

# BLOCKCHAIN AND CRYPTOCURRENCIES AS EMERGING SECURITY THREATS: A BIBLIOMETRIC ANALYSIS OF GLOBAL CONCERNS

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## ABSTRACT

*The rapid development of blockchain technology and cryptocurrencies has introduced new challenges to global security, particularly within the context of emerging and disruptive technologies. This study aims to identify how these innovations may pose risks to national and international security, focusing on issues such as terrorism financing, cybersecurity threats, financial system vulnerabilities and illicit transactions. To explore researchers' concerns regarding this topic, a bibliometric analysis was conducted using the Bibliometrix R-package. The analysis covered the period from 2000 to 2024, identifying 112 English language articles relevant to the subject, extracted from the Web of Science database. The findings highlight the growing academic interest in the intersection of blockchain, cryptocurrencies, and security threats, confirming the relevance of the topic in current research. The findings highlight that discussions of blockchain and cryptocurrency risks are frequently linked to concerns about financial crimes, money laundering, and the use of digital assets for terrorism financing. Additionally, the study underscores how the disruption of traditional financial and monetary systems by these technologies may amplify global security risks. This research contributes to the ongoing debate on the impact of emerging and disruptive technologies on financial stability and international security, providing valuable insights for policymakers, researchers and security experts.*

**KEYWORDS:** blockchain, cryptocurrencies, cybersecurity, global security, terrorism financing

## 1. Introduction

The rapid development of blockchain technology and cryptocurrencies has transformed global financial and economic systems, offering decentralized and efficient alternatives to traditional monetary structures. However, alongside these benefits,

blockchain-based financial innovations have introduced significant security risks, raising concerns among policymakers, researchers, and law enforcement agencies. Cryptocurrencies, in particular, have been linked to illicit financial activities (Bertola, 2020), including money laundering

(Dupuis & Gleason, 2020; Kapsis, 2023), cybercrime (Nadareishvili & Kakulia, 2022) and terrorism financing (Bottazzi & Me, 2017; Song et al., 2023), due to their pseudonymous nature and lack of centralized oversight. As governments and regulatory bodies struggle to adapt to these emerging threats (Antonyna et al., 2019), there is a growing need to assess how blockchain and cryptocurrencies impact global security (Gunay et al., 2024; Fang et al., 2024).

The objective of this paper is to analyze the extent to which blockchain technology and cryptocurrencies are perceived as security threats, with a particular focus on terrorism financing, financial system disruptions and cybersecurity vulnerabilities. To achieve this, we conduct a bibliometric analysis of academic literature published between 2000 and 2024, utilizing the Web of Science database. This methodological approach enables us to identify key trends, research gaps and dominant perspectives on the intersection of blockchain technology and global security. By analyzing the academic discourse on this topic, we aim to provide insights into how researchers and policymakers approach these challenges and what aspects require further investigation.

Based on the empirical data visualized in the provided bibliometric analysis, it is evident that the countries from which the authors originate are either actively involved in cryptocurrency adoption or are significantly affected by geopolitical conflicts and strategic uncertainties. Nations such as Russia, Ukraine, China, the United States, and Switzerland stand out in the dataset, reflecting their diverse roles in the cryptocurrency ecosystem, whether as adopters, regulators, or nations dealing with financial and security implications of digital assets. There are also countries like Lebanon, Poland, Vietnam, and Tunisia that are known for experiencing financial instability or geopolitical tensions, factors that often drive interest in decentralized financial solutions. This geographic distribution suggests that

researchers from these regions are particularly invested in understanding the impact of blockchain and cryptocurrencies on national and global security. It also highlights how emerging and disruptive technologies intersect with real world challenges such as war, financial instability and cybersecurity threats, reinforcing the urgency of addressing these concerns at both academic and policy levels.

By presenting an evidence based analysis of how blockchain and cryptocurrencies are discussed in relation to global security threats, this paper contributes to a better understanding of the risks posed by emerging and disruptive technologies. The findings are relevant to policymakers, security experts, and financial regulators aiming to formulate better approaches to reducing these threats while balancing the benefits of technological innovation.

