

Cryptocurrency taxation and regulatory challenges

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Abstract

The rapid proliferation of cryptocurrencies has presented significant challenges to tax authorities and financial regulators worldwide. This study critically examines the legal, institutional, and regulatory frameworks governing cryptocurrency taxation across jurisdictions, focusing on the inconsistencies, loopholes, and enforcement difficulties that hinder effective compliance and oversight. The decentralized nature of blockchain-based financial systems, alongside the anonymity of cryptocurrency transactions, complicates traditional taxation and regulatory models. The primary objective is to identify and analyse the key regulatory challenges, evaluate legal frameworks in selected jurisdictions, and provide recommendations for policy harmonization and improved compliance mechanisms. Using a systematic literature review of 40 peer-reviewed articles from 2013 to 2024, this study synthesizes academic insights across legal, financial, and technological domains. Inclusion criteria focused on papers discussing cryptocurrency taxation, DeFi, AML, and regulatory policy analysis. The review reveals fragmented tax treatment, limited enforcement capacity, growing use of DeFi tools to evade compliance, and the lack of international regulatory alignment. Current regulatory models are outdated and jurisdiction-specific, making them ineffective against borderless crypto activity. The study recommends global regulatory harmonization, adoption of risk-based frameworks, public-private cooperation, and investment in regulatory technology and capacity building.

Keywords: Cryptocurrency; Taxation; Regulation; DeFi; Blockchain; Compliance; Legal frameworks; AML; International cooperation; Crypto policy

1. Introduction

The advent of cryptocurrency has ushered in a transformative era in global finance, redefining not only the way assets are transacted but also the boundaries of financial regulation and taxation (Silva & Da Silva, 2022). Since Bitcoin's introduction in 2009, the crypto-asset market has grown into a multi-trillion-dollar global phenomenon that challenges traditional fiscal policies and regulatory structures (Hossain, 2021). Unlike fiat currencies that are governed by centralized authorities, cryptocurrencies operate on decentralized blockchain networks, creating fundamental jurisdictional and compliance dilemmas for governments and tax authorities alike (Kamau & Yavuzaslan, 2023).

Consequently, the regulatory and taxation frameworks for cryptocurrencies remain highly fragmented and uncertain across jurisdictions, with some countries adopting progressive stances while others impose bans or stringent restrictions (Benson et al., 2024). This disjointed regulatory landscape creates multiple challenges: from defining the legal status of digital assets to enforcing capital gains tax and monitoring cross-border crypto transactions (Dupuis & Gleason, 2021). Moreover, the pseudo-anonymous nature of cryptocurrencies hinders transparency, making it difficult for tax authorities to trace and assess income generated through digital assets (Guandaru Kamau & Yavuzaslan, 2023).

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In recent years, governments and international bodies have attempted to address these complexities. For instance, the European Union introduced the Markets in Crypto-Assets (MiCA) regulation to provide a harmonized legal framework for cryptocurrencies within member states (Benson et al., 2024). Likewise, the OECD has proposed a Crypto-Asset Reporting Framework (CARF) aimed at enhancing tax transparency and curbing tax evasion in cross-border crypto transactions (Silva & Da Silva, 2022). Despite these efforts, there remains a lack of consensus on core definitional and operational standards, resulting in divergent practices globally (Almeida & Gonçalves, 2023).

Moreover, the volatility of cryptocurrency markets further complicates tax policy design. Unlike traditional securities, cryptocurrencies experience rapid and unpredictable price fluctuations, thereby making valuation, cost basis tracking, and profit computation exceedingly difficult (Hossain, 2021). Taxation models that rely on capital gains reporting are often impractical when applied to micro-transactions or when users engage in DeFi protocols, yield farming, or staking activities, which are novel and poorly understood by regulators (Hägele, 2024). In addition, auditability poses a serious challenge for regulators and revenue services. Blockchain's immutable ledger provides transparency in principle, but in practice, the complexity of wallet structures, smart contracts, and decentralized exchanges hinders traceability (Kamau & Yavuzaslan, 2023). Therefore, tax authorities must invest in advanced forensic tools and develop specialized expertise, all of which present fiscal and technical burdens, particularly for developing economies (Nembe & Idemudia, 2024).

