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Money laundering in global trade and the role of financial technology: The structured reviews

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ABSTRACT

Money laundering in international trade facilitates the concealment of illicit funds through the manipulation of trade invoices and the exploitation of regulatory gaps. Addressing this issue involves improving traceability through financial technology, a promising solution. However, the adoption of such technology poses inherent risks and challenges that require careful consideration. This review synthesises knowledge on trade-related money laundering and financial technology, highlighting critical areas for additional research and improvement. Employing a Preferred Reporting Item for Systematic Reviews and Meta-Analyses (PRISMA) approach, academic databases, including Scopus and Web of Science (WoS), were systematically searched to identify relevant studies and articles. Advanced search techniques using keywords such as money laundering, trade-based money laundering, and financial technology resulted in the identification of 57 articles for eligibility. After excluding 20 articles due to being out of the field, having titles not significantly related, or abstracts not aligning with the study's objective, 37 eligible articles and conference proceedings were further examined. Two main themes were developed, concluding that the convergence of money laundering through digital trade and financial technology requires collaborative efforts among regulatory bodies, financial institutions, and technology experts. Such collaboration is essential to balance innovation and security, ensuring stability and prosperity in global economies.

Contribution/ Originality: The novelty of this study is rooted in dissecting the convergence of money laundering within trade and the integration of financial technology in anti-money laundering efforts to mitigate risks. Identifying challenges provides valuable insights for future studies, contributing to a more effective and robust financial regulatory framework.

1. INTRODUCTION

Trade-based money laundering (TBML) involves intentional invoicing discrepancies, where goods and services are misvalued, enabling criminals to discreetly infiltrate the legitimate financial system (Carton & Slim, 2018; Ferwerda, 2017; Naheem, 2017). Through collaborative efforts between exporters and importers, falsified invoices are generated, introducing a price differential managed through covert financial transfers (Choi, 2019; Lai & Hou, 2023). In order to legitimise illicit funds, criminal entities justify them as additional income or expenditures within

the legal economy, utilising misrepresentations on customs forms and shipping documents to disguise the origin or nature of the funds (Passas, 2017; Zdanowicz, 2013). Recent advancements in emerging technologies indicate considerable potential to modernise anti-money laundering (AML) frameworks by facilitating the detection of financial anomalies and enhancing oversight capacities (Nakagawa, Yamadera, Lee, & Osada, 2023). However, while digital innovations have enabled expedited cross-border monetary transfers via novel channels, they have concurrently generated regulatory vulnerabilities to money laundering that prevailing monitoring systems struggle to adequately address (Financial Action Task Force, 2021; Wiwoho, Kharisma, & Wardhono, 2022). The ongoing refinement of transaction layering techniques presents a persistent obstacle to existing supervisory abilities. This dilemma reveals the necessity for governance mechanisms to mitigate risks as financial systems evolve.

Efforts to pursue financial modernisation must integrate robust governance protocols to mitigate unintended detrimental consequences. Achieving an optimal balance between regulatory stringency, personal privacy rights, and financial market stability represents a perennial challenge (Thommandru & Chakka, 2022). Effective governance necessitates precise regulatory alignment with international standards to strengthen AML frameworks while minimising excessive tradeoffs. Here, emerging technologies also offer solutions; incorporating advanced analytics and blockchain technologies may bolster the resilience, adaptability, and comprehensiveness of AML infrastructure. Given the complexities introduced by the evolution of trade networks and emerging technology platforms, continuous evaluation is essential for formulating measured responses. Conducting a thorough review of recent money laundering literature from 2019 to 2023 is a valuable approach to exploring the emerging threats and oversight deficiencies faced by regulatory authorities and financial institutions. Such a review aims to deepen our understanding of the issues at hand and provide insights that can guide sophisticated and proportionate reactions.

2. LITERATURE REVIEW

In-depth interviews with experts and criminals shed light on the diverse methods for laundering funds obtained through illicit activities (Wronka, 2022). TBML emerges as a systemic issue, with Global Financial Integrity (GFI) estimates indicating that billions are laundered annually through exploiting trade-based transactions. Criminals manipulate trade invoices to conceal illicit payments, exploiting the reliance of global supply chains on such records for coordinating exchanges (Saenz & Lewer, 2023). The seismic impact of the COVID-19 pandemic on global financial systems has been profound, acting as an accelerant for the adoption of cashless payments and digital platforms. While this digitisation brings convenience, it also introduces new vectors for criminal abuse, including online fraud, hacking, and identity theft (Wronka, 2022).