## **2. Literature Review**

The current literature on cryptocurrencies highlights their dual role as both a financial innovation and a regulatory challenge. Research shows that while digital assets provide new investment opportunities, they also facilitate illicit activities such as terrorism financing (Akcinaroglu & Shi, 2025; Muradyan et al., 2022) and market manipulation (Eigelshoven et al., 2021). Cryptocurrencies have emerged as a disruptive financial innovation with significant implications for global security, economic stability, and geopolitical risk (Neacșu et al., 2022; Song et al., 2023).

Jofre et al. (2024) examine the use of traditional financial systems such as Hawala and cryptocurrencies in terrorism financing. Their research highlights how digital assets can facilitate illicit transactions while circumventing regulatory oversight. Similarly, Farber and Yehezkel (2024) discuss the role of cryptocurrencies in crowdfunding for cyber terrorism, raising concerns about the anonymity and

decentralized nature of digital assets. There are also other studies (Kochergin et al., 2024; Dyntu & Dykyj, 2021; Antwi et al., 2023) that underscore the urgency for stronger regulations to mitigate security threats associated with financial anonymity in cryptocurrency transactions.

Chowdhury et al. (2024) explore shifts in investor sentiment within cryptocurrency markets, analyzing how external uncertainties influence investment behavior. Their findings align with those of Drozd et al. (2018) that focus on consumer behavior in digital asset investments, and Sestino et al. (2024), who assess the impact of cryptocurrencies on international markets and investment strategies. While Chowdhury et al. (2024) focus on sentiment and volatility, Sestino et al. (2024) delve into broader investment dynamics, emphasizing the potential for cryptocurrencies to disrupt traditional financial models. These studies collectively suggest that cryptocurrencies introduce both opportunities and risks, requiring investors to adapt to new market conditions (Lukianchuk et al., 2017; Ricci, 2020).

Gunay et al. (2024) investigate how geopolitical risks influence financial markets, particularly in the wake of COVID-19. Their work builds on the findings of Payne et al., who examine impulse-response relationships between geopolitical uncertainty and market fluctuations, ideas also found the works of other researchers (Kyriazis, 2020; Theiri, 2024). The intersection of geopolitics and financial stability remains a critical area for further exploration, particularly as digital assets gain mainstream acceptance.

A recurring theme in cryptocurrency research is the regulatory challenge posed by decentralized finance. Sestino et al. (2024) explore the risks associated with DeFi, emphasizing its potential for market manipulation and illicit activities, issues also examined in recent studies, including in ones of Leuprecht et al. (2023) and Kethineni & Cao (2020).

This aligns with Jofre et al.'s concerns (2024) regarding regulatory loopholes in financial crime prevention. Both studies call for comprehensive regulatory frameworks to bridge existing gaps and ensure the responsible development of digital financial systems.

Almeida et al. (2022) offer a comprehensive analysis of the risks linked to cryptocurrency investments in international markets, emphasizing the regulatory challenges and the need to combat financial crime, concerns also highlighted by Teichmann (2022). Additionally, Akartuna et al. (2022) expand on these issues by examining cybersecurity risks in cryptocurrency transaction.

Geopolitical risks as presented in the work of Hoang et al., (2025) and financial crises as described by Ullah et al., (2024), amplify cryptocurrency volatility, positioning them as both a hedge and a source of instability in global markets.

The significance of this research is supported by the growing role of emerging and disruptive technologies in reshaping global security dynamics. Cryptocurrencies have already been exploited by criminal networks (Kapsis, 2023) and extremist organizations (Movchan et al., 2023) to evade financial regulations; while blockchain's decentralized nature poses new challenges for cybersecurity frameworks (Corbet, 2020; Bătușaru & Sbârcea, 2024). Despite these concerns, existing research on the security implications of blockchain and cryptocurrencies remains fragmented, often focusing on specific cases rather than providing a systematic, data driven overview of the academic landscape. This study fills this gap by offering a comprehensive bibliometric assessment of the scholarly debate on this issue.

