



Review

Bitcoin, cryptocurrencies and tax evasion: A systematic literature review on global approaches to cryptocurrency taxation and the challenges for harmonising regulatory frameworks

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Abstract: Taxing Bitcoin and other cryptocurrencies presents a significant challenge due to their decentralised and pseudonymous nature, complicating enforcement and fostering regulatory inconsistencies across jurisdictions. This study systematically reviews the existing literature on cryptocurrency taxation, critically analysing 38 academic studies to identify key themes, challenges, and gaps in global regulatory frameworks. Using a structured seven-step methodology, it examines how jurisdictions approach cryptocurrency taxation, highlighting ten thematic categories, including jurisdictional comparisons, taxable events, and compliance mechanisms. The findings reveal persistent regulatory fragmentation and a lack of harmonisation, underscoring the need for international cooperation to establish coherent tax policies. By synthesising existing research and identifying unresolved issues, this study contributes to the discourse on balancing technological innovation with fiscal accountability, ultimately advocating for a unified, cross-border approach to cryptocurrency taxation.

Keywords: Bitcoin; blockchain and taxation; cryptocurrencies taxation; jurisdictional Bitcoin comparisons; regulatory frameworks

JEL Codes: H29, G28, O33, G23

1. Introduction

The rapid growth of cryptocurrencies over the past decade, especially Bitcoin, as mentioned by Fabus et al. (2024) has introduced significant challenges and opportunities for global financial systems, with one of the most pressing issues being the taxation of these digital assets. Cryptocurrency taxation is a complex and dynamic field that intersects technology, law, economics, and public policy. As cryptocurrencies like Bitcoin and Ethereum become more integrated into mainstream financial markets, governments and regulatory bodies struggle to develop effective frameworks to address their unique characteristics, such as decentralisation, pseudonymity, and borderless transactions. This has led to inconsistent and often ambiguous tax regulations, creating confusion for taxpayers and compliance challenges for tax authorities.

Benjamin Franklin (1817) said, “In this world, nothing is certain except death and taxes”. Cryptocurrency taxation falls within individual states’ jurisdiction, and understanding the various legal frameworks of different countries is of significant interest to cryptocurrency owners. Figure 1 provides an overview of cryptocurrency tax rates across multiple countries worldwide.

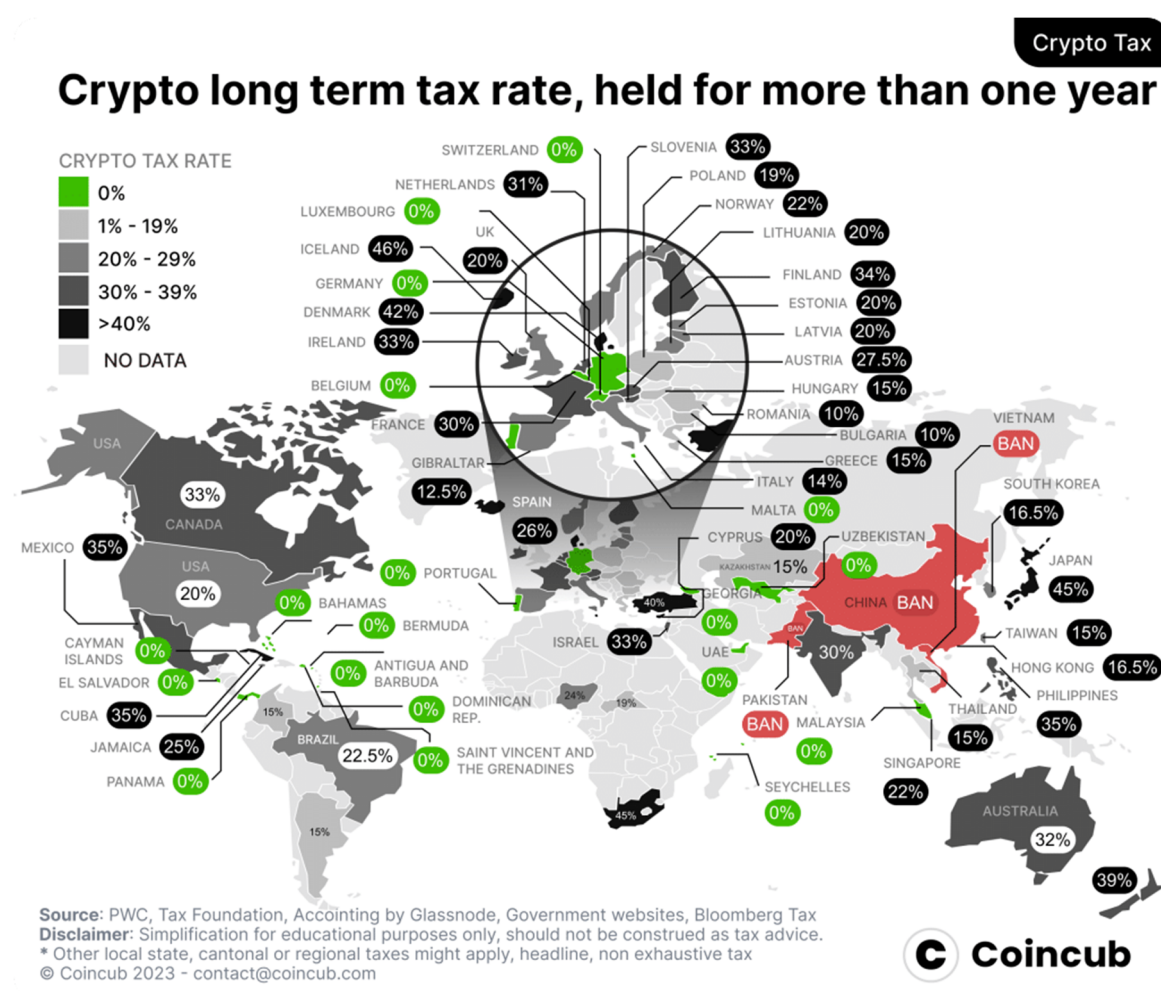


Figure 1. Crypto long-term tax rate, held for more than one year (Coincub, 2023).

Despite increasing academic interest in Bitcoin and other cryptocurrencies, most studies have focused on broader issues such as financial stability, monetary policy, and their impact on traditional financial institutions. However, the specific issue of how cryptocurrencies should be taxed remains only slightly explored. As a result, there is a notable gap in the literature regarding the nuances of cryptocurrency taxation, including classification, reporting, compliance, and enforcement issues. This study aims for a systematic literature review that synthesises the current research on cryptocurrency taxation, providing a comprehensive analysis of the existing regulatory frameworks, challenges, and proposed solutions.

This study reviews the existing literature on the taxation of cryptocurrencies across various jurisdictions to identify common themes, emerging trends, and areas where further research is needed. The objective is to provide a review of the current literature on cryptocurrency taxation with a focus on the inconsistencies in tax policies and the evolving nature of cryptocurrency regulation. The structure of this paper is as follows: The methodology section outlines the selection criteria, search methods, data extraction procedures, and synthesis approach used to analyse the relevant literature. The results section presents the analysis of the key 10 thematic groups identified in the literature and provides a critical analysis, highlighting the strengths and weaknesses of the studies. The discussion section interprets the findings, exploring their implications for policymakers and future regulatory frameworks while also considering the limitations of the review. Finally, the conclusion summarises the findings, offering recommendations for further research and discussing the broader implications for practice and policy.

The most recent uncovered cases of criminal activity in the field of cryptocurrency taxation come from the USA. In December 2024, Frank Richard Ahlgren III, an early Bitcoin investor from Texas, was sentenced to two years in prison for underreporting capital gains from selling approximately \$4 million worth of Bitcoin. He used sophisticated methods, including multiple wallets and mixers, to conceal his transactions and evade taxes exceeding \$1 million (JUSTICE.gov, 2024). In March 2025, the Justice Department USA announced a coordinated action with Germany and Finland to disrupt and take down the online infrastructure used to operate Garantex, a cryptocurrency exchange that allegedly facilitated money laundering by transnational criminal organisations—including terrorist organisations—and sanctions violations. Since April 2019, Garantex has processed at least \$96 billion in cryptocurrency transactions (JUSTICE.gov, 2025). These cases exemplify the challenges authorities face in regulating and enforcing tax compliance in the cryptocurrency decentralised and pseudonymous realm. The taxation of cryptocurrencies is highly fragmented, with no unified framework at the international level. Individual countries establish their regulations, leading to significant differences in national approaches. This regulatory divergence creates opportunities for tax arbitrage, encourages capital shifts to jurisdictions with more lenient rules, and complicates the effective taxation of digital assets. While global harmonisation is desirable, a unified approach has not yet been established, making the analysis of national policies particularly important.

