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The Bibliometric Study of The Cryptocurrency Literature in Scopus Database

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ABSTRACT

This study presents a comprehensive bibliometric analysis of cryptocurrency-related literature indexed in the Scopus database, aiming to map the intellectual landscape, identify key research trends, and highlight influential contributors in the field. Using VOSviewer as the primary analytical tool, the study examines keyword co-occurrence, temporal distribution, author collaboration networks, and international research partnerships. The findings indicate that the central focus of the literature remains on fundamental topics such as cryptocurrency, blockchain, and electronic money, while emerging trends show a growing integration of machine learning, forecasting, and sentiment analysis. Temporal mapping reveals a shift from infrastructure-oriented research to data-driven and interdisciplinary applications. Key authors and countries, including the United States, China, India, and the United Kingdom, play dominant roles in shaping the scholarly conversation. Despite the expanding scope of cryptocurrency research, gaps remain in areas such as sustainability, inclusivity, and ethical implications of AI applications. This study offers valuable insights for researchers, policymakers, and practitioners seeking to understand the evolution and future directions of cryptocurrency research.

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1. INTRODUCTION

Cryptocurrency has emerged as a transformative force in global financial systems, offering an alternative to traditional fiat currencies. Since the launch of Bitcoin by Satoshi Nakamoto in 2008, cryptocurrencies have grown exponentially, attracting interest from researchers, investors, and policymakers [1]. The underlying technology of cryptocurrency, blockchain, enables secure, decentralized, and transparent transactions, challenging conventional financial infrastructures [2]. Over the past decade, academic studies on cryptocurrency have surged, exploring various aspects such as its economic impact, technological development, regulatory challenges, and market dynamics [3]. This increasing body of literature necessitates a systematic analysis to understand trends, key contributors, and emerging themes within cryptocurrency research.

The importance of cryptocurrency extends beyond financial transactions; it has disrupted multiple industries, including

supply chain management, healthcare, and data security [4]. Many researchers have focused on its application in decentralized finance (DeFi), smart contracts, and non-fungible tokens (NFTs), showcasing its growing significance in digital economies [5]. Despite its widespread adoption, cryptocurrency remains a contentious topic, with debates surrounding its volatility, security risks, and regulatory frameworks [6]. The evolving nature of cryptocurrency research highlights the need for a bibliometric analysis to track intellectual progress and identify influential works in the field.

The bibliometric approach is widely used in various disciplines to analyze scholarly literature quantitatively, providing insights into research trends, citation patterns, and authorship networks [7]. In cryptocurrency research, bibliometric studies can help map the academic landscape, identifying prolific authors, leading institutions, and influential journals [8]. By leveraging databases such as Scopus, researchers can assess the evolution of cryptocurrency-related studies, facilitating a comprehensive understanding of its scholarly development. Given the rapid expansion of cryptocurrency research, a bibliometric study is essential to uncover research gaps and future directions in the field.

Furthermore, the regulatory landscape of cryptocurrency continues to evolve, influencing the research agenda of scholars worldwide [9]. Governments and financial institutions are grappling with how to integrate cryptocurrency into mainstream financial systems while mitigating risks associated with fraud, money laundering, and cybercrime [10]. Academic research plays a crucial role in shaping regulatory policies and market practices, underscoring the significance of analyzing existing literature to inform evidence-based policymaking. A bibliometric study enables researchers and policymakers to gauge the impact of scholarly contributions on regulatory frameworks and technological advancements in cryptocurrency.

Despite the increasing interest in cryptocurrency research, no comprehensive bibliometric study has been conducted exclusively using the Scopus database. Scopus is a widely recognized academic database that indexes high-quality peer-reviewed journals and conference proceedings, making it an ideal source for bibliometric analysis [11]. By examining the bibliometric characteristics of cryptocurrency literature within Scopus, this study aims to provide a systematic overview of the research landscape, highlighting influential studies, key trends, and potential research gaps.