### **3. Material and Methods**

For this bibliometric analysis, the R software was used along with the bibliometrix package and its graphical

interface, Biblioshiny, to examine the scientific literature published between 2000 and 2025. The selection criterion was the topic: “terrorism, geopolitical risk, blockchain, and cryptocurrencies”. The data were retrieved from the international Web of Science database, including only articles written in English. A total of 112 relevant articles were identified, originating from three main fields: Business and Economics, Finance and Political Science. The analysis period was chosen to capture the evolution of research in this domain, and the selection was based on relevant titles, abstracts and keywords.

The extracted data were preprocessed and cleaned using bibliometrix, eliminating duplicates and standardizing author and journal names. A co-occurrence analysis of keywords and abstracts was applied to identify dominant thematic connections, and a network analysis was conducted to highlight collaborations between authors and the most prolific countries in scientific production. All resulting visualizations, including co-occurrence maps and evolutionary graphs, were generated using

Biblioshiny, providing a clear representation of research trends and directions.

The interpretation of the results was carried out by identifying key emerging topics and their correlations, highlighting how cryptocurrencies and blockchain are associated with geopolitical risks and terrorism financing. Additionally, the analysis revealed an exponential growth in scientific literature on this subject since 2016, indicating increasing academic and political interest. Based on the findings, this study contributes to understanding how emerging financial technologies influence global security, offering a solid foundation for future research and regulatory policy recommendations.

#### 4. Results and Discussions

The analysis of the distribution of research on cryptocurrencies and their impact on global security was conducted using a tree-map network, with the following criteria: authors’ countries of origin, article titles and relevant keywords used in the scientific literature. The results are presented in Figure no. 1.

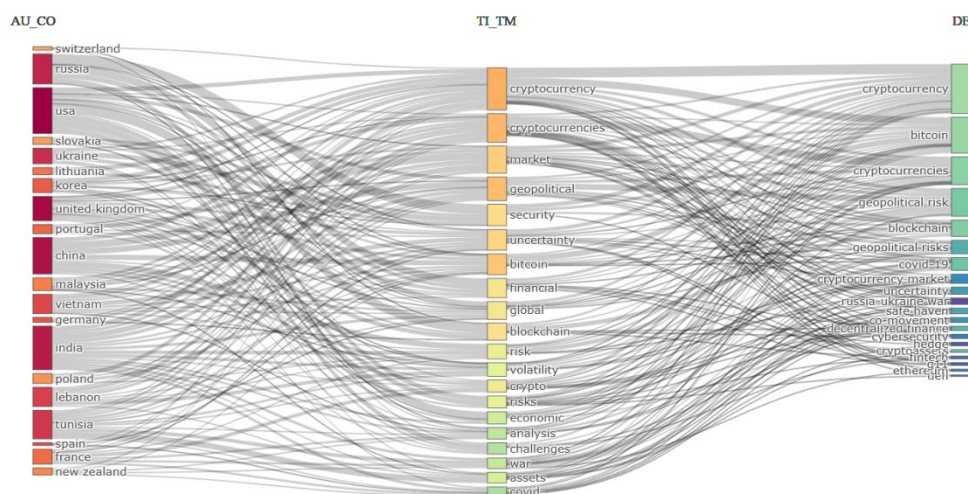


Figure no. 1: *Tree-map representation of scientific literature by authors’ countries, article titles and associated keywords*  
(Source: Authors’ own processing with Biblioshiny (R))

The analysis of the network established in Figure no. 1 highlights a diverse geographical distribution of research on cryptocurrencies, blockchain and global risks.