2. Materials and methods

This systematic literature review aims to comprehensively analyse the current cryptocurrency taxation research. The review follows a structured and replicable approach to identify and synthesise relevant literature, ensuring a thorough understanding of the topic.

2.1. Review protocol

The review protocol was carefully developed to maintain consistency and rigour throughout the research process. This protocol served as a guideline for conducting the systematic review and included the following key components:

- Research question: The research question guiding this systematic review was: “What is the current level of findings regarding cryptocurrency taxation in different jurisdictions, and what are the challenges and potential solutions for harmonising international tax policies in this emerging area, based on an analysis of recent academic literature?” This question was constructed focusing on:
 - Problem: Cryptocurrency taxation
 - Interventions: Various tax policies and regulations
 - Comparison: Different approaches across jurisdictions
 - Outcome: Overview of the recent academic literature about cryptocurrency taxation, the identification of challenges, and the insight of proposed solutions to harmonise international tax policies.
- Background information: Cryptocurrency taxation is a rapidly evolving area of study, driven by the increasing adoption of digital assets across various industries. Understanding how different jurisdictions are approaching the taxation of cryptocurrencies is crucial for developing effective tax policies and ensuring compliance.
- Research objectives: The primary objective of this review was to identify and synthesise the latest findings on cryptocurrency taxation from recent academic literature. The review aimed to provide a comprehensive overview of current research trends, identify gaps in the literature, and offer insights that could inform future policy development.

2.2. Seven-step process

The review was carried out following a structured seven-step process to ensure the thoroughness and replicability of the research.

1. Search strategy and databases: The systematic literature review on cryptocurrency taxation explored this field’s latest developments and perspectives. As cryptocurrencies continue to gain global attention, the need for effective tax policies has become increasingly critical. Therefore, the review focused on recent scholarly works published between 2022 and 2024 to capture the most current insights. The literature search was conducted across three major academic databases: Web of Science, Scopus, and ProQuest. These databases were selected due to their extensive coverage of peer-reviewed articles and high-quality academic publications. The search was limited to articles published between January 1, 2022, and July 1, 2024, ensuring that the review reflects the most recent developments in cryptocurrency taxation.
2. Search terms: The primary search terms used were “cryptocurrency” and “taxation” to ensure a comprehensive search. Boolean operators (AND, OR) were used to combine these terms effectively, adapting search strings to the specific algorithms of each database.
3. Selection criteria: The review included peer-reviewed journal articles, conference papers, and review articles that focused on the taxation of cryptocurrencies. Articles not peer-reviewed, such as editorials, opinion pieces, or non-academic sources, were excluded. Additionally, only articles

written in English and available in full text were considered for inclusion. Studies solely focusing on technical aspects of cryptocurrencies without addressing taxation were also excluded from this review. We found 84 articles for analysis.

4. Selection process

The selection process was conducted in two phases:

1. Title and abstract screening: Articles were initially assessed based on their titles and abstracts to determine relevance to the research question: “What are the prevailing perspectives and findings on the taxation of cryptocurrencies in recent academic literature?” This initial screening ensured that only studies directly relevant to cryptocurrency taxation were included.
2. Full-text review: Articles that passed the initial screening were read in full to confirm their relevance. Disagreements during the selection process were resolved through discussion among the reviewers. From an initial pool of studies, those meeting the inclusion criteria were selected for final analysis. At the beginning of the second phase, we found that 11 articles, despite appearing in full-text versions, were only available on request from the author or for a fee. We approached all authors via the Research Gate platform and received three responses. Therefore, we could not analyse the other articles further.

An overview of the number of articles in the individual phases of the review process is presented in Table 1.

Table 1. Number of articles in individual phases of the review process.

Digital library	Initial number of papers (according to the set criteria)	Number of papers after the first phase	Number of papers after the second phase	Final number of papers that were studied
Web of Science	10	7	2	38
Scopus	32	20	11	
ProQuest	24	15	14	
Articles registered in more than one library	18	15	11	

5. Data extraction and synthesis: Data extraction was performed systematically from the selected studies using standardised forms, focusing on key aspects such as study objectives, research questions, methodologies, findings, and conclusions. Two reviewers independently extracted the data, and a third reviewer resolved discrepancies. Extracted data were synthesised using a mixed-methods approach. Qualitative synthesis: A narrative summary was developed, highlighting recurring themes, differences in taxation approaches, and emerging trends in cryptocurrency taxation.
6. Analysis and quality assessment: The selected studies were analysed to identify similarities and differences across 10 thematic groups (study objectives, research questions, criteria validation, methodology, data collection methods, data analysis techniques, subject of taxation, jurisdictional comparisons, key findings, and conclusions) and categorised according to the findings. The critical analysis highlights the strengths and weaknesses of the current literature. Only papers registered in renowned libraries were included to ensure the quality and reliability of this literature review.
7. Conclusion and implications: The final synthesis of the literature review will inform the discussion of contemporary literature on cryptocurrency taxation. The conclusion will also address the study’s limitations and potential areas for further research.

3. Results

This section presents the key findings from a systematic literature analysis on cryptocurrency taxation. The reviewed papers were categorised, and we analysed each using 10 thematic groups. These groups were chosen to ensure a comprehensive understanding of each paper's theoretical and practical contributions.

The thematic groups were selected based on their relevance to understanding the papers. Study objectives help identify the core aims of each paper, ensuring alignment with the overall research goals. Research questions guide the investigation of specific issues each paper addresses within cryptocurrency taxation, allowing us to examine if these questions contribute to the broader discourse. Inclusion criteria validation ensures that only studies directly relevant to cryptocurrency taxation are included, thereby refining the scope of this review.

The methodology category assesses the robustness and appropriateness of the research designs used in the papers, ensuring they are equipped to answer the posed research questions. Data collection methods are crucial for evaluating the reliability and transparency of the sources, whether they involve surveys, government reports, or blockchain transaction data. Data analysis techniques scrutinise the adequacy of statistical and qualitative methods employed in the studies, emphasising mixed-method approaches where applicable.

Key findings and conclusions summarise the primary insights gained from each paper, focusing on the effectiveness of cryptocurrency tax policies and their societal and economic impact. The subject of taxation helps clarify how different cryptocurrencies are treated within the tax system. Finally, jurisdictional comparisons critically analyse how tax policies vary across jurisdictions and highlight the international differences in regulatory approaches.

Each thematic group plays a vital role in synthesising the literature, offering a clear and structured view of cryptocurrency taxation's challenges and proposed solutions.

3.1. Categorisation of the papers

In order to systematically analyse the diverse aspects of cryptocurrency taxation, accounting, and regulation, the 38 papers reviewed in this study have been categorised according to 10 thematic groups. This categorisation provides a structured framework for understanding research objectives, methodologies, and findings across different focus areas. By grouping the papers based on their primary subjects, such as taxation frameworks, legal classifications, technological applications, and socio-environmental concerns, this section offers a comprehensive overview of the significant trends and gaps in the existing literature, highlighting areas of consensus and points of divergence. The following sections outline these categories in detail.

3.1.1. Study objectives

- Taxation and compliance:
 - Hernández Sánchez et al. (2024), Baer et al. (2023), Cong et al. (2023), Šinković and Pribisalić (2022), Morton et al. (2023), Avi-Yonah and Salaimi (2023), Marta (2022), Kreklewetz and Burlock (2023), and Dzidzikashvili and Kheladze (2022) investigate

various taxation models, compliance challenges, tax evasion prevention, and pseudonymity concerns within cryptocurrency markets.

- Accounting standards and financial reporting:
 - Blahušiaková (2022), Lazea et al. (2024), Huang et al. (2023), Kochergin (2022), Southern and Weidmann (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) explore cryptocurrency classification under IFRS and GAAP, focusing on valuation, impairment testing, and harmonisation of financial reporting standards.
- Legal and regulatory frameworks:
 - Derevyanko et al. (2023), Smirnov et al. (2023), Southern and Weidmann (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) focus on legal definitions and classifications of cryptocurrencies as assets or property, discussing the regulation of digital assets, investor protection, and regulatory enforcement.
- Technological and environmental impacts:
 - Stroeve et al. (2022), Baer et al. (2023), Cong et al. (2023), Charest and Paquet Clouston (2023), Parsons (2022b), Reiners (2022), and Elman (2022) emphasise blockchain's technological potential for real-time tax systems, automation, transparency, and Industry 4.0 technologies. Environmental concerns, particularly the sustainability of mining operations, are also addressed in Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022).
- Behavioural and socio-economic aspects:
 - Grym et al. (2024), Jankeeparsad and Tewari (2022), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), Jayasuriya and Sims (2023), and Singh (2022) examine behavioural factors such as trust, gender, financial literacy, and moral attitudes that influence tax compliance and cryptocurrency adoption.