The field of cryptocurrency research has witnessed exponential growth, yet there is a lack of comprehensive bibliometric analysis that systematically examines the intellectual structure and evolution of the domain. While individual studies have explored various aspects of cryptocurrency, there remains a gap in understanding the broader research landscape from a bibliometric perspective. Specifically, the lack of a focused bibliometric study utilizing the Scopus database hinders efforts to identify key research trends, influential works, and scholarly collaborations. Without such an analysis, researchers may struggle to navigate the vast body of literature, leading to fragmented knowledge and missed opportunities for interdisciplinary collaboration. This study aims to conduct a bibliometric analysis of cryptocurrency literature indexed in the Scopus database to identify research trends, key contributors, and intellectual structures within the field.

Cryptocurrency has been a topic of increasing academic interest, leading to a growing body of literature covering various aspects such as its technological foundations, economic impact, regulatory challenges, and market behavior. This literature review synthesizes existing research to provide a structured understanding of the major themes and trends in cryptocurrency studies. By examining the scholarly contributions indexed in the Scopus database, this review highlights key areas of research, identifies

gaps, and sets the stage for a bibliometric analysis of the field.

Technological Foundations of Cryptocurrency

The emergence of Bitcoin in 2008 introduced blockchain technology as the underlying mechanism for decentralized digital currencies [12]. Blockchain is a distributed ledger system that enables secure, immutable, and transparent transactions without the need for intermediaries [13]. Researchers have extensively studied the technical aspects of blockchain, including consensus mechanisms, cryptographic security, and scalability solutions [14]. While proof-of-work (PoW) remains the most well-known consensus algorithm, alternative mechanisms such as proof-of-stake (PoS) and delegated proof-of-stake (DPoS) have gained attention for their energy efficiency and scalability improvements [15].

Smart contracts, introduced by Ethereum, have further expanded the utility of blockchain beyond simple financial transactions [16]. These self-executing contracts facilitate decentralized applications (DApps) and have paved the way for innovations in decentralized finance (DeFi) and non-fungible tokens (NFTs) [17]. However, challenges such as security vulnerabilities, high transaction fees, and network congestion remain key areas of concern in blockchain research [18].

Economic and Financial Implications

Cryptocurrency has been widely studied from an economic perspective, particularly in relation to its impact on financial markets, investment behavior, and monetary policies. Several studies have examined the volatility of cryptocurrencies compared to traditional assets, with findings indicating that Bitcoin and other digital currencies exhibit higher price fluctuations, making them risky yet potentially lucrative investment vehicles [19], [20]. The emergence of stablecoins, which are pegged to traditional currencies or commodities, has been proposed as a solution to mitigate volatility while maintaining the benefits of digital assets [21]. Another area of research focuses on the role of cryptocurrency as a hedge or safe-haven asset during financial crises. While some studies suggest that Bitcoin exhibits hedging properties against traditional markets, others argue that its high correlation with equities during downturns reduces its effectiveness as a safe haven [22]. The growing institutional adoption of cryptocurrencies, including investments by major financial institutions and the launch of Bitcoin exchange-traded funds (ETFs), has further influenced market dynamics and academic discourse [23].

Regulatory and Legal Challenges

The decentralized nature of cryptocurrency presents significant regulatory challenges for governments and financial authorities. Countries have adopted varying approaches, ranging from outright bans to progressive regulatory frameworks that seek to integrate digital assets into existing financial systems [24]. Key regulatory concerns include anti-money laundering (AML) compliance, taxation, and consumer protection [25]. One of the primary issues in cryptocurrency regulation is the prevention of illicit activities, including money laundering, terrorist financing, and fraud [26]. Blockchain's pseudonymous nature allows for anonymity, which, while beneficial for privacy, also raises concerns about its use in illegal transactions. Regulatory bodies such as the Financial Action Task Force (FATF) have introduced guidelines to address these risks, including the implementation of the "travel rule" to enhance transparency in cryptocurrency transactions. Another significant challenge is the taxation of cryptocurrency transactions. Governments are working to establish clear guidelines for reporting crypto-related income, capital gains, and transaction taxes [27]. However, the evolving nature of the crypto market complicates regulatory efforts, necessitating continuous research and policy adaptations.