Furthermore, cryptocurrencies introduce unprecedented cross-border taxation issues. Transactions executed via decentralized protocols often span multiple jurisdictions without a clear point of origin or residence, thus complicating the application of double taxation treaties and transfer pricing rules (Silva & Da Silva, 2022). As a result, multinational cooperation is essential, but such coordination is often hampered by varying national interests, technological capacities, and political will (Dupuis & Gleason, 2021). It is also important to note that the regulatory environment is evolving in tandem with the emergence of new crypto-financial instruments. Central Bank Digital Currencies (CBDCs), stablecoins, and tokenized assets further blur the boundaries between public and private money, necessitating even more nuanced and adaptive regulatory and taxation mechanisms (Ozili, 2023). These innovations challenge not only the scope of taxation but also raise broader questions of monetary sovereignty and regulatory jurisdiction (Al-Amri et al., 2019).

Given the magnitude and multi-dimensionality of these issues, a systematic literature review is essential to synthesize the current state of research and policy on cryptocurrency taxation and regulation. Previous reviews have examined discrete aspects such as market volatility (Haq et al., 2021), exchange structures (Hägele, 2024), and technological risks (Zhang, 2024), but few have comprehensively explored taxation and regulatory challenges in an integrated manner. This study is therefore timely and significant. It not only consolidates current knowledge across jurisdictions and sectors but also identifies thematic gaps in literature and proposes evidence-based recommendations for regulatory reform. The relevance of this inquiry extends to policymakers, tax authorities, investors, legal scholars, and FinTech entrepreneurs alike, all of whom have a vested interest in the stability, transparency, and legitimacy of the global cryptocurrency ecosystem (Silva & Da Silva, 2022).

In essence, the field of cryptocurrency taxation and regulation presents a rich, dynamic, and critically underexplored domain of research. By applying a systematic review methodology, this study seeks to provide a robust conceptual foundation and a practical roadmap for future inquiry and policy formulation. It will not only clarify definitional ambiguities but also offer guidance on enforcement strategies, audit procedures, and cross-border harmonization, thereby contributing meaningfully to the global discourse on digital asset governance.

2. Methodology

A systematic review methodology was employed in this study to synthesize existing academic literature on cryptocurrency taxation and regulatory challenges. This approach was chosen due to its rigorous and transparent framework, which facilitates the identification, evaluation, and integration of relevant empirical and theoretical studies across various contexts (Silva & Da Silva, 2022). By applying a systematic review, the study ensures a comprehensive understanding of the diverse perspectives and evidence surrounding the regulatory and fiscal complexities associated with cryptocurrencies (Hossain, 2021). Moreover, this methodology reduces researcher bias, promotes replicability, and enhances the validity of conclusions drawn from existing scholarship (Hägele, 2024).

2.1. Search Strategy

To initiate the review process, a robust and structured search strategy was developed to retrieve the most relevant and high-quality academic literature on cryptocurrency taxation and regulation. Multiple scholarly databases were systematically searched, including Scopus, Web of Science, SpringerLink, and the Researcher.Life Discovery platform,

as recommended in prior reviews on digital finance and regulatory studies (Almeida & Gonçalves, 2023). Boolean search operators and keyword combinations were applied using terms such as “cryptocurrency,” “taxation,” “blockchain regulation,” “crypto compliance,” “digital asset policy,” and “crypto tax enforcement” to refine the search results (Silva & Da Silva, 2022).

Furthermore, citation chaining and backward referencing techniques were used to identify key foundational articles cited in later research, as this improves coverage and captures influential literature that might not appear in keyword searches alone (Al-Amri et al., 2019). The initial search yielded over 300 peer-reviewed records, which were then exported into a citation manager for screening and categorization. Titles, abstracts, and keywords were first reviewed to eliminate duplicates and irrelevant entries before full-text evaluation (Kamau & Yavuzaslan, 2023). To ensure recency and relevance, only articles published between 2015 and 2024 were considered in the final analysis, except for foundational regulatory reports or early empirical work cited in contemporary studies (Dupuis & Gleason, 2021). By integrating a wide array of scholarly sources, the study aimed to capture both global trends and jurisdiction-specific policy developments, thereby facilitating a comparative and contextualized understanding of cryptocurrency taxation and regulation (Benson et al., 2024).

2.2. Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were rigorously defined to ensure that only high-quality and relevant sources were analyzed in this study. First and foremost, only peer-reviewed journal articles, book chapters, and government or intergovernmental reports were included in order to ensure scholarly validity and policy relevance (Nembe & Idemudia, 2024). Additionally, selected studies had to focus specifically on aspects of cryptocurrency regulation, taxation policy, compliance enforcement, or legal classification within regional or international contexts (Haq et al., 2021).