The rise of decentralised financial technologies and the use of online payments and cryptocurrencies have the potential to fuel the growth of TBML schemes. These technologies enable faster cross-border value shifts, allowing illicit actors to exploit loopholes and bypass regulated banking transparency protocols (Barone & Masciandaro, 2019; Kien & Binh, 2021). By leveraging the anonymity and untraceability of cryptocurrencies, criminals can conduct illicit transactions without leaving a clear financial trail (Barone & Masciandaro, 2019; Kien & Binh, 2021).

Furthermore, TBML schemes often circumvent established security measures, including transaction reporting, monitoring, and Know Your Customer (KYC) protocols (Utkina, 2022). Facilitated through correspondent banks, opaque beneficial ownership structures, and front companies registered in secrecy jurisdictions (Wang, 2023; Wronka, 2022) this evasion is compounded by fragmented jurisdiction-based oversight and inadequate enforcement. As TBML schemes continue to evolve in response to advancements in financial technologies, it becomes crucial for regulators and law enforcement agencies to stay ahead by developing robust frameworks and employing innovative techniques to mitigate the risks associated with these illicit practices (Chitimira & Ncube, 2021).

The Regulatory Dialectic Theory, as proposed Kane (1977) and Kane (1988) offers valuable insights into the complex interplay between financial innovation and regulatory mechanisms. This theory becomes particularly relevant in emerging technologies in the financial sector, such as decentralised cryptocurrencies, which necessitate

adaptive regulatory frameworks (Dupuis & Gleason, 2020). The theory emphasises the need for regulatory frameworks to evolve alongside financial innovations, striking a delicate balance between managing associated risks and unleashing the creative potential enabled by effective regulation.

However, the rapid advancement of financial technologies has outpaced the capabilities of AML regulatory systems, presenting significant governance challenges (Ocampo, Branzoli, & Cusmano, 2023). The speed at which innovations surpass oversight structures has created regulatory gaps, providing opportunities for opportunistic criminals to exploit compliance vulnerabilities before necessary reforms can be implemented (Sinno, Baldock, & Gleason, 2023). Furthermore, divergent priorities among national jurisdictions impede efforts to standardise transparency and cooperation measures among regulatory authorities (Teichmann & Falker, 2021; Teichmann & Falker, 2020). In the absence of unified governance, intricate tradeoffs arise, involving considerations of security, privacy, efficiency incentives, and competitiveness concerns (Thommandru & Chakka, 2022, 2023). Consequently, fragmented trade oversight fosters openings for money laundering, capitalising on enforcement gaps across different jurisdictions (Ferwerda, Saase, Unger, & Getzner, 2020). The exponential growth of emerging financial technologies, juxtaposed with established yet fragmented regulatory systems, has created an environment that allows criminals to exploit weaknesses in the AML compliance landscape.

3. MATERIAL AND METHODS

Incorporating pertinent literature into the study involves three essential stages within the systematic review process: identification, screening, and eligibility assessment.

3.1. Identification

The first stage entailed the identification of key terminology. Subsequently, related terms were scrutinised by leveraging resources such as extant academic studies. Employing pertinent keyword selections, search queries were executed to uncover relevant entries in Scopus and WoS (see Table 1). In this phase of the systematic review, 231 articles were successfully retrieved from the databases selected for this study.

Table 1. The search strings.

Database	Queries
Scopus	TITLE-ABS-KEY (("Money laundering" OR "trade-based money laundering" OR "illicit money" OR "conceal* money" OR "illicit fund" OR "illegal transfer") AND ("Financial tech*" OR "digital finance*" OR "fintech" OR "mobile transfer*" OR "online transfer*" OR "online pay*" OR "illicit financial flow*" OR "IFF*" OR "capital flight")) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp")) AND (LIMIT-TO (PUBSTAGE, "final"))
WoS	("Money laundering" OR "trade-based money laundering" OR "illicit money" OR "conceal* money" OR "illicit fund" OR "illegal transfer") AND ("Financial tech*" OR "digital finance*" OR "fintech" OR "mobile transfer*" OR "online transfer*" OR "online pay*" OR "illicit financial flow*" OR "IFF*" OR "capital flight") (Topic) and 2023 or 2022 or 2021 or 2020 or 2019 (Publication Years) and Article or Proceeding Paper (Document types) and English (Languages) and Business Economics or Social Sciences other topics (Research areas) and Article or Proceeding paper (Document Types) and 2023 or 2022 or 2021 or 2020 or 2019 (Publication years) and English (Languages)

Note: "TITLE-ABS-KEY" is a search abbreviation in Scopus for retrieving information based on title, abstract, and keywords. "*" is a wildcard symbol, expanding searches to identify words starting with the same letters.