Market Behavior and Investor Sentiment

Market behavior and investor sentiment play a crucial role in cryptocurrency price dynamics. Several studies have explored how factors such as

social media trends, news sentiment, and macroeconomic events influence crypto prices [28], [29]. Twitter activity, Google search trends, and Reddit discussions have been found to correlate with short-term price movements, indicating the impact of public sentiment on market fluctuations [30]. Behavioral finance research has also examined the psychological factors driving cryptocurrency investments. The speculative nature of digital assets attracts retail investors who may exhibit herding behavior, panic selling, and overreaction to market news [31]. Understanding investor psychology is essential for developing risk management strategies and regulatory policies that promote market stability.

2. METHODS

This study employs a bibliometric analysis to systematically examine the academic literature on cryptocurrency within the Scopus database. The methodology involves three key stages: data collection, data processing, and bibliometric analysis. First, relevant publications are retrieved using predefined search queries with keywords such as "cryptocurrency," "blockchain," "Bitcoin," and related terms, ensuring a comprehensive dataset. The inclusion criteria focus on peer-reviewed journal articles, conference proceedings, and review papers published within a specified timeframe. Second, the collected data undergoes cleaning and preprocessing to remove duplicates and irrelevant records, followed by an analysis of citation patterns, co-authorship networks, keyword co-occurrence, and research trends using the bibliometric tool VOSviewer.

3. RESULTS AND DISCUSSION

3.1 Keyword Co-Occurrence Network Visualization

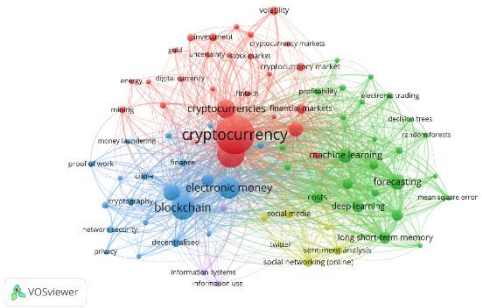

Figure 1. Network Visualization
Source: Data Analysis, 2025

The visualization presented above shows a keyword co-occurrence network derived from the Scopus database, highlighting major themes and clusters within the cryptocurrency research domain. Each node represents a keyword extracted from the titles, abstracts, or keywords of academic publications. The size of the nodes corresponds to the frequency of occurrence, while the colors and proximity indicate thematic clusters and the strength of relationships among keywords. This bibliometric map reveals a multi-disciplinary landscape, with research converging from finance, computer science, and data analytics. At the center of the network, the keyword “cryptocurrency” appears as the dominant and most connected term, emphasizing its centrality in the scholarly discourse. Closely surrounding this node are terms like “cryptocurrencies,” “financial markets,” and “cryptocurrency market,” indicating a strong concentration of research on the economic and financial aspects of digital currencies. This red cluster reflects a finance-oriented stream, dealing with issues like market volatility, investment, uncertainty, and digital asset performance.

The blue cluster represents a technology-driven perspective, focusing on blockchain technology and its foundational elements. Keywords such as “blockchain,” “electronic money,” “cryptography,” “proof of work,” and “decentralised” form the core of this group. This suggests a significant body of literature dedicated to the technical infrastructure of cryptocurrency, including security, privacy, and the computational mechanisms that underpin decentralized

systems. This cluster also connects with themes like network security and information systems, showcasing its overlap with computer science and cybersecurity domains. The green cluster highlights the increasing application of machine learning and artificial intelligence in cryptocurrency research. Terms such as "machine learning," "forecasting," "deep learning," "long short-term memory," and "sentiment analysis" indicate a data analytics perspective, where researchers employ predictive models to understand and forecast cryptocurrency prices and market trends. The presence of specific methodologies like decision trees and random forests reinforces the use of supervised learning techniques in this space, often combined with social media and public sentiment as inputs. The yellow cluster provides insight into the intersection of cryptocurrency with social and behavioral themes. Terms like "social media," "twitter," and "social networking (online)" suggest a growing interest in how online discourse influences crypto market dynamics. This reflects the broader trend of using social data to analyze investor sentiment, behavioral finance, and collective trends.