The countries contributing the most to the specialized literature in this field are the United States, Russia, Switzerland, Germany, China, India, and the United Kingdom,

reflecting both advanced technological development and national security concerns. The presence of countries such as Ukraine, Lithuania, Poland and Slovakia indicates an increased interest in the geopolitical and economic implications of cryptocurrencies, particularly in the context of conflicts and financial instability in Eastern Europe. Asian countries, including China, Malaysia, Vietnam, and South Korea, are becoming increasingly active in this domain, which can be attributed to both the growth of crypto markets and governmental efforts to regulate them. This geographical diversity underscores the global nature of concerns related to cryptocurrencies and their impact on the economy and international security. The analysis of the relationships between authors' countries of origin and the themes addressed in the scientific literature reveals significant differences in research priorities. For example, the U.S. and Switzerland focus on the financial dimension of cryptocurrencies, with terms such as "cryptocurrency", "bitcoin", "market" and "financial", suggesting a predominant interest in market analysis and regulations. Russia

and Ukraine are strongly correlated with terms like "geopolitical risk", "security" and "war", indicating concerns about the use of cryptocurrencies in international conflicts and economic sanctions. In Asia, China and India are associated with "blockchain", "decentralized finance (DeFi)", and "cybersecurity", reflecting their interest in regulating emerging technologies and using cryptocurrencies as tools for data protection and financial control. Eastern European countries, Lithuania, Poland and Slovakia, are linked to concepts such as "uncertainty" and "regulation", reflecting their concerns about cryptocurrency volatility and its impact on economic stability.

These correlations demonstrate that each region approaches the topic of cryptocurrencies from a specific perspective, influenced by local economic and geopolitical contexts.

Based on the information provided by the network map above, this research also aimed to analyze the annual scientific production on this topic, with the results presented in Figure no. 2.

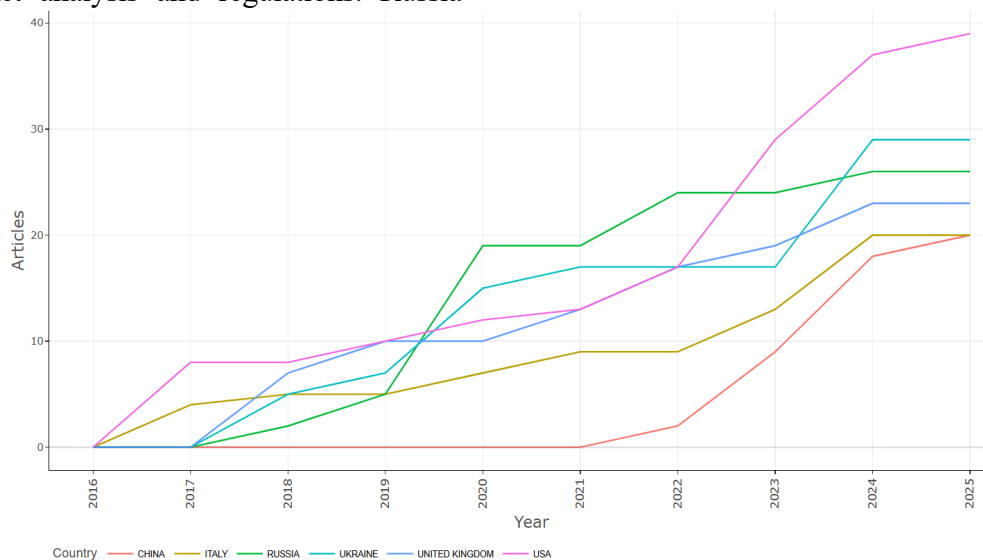


Figure no. 2: *Scientific production over time by country*  
(Source: Authors' own processing with Biblioshiny (R))

Scientific interest in cryptocurrencies and global security began to rise only after 2016, as cryptocurrencies were not previously

perceived as a significant threat to financial stability and international security. Initially, Bitcoin and other cryptocurrencies were

viewed primarily as technological innovations or speculative opportunities, without major security implications. However, after 2016, their use in illegal activities, such as money laundering, terrorism financing and cybercrime, became increasingly evident, leading to heightened academic and political concerns.