3.1.2. Research questions

- Taxation systems:
 - Hernández Sánchez et al. (2024), Baer et al. (2023), 8 - Cong et al. (2023), Šinković and Pribisalić (2022), Morton et al. (2023), Avi-Yonah and Salaimi (2023), Marta (2022), Kreklewetz and Burlock (2023), and Dzidzikashvili and Kheladze (2022) ask how best to optimise cryptocurrency taxation to minimise tax evasion and improve compliance.
 - Baer et al. (2023), Šinković and Pribisalić (2022), and Kreklewetz and Burlock (2023) examine how tax systems can be adapted for decentralised finance and pseudonymous transactions.
- Accounting and legal classification:
 - Blahušiaková (2022), Lazea et al. (2024), Huang et al. (2023), Derevyanko et al. (2023), Kochergin (2022), Southern and Weidmann (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) ask how cryptocurrencies should be classified for tax and financial reporting purposes under existing accounting standards (e.g., IFRS, GAAP).
 - Smirnov et al. (2023), Southern and Weidmann (2023), and Baker et al. (2022) raise questions about cryptocurrencies' legal status and whether they should be classified as property, assets, or financial instruments.
- Technology and policy:

- Studies by Stroeve et al. (2022), Baer et al. (2023), Cong et al. (2023), Charest and Paquet Clouston (2023), Parsons (2022b), Morton et al. (2023), and Reiners (2022) explore how blockchain and Industry 4.0 technologies can be leveraged for tax compliance and automation of regulatory processes.
- Studies by Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) consider how to regulate cryptocurrency mining to minimise environmental harm and ensure sustainability.
- Behavioural factors:
 - Grym et al. (2024), Jankeepsad and Tewari (2022), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), Jayasuriya and Sims (2023), and Singh (2022) explore how trust, financial literacy, and social norms influence tax compliance and cryptocurrency adoption.
 - Grym et al. (2024) and Singh (2022) examine how gender differences and socio-economic factors impact compliance and usage behaviour.

3.1.3. Criteria validation

- Comparative frameworks:
 - Blahušáková (2022), Lazea et al. (2024), Baer et al. (2023), Charest and Paquet Clouston (2023), Jankeepsad and Tewari (2022), Šinković and Pribisalić (2022), Morton et al. (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) validate the findings by comparing different jurisdictional frameworks regarding tax policy, legal regulation, and accounting standards.
 - Baer et al. (2023) and Šinković and Pribisalić (2022) provide comparative analyses of the tax treatment of cryptocurrencies in various jurisdictions, such as the EU, the US, and emerging economies.
- Empirical validation:
 - Hernández Sánchez et al. (2024), Cong et al. (2023), Grym et al. (2024), Jankeepsad and Tewari (2022), Marta (2022), and Singh (2022) validate their findings using surveys, econometric models, and statistical analysis, specifically focusing on compliance behaviours and public perceptions.
 - Marta (2022) and Singh (2022) validate the effects of trust and financial literacy on cryptocurrency adoption using regression models and survey data.
- Standards and frameworks:
 - Blahušáková M (2022), Huang et al. (2023), Derevyanko et al. (2023), Kochergin (2022), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) use IFRS, MiCA, and GAAP as benchmarks to compare global tax and accounting frameworks for cryptocurrencies.
 - Derevyanko et al. (2023), Smirnov et al. (2023), and Southern and Weidmann (2023) explore how MiCA's framework can be adapted globally to ensure consistent regulatory approaches.

3.1.4. Methodology

- Quantitative approaches:
 - Hernández Sánchez et al. (2024), Baer et al. (2023), Cong et al. (2023), Grym et al. (2024), Jankeepsad and Tewari (2022), Parsons (2022b), Marta (2022), Singh (2022), Kreklewetz

and Burlock (2023), and Dzidzikashvili and Kheladze (2022) use quantitative methods, including surveys, econometric models, and statistical tests, to evaluate tax compliance behaviours, blockchain adoption, and regulatory efficacy.

- Marta (2022) and Singh (2022) also use regression and correlation analysis to measure the impact of gender and financial literacy on compliance.
- Qualitative approaches:
 - Blahušiaková (2022), Derevyanko et al. (2023), Smirnov et al. (2023), Kochergin (2022), Southern and Weidmann (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) employ legal and policy analysis to examine cryptocurrency classifications, regulatory frameworks, and the legal treatment of digital assets.
 - Grym et al. (2024) and Jankeeparsad and Tewari (2022) use qualitative interviews and content analysis to examine how trust and public perceptions influence compliance.
- Mixed methods:
 - Lazea et al. (2024), Stroeve et al. (2022), Baer et al. (2023), Charest and Paquet Clouston (2023), Morton et al. (2023), and Reiners (2022) use qualitative and quantitative methods, such as bibliometric studies, blockchain analytics, and empirical data analysis, to examine trends in cryptocurrency research and blockchain's role in tax automation.

3.1.5. Data collection methods

- Primary data:
 - Hernández Sánchez et al. (2024), Grym et al. (2024), Jankeeparsad and Tewari (2022), Marta (2022), and Singh (2022) collect primary data via surveys, interviews, and blockchain transaction analytics to study tax compliance behaviour, adoption trends, and environmental impacts.
 - Mussin et al. (2024) and Morton et al. (2023) use industry stakeholder interviews to gather insights into mining operations, sustainability, and regulatory concerns.
- Secondary data:
 - Blahušiaková M (2022), Lazea et al. (2024), Baer et al. (2023), Huang et al. (2023), Derevyanko et al. (2023), Southern and Weidmann (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) use secondary data from legal frameworks, financial reports, blockchain transaction data, and accounting standards to analyse taxation and regulatory practices.
 - Stroeve et al. (2022), Baer et al. (2023), Charest and Paquet Clouston (2023), Parsons (2022b), and Reiners (2022) rely on secondary data such as government reports, tax filings, and blockchain transparency tools.

3.1.6. Data analysis techniques

- Quantitative analysis:
 - Cong et al. (2023), Grym et al. (2024), Jankeeparsad and Tewari (2022), Marta (2022), and Singh (2022) use econometric methods, such as regression analysis, correlation, and t-tests, to analyse tax compliance, cryptocurrency adoption, and behavioural factors.
 - Parsons (2022b) and Dzidzikashvili and Kheladze (2022) use time-series analysis and econometrics to model cryptocurrency market dynamics and its impact on taxation.

- Qualitative analysis:
 - Blahušiaková M (2022), Derevyanko et al. (2023), Smirnov et al. (2023), Kochergin (2022), and Kasemrat and Kraiwanit (2023) use thematic content analysis to examine legal and policy documents, focusing on the classification and regulation of cryptocurrencies.
 - Grym et al. (2024) and Jankeeparsad and Tewari (2022) use thematic coding to analyse the influence of trust and socio-economic factors on compliance.
- Comparative analysis:
 - Lazea et al. (2024), Baer et al. (2023), Charest and Paquet Clouston (2023), Morton et al. (2023), and Reiners (2022) compare jurisdictional regulatory frameworks, tax policies, and blockchain adoption across countries, evaluating differences in enforcement and taxation models.

3.1.7. Subject of taxation

- Income and capital gains:
 - Hernández Sánchez et al. (2024), Baer et al. (2023), Cong et al. (2023), Šinković and Pribisalić (2022), Parsons (2022b), Morton et al. (2023), Marta (2022), Kreklewetz and Burlock (2023), and Dzidzikashvili and Kheladze (2022) discuss the taxation of trading profits, mining, staking, and other crypto-related income.
 - Baer et al. (2023), Cong et al. (2023), and Šinković and Pribisalić (2022) focus on how capital gains taxation applies to cryptocurrencies and the challenges in enforcing it.
- Environmental taxation:
 - Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) discuss the environmental impact of mining and propose carbon taxes or green incentives for sustainable mining practices.
 - Mussin et al. (2024) and Kess and Riggs (2022) examine the environmental costs of mining and the need for carbon taxes to mitigate its impact.