3.2. Screening

Various potentially pertinent research materials were scrutinised during the screening phase to identify content congruent with the predetermined research question(s). The selection criteria were often rooted in categorising money laundering and financial technology employing machine learning, serving as a content-specific parameter

during screening. This process involved eliminating duplicate papers from the search results removing 165 publications in the initial screening phase. Subsequently, 66 papers underwent examination in the second screening phase, guided by various exclusion and inclusion criteria (refer to Figure 1). Table 2 highlights the primary criterion, emphasising literature (research papers) as the principal source for practical recommendations, including recent conference proceedings, while excluding other document types. The review exclusively considered English-language publications, focusing on 2019 to 2023. A meticulous rejection of nine publications occurred due to adherence to duplicate publication criteria.

Table 2. The selection criterion is searching.

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time horizon	2019 to 2023	< 2013
Literature type	Journal (Article), conference paper	Book, book chapter
Publication stage	Final	In press

3.3. Eligibility

In the "eligibility" phase, constituting the third stage, a compilation comprising 57 articles was collated. This stage involved a thorough investigation of both the titles and substantive content of these articles, aiming to determine their adherence to the inclusion criteria and alignment with the research objectives of the current study. Consequently, 20 reports were excluded due to their lack of relevance, insignificance of titles, and a disconnect between their abstracts and the study's objectives. As a result, 37 articles remained available for review (refer to Figure 2).

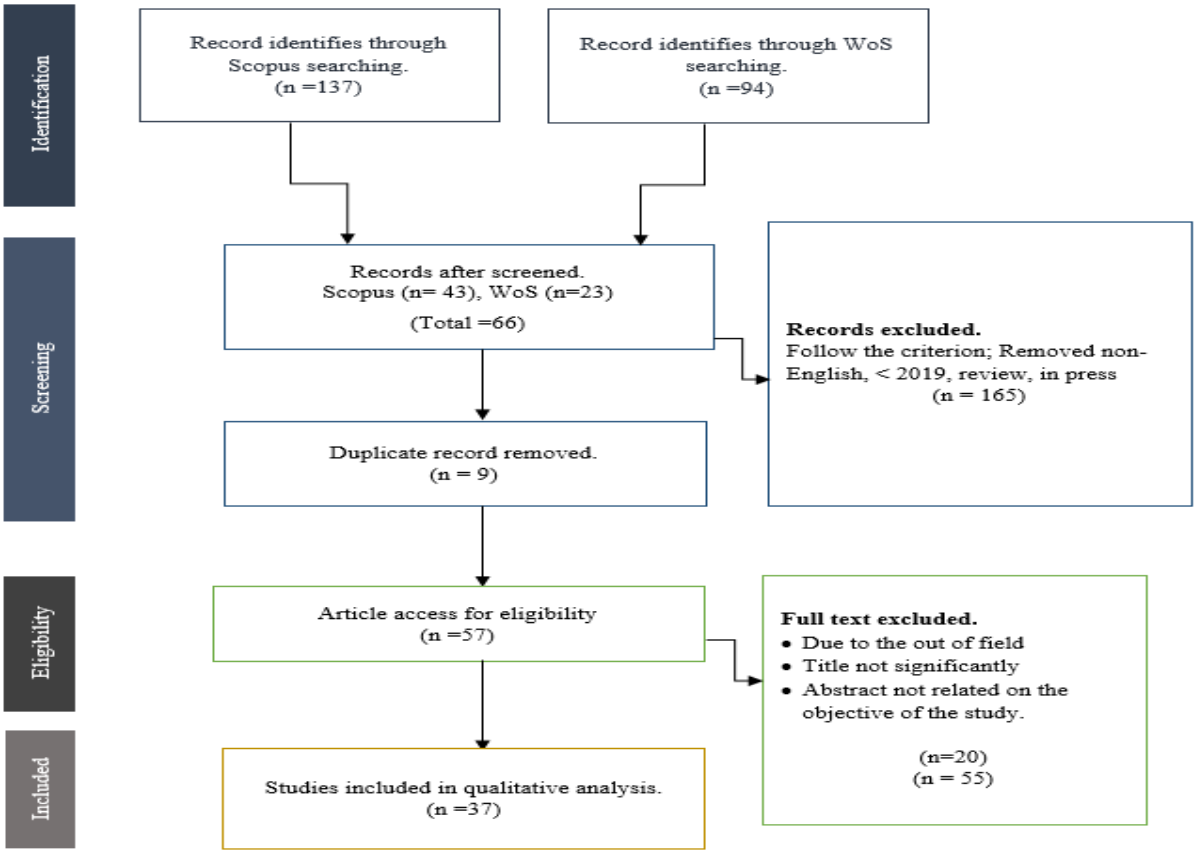

Figure 1. Flow diagram of the proposed searching study.