As shown in the graph below, the publication of articles on this topic increased significantly after 2017, with steady growth in countries such as the United States, Russia and the United Kingdom, indicating a global recognition of the risks associated with cryptocurrencies. Geopolitical events, including economic sanctions on Russia, financial instability in certain regions, and the rising adoption of cryptocurrencies in emerging markets, have further amplified researchers' interest in this intersection between technology and global security. Thus, the interest of different countries in cryptocurrencies and global security can be explained by a combination of economic, geopolitical, and technological factors. The U.S. and Switzerland, as major financial hubs, are concerned with both the opportunities presented by cryptocurrencies

and the associated risks, such as money laundering and the financing of illicit activities. Russia and Ukraine, involved in geopolitical conflicts, use cryptocurrencies to circumvent international sanctions and fund cyber and military operations. China plays a crucial role in the development of blockchain technology and central bank digital currencies, reflecting its desire to control digital financial flows. India and Southeast Asian countries leverage cryptocurrencies for financial inclusion and to protect assets against inflation and currency devaluation. In Eastern Europe, countries facing economic and geopolitical risks analyze the impact of cryptocurrencies on financial stability and international security, given the vulnerabilities in their economic systems.

This diversity of perspectives demonstrates that cryptocurrencies are not just a technological or financial concern, but a key factor in shaping national economic and security strategies.

To clearly illustrate the connection between blockchain, cryptocurrencies and security risks, as identified in the analysis of the studied articles, a thematic map has been generated and is shown in Figure no. 3.

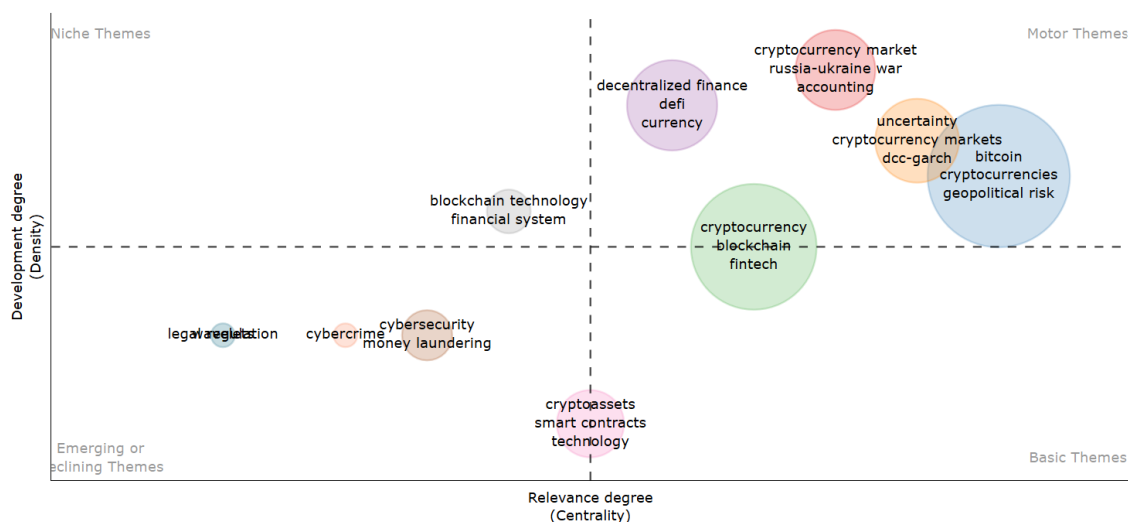


Figure no. 3: *Thematic map related to blockchain, cryptocurrencies and security risks*  
(Source: Authors' own processing with Biblioshiny (R))

This thematic map presents an analysis of author keywords from bibliometric research, showing how

different themes related to blockchain, cryptocurrencies and security risks are categorized based on their development

degree (density) and relevance degree (centrality). The map is divided into four quadrants: Motor Themes, Basic Themes, Niche Themes and Emerging or Declining Themes, each providing insight into the significance and maturity of different topics related to cryptocurrencies, blockchain and security risks.