3.1.8. Jurisdictional comparisons

- Developed economies:
 - Blahušiaková (2022), Lazea et al. (2024), Baer et al. (2023), Huang et al. (2023), Šinković and Pribisalić (2022), Kochergin (2022), Parsons (2022b), Morton et al. (2023), and Baker et al. (2022) compare tax and accounting practices in developed economies like the EU, US, and other IFRS-compliant regions.
 - Blahušiaková (2022), Lazea et al. (2024), and Morton et al. (2023) analyse the role of MiCA in European crypto regulation.
- Developing economies:
 - Grym et al. (2024), Jankeeparsad and Tewari (2022), Mussin et al. (2024), Smirnov et al. (2023), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) explore challenges in emerging markets, such as South Africa, Ukraine, Kazakhstan, and other developing economies, focusing on adopting cryptocurrencies and regulatory gaps.

3.1.9. Key findings

- Regulatory fragmentation:
 - Blahušiaková (2022), Baer et al. (2023), Derevyanko et al. (2023), Smirnov et al. (2023), Morton et al. (2023), and Kasemrat and Kraiwanit (2023) highlight inconsistent tax policies and regulatory frameworks across jurisdictions.
 - Šinković and Pribisalić (2022) and Baker et al. (2022) emphasise the need for unified international standards.
- Behavioural influences:
 - Grym et al. (2024), Jankeeparsad and Tewari (2022), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Singh (2022) find that trust and financial literacy play a significant role in cryptocurrency adoption and tax compliance.
 - Grym et al. (2024) and Singh (2022) show that gender and socio-economic status impact compliance and adoption rates.
- Environmental concerns:
 - Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) underline the adverse environmental effects of cryptocurrency mining and recommend sustainability measures.
- Technological advancements:
 - Stroeve et al. (2022), Baer et al. (2023), Charest and Paquet Clouston (2023), Parsons (2022b), and Reiners (2022) discuss blockchain's potential for improving tax compliance, transparency, and automation in global tax systems.

3.1.10. Conclusions

- Global standardisation:
 - Blahušiaková (2022), Lazea et al. (2024), Šinković and Pribisalić (2022), Morton et al. (2023), Baker et al. (2022) and Dzidzikashvili and Kheladze (2022) conclude that international harmonisation of tax and legal frameworks is necessary for cryptocurrency regulation.
- Blockchain and technology's role:
 - Stroeve et al. (2022), Baer et al. (2023), Cong et al. (2023), Parsons (2022b), and Reiners (2022) emphasise the potential of blockchain and AI to improve tax compliance and automate regulatory processes.
- Sustainability and regulation:
 - Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) call for carbon taxes and other regulatory measures to address the environmental impact of cryptocurrency mining.

3.2. Critical analysis of the literature

The literature on cryptocurrency taxation, accounting, legal frameworks, technological applications, and socio-environmental concerns is vast and evolving. The 38 papers analysed in this study provide valuable insights into cryptocurrency's impact on tax policy, accounting standards, legal

frameworks, and societal adoption. While the research collectively presents a comprehensive view of the topic, it also has notable strengths and weaknesses that must be highlighted.

3.2.1. Strengths

1. Wide-ranging coverage of cryptocurrency topics

The literature covers diverse subjects, providing a well-rounded view of cryptocurrency in the context of taxation, accounting, legal regulation, technology, and sustainability.

- Taxation and compliance: Hernández Sánchez et al. (2024), Baer et al. (2023), Cong et al. (2023), Šinković and Pribisalić (2022), and Morton et al. (2023) focus on understanding the complexities of cryptocurrency taxation, especially how current tax laws can be adapted to account for the decentralisation, pseudonymity, and global nature of digital assets.
- Accounting and financial reporting: Blahušiaková (2022), Lazea et al. (2024), Huang et al. (2023), Kochergin (2022), and Southern and Weidmann (2023) explore the accounting treatment of cryptocurrencies, including their classification, valuation, and financial reporting under IFRS and GAAP, providing deep insights into how digital assets fit into traditional accounting frameworks.
- Legal and regulatory frameworks: Derevyanko et al. (2023), Smirnov et al. (2023), Kasemrat and Kraiwanit (2023), and Baker et al. (2022) assess the legal classification of cryptocurrencies, investor protection, and regulatory gaps, offering perspectives on how different jurisdictions approach cryptocurrency regulation.
- Technology integration: Stroeve et al. (2022), Baer et al. (2023), Charest and Paquet Clouston (2023), Parsons (2022b), and Reiners (2022) focus on the role of blockchain technology in improving tax compliance, transparency, and fraud prevention, offering innovative solutions for digital asset regulation.
- Environmental and socio-economic issues: Mussin et al. (2024), Obu and Ukpere (2022), Lehtimaja and Kalpio (2023), and Kess and Riggs (2022) discuss the environmental impacts of cryptocurrency mining, proposing solutions such as carbon taxes or incentives for green energy mining to mitigate its carbon footprint.

This wide-ranging coverage allows an in-depth analysis of cryptocurrency's multifaceted challenges and opportunities to the global financial system, legal frameworks, and society.

2. Interdisciplinary approach

Integrating multiple academic disciplines, law, economics, technology, and behavioural sciences, enriches the findings.

- Behavioural and socio-economic insights: Grym et al. (2024), Jankeeparsad and Tewari (2022), Lehtimaja and Kalpio (2023), Jayasuriya and Sims (2023), and Singh (2022) incorporate social science perspectives to understand the role of trust, financial literacy, and social norms in cryptocurrency adoption and tax compliance. These papers highlight the behavioural barriers to compliance and explore how gender and socio-economic status affect cryptocurrency usage and tax morale.
- Technological integration: Stroeve et al. (2022), Baer et al. (2023), and Parsons (2022b) explore how blockchain and Industry 4.0 technologies can enhance compliance and transparency in taxation, bridging the gap between technological innovation and regulatory practices.

- Economic modelling and statistical rigour: Hernández Sánchez et al. (2024), Cong et al. (2023), Marta (2022), and Singh (2022) employ econometric modelling, statistical analysis, and empirical data to substantiate theoretical claims. These papers use surveys and large-scale data to empirically assess compliance behaviour, market dynamics, and taxation effects, validating their theoretical findings.

The interdisciplinary nature of these papers allows for a holistic view of cryptocurrency regulation, addressing not only technical and legal challenges but also behavioural and environmental concerns.

3. Global perspective and jurisdictional comparisons

Including various jurisdictions in the papers provides valuable insights into how countries regulate cryptocurrencies and address associated challenges.

- Baer et al. (2023), Derevyanko et al. (2023), Šinković and Pribisalić (2022), Morton et al. (2023), and Kasemrat and Kraiwanit (2023) compare regulatory approaches across jurisdictions, identifying harmonisation efforts and discrepancies between countries such as the US, the EU, South Africa, Ukraine, and Kazakhstan. These comparative studies are invaluable for understanding the implications of jurisdictional diversity on global regulatory standards and the potential for harmonisation.

The papers address a global audience and offer insights into developed economies and emerging markets, providing a broader understanding of how cryptocurrency taxation and regulation play out in different contexts.

3.2.2. Weaknesses

1. Fragmentation in regulatory approaches

Despite the broad coverage, the research highlights the fragmentation of regulatory frameworks as a significant challenge.

- The lack of standardised approaches across jurisdictions is evident in many papers (e.g., Blahušáková, 2022; Derevyanko et al., 2023; Smirnov et al., 2023; and Kasemrat and Kraiwanit, 2023), where authors emphasise that the regulatory landscape is highly inconsistent.
- Inconsistent legal classifications of cryptocurrencies—whether treated as property, securities, or currency—pose significant challenges to harmonising global tax policies (e.g., Derevyanko et al., 2023; Smirnov et al., 2023).
- The ongoing debate regarding the treatment of crypto-related income (capital gains, income from mining, or staking) further complicates the creation of global tax and accounting standards. While some papers (Hernández Sánchez et al., 2024; Stroeve et al., 2022; Baer et al., 2023; Cong et al., 2023) explore these inconsistencies, few offer comprehensive solutions for standardisation.

This fragmentation is problematic because it creates compliance risks, regulatory arbitrage, and inefficiencies, especially in cross-border transactions, limiting businesses' and governments' ability to manage cryptocurrency markets effectively.

2. Limited empirical data

While many papers provide conceptual frameworks and theoretical models, the empirical validation of claims is often limited.

