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EXPLORING THE ROLE OF BLOCKCHAIN AND CRYPTOCURRENCY IN RESHAPING GLOBAL TRADE: A BIBLIOMETRIC ANALYSIS

MENGEKSPLORASI PERAN BLOCKCHAIN DAN MATA UANG KRIPTO DALAM MEMBENTUK KEMBALI PERDAGANGAN GLOBAL: ANALISIS BIBLIOMETRIK

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ABSTRACT

In the rapidly evolving digital era, technological transformation has become a critical factor in accelerating and streamlining global trade. Blockchain and cryptocurrency have emerged as innovations with significant potential to revolutionize cross-border transactions by offering fast, intermediary-free methods of transaction. Blockchain ensures transparency, security, and efficiency in managing global supply chains and business transactions, while cryptocurrency enables faster and cheaper cross-border payments, eliminating delays and high fees associated with traditional banking systems. The purpose of this study is to explore the role of blockchain and cryptocurrency in reshaping global trade, analyze patterns and trends in the global trade digital transformation literature, and identify the challenges and opportunities faced by these technologies in the context of international trade. This study uses a bibliometric approach to analyze relevant literature, resulting in four main clusters: Green (Global Trade and Supply Chain), Blue (Ethereum Blockchain and Challenge), Red (Market and Currency), and Yellow (Role and Example). The findings suggest that blockchain and cryptocurrency can enhance the efficiency, security, and transparency of international trade; however, challenges such as cryptocurrency price volatility, security issues, and limited technology adoption still need to be addressed to fully realize the potential of these technologies.

Keywords: *Blockchain, Cryptocurrency, Global Trade.*

ABSTRAK

Di era digital yang terus berkembang, transformasi teknologi menjadi faktor penting dalam mempercepat dan mempermudah perdagangan global. Blockchain dan cryptocurrency muncul sebagai inovasi yang memiliki potensi besar untuk merevolusi transaksi lintas negara dengan menawarkan cara transaksi yang cepat dan bebas perantara. Blockchain memastikan transparansi, keamanan, dan efisiensi dalam pengelolaan rantai pasokan global dan transaksi bisnis, sementara cryptocurrency memungkinkan pembayaran lintas negara yang lebih cepat dan lebih murah, menghilangkan keterlambatan dan biaya tinggi yang terkait dengan sistem perbankan tradisional. Tujuan dari studi ini adalah untuk mengeksplorasi peran blockchain dan cryptocurrency dalam mengubah perdagangan global, menganalisis pola dan tren dalam literatur transformasi digital perdagangan global, serta mengidentifikasi tantangan dan peluang yang dihadapi oleh teknologi ini dalam konteks perdagangan internasional. Penelitian ini menggunakan pendekatan bibliometrik untuk menganalisis literatur yang relevan, menghasilkan empat kluster utama: Hijau (Perdagangan Global dan Rantai Pasokan), Biru (Blockchain Ethereum dan Tantangan), Merah (Pasar dan Mata Uang), dan Kuning (Peran dan Contoh). Temuan ini menunjukkan bahwa blockchain dan cryptocurrency dapat meningkatkan efisiensi, keamanan, dan transparansi perdagangan internasional, namun tantangan seperti volatilitas harga cryptocurrency, masalah keamanan, dan keterbatasan adopsi teknologi masih perlu diatasi untuk mewujudkan potensi penuh dari teknologi ini.

Kata Kunci: Blockchain, Mata Uang Kripto, Perdagangan Global

INTRODUCTION

In the rapidly evolving digital era, technological transformation has become a critical factor in accelerating and streamlining global trade (Ianenko et al., 2019). As the volume of international commerce grows, there is an increasing need for solutions that enhance efficiency, security, and transparency. Blockchain technology and cryptocurrency are emerging as innovations with significant potential to

revolutionize cross-border transactions. By offering fast, intermediary-free methods of transaction, these technologies are helping businesses worldwide achieve levels of efficiency that were previously unimaginable (Lee, 2019). Blockchain and cryptocurrency are two transformative technologies that have the potential to revolutionize international trade. Blockchain technology was developed to enable two parties to carry out online transactions directly, without the need for a third-party intermediary (Gabinson, 2016). Blockchain, with its decentralized ledger system, ensures transparency, security, and efficiency in managing global supply chains and business transactions (Li et al., 2019). By providing an immutable record, it reduces the risk of fraud, errors, and data manipulation, which are common in traditional trade systems, and helps streamline processes by minimizing the need for intermediaries (Hooper & Holtbrügge, 2020). Cryptocurrency, on the other hand, enables faster and more cost-effective cross-border payments, eliminating the delays and high fees associated with traditional banking systems (Tredinnick, 2019). It allows businesses to bypass currency exchange complexities, facilitating seamless global transactions and fostering more inclusive trade practices, especially in regions with limited banking infrastructure (Al-Saqaf & Seidler, 2017). Together, these technologies enhance the efficiency, security, and transparency of international trade, addressing long-standing challenges and creating a more interconnected, frictionless global marketplace (Anuyahong & Ek-udom, 2023).

As global trade continues to grow, understanding how these digital tools can reshape global trade is critical. The integration of blockchain and cryptocurrency offers a solution that addresses some of the long-standing challenges in international trade, including payment delays, high transaction costs, and the complexity of international regulation. This integration involves embedding blockchain technology into supply chain management systems to increase transparency and traceability, as well as adopting cryptocurrency as a secure and decentralized payment method for cross-border transactions.