Located in the top-right quadrant, **motor themes** represent key research areas that are both highly relevant and well developed. These topics have strong theoretical foundations and significantly influence the development of the field. The most prominent themes in this category include cryptocurrency markets, geopolitical risk, uncertainty and the Russia-Ukraine war. The presence of geopolitical elements suggests that cryptocurrencies are increasingly studied in the context of financial stability and economic warfare. The terms “bitcoin” and “accounting” indicate a growing academic focus on the financial implications of digital assets, particularly in times of economic uncertainty. The combination of these factors highlights that cryptocurrencies are not only financial instruments but also tools with broader geopolitical and economic consequences.

The bottom-right quadrant, **basic themes**, contains topics that are highly relevant but less developed in terms of research density. These themes serve as the foundation of the field but require further exploration. Keywords such as “cryptocurrency”, “blockchain” and “fintech” indicate that these areas are fundamental in discussions around digital finance and technological innovation. Although widely studied, ongoing advancements in regulation, security and adoption suggest that these themes continue to evolve. Their position on the map reflects the strong interconnection between blockchain technology and financial technology (fintech), making them central to both academic research and industry applications.

Positioned in the top-left quadrant, **niche themes** are highly developed but with minimal integration into the wider academic discourse. These topics, including decentralized finance (DeFi), digital currencies and blockchain technology in financial systems, indicate focused academic interest in specific aspects of financial innovation. The presence of DeFi in this category suggests that while decentralized financial ecosystems are rapidly expanding, they remain somewhat isolated from mainstream discussions. Similarly, blockchain’s impact on the traditional financial system is explored in depth but lacks broader integration into research on global security or monetary policies. These themes are valuable for specialized research but may need further connections to broader financial and economic discussions.

Located in the bottom-left quadrant, **emerging or declining themes** have low density and low centrality, meaning they are either underexplored research areas or topics that have lost relevance. This quadrant includes legal regulation, legislation, cybercrime, cybersecurity, and money laundering. The relatively low presence of legal and regulatory discussions suggests that academic research has not yet fully caught up with the urgent need for policy frameworks surrounding cryptocurrencies. Considering these aspects, cybersecurity and financial crime concerns remain underdeveloped, despite their importance in addressing the risks associated with digital assets. These gaps in the literature present opportunities for future research to explore regulatory challenges, anti-money laundering policies and cybersecurity threats more extensively and in a more comprehensive manner.

The identification of the main areas of interest in scientific research is also highlighted through the co-occurrence map based on authors’ keywords, presented in Figure no. 4.

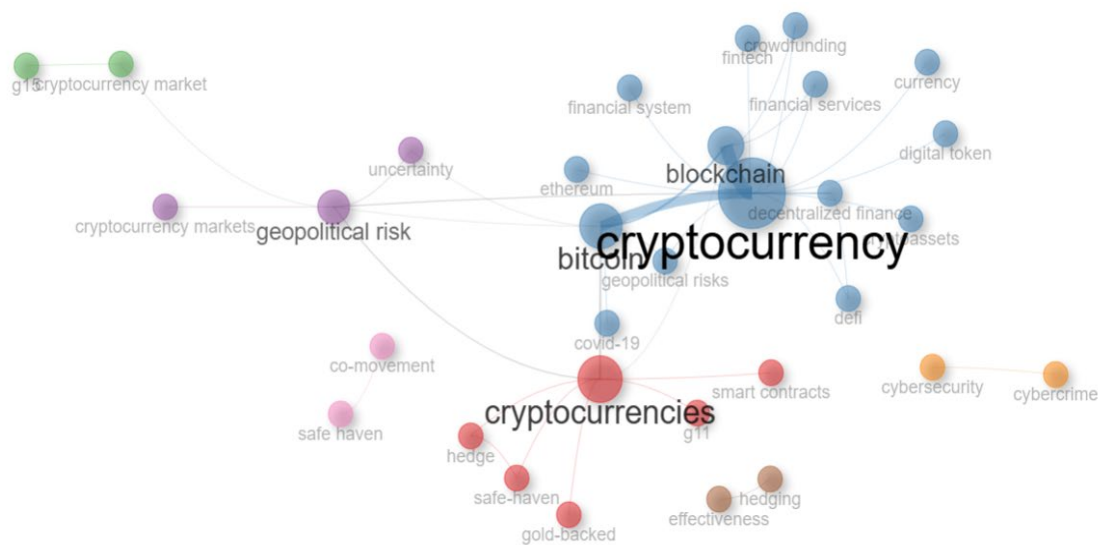


Figure no. 4: *Authors keywords co-occurrence Network*  
(Source: Authors' own processing with Biblioshiny (R))