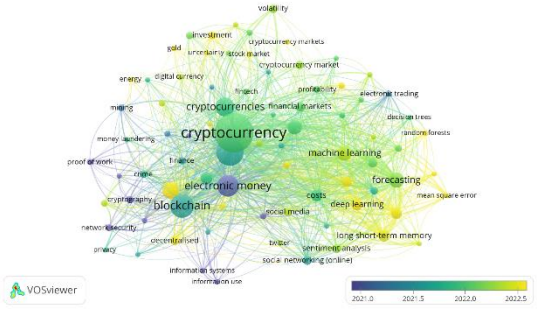

Figure 2. Overlay Visualization
Source: Data Analysis, 2025

This VOSviewer visualization presents a temporal overlay map of keyword co-occurrences in cryptocurrency literature indexed in Scopus. The color gradient, ranging from blue to yellow, indicates the average publication year associated with each keyword—blue representing earlier publications (around 2021) and yellow indicating more recent ones (2022 and beyond). The central keyword "cryptocurrency" remains dominant and consistently researched across the timeline, with frequent connections to keywords like "blockchain," "electronic money," and "financial markets." These foundational concepts have anchored the literature and continue to attract scholarly attention.

Keywords shaded in yellow, such as "machine learning," "forecasting," "deep learning," "sentiment analysis," and "long short-term memory," suggest a shift toward more recent research interests. These terms reflect an increasing application of artificial intelligence and data analytics in cryptocurrency studies, especially in areas related to price prediction, behavioral analysis, and automated trading. The presence of specific techniques like "random forests" and "mean square error" further confirms the rise of predictive modeling and algorithmic methods in the latest wave of research.

Conversely, terms in darker blue, such as "blockchain," "proof of work," "network security," and "cryptography," were more dominant in earlier publications. This suggests that earlier research primarily focused on the technological and infrastructural aspects of cryptocurrencies, especially the foundational mechanisms that ensure decentralization and security. Over time, the focus appears to have gradually shifted from core blockchain technology to more applied and interdisciplinary areas, indicating the maturation and diversification of cryptocurrency research. This transition underscores a dynamic evolution in scholarly focus—from foundational technology to sophisticated analytical applications.

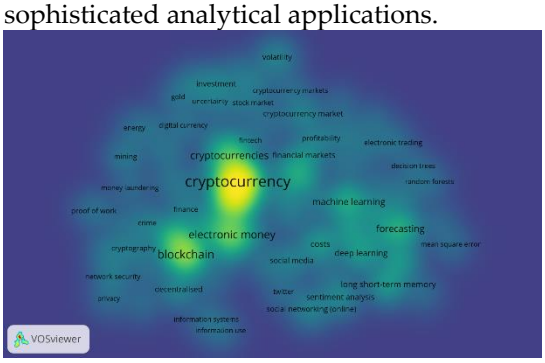

Figure 3. Density Visualization
Source: Data Analysis, 2025

This heatmap visualization from VOSviewer highlights the density of keyword occurrences in cryptocurrency-related literature, based on data indexed in Scopus. The most intense (bright yellow) areas represent keywords with the highest frequency and co-occurrence, while cooler areas (green and blue) reflect lower but still notable activity. The central term "cryptocurrency" is the hottest spot on the map, indicating its dominance and central role across research topics. Closely associated terms like "blockchain," "electronic money," and "financial markets" also appear in high-density zones, suggesting these foundational concepts are widely studied and form the core of the scholarly discourse. On the periphery, areas with moderate activity include more specialized or emerging topics such as "machine learning," "forecasting," "deep learning," and "sentiment analysis." These terms are increasingly gaining traction as researchers integrate advanced computational techniques to analyze market behavior and investor sentiment. Meanwhile, terms like "proof of work," "cryptography," and "network security" indicate earlier technical focuses that remain relevant, albeit less intensively studied in the latest trends.