- Grym et al. (2024), Jankeepsad and Tewari (2022), Derevyanko et al. (2023), and Kasemrat and Kraiwanit (2023) provide important insights into cryptocurrency adoption, tax compliance

behaviour, and legal frameworks, but often rely on small sample sizes, case studies, or qualitative analysis rather than large-scale, diverse datasets.

- For example, Grym et al. (2024) and Jankeepsad and Tewari (2022) explore behavioural factors like trust and financial literacy but primarily through qualitative methods (e.g., interviews), limiting the generalisability of the findings.
- Some papers (e.g., Smirnov et al. 2023 and Southern and Weidmann 2023) lack empirical data on the effectiveness of regulatory measures, relying instead on theoretical discussions about the role of cryptocurrencies in the broader economy.

This lack of extensive empirical data means that some findings are not universally applicable, and there remains a gap in understanding the actual impact of cryptocurrency regulations on markets, tax compliance, and economic behaviour.

3. Underexplored technological integration

Although many papers discuss the potential of blockchain and Industry 4.0 technologies, the practical application and scalability in global tax compliance are still underexplored.

- While Stroeve et al. (2022), Baer et al. (2023), Charest and Paquet Clouston (2023), and Parsons (2022b) highlight the theoretical benefits of blockchain for tax automation and transparency, only a few papers provide real-world examples or case studies on implementing such technologies.
- Papers from Stroeve et al. (2022) and Baer et al. (2023) propose integrating blockchain for real-time tax collection, but few address the operational challenges and technological barriers involved in adopting these systems globally.
- Integrating other emerging technologies like AI, IoT, or big data analytics in cryptocurrency taxation is also insufficiently explored in the literature, especially regarding its potential to combat fraud, enhance regulatory oversight, and automate tax compliance in decentralised systems.

The technological solutions proposed in many papers remain primarily theoretical, with limited exploration of how these can be implemented at scale in real-world scenarios.

4. Environmental concerns are insufficiently addressed

While there is considerable attention on the environmental impact of cryptocurrency mining in some papers (e.g., Mussin et al., 2024; Obu and Ukpere, 2022; and Lehtimaja and Kalpio, 2023), the solutions offered are still emerging and lack detailed policy recommendations.

- Mussin et al. (2024), Obu and Ukpere (2022), and Kess and Riggs (2022) raise concerns about mining operations' carbon footprints but do not offer comprehensive policy solutions or in-depth discussions on how to tax or incentivise sustainable mining practices effectively.
- Although some studies suggest carbon taxes or green energy incentives for miners, these solutions are not fully developed, and the broader implications of implementing such policies remain unexplored.

The lack of comprehensive, actionable solutions for mitigating the environmental impact of cryptocurrency mining suggests that this issue requires further research and more robust policy development.

4. Discussion

The emergence of cryptocurrency has presented a profound shift in the global financial landscape, prompting significant changes in taxation, accounting, legal frameworks, and regulatory enforcement. This study reviewed 38 papers exploring various facets of cryptocurrency, including taxation, legal and regulatory challenges, technological innovations, environmental sustainability, and behavioural

factors. The findings from this literature review indicate both the progress made in understanding cryptocurrency's implications and the substantial challenges that remain in adapting traditional systems to the decentralised nature of digital assets.

4.1. Key insights from the literature

One of the most significant insights from the literature is the lack of global regulatory harmonisation. The taxation of cryptocurrencies varies significantly across jurisdictions, with different countries adopting diverse approaches based on their legal, economic, and technological frameworks. While some countries, such as the US and the EU, treat Bitcoin and other cryptocurrencies as assets or property for tax purposes, others, like Japan, classify them as commodities. These inconsistencies confuse taxpayers and tax authorities, particularly in cross-border transactions, where jurisdictional differences can lead to regulatory arbitrage. One of the main challenges in harmonising international tax policies is the decentralised, pseudonymous nature of cryptocurrencies, which complicates enforcement and compliance. Many tax authorities struggle to track cryptocurrency transactions, making ensuring accurate reporting and tax collection challenging. Moreover, the rapid technological evolution of the cryptocurrency market and the emergence of new financial products, such as decentralised finance (DeFi), further complicate regulatory efforts.

While several studies (Blahušiaková, 2022; Baer et al., 2023; Derevyanko et al., 2023; Smirnov et al., 2023; and Morton et al., 2023) highlight the progress made in different regions, such as the European Union's MiCA framework and the US's evolving approach to cryptocurrency taxation, the literature also reveals significant regulatory fragmentation. This lack of consistency confuses taxpayers, businesses, and regulators, making managing cross-border cryptocurrency transactions difficult. The disparity in tax policies and classification of cryptocurrencies, whether as property, commodity, or currency, has compounded this issue. Hernández Sánchez et al. (2024), Baer et al. (2023), and Šinković and Pribisalić (2022) emphasise the necessity for international collaboration to develop unified standards for cryptocurrency classification and taxation.

The study suggests that potential solutions for harmonising cryptocurrency tax policies include the development of standardised international frameworks, collaborating with global regulatory bodies like the OECD, and adopting blockchain technology to enhance transparency and automate tax compliance. Furthermore, addressing environmental concerns related to cryptocurrency mining and promoting sustainable practices could play an important role in the broader regulatory landscape. In conclusion, while the path towards a unified global tax policy for cryptocurrencies presents significant challenges, there is a growing recognition of the need for coordinated international efforts to ensure effective taxation, prevent fraud, and foster a fair and transparent cryptocurrency market.

Moreover, many papers pointed to the technological potential of blockchain for automating tax compliance and enhancing regulatory transparency (Stroev et al., 2022; Baer et al., 2023; Parsons, 2022b; and Reiners, 2022). Blockchain's transparency and immutability could reduce fraud and enhance enforcement, making it a promising tool for real-time tax collection and compliance monitoring. However, Stroev et al. (2022) and Baer et al. (2023) note that implementing large-scale blockchain-based solutions remains limited. Challenges such as scalability, security concerns, and integration with existing tax infrastructure are significant hurdles that must be addressed before these technologies can be fully leveraged for taxation purposes.

Estonia exemplifies how small nations can lead in digital innovation, particularly blockchain technology, to enhance transparency in taxation systems. Since 2012, Estonia has integrated blockchain into its national health, judicial, and legislative databases, ensuring data integrity and security. This technological integration has streamlined tax processes, enabling citizens to file tax returns in under five minutes and increasing efficiency and trust in the system (PWC, 2019). By leveraging blockchain's decentralised and transparent nature, Estonia has created a tax environment that reduces fraud and enhances compliance. This approach is a model for other countries, demonstrating that embracing digital solutions can lead to more efficient and transparent tax administration (Sang, 2023). Estonia's experience underscores the potential of blockchain to revolutionise public services, offering valuable insights for nations aiming to modernise their tax systems in the digital era.

The environmental concerns associated with Bitcoin mining have been a focal point in the literature, especially concerning the energy-intensive processes involved in proof-of-work systems. Mussin et al. (2024), Obu and Ukpere (2022), and Kess and Riggs (2022) argue that the environmental impact of mining is one of the most urgent challenges facing the industry, particularly with the growing popularity of cryptocurrencies like Bitcoin. The recommendations from these studies often revolve around introducing carbon taxes or incentivising green mining practices. However, as Mussin et al. (2024) and Kess and Riggs (2022) highlight, these solutions are still in the early stages and require further exploration.

The behavioural aspects of cryptocurrency adoption and tax compliance are another prominent theme. Grym et al. (2024), Jankeepsad and Tewari (2022), Lehtimaja and Kalpio (2023), and Singh (2022) explored how trust, financial literacy, and social norms influence individuals' willingness to adopt cryptocurrencies and comply with tax laws. These studies highlight that trust in the financial system and governmental institutions plays a critical role in adoption. Interestingly, some studies also point out that gender and socio-economic factors influence compliance, with women and individuals from lower socio-economic backgrounds often exhibiting lower levels of tax compliance (Grym et al., 2024). These findings suggest that future policy development should consider these factors to improve compliance rates and increase cryptocurrency adoption across diverse populations.

4.2. Challenges in implementing solutions

Despite the numerous innovative ideas and theoretical frameworks in the reviewed papers, the practical implementation of these solutions remains challenging. For example, while blockchain technology presents a promising avenue for enhancing transparency and automating tax systems, blockchain integration into existing tax infrastructures is still limited, as noted in Papers from Stroev et al. (2022) and Baer et al. (2023). Moreover, the technological divide between countries and the lack of digital infrastructure in developing economies could impede the global implementation of blockchain-based solutions.