Source: Moher, Liberati, Tetzlaff, Altman, and Group* (2009).

3.4. Data Abstraction and Analysis

This study used a comprehensive analysis as a pivotal examination approach to scrutinize and amalgamate diverse research designs, encompassing qualitative, quantitative, and mixed methods. The focus of expert research was on the development of pertinent topics and sub-topics. It is imperative to emphasize that theme development commenced during the initial data collection phase. A meticulous review of 37 papers was undertaken to extract statements or information addressing the current research questions.

Following this, the authors and experts analysed money laundering, trade, and financial technology associations, aiming to identify and form meaningful groups. The methodology identified three core themes: development and mechanisms, risks and challenges, and prevention efforts. Subsequently, the authors elaborated on each developed theme, incorporating any associated themes, concepts, or ideas. Additionally, collaboration between the corresponding author and other co-authors within the study framework occurred to refine themes based on the findings. A log was maintained throughout the data analysis process to document analyses, opinions, puzzles, or other ideas pertinent to data interpretation.

In order to ensure coherence in the theme-creation process, collaborative efforts were made by the authors to compare results and identify any discrepancies. Notably, in instances of inconsistencies in themes, the authors engaged in discussions to address and resolve them. Ultimately, the designated themes underwent refinement to guarantee consistency. The examinations were overseen by an expert specialising in international finance and trade, ensuring the validity of the research problems. Through establishing domain validity, the expert review phase ensured each sub-theme's clarity, importance, and adequacy. Adjustments were made based on expert feedback and comments, guided by the authors' discretion.

4. FINDINGS AND DISCUSSIONS

4.1. The Top Ten Highly Cited Academic Journal Articles

Figure 2 displays the citation counts for academic journal articles within the study timeframe. The highest number of citations recorded was 29, followed by 18 and 15. The figure includes the names of the author(s) and the publication year. Subsequently, the research findings of the top ten academic journal articles with the highest citation counts are elaborated below.

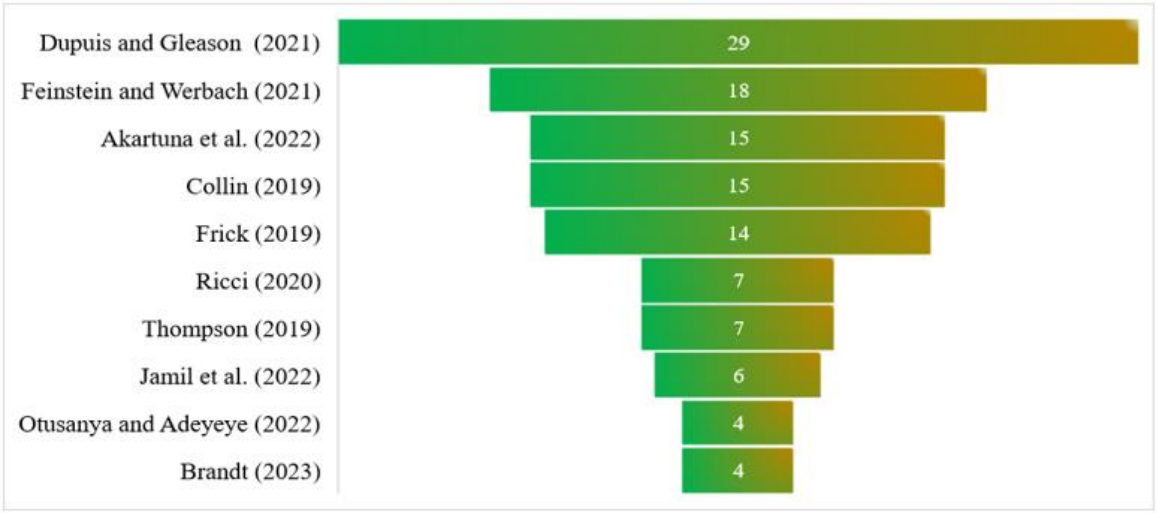

Figure 2. Number of citations, author(s), and publication year.

(1) Dupuis and Gleason (2020) studied the potential of cryptocurrency for money laundering, identifying six methods and proposing potential law enforcement strategies. They also highlighted the cost implications of stringent measures on crypto-to-fiat exchanges used in money laundering. Despite challenges, their insights

into the feasibility of money laundering across crypto-related assets significantly contributed to the field.

(2) Feinstein and Werbach (2021) study explores regulators' challenges in the rapidly growing global cryptocurrency markets. They analysed trading activity at various exchanges following regulatory announcements and found that diverse measures had insignificant impacts on traders' movements, challenging the notion of capital flight or chilling effects.