Conversely, publications that merely addressed technical blockchain development, speculative investment strategies, or price prediction without linkage to regulatory or tax implications were excluded from the final synthesis (Zhang, 2024). Grey literature, blogs, non-peer-reviewed opinion pieces, and commercial consultancy reports were also omitted to preserve methodological rigor (Silva & Da Silva, 2022). Only English-language publications were considered due to accessibility constraints and the international dominance of English in regulatory discourse. In summary, the methodology adopted for this study ensures a balanced, evidence-based, and critically informed examination of the global challenges in cryptocurrency taxation and regulation. By applying a systematic review framework grounded in established research protocols, the study contributes to a deeper understanding of the policy gaps, enforcement dilemmas, and regulatory innovations in the rapidly evolving digital finance landscape.

2.3. Data Extraction and Synthesis

Following the article selection process, data extraction was carried out systematically to ensure the consistency and accuracy of the findings derived from the literature. A standardized extraction framework was designed to record essential variables including authorship, publication year, country of focus, research methodology, regulatory topic (e.g., taxation, compliance, legal classification), and key conclusions of each study (Silva & Da Silva, 2022). This structured format allowed for comparative analysis and helped in identifying patterns, gaps, and contradictions in the existing research corpus (Hossain, 2021). Moreover, the extracted data were subjected to a thematic synthesis process, a method suitable for integrating both qualitative and quantitative findings across heterogeneous studies (Almeida & Gonçalves, 2023). Themes were identified inductively by coding recurring regulatory issues, such as tax evasion risks, lack of unified classification, and jurisdictional inconsistencies (Kamau & Yavuzaslan, 2023). For instance, the frequent mention of decentralized exchanges (DEXs) as a challenge for tax reporting indicated a cross-cutting concern in both developed and emerging economies (Hägele, 2024).

In addition to thematic grouping, studies were further classified by methodological approach—empirical, conceptual, or policy-oriented—to understand the strength and type of evidence underpinning the findings (Nembe & Idemudia, 2024). This dual categorization was crucial for identifying research gaps, especially in regions or themes lacking empirical data or in need of updated legal frameworks (Benson et al., 2024). Furthermore, synthesis of the extracted data was not merely descriptive but interpretive, involving a critical analysis of how national regulatory objectives align or conflict with global tax compliance norms (Dupuis & Gleason, 2021). The goal was to build a comprehensive narrative around the interconnected challenges of regulatory arbitrage, enforcement loopholes, and taxation uncertainty in the cryptocurrency domain (Al-Amri et al., 2019).

2.4. Addressing Bias and Ensuring Reliability

To minimize bias and improve the reliability of the systematic review, multiple strategies were implemented throughout the data collection and synthesis process. Firstly, a dual-reviewer system was used during the screening and inclusion stages, wherein two independent researchers evaluated each article against the inclusion criteria to prevent subjective selection (Silva & Da Silva, 2022). Discrepancies were resolved through consensus or arbitration by a third reviewer, a method widely regarded as best practice in systematic reviews (Hägele, 2024). Secondly, the reliability of data extraction was enhanced by piloting the extraction framework on a subset of studies to ensure clarity and consistency in variable coding (Kamau & Yavuzaslan, 2023). This pre-testing phase reduced the chances of interpretive error and improved inter-coder agreement, thereby strengthening the internal validity of the analysis (Almeida & Gonçalves, 2023).

Furthermore, publication bias—wherein studies with positive or policy-conforming results are more likely to be published—was addressed by including grey literature from institutional reports and government working papers, provided they met the inclusion quality threshold (Nembe & Idemudia, 2024). This inclusive strategy ensured that lesser-known but methodologically sound perspectives were incorporated into the review. Additionally, transparency was maintained through the documentation of every step in the review process, including the rationale for exclusion of specific studies, enabling future researchers to replicate or build upon the findings (Silva & Da Silva, 2022). Finally, potential conflicts of interest in included studies were assessed by evaluating funding sources and author affiliations, a practice that further strengthens the credibility and neutrality of the review outcomes (Dupuis & Gleason, 2021). In sum, rigorous procedures for bias mitigation and reliability enhancement were embedded throughout the research design. This ensures that the findings presented in the review are both robust and trustworthy, thereby contributing meaningful insights into the global discourse on cryptocurrency regulation and taxation.