Another challenge highlighted in the literature is the ambiguity surrounding cryptocurrency classification. As noted in the studies from Stroev et al. (2022) and Baer et al. (2023), different jurisdictions have adopted varying stances on whether cryptocurrencies should be classified as property, currency, or security, with significant implications for how they are taxed. These inconsistencies confuse taxpayers and businesses, further complicating the tax collection process. While some papers propose adopting a universal classification, the legal and economic implications of

such a decision require careful consideration and further study.

The taxation of cryptocurrencies varies significantly across jurisdictions, reflecting diverse regulatory approaches. The Internal Revenue Service classifies Bitcoin and other cryptocurrencies as property in the United States, subjecting all transactions—including sales, exchanges, and purchases—to capital gains tax. This comprehensive taxation framework can be burdensome for investors, as each transaction necessitates meticulous record-keeping and reporting (Cleartax, 2024). Conversely, Germany offers a more favourable regime; cryptocurrencies held for over a year are exempt from taxation, incentivising long-term investment and simplifying tax obligations for holders (Legge, 2024). In Slovakia, cryptocurrency income is subject to income tax and health insurance contributions, potentially leading to a higher overall tax burden for investors (Cleartax, 2024). These examples underscore the lack of uniformity in cryptocurrency taxation policies globally, highlighting the challenges faced by investors operating across different legal systems.

Real-world applications of technology

Blockchain and artificial intelligence (AI) technologies have been increasingly integrated into tax systems worldwide, leading to notable improvements in efficiency and compliance. One of the real-world case studies and pilot projects demonstrated is in India. The Income Tax Department of India collaborated with Infosys to implement a blockchain-based solution to simplify tax processes (Ashutosh, 2020). Another pilot project we found in Colorado introduced plans to allow residents to pay state taxes and fees using cryptocurrencies. This initiative reflects an effort to position Colorado as a leader in digital state functions by integrating blockchain technology into public services (Colorado Department of Revenue, 2022). The U.S. Internal Revenue Service (IRS) has explored using AI models to identify taxpayers most likely to underreport or not pay taxes owed. By leveraging AI, the IRS aims to enhance compliance and reduce the tax gap (GAO, 2024). Revenue, the Irish Tax and Customs agency, implemented a voicebot powered by conversational AI technology to improve the taxpayer experience as early as in 2018. This solution aimed to meet customer needs for on-demand service, enhancing accessibility and efficiency in taxpayer interactions (O'Brien, 2018). These examples illustrate the transformative potential of blockchain and AI in modernising tax systems, enhancing compliance, and improving taxpayer services.

Policy recommendations for taxation of cryptocurrencies

With the rapid growth in popularity and usage of cryptocurrencies, there is a need for policymakers to swiftly adapt existing tax frameworks. This is crucial to effectively address the unique challenges posed by digital assets. To achieve this, the following recommendations should be considered:

- **Clear and harmonised tax classifications:** Policymakers should establish clear and consistent classifications of crypto assets (e.g., as property, currency, or commodities). This would improve legal certainty, facilitate tax compliance, and instil confidence in the decisions made, reducing administrative complexity for taxpayers and authorities.
- **Implementation of real-time transaction reporting:** Governments should introduce mandatory real-time reporting of cryptocurrency transactions through centralised exchanges and intermediaries. Like those under the EU's DAC8 or the U.S. broker reporting rules, such systems enhance transparency and help close the tax gap.
- **Voluntary disclosure and compliance programs:** Introducing voluntary disclosure programs with reduced penalties can incentivise taxpayers to declare previously unreported crypto assets. These

initiatives, which have proven effective in countries such as Italy, Argentina, and South Africa, should be considered transitional compliance measures, providing reassurance about their potential impact.

- **Use of technology:** Tax administrations should adopt advanced technologies—such as blockchain forensics and artificial intelligence—to trace crypto transactions and improve audit effectiveness. These tools are crucial in addressing the pseudonymous nature of blockchain systems and identifying undeclared income.

- **De minimis exemptions for low-value transactions.** To reduce the compliance burden on retail users and encourage the everyday use of digital assets, countries should consider exempting small crypto transactions from taxation. Legislative proposals like the U.S. Virtual Currency Tax Fairness Act offer valuable models.

- **International cooperation and data sharing:** Given the global and borderless nature of digital assets, international coordination is not just important; it is essential. Policymakers should actively support initiatives like the OECD's Crypto-Asset Reporting Framework (CARF) to facilitate the automatic exchange of crypto-related tax information and ensure cross-border transparency.

4.3. Future directions for research

Given the gaps identified in the literature, future research should focus on the following areas:

1. **Global standardisation:** As discussed in multiple papers (Blahušíková, 2022; Baer et al., 2023; Šinković and Pribisalić, 2022; and Morton et al., 2023), the lack of harmonised regulations across jurisdictions remains a key challenge. Future research should explore the feasibility of establishing international standards for cryptocurrency taxation, accounting, and classification. This would facilitate cross-border transactions and reduce compliance costs for businesses and individuals.

2. **Empirical studies on blockchain applications:** While many studies (Stroev et al., 2022; Baer et al., 2023; and Parsons, 2022b) discuss blockchain's potential for tax automation, there is limited empirical evidence on its real-world application. Future research should focus on case studies and pilot projects implementing blockchain technology in tax systems, examining the global challenges and opportunities for scaling these systems.

3. **Environmental taxation models:** Given the growing concerns about the environmental impact of cryptocurrency mining (Mussin et al., 2024; and Kess and Riggs, 2022), further research is needed to develop effective carbon taxation models for the cryptocurrency industry. Studies should explore balancing environmental concerns with the need for technological innovation, potentially through incentives for more sustainable mining practices.

4. **Behavioural economics and tax compliance:** Research on the role of trust, social norms, and financial literacy in cryptocurrency adoption and compliance (Grym et al., 2024; Jankeeparsad and Tewari, 2022; and Singh, 2022) is still in its early stages. Future studies should build on these insights, conducting large-scale, cross-cultural studies to better understand how these factors influence compliance. Understanding these dynamics could help governments design policies encouraging responsible cryptocurrency use and ensuring tax compliance.

4.4. Limitations

The paper's methodology is robust and systematic, but it is important to identify its limitations and possible implications for interpreting the results. The literature analysed in the study covers the

period from January 2022 to July 2024, which means that older but still relevant studies may have been omitted, particularly those that shaped early regulatory frameworks for cryptocurrencies. This time limitation may distort the historical and contextual overview of the issue. Another limitation is the language barrier, as the analysis was limited to academic papers published in English. Research from countries with significant experience in cryptocurrency regulation (e.g., Japan, South Korea, or Brazil) could have been published in local languages and thus excluded from the analysis. This language barrier may affect the results' global representativeness; therefore, future studies should consider involving multilingual analytical teams. During the article selection phase, some relevant studies were only available on request from the authors or for a fee, and not all requests were successful. This situation may have led to the loss of potentially valuable resources, and consideration should be given to combining approaches to retrieve locked sources and explore alternative open-access databases. At the same time, the review primarily focuses on academic studies from economically developed countries such as the USA or EU countries, while research from developing countries is less represented. This imbalance may affect conclusions regarding regulatory approaches specific to different economic environments. Therefore, future studies should seek research from developing economies where cryptocurrencies are often used for financial inclusion.

5. Conclusions

This study examined the current research on cryptocurrency taxation, accounting, legal frameworks, technological implications, and socio-environmental concerns, drawing on a comprehensive review of 38 academic papers. The findings highlight the significant progress made in understanding the complex dynamics of cryptocurrency and the substantial challenges that remain in adapting existing financial, legal, and regulatory systems to accommodate the growing influence of digital assets.

A key insight emerging from the literature is the fragmented regulatory landscape. While various jurisdictions have taken steps to regulate cryptocurrency through taxation and legal frameworks, the lack of uniformity across borders has created a patchwork of approaches that complicate compliance for businesses and individuals operating in the cryptocurrency space. This fragmentation hinders the development of cohesive global tax policies and legal standards, essential for ensuring transparency and fairness in the global digital economy.

Additionally, the reviewed papers discuss blockchain's potential for improving tax compliance and transparency. Blockchain's ability to enhance trust and accountability in digital asset transactions positions it as a powerful tool for automating tax collection and combating fraud. However, challenges remain in integrating blockchain into existing financial systems at scale, particularly in developing economies where digital infrastructure may be limited.

Environmental sustainability has also emerged as a critical issue, particularly given Bitcoin mining's energy-intensive nature. While some papers suggest solutions like carbon taxes or incentives for green mining, the practical implementation of these solutions remains in the early stages. This area of research is crucial, as the long-term sustainability of cryptocurrency mining could significantly impact the broader digital economy.