3.2 Co-Authorship Network

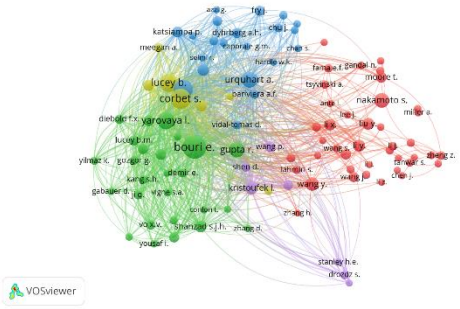

Figure 4. Author Visualization
Source: Data Analysis, 2025

This visualization illustrates the co-authorship network among the most prolific researchers in cryptocurrency studies, based on Scopus-indexed publications. Each node represents an author, and its size indicates the volume of publications or citations, while lines denote collaborative relationships. The network is divided into distinct clusters, each represented by a different color, revealing collaboration communities. Notably, Lucey B., Corbet S., Yarovaya L., and Bouri E. emerge as central figures in the green and yellow clusters, indicating strong collaborative networks and significant scholarly influence. The red cluster, including Nakamoto S., Wang Y., Liu Y., and Li X., appears more fragmented but still tightly connected internally, suggesting a separate line of research focus, potentially more technical or blockchain-focused. The blue cluster, with authors like Urquhart A. and Dyhrberg A.H., reflects another influential group with cross-links to the central green network.

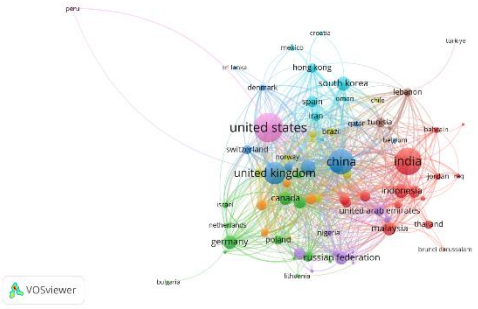

Figure 5. Country Visualization
Source: Data Analysis, 2025

This map illustrates international collaboration among countries involved in cryptocurrency research based on co-authorship data from Scopus. The United States, China, India, and the United Kingdom emerge as the most influential and active contributors, represented by the largest nodes, indicating high publication volume and central roles in global research networks. The dense web of connections between these and other countries such as Germany, Malaysia, Russia, and Canada reflects strong international collaboration in the field. Clusters of countries with shared research ties are color-coded, with notable groupings around regional or linguistic proximities—for instance, Southeast Asian countries like Indonesia, Thailand, and Malaysia forming a collaborative network, while Western European nations align in another. Outliers like Peru and Sri Lanka show fewer connections, indicating limited but emerging involvement.

DISCUSSION

The keyword co-occurrence analysis confirms that "cryptocurrency" remains the central focus of research, forming strong conceptual ties with "blockchain," "electronic money," and "financial markets." This demonstrates that despite diversification, the core of cryptocurrency research still revolves around its technological and economic implications. The prominence of blockchain-related terms such as "proof of work," "cryptography," and "decentralised" underscores the foundational role of blockchain technology in cryptocurrency systems. These findings align with early studies that framed blockchain as the essential infrastructure for digital currencies [5], [8]. However, the emergence of more sophisticated applications such as decentralized finance (DeFi) and non-fungible tokens (NFTs) has gradually shifted scholarly attention toward applied blockchain solutions.

Another noteworthy trend is the rising presence of data-driven methodologies, as evidenced by the strong representation of keywords like "machine learning," "deep learning," "forecasting," and "sentiment analysis." These keywords often co-occur with terms related to market behavior, such as "volatility," "profitability," and "investment," suggesting a growing interest in predicting cryptocurrency price dynamics and market sentiment. This shift reflects the broader integration of artificial intelligence into financial analytics, where machine learning algorithms are employed to analyze large datasets from social media, financial indicators, and transactional records [1], [11]. The inclusion of technical methods like "long short-term memory (LSTM)," "random forests," and "mean square error" indicates the field's progression towards advanced predictive modeling and validation techniques.

Temporal overlay mapping provides a chronological perspective on these developments. Earlier research, dominated by technological and security-focused terms such as "blockchain," "network security," and "cryptography," gave way to more recent keywords like "forecasting," "deep learning," and "social media." This temporal evolution suggests a transition from foundational infrastructure studies to applied, interdisciplinary research involving finance, computer science, and behavioral analysis. As such, the field has matured from theoretical and conceptual exploration into practical, solution-oriented investigations with real-world relevance. The use of social networking data and online sentiment further highlights the influence of behavioral finance and media dynamics on cryptocurrency markets, confirming findings by [14].