The size of the nodes reflects the frequency of a term's occurrence in the analyzed literature, meaning that larger keywords are the most frequently used. The connections between nodes indicate thematic relationships between concepts, while the thickness of these connections signifies how often two terms appear together in the same studies. The color of the nodes represents distinct thematic groups, suggesting clusters of research topics.

One of the most prominent clusters is centered on the terms "cryptocurrency" and "blockchain" (represented in blue). This thematic group is the most significant and includes concepts such as "bitcoin", "decentralized finance" and "financial system". This association indicates that research is heavily focused on the impact of decentralized technologies on the financial sector. The connection between "blockchain" and "financial services" also points to significant interest in applying blockchain to traditional financial services.

Another notable cluster is the cryptocurrencies cluster (represented in red). This group includes terms such as "hedge", "safe haven" and "gold-backed", suggesting a research focus on the role of cryptocurrencies as safe-haven assets

during financial crises. The presence of the term "smart contracts" within this cluster reflects growing interest in automating financial transactions through smart contracts.

The "geopolitical risk" cluster (marked in purple) highlights the connection between cryptocurrencies and geopolitical uncertainty. The strong links between "geopolitical risk", "uncertainty" and "cryptocurrency markets" suggest that the literature is examining the impact of geopolitical events on crypto markets. In the current global context, the inclusion of "geopolitical risk" alongside "cryptocurrency markets" confirms an emerging trend in analyzing cryptocurrencies as alternative financial instruments during periods of global instability.

A final major cluster is the "cybersecurity and cybercrime" cluster (represented in orange), which highlights the security risks associated with cryptocurrencies. The connections between "cybersecurity" and "cybercrime" reflect researchers' concerns about issues such as cyberattacks, fraud and money laundering. This association underscores the need for stricter regulations and technological solutions to protect crypto markets.

To highlight the perspective of the authors regarding the thematic approach and to identify how cryptocurrencies are correlated with critical topics such as global security, cybercrime, terrorism financing and geopolitical risks, a co-occurrence map of abstracts was also generated.

This visual analysis, presented in Figure no. 5, illustrates the conceptual connections between cryptocurrencies and economic, political and security aspects, reflecting researchers' concerns about the impact of these digital assets on global security.