Finally, the behavioural factors influencing cryptocurrency adoption and tax compliance, such as trust, financial literacy, and social norms, have been highlighted as essential for understanding and addressing compliance gaps. Research suggests that trust in the financial system and governmental

institutions significantly influences adoption rates and compliance behaviour, particularly in emerging markets.

After a thorough synthesis of the literature, it has become clear that harmonisation of regulatory frameworks is essential for the effective taxation of cryptocurrencies at a global level. The diversity of approaches between jurisdictions creates room for tax arbitrage and complicates cross-border transactions. Technological innovations, in particular blockchain, have the potential to transform tax systems through transparency, automation, and efficient real-time monitoring of transactions. However, the implementation of such technologies requires international cooperation as well as financial and technological investment. Another important finding is the role of behavioural factors such as trust in institutions, financial literacy, and socio-economic background in influencing the level of tax compliance for cryptocurrencies. Improving awareness and education in this area can improve tax compliance and reduce tax evasion. Moreover, the current literature has identified persistent gaps in empirical data and the need for longitudinal studies to provide more accurate and robust conclusions. Based on the findings, it is clear that policymakers need to strike a balance between encouraging innovation in digital assets and ensuring efficient tax collection. In addition, it is important that future research purposefully examines cases of successful regulatory implementations and their impact on tax compliance and cryptocurrency adoption. In conclusion, it is important to highlight that only through global collaboration, technological innovation, and a deeper understanding of behavioural factors can the challenges associated with cryptocurrency taxation be effectively addressed.

In conclusion, this study underscores the need for global coordination in cryptocurrency regulation, emphasising the development of unified frameworks for taxation, legal classification, and compliance. Future research should focus on filling the gaps in empirical data, exploring practical applications of blockchain for tax automation, addressing the environmental impact of cryptocurrency mining, and examining the socio-economic and behavioural dynamics that influence cryptocurrency adoption. By addressing these challenges, future research can help shape the development of cryptocurrency in a way that supports global economic stability, fairness, and sustainability.

Author contributions

The authors declare to have contributed equally to the manuscript. All authors have read and approved the final manuscript.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

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Conflict of interest

All authors declare no conflicts of interest in this paper.

References

- Ahsan ZB, Gupta A, Kar AK (2023) The effect of countries' independent regulation on cryptocurrency markets. *J Glob Inf Manag* 31: 1–32. <https://doi.org/10.4018/JGIM.323567>
- Ashutosh S (2020) Case Study: India's Income Tax Department Uses Blockchain to Simplify Tax Processes. Available from: <https://www.infosys.com/blockchain/documents/blockchain-simplify-tax-processes.pdf>.
- Avi-Yonah RS, Salaimi M (2023) A New Framework for Taxing Cryptocurrencies. *Tax Lawyer* 77: No. 1. SSRN. <http://dx.doi.org/10.2139/ssrn.4071391>
- Baer K, de Mooij R, Hebous S, et al. (2023) Taxing cryptocurrencies. *Oxford Rev Econ Policy* 39: 478–497. <https://doi.org/10.1093/oxrep/grad035>
- Baker CW, Norton T, McKinney RE (2022) US State Taxation of Cryptocurrency - Involved Transactions: Trends and Considerations for Policy Makers. *The Tax Lawyer* 75: 601–635. Available from: <https://www.proquest.com/scholarly-journals/u-s-state-taxation-cryptocurrency-involved/docview/2727013684/se-2?accountid=49401>.
- Barceló E, Dimić-Mišić K, Imani M, et al. (2023) Regulatory Paradigm and Challenge for Blockchain Integration of Decentralized Systems: Example—Renewable Energy Grids. *Sustainability* 15: 2571. <https://doi.org/10.3390/su15032571>
- Blahušiaková M (2022) Accounting for Holdings of Cryptocurrencies in the Slovak Republic: Comparative Analysis. *Contemp Econ* 16: 16–31. <https://doi.org/10.5709/ce.1897-9254.466>
- Budak T, Yilmaz G (2022) Taxation of Virtual/Crypto Assets/Currencies. *Sosyoekonomi* 30: 37–54. <https://doi.org/10.17233/sosyoekonomi.2022.02.03>
- Caliskan K (2022) The Elephant in the Dark: A New Framework for Cryptocurrency Taxation and Exchange Platform Regulation in the US. *J Risk Financ Manag* 15. <https://doi.org/10.3390/jrfm15030118>
- Charest T, Paquet-Clouston M (2023) An Exploration on Cryptocurrency Corporations' Fiscal Opportunities. In: *ACM Web Conference 2023 - Companion of the World Wide Web Conference, WWW 2023*. Association for Computing Machinery, Inc. 1085–1092. <https://doi.org/10.1145/3543873.3587603>
- ClearTax (2024) Crypto Tax Rates in Various Countries. Available from: <https://cleartax.in/s/crypto-tax-rates-in-various-countries>.
- Coincub (2023) Figure: Crypto long term tax rate, held for more than one year. Available from: <https://coincub.com/ranking/worldwide-crypto-tax-2023/>.
- Colorado Department of Revenue (2022) Crypto Currency Now Accepted for All State Tax Payments. Available from: <https://tax.colorado.gov/cryptocurrency>.
- Cong LW, Landsman W, Maydew E, et al. (2023) Tax-loss harvesting with cryptocurrencies. *J Account Econ* 76. <https://doi.org/10.1016/j.jacceco.2023.101607>
- Derevyanko B, Ivanchenko N, Podskrebko O, et al. (2023) On pros and cons of legitimising cryptocurrency (a case study of Ukraine). *Soc Legal Studios* 6: 9–15. <https://doi.org/10.32518/sals3.2023.09>
- Dzidzikashvili D, Kheladze M (2022) The Future of Blockchain Tech in Transactional Business. *Econ Insights Trends Chall* 77. <https://doi.org/10.51865/EITC.2022.04.05>

- Egorova MA, Grib VV, Efimova LG, et al. (2023) Research of the effectiveness of the system of legal regulation of tax relations for operations with cryptocurrency currently in force. *Vestn St Peter U* 14: 564–579. <https://doi.org/10.21638/spbu14.2023.301>
- Elman W (2022) New Coins on the Block: How Should Cryptocurrency Hard Forks be Taxed? *Fed Commun Law J* 74: 55–80. Available from: <https://www.proquest.com/scholarly-journals/new-coins-on-block-how-should-cryptocurrency-hard/docview/2625342866/se-2?accountid=49401>.
- Fabus J, Kremenova I, Stalmasekova N, et al. (2024) An Empirical Examination of Bitcoin's Halving Effects: Assessing Cryptocurrency Sustainability within the Landscape of Financial Technologies. *J Risk Financ Manag* 17: 229. <https://doi.org/10.3390/jrfm17060229>
- Franklin B (1817) Benjamin Franklin's last great quote and the Constitution. Available from: <https://constitutioncenter.org/blog/benjamin-franklins-last-great-quote-and-the-constitution>.
- GAO (2024) Artificial Intelligence May Help IRS Close the Tax Gap. Available from: <https://www.gao.gov/blog/artificial-intelligence-may-help-irs-close-tax-gap>.
- Grym J, Aspara J, Nandy M, et al. (2024) A Crime by Any Other Name: Gender Differences in Moral Reasoning When Judging the Tax Evasion of Cryptocurrency Traders. *Behav Sci* 14. <https://doi.org/10.3390/bs14030198>
- Hernández Sánchez Á, Sastre-Hernández BM, Jorge-Vazquez J, et al. (2024) Cryptocurrencies, Tax Ignorance and Tax Noncompliance in Direct Taxation: Spanish Empirical Evidence. *Economies* 12. <https://doi.org/10.3390/economies12030062>
- Huang RH, Deng H, Chan AFL (2023) The legal nature of cryptocurrency as property: Accounting and taxation implications. *Comput Law Secur Rev* 51. <https://doi.org/10.1016/j.clsr.2023.105860>
- Jankeepsad RW, Tewari D (2022) BITCOIN: AN EXPLORATORY STUDY INVESTIGATING ADOPTION IN SOUTH AFRICA. *Interd J Inf Knowl Manag* 17: 191–214. <https://doi.org/10.28945/4947>
- Jayasuriya DD, Sims A (2023) From the abacus to enterprise resource planning: is blockchain the following big accounting tool? *Account Audit Account J* 36: 24–62. <https://doi.org/10.1108/AAAJ-08-2020-4718>
- JUSTICE.gov (2024) Early Bitcoin Investor Sentenced for Filing Tax Returns that Falsely Reported His Cryptocurrency Gains. Available from: https://www.justice.gov/archives/opa/pr/early-bitcoin-investor-sentenced-filing-tax-returns-falsely-reported-his-cryptocurrency?utm_source=chatgpt.com.
- JUSTICE.gov (2025) Garantex Cryptocurrency Exchange Disrupted in International Operation. Available from: <https://www.justice.gov/opa/pr/garantex-cryptocurrency-exchange-disrupted-international-operation>.
- Kasemrat R, Kraiwanit T (2023) ACCEPTANCE OF CRYPTOCURRENCY IN THAILAND. *J Interdiscip Res* 8: 1–5. Available from: <https://www.proquest.com/scholarly-journals/acceptance-cryptocurrency-thailand/docview/2838575511/se-2?accountid=49401>.
- Kess S, Riggs T (2022) The ABCS of the Taxation of Virtual Currency: Certified Public Accountant. *CPA J* 92: 46–49. Available from: <https://www.proquest.com/scholarly-journals/abcs-taxation-virtual-currency/docview/2682883311/se-2?accountid=49401>.
- Kochergin D (2022) CRYPTO-ASSETS: ECONOMIC NATURE, CLASSIFICATION AND REGULATION OF TURNOVER. *Int Organ Res J* 17. <https://doi.org/10.17323/1996-7845-2022-03-04>