The density visualization complements this perspective by illustrating areas of concentrated scholarly activity. The most intense clusters appear around terms like "cryptocurrency," "blockchain," and "electronic money," reaffirming their foundational status. However, the growing density around "machine learning," "forecasting," and "sentiment analysis" reflects a burgeoning interest in empirical modeling. These high-density zones indicate that while the core of cryptocurrency research remains robust, there is a clear expansion into innovative domains that incorporate predictive technologies and human behavior analysis.

The co-authorship network analysis provides insight into the structure of scholarly collaboration. Authors such as Lucey B., Corbet S., Yarovaya L., Bouri E., and Urquhart A. emerged as central figures with extensive collaboration networks, forming dense and interconnected clusters. These researchers are responsible for significant contributions in areas like financial modeling, market volatility, and risk analysis, demonstrating strong thematic cohesion. Meanwhile, the presence of Nakamoto S. and technical researchers in a distinct cluster reflects a parallel stream of research centered on blockchain technology, cryptography, and decentralized systems. This dual structure suggests that cryptocurrency research can be broadly categorized into financially oriented and technologically oriented communities,

with some overlap and interdisciplinary collaboration. Such division is consistent with prior bibliometric insights that highlight the multidisciplinary nature of blockchain and cryptocurrency studies [15].

The international collaboration map reveals the global distribution of cryptocurrency research, highlighting the dominance of countries like the United States, China, India, and the United Kingdom. The United States, with the largest node and most extensive connections, acts as a central hub, collaborating extensively with both Western and Eastern countries. China and India form large, tightly-knit networks, suggesting strong national research agendas supported by domestic academic institutions. Interestingly, Southeast Asian countries such as Malaysia, Indonesia, and the United Arab Emirates are increasingly visible in the collaboration map, indicating growing regional interest and academic investment in cryptocurrency research. This is particularly significant given these countries' burgeoning fintech ecosystems and efforts to adopt blockchain for financial inclusion and digital infrastructure.

Moreover, the collaborative ties among countries reveal a growing trend toward internationalization in cryptocurrency research. Shared interests in regulation, financial innovation, and technological advancement drive partnerships across borders. For example, collaborations between the United Kingdom, Germany, and Netherlands indicate a European research nexus, while ties between China, South Korea, and Hong Kong suggest a strong East Asian cluster. These patterns reflect how different regions are approaching cryptocurrency through distinct lenses—whether it be financial regulation, technical development, or socio-economic impact—yet contributing to a shared global discourse.

From a theoretical perspective, the findings affirm that cryptocurrency research is situated at the intersection of multiple domains, including economics, computer science, information systems, and behavioral studies. The breadth of keyword themes and collaborative diversity demonstrates the inherently interdisciplinary nature of this field. While traditional economic and technological concerns remain central, the adoption of machine learning and social analysis techniques is expanding the scope of inquiry. This offers opportunities for further integration of disciplines such as psychology, law, environmental science (in relation to crypto mining), and development studies.

Despite the breadth of research, certain gaps are apparent. For example, while environmental issues related to cryptocurrency mining (e.g., energy consumption, carbon footprint) are critical, they are underrepresented in the keyword networks. Similarly, the socio-economic implications of cryptocurrency in low-income or unbanked populations receive comparatively less attention. These omissions present future research opportunities, particularly in assessing the sustainability and inclusiveness of digital financial systems. Furthermore, the increasing use of AI-based methodologies introduces challenges related to transparency, model bias, and ethical implications. While machine learning offers powerful tools for market prediction and behavioral analysis, its opaque nature can hinder interpretability, especially in policy-making contexts. Thus, future studies must balance technical sophistication with interpretability and ethical considerations.

4. CONCLUSION

this bibliometric analysis paints a comprehensive picture of the cryptocurrency research landscape as represented in the Scopus database. The field has evolved from early technological explorations to a multifaceted domain integrating predictive analytics, financial modeling, and behavioral research. Central authors and countries have emerged as leaders, driving both conceptual and applied advancements. However, to sustain momentum and relevance, future research must address underexplored areas such as sustainability, ethics, and inclusivity, while continuing to embrace interdisciplinary

collaboration and innovation. This ongoing evolution reflects cryptocurrency's transformative potential—not only as a financial asset but as a catalyst for technological, economic, and social change.

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