3. Analyses and findings

3.1. Research methods used in the analyzed articles

The methodological diversity observed in the 40 articles reviewed underscores the interdisciplinary nature of research on cryptocurrency taxation and regulatory challenges. The studies utilized a wide range of methodological approaches—spanning systematic reviews, qualitative analyses, empirical investigations, legal comparisons, and policy commentaries. Each method offers unique insights, and the frequency distribution of these approaches highlights prevailing trends in how researchers approach the evolving discourse around digital asset governance.

To begin with, systematic literature reviews were prominently used in seven of the studies, reflecting a growing emphasis on consolidating fragmented research into coherent syntheses (Silva & Da Silva, 2022). These reviews are instrumental in identifying thematic gaps, methodological inconsistencies, and emerging research priorities in a rapidly evolving field (Almeida & Gonçalves, 2023). For instance, Hägele (2024) undertook a systematic comparison between centralized and decentralized exchanges, while Haq et al. (2021) focused on economic policy uncertainty and its impact on crypto markets. These reviews are particularly valuable in addressing the lack of empirical consistency and definitional clarity that characterizes much of the discourse on crypto regulation (Amsyar et al., 2020).

In addition, the use of qualitative content analysis was the most frequently employed method, appearing in nine studies. This approach enables scholars to explore legal texts, regulatory frameworks, and institutional responses in greater depth and detail (Dupuis & Gleason, 2021). For example, Kamau and Yavuzaslan (2023) conducted a detailed content analysis on the auditability of blockchain-based financial transactions, identifying structural challenges in enforcing tax laws in decentralized finance systems. Similarly, Nembe and Idemudia (2024) analyzed global digital tax policies and proposed reforms tailored to crypto-related revenue gaps. These studies typically lack numerical data but compensate through rich legal interpretation, making them well-suited for normative or policy-driven investigations (Ozili, 2023).

Notably, case study analyses were used in five articles, emphasizing real-world instances such as regulatory responses to crypto exchange failures or national approaches to crypto-tax policy. For instance, Benson et al. (2024) conducted a comparative case analysis of harmonized regulation in the EU, while Zetzsche et al. (2018) critically examined the ICO boom and its implications for financial oversight. These case studies offer granular insights into specific legal or institutional environments and allow researchers to draw practical lessons from complex regulatory contexts (Chen & Bellavitis, 2020).

Meanwhile, comparative legal analysis was employed in six studies, underscoring the importance of jurisdictional variance in cryptocurrency regulation. These studies compared tax treatments, regulatory frameworks, or legal

definitions of crypto-assets across countries or regions. For example, Wronka (2024) examined the divergence between UK and German regulatory regimes, while Marian (2013) evaluated how cryptocurrency functions as a tax haven across borders. These comparative works reveal the fragmentation in regulatory responses and the difficulties in achieving international tax cooperation (Vandezande, 2017).

On the other hand, empirical or quantitative analysis was utilized in eight studies, reflecting the field's increasing reliance on data-driven insights. Such studies often examined market behavior, tax compliance patterns, or asset volatility using statistical tools or machine learning algorithms. For instance, Feinstein and Werbach (2021) used econometric models to assess how regulation affects crypto trading volumes, while Zhang (2024) applied neural networks to predict crypto market trends. This growing empirical focus is crucial in validating theoretical assumptions and providing evidence-based guidance to policymakers (Adeoye et al., 2024).

Lastly, policy analysis and commentary appeared in five of the articles, serving as critical reflections on the philosophical and practical implications of regulating decentralized financial systems. These works often drew from legal theory, institutional critique, and ethical considerations to assess the future of financial governance. De Filippi and Wright (2018), for instance, highlighted the "rule of code" as a competing regulatory force to traditional legal systems, while Zetzsche et al. (2019) explored how RegTech could bridge the compliance gap in a digitized financial landscape. Though less empirical in nature, such commentaries are vital in pushing conceptual boundaries and identifying regulatory blind spots (Marian, 2013).

In sum, the methodological distribution in the reviewed literature demonstrates a healthy pluralism in the research on cryptocurrency taxation and regulation. The predominance of qualitative and review-based methods reflects the early and still-theoretical stage of much crypto-policy research, where empirical data are scarce or underutilized. However, the growing inclusion of data-driven and comparative legal methods signals an evolving scholarly response to the increasing complexity and institutionalization of the crypto economy. Importantly, the complementarity of these methods—rather than any single dominant approach—suggests that multi-methodological designs may be most effective in future investigations. Such integration will not only deepen academic understanding but also provide more actionable guidance for policymakers, regulators, and industry stakeholders alike (Silva & Da Silva, 2022).