- Kreklewetz RG, Burlock LJ (2023) Policy Forum: Canada's Proposed Cryptoasset Legislation. *Canadian Tax J* 71: 73–81. <https://doi.org/10.32721/ctj.2023.71.1.pf.kreklewetz>
- Lazea GI, Bunget OC, Lungu C (2024) Cryptocurrencies' Impact on Accounting: Bibliometric Review. *Risks* 12: 94. <https://doi.org/10.3390/risks12060094>
- Legge M (2024) How is Crypto Taxed Around the World in 2024? Available from: <https://koinly.io/blog/crypto-tax-world/>.
- Lehtimaja A, Kalpio S (2023) Key Issues for the Taxation of Crypto Assets in Finland with Comparison to Other Jurisdictions. *Bus Law Int* 24: 287–305. Available from: <https://www.proquest.com/scholarly-journals/key-issues-taxation-crypto-assets-finland-with/docview/2957757968/se-2?accountid=49401>.
- Marta AF (2022) Some Considerations regarding the Regulation of E-commerce Taxation and Cryptocurrency Trading. *Rev Manag Comp Int* 23: 694–706. <https://doi.org/10.24818/RMCI.2022.5.694>
- Morton E, Devos K, Vesty G, et al. (2023) The crypto-economy and tax practitioner competencies: an Australian exploratory study. *J Tax Res* 21: 203–252. Available from: <https://www.unsw.edu.au/content/dam/pdfs/business/acct-audit-tax/research-reports/ejournal-of-tax-research/2024-volume-22-number-1/2023-V21-N2-The-Crypto-economy-and-tax-practitioner.pdf>.
- Mussin B, Kosherbayeva A, Kuandykov N, et al. (2024) Problems and prospects of state regulation of cryptomining in Kazakhstan. *Public Policy Admin* 23: 63–73. <https://doi.org/10.5755/j01.ppaa.23.1.35833>
- Niu H, Li T, Gong X (2022) A blockchain-based certifiable anonymous E-taxing protocol. *PLoS One* 17: e0270454. <https://doi.org/10.1371/journal.pone.0270454>
- O'Brien C (2018) Revenue turns to a digital bot to answer your tax queries. Available from: <https://www.irishtimes.com/business/technology/revenue-turns-to-a-digital-bot-to-answer-your-tax-queries-1.3619383>.
- Obu OC, Ukpere WI (2022) The Implications of the Incursion of Cryptocurrency on the Effectiveness of Fiscal Policy. *Rev Appl Socio-Econ Res* 23: 134–150. <https://doi.org/10.54609/reaser.v23i1.214>
- OECD (2020) *Taxing Virtual Currencies: An Overview of Tax Treatments and Emerging Tax Policy Issues*. Available from: <https://www.oecd.org/content/dam/oecd/en/topics/policy-issues/tax-policy/flyer-taxing-virtual-currencies-an-overview-of-tax-treatments-and-emerging-tax-policy-issues.pdf>.
- OECD (2022) Crypto-Asset Reporting Framework and Amendments to the Common Reporting Standard. Available from: <https://www.swissfoundations.ch/wp-content/uploads/2019/07/public-consultation-document-crypto-asset-reporting-framework-and-amendments-to-the-common-reporting-standard.pdf>.
- Parsons S (2022a) Taxing crypto-asset transactions: foundations for a globally coordinated approach. IBFD. <https://doi.org/10.59403/d73e3z>
- Parsons S (2022b) Article: What's in a Name? The Classification of 'Interest' on Crypto-assets in South Africa and Beyond, *Intertax* 50: 499–511. Available from: <https://kluwerlawonline.com/journalarticle/Intertax/50.6/TAXI2022054https://doi.org/10.54648/taxi2022054>.

- PWC (2019) Estonia the digital republic secures by blockchain. Available from: <https://www.pwc.com/gx/en/services/legal/tech/assets/estonia-the-digital-republic-secured-by-blockchain.pdf>.
- Reiners L (2022) 10 Things Judges Should Know About CRYPTOCURRENCY. *Judicature* 106: 62–69. Available from: <https://www.proquest.com/scholarly-journals/10-things-judges-shoud-know-about-cryptocurrency/docview/2720474543/se-2?accountid=49401>.
- Sang VH (2023) Blockchain in tax management: A paradigm shift in transparency and efficiency. *J Financ Account Res* 3: 5–9. Available from: https://www.researchgate.net/publication/374262006_Blockchain_in_tax_management_A_paradigm_shift_in_transparency_and_efficiency.
- Singh P (2022) Is the Financial Market ready for Cryptocurrency ETFs? - A critical evaluation. *J Risk Financ* 23: 456–460. <https://doi.org/10.1108/JRF-08-2022-241>
- Smirnov D, Baklanova O, Sagalaeva E, et al. (2023) Role of legal regulation in preventing corruption in the market of digital financial assets in the context of sustainable development. *J Law Sustain Dev* 11: e557-e557. <https://doi.org/10.55908/sdgs.v11i5.557>
- Sotiropoulou A, Ligtot S (2019) Legal Challenges of Cryptocurrencies: Isn't It Time to Regulate the Intermediaries? *European Company Financ Law Rev* 16: 652–675. <https://doi.org/10.1515/ecfr-2019-0023>
- Southern D, Weidmann O (2023) Cryptotaxation: A Guide to a Brave New World. Available from: <http://www.sweetandmaxwell.co.uk/catalogue/productdetails.aspx?recordid=338&productid=6614>. www.westlaw.co.uk, or <https://www.checkpointworld.com>.
- Stroev PV, Fattakhov RV, Pivovarova OV, et al. (2022) Taxation Transformation under the Influence of Industry 4.0. *Int J Adv Comput Sci Appl* 13. <https://doi.org/10.14569/IJACSA.2022.01309116>
- Šinković Z, Pribisalić L (2022) Taxation of Cryptocurrencies with Income Tax and Corporate Income Tax. *45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO)*, 1126–1131. <https://doi.org/10.23919/MIPRO55190.2022.9803705>.
- Thiemann A (2021) Cryptocurrencies: An empirical view from a tax perspective JRC. *Working Papers on Taxation and Structural Reforms*, 12. Available from: <https://ideas.repec.org/p/ipt/taxref/202112.html>.
- Van Nam T, Minh NB, van Hai T, et al. (2022) The Development of New Technology Integration in E-commerce Dispute Resolution in Vietnam. *Rev Bras Alterna Disput Res* 4: 215–229. <https://doi.org/10.52028/rbadr.v4i7.13>
- Vumazonke N, Parsons S (2023) An analysis of South Africa's guidance on the income tax consequences of crypto assets. *South African J Econ Manag Sci* 26: 4832. <https://doi.org/10.4102/sajems.v26i1.4832>
- Widhiasthini NW, Subawa NS, Fong Emmerson M, et al. (2024) Public regulation urgency in cryptocurrency based on administrative reform for Bali sustainable tourism. *Cogent Soc Sci* 10. <https://doi.org/10.1080/23311886.2024.2312657>



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