(3) Akartuna, Johnson, and Thornton (2022) discuss the risks of rapid financial innovation and technological advancements, including distributed ledger technologies, cryptocurrencies, and financial technology (FinTech), which criminals exploit for money laundering and terrorist financing. They propose a flexible framework and 3-point implementation standard to enhance suspicious activity detection and protect technologies from misuse.

(4) Collin (2019) studied the harmful impact of illegal cross-border financial flows on economic and human development. It introduces a conceptual framework for these flows, including money laundering and tax evasion. Collin evaluates three types of studies: methods to measure IFFs, constructed risk indicators, and forensic studies. The study acknowledges limitations and proposes ways to advance research on IFFs due to their secretive nature.

(5) Frick (2019) highlighted the surge in cryptocurrencies from 2017-2018, with the European Union (EU) initially experiencing developments without active regulation. The introduction of the Fifth Anti-Money Laundering Directive in 2019 marked a shift, and Switzerland's unique crypto regulation offers a potential model for EU regulators.

(6) Ricci (2020) study explores the relationship between economic freedom and fintech growth, focusing on Bitcoin transactions across the top 70 economies. It finds strong connections between network centrality measures and economic freedom levels, with countries with high international trade freedom, low inflation, and minimal administrative requirements showing robust fintech development.

(7) Thompson (2019) study investigates Myanmar's informal "hundi" system, which is thriving due to historical banking restrictions and limited financial services. Despite its involvement in criminal activities, it remains unregulated. The growing formal banking sector, fintech, and mobile money services pose challenges to the Hundi system, which is recognised as a significant AML and countering financing of terrorism risk.

(8) Jamil, Sanusi, Yaacob, Isa, and Tarjo (2022) examined the impact of Covid-19 on financial crime and regulatory compliance. It reveals a shift from physical to cybercrime, highlighting challenges in regulatory compliance even before the pandemic. The study emphasises the need for collaboration between financial institutions and regulators, digitalisation, robust risk management, and government fund packages for small firms to enhance regulatory compliance. This research contributes to understanding financial crime and compliance in Malaysia.

(9) Otusanya and Adeyeye (2022) explored the role of secrecy jurisdictions in promoting IFFs from developing countries, highlighting the link between capital flight, money laundering, and global offshore financial centres (OFCs). The research highlights the importance of addressing supply-side corruption to break the aid dependency cycle and promote economic stability in developing nations, highlighting the predatory practices of the international financial industry.

(10) Brandt (2023) highlights the significant challenge of IFFs on the development of low-income countries, emphasising the need for domestic resource mobilisation to fund essential public services. The paper examines the economic dimension of IFFs, excluding drug trade, money laundering, and human trafficking. The study reveals that individuals hold financial assets equivalent to ten per cent of global gross domestic products in tax havens, and illicit money transfers disproportionately affect developing nations. Addressing IFFs is crucial for sustainable development in low-income countries.

Table 3 and 4 present a condensed summary of research article discoveries on two pivotal themes explored in this study. Table 3 centres on money laundering in the digital era, whereas Table 4 delves into the theme of risks and challenges. Both tables furnish crucial details such as the author's name, year of publication, journal title, and publication type, indicating whether the article is indexed in WoS or Scopus. The following section elaborates extensively on the findings associated with each theme mentioned.

4.2. Money Laundering and the Digital Age

Money laundering from trade is a pervasive issue that significantly impacts developing economies, posing threats to their economic stability and domestic resource mobilisation (Brandt, 2023; Sotande, 2019). Empirical evidence demonstrates that these illicit financial flows impede economic growth and often exert a more substantial influence than foreign aid (Mugari, Farooq, Shah, & Irfan, 2022). Furthermore, criminal entities involved in money laundering conduct meticulous cost-benefit analyses, considering economic feasibility, financial freedom, government expenditure, and tax policies when planning illicit activities (Tiwari, Gepp, & Kumar, 2023). Tax havens, for instance, facilitate corruption and illicit activities among elites in developing countries. Therefore, addressing this supply-side corruption is crucial in reducing aid dependence and promoting stable democracies (Otusanya & Adeyeye, 2022).

In recent years, cross-border trade-based money laundering has become the predominant mechanism for illicit financial flows, often involving trade misinvoicing and accounting for over 20% of international trade value (Umar, 2023). Factors such as foreign direct investment, shadow economy, corruption and organised crimes play a critical role, especially in transactions with low-income nations (Korystin, Nekrasov, Krivolapchuk, & Sviridyuk, 2019; Toan, 2022). Furthermore, implementing AML legislation focused on financial intermediaries can unintentionally fuel trade misinvoicing as individuals and firms turn to cross-border trade to conceal funds (Toan, 2022).