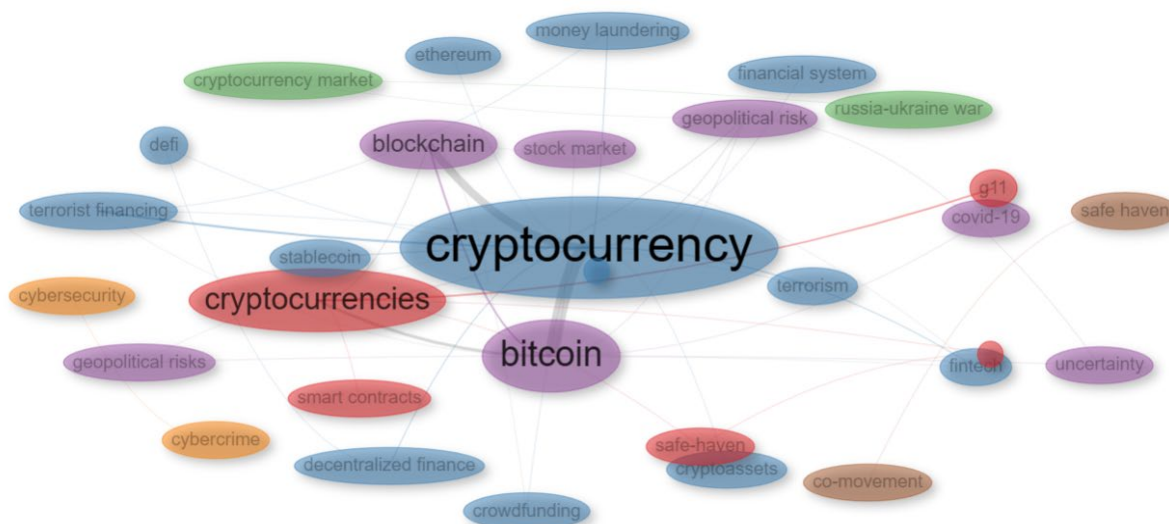


Figure no. 5: *Abstracts co-occurrence Network*  
(Source: Authors' own processing with Biblioshiny (R))

Analyzing the interdependencies among key concepts identified in the co-occurrence map, a clear connection emerges between “cryptocurrency” and “terrorist financing”, highlighting concerns regarding the use of cryptocurrencies to facilitate the financing of criminal groups. In this context, cryptocurrencies provide anonymity and bypass traditional banking systems, making them attractive for illicit transactions. This relationship is further supported by additional connections to “cybercrime” and “money laundering”, indicating the mechanisms through which illicit funds can be laundered and redirected to terrorist activities. The terms “geopolitical risks” and “geopolitical risk” also appear in the network and are linked to cryptocurrencies. This suggests that the use of digital assets is perceived as playing a significant role in intensifying international tensions. For instance, cryptocurrencies can

be used to evade economic sanctions imposed on certain states or terrorist organizations, thereby contributing to the destabilization of conflict affected regions.

Moreover, the presence of terms such as “cybercrime” and “cybersecurity” closely associated with cryptocurrencies reflects concerns related to cyberattacks, ransomware and digital asset theft. The connection to “money laundering” further indicates that cryptocurrency-based money laundering is a recurring theme in the literature, serving as a common method used by criminal and terrorist organizations to obscure their sources of funding.

Another relevant aspect of the analysis is the presence of the terms “uncertainty”, “safe haven”, and “decentralized finance”, which suggest that while cryptocurrencies are perceived as a security risk, they are also seen as a financial safe haven during periods of

crisis. This paradox highlights the fact that, although digital assets can contribute to instability, they are simultaneously used by investors to protect capital against geopolitical and economic risks.

As observed from the interdependencies identified among the concepts explored in the scientific literature, the intersection between cryptocurrencies and global security is highly complex. While cryptocurrencies can present an economic opportunity, they are also a tool for terrorism financing, money laundering and cybercrime facilitation, necessitating strict regulations and international oversight measures.

## 5. Conclusions

The bibliometric analysis presented in this study highlights the complex relationship between blockchain technologies, cryptocurrencies and security risks, emphasizing both well established research directions and underexplored areas. The study's findings indicate a significant increase in academic interest in these topics starting in 2016, reflecting growing concerns about the use of cryptocurrencies in financial, geopolitical, and cybersecurity risk contexts.

The most prominent scientific concerns have focused on topics such as crypto markets, geopolitical risk, economic uncertainty, and the impact of international conflicts, which are well defined in the specialized literature. In contrast, critical aspects such as legal regulation, cybercrime, cybersecurity and money laundering remain underdeveloped academically, despite their obvious importance in managing the risks associated with digital assets. This gap presents opportunities for future research to explore strategies for combating financial crime and developing robust legal frameworks for cryptocurrency regulation.

The most relevant future research directions in this field should focus on strengthening regulatory measures to mitigate risks associated with financial anonymity and decentralized finance, as well as understanding the role and implications of cryptocurrencies in financial crises and geopolitical conflicts. These research directions are crucial for enhancing global economic security while ensuring a balance between innovation and risk management in the cryptocurrency sector.

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