Table 1 Research Methods Used in the Analyzed Articles

Research Methods	Frequency	Studies
Systematic Literature Review	7	Silva & Da Silva, 2022; Almeida & Gonçalves, 2023; Hägele, 2024; Haq et al., 2021; Amsyar et al., 2020; Valdeolmillos et al., 2019; Al-Amri et al., 2019
Qualitative Content Analysis	9	Dupuis & Gleason, 2021; Nembe & Idemudia, 2024; Kamau & Yavuzaslan, 2023; Wronka, 2024; Davenport & Usrey, 2023; Makurin et al., 2023; Ozili, 2023; Pandey & Gilmour, 2023; Manda & Nihar, 2023
Case Study Analysis	5	Benson et al., 2024; Zetzsche et al., 2018; Shukla et al., 2022; Chen & Bellavitis, 2020; Lo & Medda, 2021
Comparative Legal Analysis	6	Wronka, 2024; Vandezande, 2017; Marian, 2013; De Filippi & Wright, 2018; Zetzsche et al., 2019; Böhm & Kolev, 2019
Empirical/Quantitative Analysis	8	Feinstein & Werbach, 2021; Zhang, 2024; Lo & Medda, 2021; Chen & Bellavitis, 2020; Lansky, 2018; Ozili, 2023; Fauzi et al., 2020; Adeoye et al., 2024
Policy Analysis/Commentary	5	De Filippi & Wright, 2018; Marian, 2013; Vandezande, 2017; Zetzsche et al., 2019; Feinstein & Werbach, 2021

3.2. The legal and institutional frameworks governing cryptocurrency taxation across jurisdictions

Cryptocurrency taxation remains one of the most complex areas in financial regulation, largely due to the divergence in legal interpretations, institutional responses, and policy implementation across global jurisdictions. The decentralized and borderless nature of cryptocurrencies challenges the traditional tax infrastructure, creating inconsistencies in classification, compliance, and enforcement. In analyzing the legal and institutional frameworks adopted worldwide, it becomes evident that there is a critical lack of harmonization, which continues to hinder effective governance.

To begin with, one of the most comprehensive efforts toward regulatory coherence is the European Union's proposed Markets in Crypto-Assets Regulation (MiCA). This initiative aims to create a harmonized framework for cryptocurrency activities across member states, thereby reducing the risk of regulatory arbitrage (Benson et al., 2024). However, despite the EU's attempt to establish consistency, there remains substantial disparity at the national level, with member states applying anti-money laundering (AML) frameworks unevenly or lacking comprehensive tax provisions for crypto transactions (Benson et al., 2024).

Moreover, case-specific regulatory failures, such as the collapse of the FTX exchange, have exposed institutional weaknesses in monitoring centralized exchanges and enforcing investor protections. The FTX case illuminated a significant gap in the oversight of financial intermediaries operating in the crypto space and prompted renewed calls for global regulatory convergence (Manda & Nihar, 2023). It also demonstrated that even in jurisdictions with relatively advanced financial oversight, digital asset platforms often operate in legal grey areas, creating opportunities for tax avoidance and fraud (Manda & Nihar, 2023).

Importantly, comparative legal research reveals that jurisdictions differ not only in regulation but also in how they classify cryptocurrencies—whether as commodities, currencies, or securities. For instance, Indonesia's approach to Islamic crypto assets (ICAs) offers a unique religious-legal framework, where digital tokens are regulated as tradable commodities provided they are backed by tangible assets like gold (Wiwoho et al., 2023). While this model integrates shariah governance with legal infrastructure, it highlights that taxation mechanisms must also accommodate jurisdiction-specific socio-economic and cultural values (Wiwoho et al., 2023).

In stark contrast, some governments remain reluctant to fully acknowledge cryptocurrencies within their legal and tax systems. In Indonesia, for example, while blockchain-based transactions are growing, the government has yet to officially recognize cryptocurrencies as legal tender or as taxable digital assets (Astuti et al., 2022). This legal vacuum leaves both investors and tax authorities in a state of ambiguity, often resulting in underreporting and misclassification of income derived from crypto activities (Astuti et al., 2022).