As digital finance continues to evolve, regulatory authorities have exhibited escalating concerns regarding the potential implications of emerging financial technologies. This includes online lending platforms and cryptocurrencies in facilitating money laundering and the financing of terrorism (Gaviyau & Sibindi, 2023; Ricci, 2020). Several studies have explored how these emerging technologies can facilitate money laundering and other financial crimes (Dupuis & Gleason, 2020; Hapsari & Satria, 2019). This evolving landscape demands heightened vigilance and innovative strategies from policymakers and regulators to combat the misuse of both traditional and modern financial tools. Criminal entities also continually enhance their technological capabilities to circumvent existing oversight controls. Recent case studies from Ethiopia and Myanmar underscore the evolving nature of financial crime, particularly concerning money laundering facilitated by digital technologies and virtual currencies (Gobena, 2023; Thompson, 2019). Additionally, criminals exploit cash-based economies, advocating for incorporating modern technologies like the Hundi system despite inherent risks.

During the COVID-19 pandemic, digital transactions, especially cashless ones, have surged, increasing card fraud. Consequently, new regulations, such as the digital finance package, have been introduced to address this issue. However, concerns have been raised that these regulations might destabilise the virtual currency market, potentially prompting investors to withdraw and funds to shift towards Asian markets (Thommandru & Chakka, 2022). These challenges highlight the need for tailored responses that address diverse industry-specific and geographical contexts while balancing economic activities and vigilant oversight (Langdale, 2022; Marxen, 2022). Therefore, it is crucial to note that current regulations, aiming for stringent control, may inadvertently hinder technological advancement rather than promote it Shavshukov and Zhuravleva (2023). Hence, a delicate equilibrium is necessary to ensure regulatory efficacy without stifling innovation and compromising the stability and integrity of the global financial system.

Table 3. Research article findings on money laundering in the digital age.

Author(s) (Year)	Title	Journal / Proceeding / Book	S	W
Brandt (2023)	Illicit financial flows and developing countries: A review of methods and evidence	Journal of Economic Surveys	/	
Dupuis and Gleason (2020)	Money laundering with cryptocurrency: Open doors and the regulatory dialectic	Journal of Financial Crime	/	
Gaviyau and Sibindi (2023)	Global anti-money laundering and combating terrorism financing regulatory framework: A critique	Journal of Risk and Financial Management	/	
Gobena (2023)	Money laundering in Ethiopia: An analysis of typologies and techniques	Journal of Money Laundering Control	/	
Hapsari and Satria (2019)	Regulatory sandbox analysis to prevent money laundering crime of financial technology in Indonesia	International Journal of Scientific and Technology Research	/	
Toan (2022)	Assessing the introduction of anti-money laundering law on trade misinvoicing: The case of Vietnam	Economics and Finance Letters		/
Toan (2022)	Effects of foreign direct investment on trade-based money laundering: The case of Vietnam	Cogent Social Sciences	/	/
Korystin et al. (2019)	The phenomenology of money laundering in Ukraine	Financial and Credit Activity-Problems of Theory and Practice		/
Langdale (2022)	Money laundering in Australian casinos	Journal of Money Laundering Control	/	
Marxen (2022)	When context matters- application and potential of financial crime risk indicators in selected African jurisdictions	Potchefstroom Electronic Law Journal	/	
Mugari et al. (2022)	Illicit financial flows and international trade nexus under inadequate governance structures: The case of sub-Saharan Africa	Global & Local Economic Review		/
Otusanya and Adeyeye (2022)	The dark side of tax havens in money laundering, capital flight and corruption in developing countries: Some evidence from Nigeria	Journal of Financial Crime	/	
Ricci (2020)	How economic freedom reflects on the Bitcoin transaction network	Journal of Industrial and Business Economics	/	
Sotande (2019)	Impediments affecting the curbing of illicit financial flows of organized crime in developing economies: Policy implications	Journal of Financial Crime	/	
Thommandru and Chakka (2022)	The globalisation of cashless transactions using blockchain technology to preventing money laundering and the changing trends in the cryptocurrency market: A learning experience of polish and EU laws	European Studies: The Review of European Law, Economics and Politics	/	
Thompson (2019)	"Underground banking" and Myanmar's changing Hundi system	Journal of Money Laundering Control	/	
Tiwari et al. (2023)	Global money laundering appeal index: Application of principal component analysis	Journal of Money Laundering Control	/	
Umar (2023)	Effects of trade misinvoicing on money laundering in developing economies	Journal of Money Laundering Control	/	

Note: S: Scopus and W: Web of Science.

