transaction monitoring. The study recommended a few data automation technologies, such as those developed by Bureau van Dijk Electronic Publishing (BvDEP), which can significantly minimize the time necessary for data processing. According to the study, practical and adequate customer identification systems combined with automated transaction monitoring can enable financial institutions to monitor transactions better and report questionable activities to authorities (Doughty, 2005).

To research alternative methods for increasing the effectiveness of criminal prosecution for money laundering,

William (2009) did a case study on the theoretical underpinning and practical implications of Know Your Customer (KYC) and Customer Due Diligence (CDD) regulations. The study's findings offer an alternative way of prosecuting money laundering crimes (Williams, 2009). De Smet (2011) studied the existing AML framework in a qualitative research study and proposed a novel Model to integrate reporting formats, KYC annexures, and business integration for internal control and AML audit efficacy (De Smet & Mention, 2011; Naheem, 2015). The mechanism of suspicious transaction reporting (STR) was investigated in the context of Chinese financial institutions. While reviewing the existing framework, the author discovered that deployed systems at financial institutions generate mostly rule-based alerts, which are no longer effective, especially in light of emerging money laundering trends. Compared to actual profiling and consumer business behavior, the rule-based method merely generates many false positives. For the success of STR efforts in China, the study proposed a risk-based approach and the implementation of an automated system based on a risk profiling technique (Tang, 2016).

Cluster-04: Crypto Currencies and Money Laundering

Because of the anonymity aspects of cryptocurrencies, their existence, rising acceptability, and suitability for payment systems in various nations represent another challenge to anti-money laundering efforts (Reynolds & Irwin, 2017). Although the European Union and other nations have begun to build regulatory frameworks for crypto exchanges, this area urgently requires adequate regulation for KYC and STR reasons (Limba et al., 2019). Binh (2021) endorsed the worries regarding the acceptability of cryptocurrencies in payment systems in research undertaken to evaluate crime in the digital currency era (2021). Cryptocurrencies are revolutionizing the globe through blockchain-efficient system utilization, but they also pose a risk of money laundering if not adequately regulated (Dupuis & Gleason, 2020).

Cluster-05: Role of regulatory technology and system automation in AML Compliance.

Kurum (2023) proposed implementing regulatory technology (RegTech) by financial institutions to combat money laundering is the most effective path forward for the next ten

years to combat money laundering operations better. However, the study recommended that banks focus on properly integrating AML systems with core banking systems, which could be the biggest issue in obtaining effective outcomes from regulatory technologies (Alkhalili et al., 2021; Kurum, 2023). Singh and Lin (2020) expanded on the importance of technology by investigating the implications of artificial intelligence-based AML tools for UK banks and charities. According to research, growing risks in money laundering can be better mitigated by utilizing the most recent AI-based AML systems (Singh & Lin, 2021). Given the benefits, a blockchain-based decentralized paradigm for Customer KYUC profiling and integration is becoming increasingly important for financial institutions. They expected reduced compliance costs due to automatically implementing KYC rules (Ostern & Riedel, 2021; Labanca et al., 2022). Malhotra (2022) endorsed the benefits of blockchain for KYC profiling in a research study that reviewed traditional KYC profiling and the use of the latest blockchain technologies that have already been deployed for cryptocurrencies and their efficient echo system (Malhotra et al., 2022).

Turki et al. (2020) did a study in the Bahrain banking industry to explain the impact of regulatory technologies on the effectiveness of banking anti-money laundering frameworks. The study's findings revealed that Regtech improves transaction monitoring and reporting. KYC profile, however, finding minor study results requires more effective catering through cutting-edge technologies (Turki et al., 2020). Most financial institutions use rule-based systems for transaction monitoring and reporting suspicious activities, resulting in more than 90% false positive alarms. The authors suggested a scientific model based on time-based frequency to address this issue, which reduces false positives from 90% to 14%—a machine learning method known as random forest was used. The study proposes the most recent AI-based machine learning techniques for transaction monitoring over traditional rule-based approaches that are no longer effective (Ketenci et al., 2021). Viritha et al. (2015) investigated the effectiveness of Indian anti-money laundering systems detecting suspicious transactions and its influence on criminal convictions and confiscation of laundered assets. The study findings show that there has been significant progress in suspicious transaction monitoring and reporting. However, no significant cases of conviction or confiscation have been observed, indicating that there is still much work to be done in this area for overall improvement in the AML framework following FATF recommendations (Viritha et al., 2015). Changing financial and technological sectors put present systems to the test and necessitate more advanced technological AML solutions (Akartuna et al., 2022; Hayble, 2022). Sterling (2015) presented a novel methodology for adoption in Canada to increase overall integration in questionable transaction reporting and examination of money laundering validity in a specific transaction. The model objectively examines the scenario with the client profile or separately to prevent and discover novel money laundering topologies (Sterling, 2015; Juntunen & Teittinen, 2022).

Conclusion

This research study centered around two primary research inquiries: RQ-01, which investigated the existing state of research on Anti Money Laundering and the Role of Regulatory Technology (RegTech), and RQ-02, which identified significant thematic clusters within this research domain and examined potential avenues for future research. Using the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) approach, 74 pertinent articles were identified from 95 publications. The findings of this review indicate that the primary themes covered in these articles include Emerging Money Laundering trends and threats, the Financial Action Task Force (FATF), the Anti-Money Laundering (AML) Regulatory Framework and Standards, evaluations of AML System effectiveness, the relationship between Crypto Currencies and Money Laundering, and the Role of regulatory technology in AML Compliance. The data indicates a consistent increase in publications from

2013, corresponding to the global emphasis on anti-money laundering (AML) efforts. In addition, the study also identified the leading publications, authors, and nations in the field.
In order to facilitate future research, it is imperative to examine the progress made in artificial intelligence (AI) and Anti-Money Laundering (AML) solutions based on blockchain technology. Additionally, it is crucial to evaluate the integration and standardization of data, study the potential of blockchain in enhancing transparency, foster collaboration among relevant parties, and address the ethical and legal ramifications of these improvements. Examining these factors will facilitate the advancement of more resilient and effective Regulatory Technology (RegTech) solutions, thus fortifying the efforts against money laundering and guaranteeing adherence to Anti Money Laundering Regulations. Consequently, this will enhance the integrity of the worldwide financial system.

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