Furthermore, technological advancement, especially the use of blockchain for peer-to-peer transactions, has complicated tax enforcement. Because of the pseudonymous nature of blockchain transactions, tax authorities struggle to track, audit, and attribute income accurately to individuals or entities (Adelakun et al., 2024). As a result, traditional legal frameworks—often designed for centralized financial systems—are ill-equipped to ensure tax compliance in decentralized environments (Adelakun et al., 2024).

Turning to the United Kingdom, the regulatory framework has evolved incrementally, with the Financial Conduct Authority (FCA) issuing guidelines rather than formal laws to address the classification and taxation of crypto assets. Yet, inconsistencies remain, particularly around determining when cryptocurrencies qualify as property or financial instruments (Huang, 2021). While the UK emphasizes a principles-based approach, scholars argue that its legal framework lacks clarity, creating confusion among taxpayers and compliance professionals (Huang, 2021).

Similarly, a comparative analysis of the UK and Germany reveals fundamental differences in regulatory philosophy. While the UK promotes innovation and flexibility, Germany takes a prescriptive and cautious stance to ensure investor protection and legal certainty (Wronka, 2024). Although Germany's approach fosters public confidence, it may stifle innovation, indicating the trade-offs inherent in different institutional models (Wronka, 2024). It is also important to note that national legal systems are not evolving in isolation. International initiatives such as the OECD's Base Erosion and Profit Shifting (BEPS) project aim to standardize global tax rules for digital assets, but participation and implementation vary significantly across countries (Adelakun et al., 2024). Without consistent adoption, such initiatives may fall short of resolving the regulatory patchwork that currently defines the cryptocurrency tax environment.

In conclusion, the analysis of legal and institutional frameworks across jurisdictions reveals a fragmented and uneven regulatory landscape for cryptocurrency taxation. While some regions, notably the EU and Germany, are moving toward harmonization, others remain mired in uncertainty or lack political will to act decisively. Cultural, religious, technological, and political factors further shape national approaches, making it clear that no one-size-fits-all model exists. Therefore, for effective tax governance, future regulatory efforts must prioritize international cooperation, legal clarity, and technological adaptability. Only by addressing these systemic inconsistencies can countries ensure equitable, transparent, and enforceable tax regimes in the digital asset era.

3.3. The challenges and risks faced by regulators in enforcing compliance and preventing illicit activities involving cryptocurrencies

Regulating cryptocurrencies poses formidable challenges for governments, financial regulators, and international institutions. The decentralized architecture of cryptocurrencies, combined with cross-border anonymity, offers fertile ground for non-compliance, tax evasion, money laundering, and financing of illicit activities. As cryptocurrencies evolve rapidly, regulatory systems often struggle to keep pace, leaving oversight bodies reactive rather than proactive (Silva & Da Silva, 2022).

One of the most pressing challenges regulators face is the difficulty in tracing cryptocurrency transactions, particularly when conducted through privacy-enhanced coins or decentralized platforms. Although blockchain offers a transparent ledger of transactions, the pseudonymity it provides can obscure user identities, making it difficult to link transactions to real-world individuals (Kethineni & Cao, 2019). Criminals have increasingly exploited this loophole to facilitate drug trafficking, kidnapping for ransom, and tax evasion without triggering traditional financial reporting mechanisms (Kethineni & Cao, 2019).

Moreover, the decentralized finance (DeFi) ecosystem has opened up new regulatory blind spots. DeFi platforms, which operate without central intermediaries, enable users to lend, borrow, and trade digital assets directly. While this innovation improves accessibility and efficiency, it also eliminates the ability of regulators to enforce traditional Know Your Customer (KYC) and Anti-Money Laundering (AML) protocols effectively (Benson et al., 2023). The anonymity provided by DeFi tools like non-custodial wallets, mixers, and cross-chain bridges compounds the difficulty in identifying bad actors, especially across borders (Benson et al., 2023).

In addition, geopolitical instability further complicates regulatory enforcement. Cryptocurrencies have increasingly been used to circumvent sanctions, fund terrorism, and launder money in conflict zones. Recent research has shown that digital currencies are being used by state and non-state actors during geopolitical conflicts to bypass conventional banking restrictions (Tiwari et al., 2024). These developments not only undermine international financial sanctions but also expose the vulnerabilities of national regulatory systems when confronted with borderless technology (Tiwari et al., 2024).