4.3. Risks and Challenges

Rapid evolution in financial technologies has profoundly influenced the money laundering landscape, presenting challenges and opportunities for regulators and financial institutions. Integrating groundbreaking technologies like cryptocurrencies and blockchain has markedly enhanced global financial efficiency and connectivity (Akartuna et al., 2022; Pocher, Zichichi, Merizzi, Shafiq, & Ferretti, 2023). As traditional markets transform, banks embrace innovations to enhance efficiency while prioritising client protection (Murshudli & Loguinov, 2019). Simultaneously, implementing digital technology for archiving and document processing in banks

stands to improve efficiency substantially (Subia & Corpuz, 2020). In addition, central banks are cautiously approaching the adoption of digital currencies, emphasising the need for balanced regulatory oversight as they navigate emerging technologies (Dijmărescu, 2021). However, the rapid pace of financial innovation has outpaced many financial institutions' outdated systems, leading to vulnerabilities and opportunities for criminal exploitation (Battanta, Giorgino, Grassi, & Lanfranchi, 2020). As a result, this expansion of financial systems through new technologies has broadened the scope of financial crimes, necessitating vigilant regulatory efforts to combat these challenges (Koibichuk, Ostrovska, Kashiyeva, & Kwilinski, 2021).

The impact of financial technologies on capital flows underscores the importance of adaptive regulatory frameworks addressing money laundering, cyber threats, and cross-border financial crimes (Asif, Lodhi, Sarwar, & Ashfaq, 2023; Rubasundram, 2019). Prioritising enhanced digitalisation and implementing robust risk management practices are imperative, especially given criminals' increasingly sophisticated financial technology skills (Jamil et al., 2022). Regulators find themselves at a crossroads, aiming to foster innovation within the financial sector while safeguarding the financial system's stability (Frick, 2019). Encouraging innovation is crucial for economic growth and technological advancement. However, too much leniency in regulations might lead to financial instability, as observed in past economic crises. Establishing the appropriate balance is pivotal to mitigate systemic risks effectively. Notably, the challenge lies in formulating regulations robust enough to deter criminal activities while remaining flexible to foster legitimate financial pursuits. Hence, achieving this delicate equilibrium demands a nuanced understanding of the financial industry's intricacies and criminal behaviours. Furthermore, complicating matters further are research findings indicating the limitations of regulations in consistently shaping traders' decisions (Feinstein & Werbach, 2021). This raises fundamental questions about the efficacy of current regulatory strategies and underscores the need for innovative approaches.

To effectively combat these challenges, regulators must proactively embrace technological advancements and anticipate emerging trends, implementing strategic measures to navigate this intricate landscape (Mykhailiuk, Rustamzade, & Bakhishov, 2021). Note that a pragmatic approach involves integrating technology to enhance compliance. Regulatory technology solutions can adeptly manage the substantial regulatory burden, ensuring more effective oversight (Day, 2021) and yielding innovative regulatory solutions (Lieonov, Vasylieva, Mynenko, & Dotsenko, 2021; Nikiforova & Nikiforov, 2021). Accordingly, these solutions not only deter illicit activities but also safeguard investors, preserving the financial system's integrity. Furthermore, recognising the persistent deficiencies in AML practices is crucial, necessitating enhanced interagency coordination, rigorous customer due diligence, and culturally appropriate regulations (Collin, 2019; Mogomotsi, Mogomotsi, & Hambira, 2020).

In the context of international trade, financial technologies have introduced complexities to money laundering schemes. However, the seamless cross-border transactions facilitated by cryptocurrencies and blockchain technology have allowed criminals to exploit trade networks. It also creates challenges in distinguishing between legitimate trade activities and those intended for money laundering. Integral components of modern trade finance, such as smart contracts, digital invoices, and online payment platforms, can be manipulated to facilitate fraudulent activities. Thus, addressing these challenges requires a proactive and cooperative approach among regulatory bodies, financial institutions, and technology experts. Swift and decisive action is also necessary to adapt to this evolving landscape, reinforcing the financial sector's resilience against emerging threats and ensuring a secure and prosperous future.

Table 4. Research article findings on risk and challenge's theme.