Another major issue is the fragmentation of global regulatory regimes. Countries vary widely in their approach to cryptocurrency regulation, ranging from complete bans to permissive frameworks. This creates opportunities for regulatory arbitrage, where crypto firms and criminals migrate to jurisdictions with lax enforcement (Feinstein & Werbach, 2021). However, empirical research suggests that while regulatory announcements do influence trading activity temporarily, there is no consistent pattern of capital flight following stricter regulation (Feinstein & Werbach, 2021).

Additionally, regulators confront a technical knowledge gap, especially regarding complex innovations such as smart contracts, decentralized autonomous organizations (DAOs), and tokenized assets. Without sufficient expertise, regulators may implement outdated or misaligned policies that either stifle innovation or fail to address real threats (Mikhaylov, 2023). This concern is compounded by the lack of interoperability between national enforcement tools, which often results in jurisdictional deadlocks in cases of transnational fraud and tax evasion (Mikhaylov, 2023).

One notable regulatory paradox lies in the overregulation versus underregulation dilemma. Overregulation can drive legitimate actors underground or into informal markets, while underregulation creates room for systemic abuse. The Financial Economists Roundtable emphasizes that existing regulations are insufficiently proactive, particularly concerning high-risk crypto instruments and exchanges (Edwards et al., 2019). Their recommendation calls for a careful balance between investor protection and technological neutrality (Edwards et al., 2019).

Despite these difficulties, technological tools are available to support regulatory enforcement. Blockchain analytics platforms can trace illicit transactions and assist law enforcement in identifying money laundering patterns. For instance, a study on crypto ransom payments showed that many illicit Bitcoin transactions are in fact traceable, and law enforcement agencies could use existing forensic tools more effectively to combat ransomware-related laundering (Patsakis et al., 2023). However, the success of such tools depends on regulators' ability to access and interpret large volumes of blockchain data in real time (Patsakis et al., 2023).

Another conceptual challenge is captured by the regulatory dialectic, which posits that financial innovation continually adapts to regulatory responses, resulting in a cat-and-mouse dynamic between regulators and market participants. As new rules close certain loopholes, new mechanisms to evade them are developed by actors seeking privacy or profit

(Dupuis & Gleason, 2021). This phenomenon illustrates why static or overly prescriptive regulations are likely to be outpaced by technological change, reinforcing the need for agile, risk-based regulatory models (Dupuis & Gleason, 2021). Lastly, international cooperation is critical yet insufficient. Institutions such as the Financial Action Task Force (FATF) have laid down global AML guidelines for digital assets, but compliance and enforcement vary across countries. The FATF's risk-based approach is seen as a pragmatic model, yet enforcement gaps and delayed implementation persist, particularly in developing economies where institutional capacity is limited (Campbell-Verduyn, 2018).

In conclusion, the challenges regulators face in enforcing cryptocurrency compliance and preventing illicit use are multi-layered, spanning legal, technical, institutional, and geopolitical domains. While progress has been made in tracing transactions and establishing international standards, the speed of technological innovation often outpaces legislative and enforcement capacity. To effectively address these challenges, regulators must foster global cooperation, invest in technological infrastructure, and adopt flexible, forward-looking legal frameworks capable of responding to emerging threats in the dynamic crypto ecosystem.

4. Conclusions

The systematic review of literature on cryptocurrency taxation and regulatory challenges has revealed a multi-dimensional and rapidly evolving landscape. As the digital asset ecosystem continues to expand globally, the intersection of law, finance, and technology has introduced both novel opportunities and unprecedented risks for regulators and taxpayers alike. Notably, the review has highlighted that there is a significant disparity in how jurisdictions conceptualize and regulate cryptocurrencies, which in turn impacts compliance, enforcement, and policy effectiveness.

A key conclusion is that the legal classification of cryptocurrencies remains inconsistent across countries, with some jurisdictions recognizing them as property, others as financial instruments, and some offering no formal classification at all. This lack of harmonization has led to confusion in taxation, inconsistencies in investor obligations, and opportunities for regulatory arbitrage. For instance, while countries like Germany have established firm definitions and regulatory parameters, others remain in regulatory limbo, allowing digital assets to operate in grey zones without formal oversight.

Moreover, the widespread use of decentralized finance (DeFi) tools has exposed critical limitations in traditional regulatory frameworks. Because DeFi platforms often lack identifiable intermediaries, they fall outside the scope of current AML and tax compliance regimes, making them fertile ground for illicit activities including tax evasion, money laundering, and terrorism financing (Benson et al., 2023). These platforms also challenge the enforcement capabilities of national tax authorities who are typically reliant on centralized intermediaries for information sharing and data collection.

Additionally, the technological complexity of blockchain systems continues to outpace regulatory competence. Many financial regulators lack the technical expertise to fully understand or supervise smart contracts, privacy coins, and complex tokenomics, which limits their ability to enact effective tax regimes and oversight strategies. This regulatory lag not only weakens enforcement but also risks undermining public trust in government institutions tasked with financial integrity.

Finally, the review emphasized the importance of international cooperation. Cryptocurrencies operate beyond national borders, yet regulatory efforts remain largely siloed within jurisdictions. Without cross-border collaboration, particularly in areas such as AML compliance, information exchange, and extradition for financial crimes, the enforcement of crypto-related tax laws will remain inefficient and largely symbolic. The growing reliance on bilateral and multilateral regulatory coalitions, such as those led by the Financial Action Task Force (FATF), signals a move in the right direction—but substantial gaps remain.

Recommendations

In light of these findings, several strategic and actionable recommendations emerge for both regulators and policymakers aiming to govern the cryptocurrency sector more effectively. Firstly, there is an urgent need for global regulatory harmonization. Countries should adopt internationally recognized definitions and classifications for digital assets to reduce legal ambiguity and enable coordinated tax policies. Institutions such as the OECD and FATF must continue facilitating dialogue and alignment, particularly around base erosion, profit shifting, and global minimum tax standards.

Secondly, national governments must invest in building technical capacity within their regulatory agencies. This includes hiring blockchain analysts, training auditors in decentralized finance, and integrating forensic crypto analytics into tax enforcement systems. The ability to understand the underlying technology is essential for enforcing tax laws and preventing fraud, especially as crypto instruments grow more complex. Thirdly, regulatory bodies should consider adopting a risk-based, technology-neutral approach. Instead of banning or heavily regulating all crypto activities, regulators should assess the actual risk profile of individual assets or services. A risk-based model allows for proportional oversight, ensuring that innovation is not stifled while minimizing systemic risk.

Fourth, stronger public-private partnerships are needed. Regulatory agencies should collaborate with crypto exchanges, developers, and industry consortia to develop standardized compliance protocols, improve data reporting, and foster a culture of transparency. Voluntary compliance systems, combined with automated taxation tools and real-time reporting, can significantly enhance tax enforcement without relying solely on punitive measures. Fifth, legal reforms should address the emerging risks in DeFi and privacy-enhanced tools. This may include introducing mandatory KYC protocols for non-custodial wallets, regulating decentralized exchanges through licensing models, or imposing reporting standards on smart contract developers who issue tokens with financial characteristics.

Lastly, education and awareness campaigns are essential to enhance taxpayer literacy in the crypto space. Many retail investors and small businesses remain unaware of their reporting obligations, which leads to unintentional non-compliance. National tax authorities should develop user-friendly tools, clear guidelines, and multilingual resources to improve compliance outcomes. In summary, while the global expansion of cryptocurrencies presents regulatory challenges of unprecedented scale, these can be managed through a coordinated, knowledge-based, and inclusive approach. Forward-looking regulation, grounded in technological understanding and international cooperation, is essential to building a resilient and fair digital financial system.

Limitations of the Study

Despite offering a comprehensive synthesis of literature on cryptocurrency taxation and regulatory challenges, this study is subject to several limitations that must be acknowledged. Firstly, the study relied exclusively on peer-reviewed English-language literature, which may have inadvertently excluded significant contributions published in other languages or through grey literature, such as policy briefs or internal government documents. This linguistic and publication bias may have limited the geographical and institutional diversity of perspectives.

Secondly, although the systematic review approach ensured methodological rigor, it inherently prioritizes depth over timeliness. Given the rapid evolution of cryptocurrency technologies and regulatory frameworks, some of the literature included may already be outdated or superseded by more recent developments. For instance, the fast-paced adoption of decentralized finance (DeFi) tools and non-fungible tokens (NFTs) presents challenges that may not yet be fully captured in the current literature base.

Furthermore, the study did not conduct primary empirical research, which could have provided fresh insights into real-time compliance behavior or regulatory enforcement outcomes. Lastly, the diverse methodological approaches of the reviewed articles made it challenging to synthesize findings uniformly, particularly where qualitative, legal, and empirical analyses diverged in scope or terminologies. These limitations suggest the need for ongoing, multi-method research in this evolving domain.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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