Author(s) (Year)	Title	Journal / Proceeding / Book	S	W
Akartuna et al. (2022)	Preventing the money laundering and terrorist financing risks of emerging technologies: An international policy Delphi study	Technological Forecasting and Social Change	/	/
Asif et al. (2023)	Dark side whitewashes the benefits of fintech innovations: A bibliometric overview	International Journal of Bank Marketing		/
Battanta et al. (2020)	Regtech: Case studies of cooperation with banks in Italy	Proceedings of The European Conference on Innovation and Entrepreneurship, ECIE	/	
Collin (2019)	Illicit financial flows: Concepts, measurement, and evidence	World Bank Research Observer	/	/
Day (2021)	Artificial intelligence for knowledge graphs of cryptocurrency anti-money laundering in fintech	Proceedings of the 2021 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, ASONAM 2021	/	
Dijmărescu (2021)	Towards a fiduciary digital currency	Romanian Journal of European Affairs	/	
Feinstein and Werbach (2021)	The impact of cryptocurrency regulation on trading markets	Journal of Financial Regulation	/	
Frick (2019)	Virtual and cryptocurrencies—regulatory and anti-money laundering approaches in the European Union and in Switzerland	ERA forum	/	
Jamil et al. (2022)	The covid-19 impact on financial crime and regulatory compliance in Malaysia	Journal of Financial Crime	/	
Koibichuk et al. (2021)	Innovation technology and cyber frauds risks of neo banks: Gravity model analysis	Marketing and Management of Innovations		/
Lieonov et al. (2021)	Banking in digital age: Efficiency of anti-money laundering system	Financial and Credit Activity-Problems of Theory and Practice		/
Mogomotsi et al. (2020)	Illicit capital flows and money laundering in Botswana: An institutional economic analysis	Africa Development	/	
Murshudli and Loguinov (2019)	Digitalisation challenges to global banking industry	Economic and Social Development (ESD 2019): 37th International Scientific Conference on Economic and Social Development		/
Mykhailiuk et al. (2021)	Digitalisation of financial services and challenges of adaptation of control	Financial and Credit Activity-Problems of Theory and Practice		/
Nikiforova and Nikiforov (2021)	State regulation of blockchain technology in the sphere of payments and financial services	Socio-Economic Systems, Vol. 2: Paradigms for The Future		/
Pocher et al. (2023)	Detecting anomalous cryptocurrency transactions: An AML/CFT application of machine learning-based forensics	Electronic Markets	/	
Rubasundram (2019)	The dark web and digital currencies: a potent money laundering and terrorism opportunity	International Journal of Recent Technology and Engineering	/	
Shavshukov and Zhuravleva (2023)	National and international financial market regulation and supervision systems: Challenges and solutions	Journal of Risk and Financial Management	/	
Subia and Corpuz (2020)	Archiving and digitising of customer records of golden rural bank of the Philippines.	International Journal of Scientific and Technology Research	/	

Note: S: Scopus and W: Web of Science. CFT is countering the financing of terrorism.

5. CONCLUSION

In addressing the intricate nexus of money laundering from global trade and financial technology, a nuanced response is imperative, encompassing collaborative policy efforts and responsible innovation. Establishing robust

regulatory frameworks necessitates collaboration among intergovernmental organisations, national regulators, law enforcement agencies, and private sector stakeholders. Key policy priorities involve international harmonising AML regulations, fostering information exchange between institutions, and exploring advanced monitoring systems, such as AI-powered Regulatory Technology (RegTech). Ongoing updates to risk-based guidance by global standard-setting bodies like the Financial Action Task Force (FATF) are essential to keeping pace with the dynamic landscape of technological advancements.

At the domestic level, regulators play a pivotal role in translating international norms into context-specific regulations. Financial authorities can bolster detection capabilities by integrating technology systems, such as RegTech and blockchain analysis, with human intelligence while preserving the intricacies of local contexts. Specialised training for law enforcement is crucial to investigating the evolving risks associated with emerging technologies, including cryptocurrencies and cybercrime. Multi-stakeholder partnerships involving governments, financial institutions, and technology companies can facilitate a cohesive approach from policy formulation to on-the-ground crime prevention.

However, the formulation of rules should strike a delicate balance, combining prescriptiveness with supportive conditions that foster responsible innovation in finance. The Regulatory Dialectic framework posits that regulations and technologies evolve reciprocally, influencing each other over time. Therefore, policy solutions must remain adaptable, avoiding rigid imposition. The encouragement of technologies like RegTech and ethical AI to reinforce compliance and data security supports this balanced approach. Looking ahead, preserving integrity in digital finance necessitates the cultivation of accountable innovation alongside adaptive policymaking. Through coordinated efforts among stakeholders globally, risks can be mitigated without compromising efficiency or inclusion in financial services. This delicate yet imperative balance forms the foundation for prosperity and stability in a globalised economy witnessing increased digitisation. While the path forward remains intricate, the possibilities appear boundless if met with collaboration, ethics, and forward-thinking leadership ready to shape a financial system for the future.

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