RESEARCH METHODS

This study uses a bibliometric approach to understand patterns and trends in the global trade digital transformation literature with a focus on the role of blockchain and cryptocurrencies as catalysts for international business efficiency. Bibliometrics offers a quantitative method for assessing the impact and productivity of research, making it a useful tool for evaluating the influence of academic publications. Additionally, it enables researchers to gauge the impact of articles using citation metrics. The data gathered through bibliometric analysis is valuable for making informed decisions, setting objectives, and pinpointing areas for improvement (Brown et al., 2018)

The first step in using bibliometrics is to select an appropriate database, in this case using Harzing's Publish or Perish, to collect 1000 publications related to blockchain, cryptocurrency and Global trade between 2014 and 2024 and the final result obtained 999 journals. This data was retrieved using the Harzing's Publish or Perish app to identify publication trends over the period.

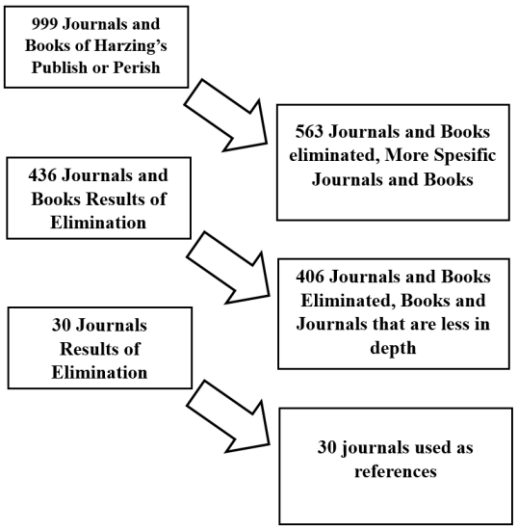
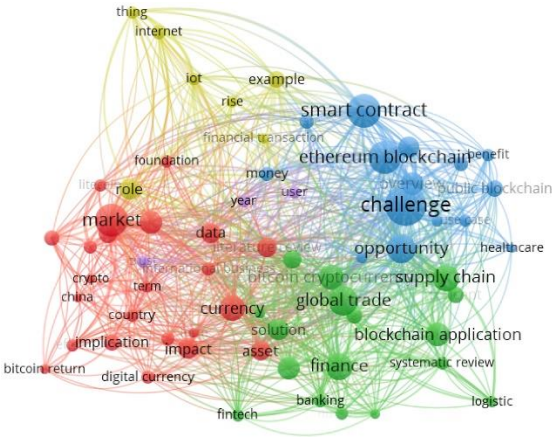


Figure 1. Journals and Books Elimination Process

Once the data were gathered, VOSViewer was employed to categorize the topics from the selected journals. VOSViewer aided in bibliometric visualization and network analysis by revealing patterns within the bibliographic data, such as keyword frequency and the relationships between topics. This approach facilitated the grouping of key topics and provided insight into research trends in Global Trade, ultimately identifying four clusters: Green (Global Trade and Supply Chain), Blue (Ethereum Blockchain and Challenge), Red (Market and Currency), and Yellow (Role and Example).

RESULTS AND FINDINGS

The network map analysis using VosViewer software, based on keywords from data sources, produced the following image : 999 manuscripts that appears in the Harzing's Publish or Perish software under the keyword 'cryptocurrency, 'blockchain', 'global trade, and 'trade technology'.



Source : VosViewer Output Results, 2024.

Figure 2. Main Topics Network Map Results

Green Cluster (Global Trade and Supply Chain)

Global trade management through hierarchical blockchain architecture can automate processes, increase visibility, and ensure regulatory compliance efficiently (Benayoun et al., 2018). Blockchain addresses global trade challenges by providing transparency, security, and efficiency in data exchange while ensuring accurate identification of participants and goods (Kupriyanovsky et al., 2018).

Supply chain issues include reliance on intermediaries, relational risks, complex documentation, lack of transparency, and operational uncertainty (Gurtu & Johny, 2019). Blockchain technology can significantly improve trade supply chains, particularly in customs management and international trade operations (Juma et al., 2019). Blockchain enhances supply chain transparency, security, and efficiency by enabling real-time tracking, minimizing fraud, and automating transactions with smart contracts (Dujak & Sajter, 2019).

Blue Cluster (Ethereum Blockchain and Challenge)

Ethereum provides a decentralized virtual machine to manage smart contracts, which function as digital agreements that govern users' digital assets by defining the rights and responsibilities of the participants (Lin & Liao, 2017). Ethereum blockchain is a decentralized platform designed to execute smart contracts and decentralized applications through blockchain technology (da Cruz et al., 2020). It features a Turing-complete decentralized virtual machine, known as the Ethereum Virtual Machine (EVM), which encodes rules and runs scripts for processing transactions (Luu et al., 2016). The efficiency in the blockchain systems can be achieved with combination with smart contracts (Li et al., 2019).

The challenges of implementing Ethereum blockchain in the global supply chain include issues with traceability, high dispute resolution costs, cargo security risks, barriers to digitalization due to the large number of documents, the need to meet compliance requirements, and reliance on intermediaries for trust and stakeholder management (Chang et al., 2020).

Red Cluster (Market and Currency)

The cryptocurrency market sees blockchain technology as a revolutionary innovation that enables fast and secure transactions without a central institution, and has great potential for applications beyond finance, as seen on the Ethereum platform (Wątorek et al., 2020). The cryptocurrency market responds efficiently to regulatory changes, with prices generally rising in response to advancements in regulatory frameworks and legal recognition, while bans and restrictions lead to price declines; however, stricter regulations, particularly those related to anti-money laundering and issuance, often result in lower cryptocurrency prices, suggesting that the negative impact on prices may outweigh the benefits of regulation, and there is heterogeneity in price responses to different types of regulations (Shanaev et al., 2020).

The Bitcoin system aims to maintain the integrity of the payment system by focusing on counterfeit prevention and ensuring anonymity (Ciaian et al., 2016). It seeks to digitally replicate the characteristics of cash, such as anonymity, payment finality, low transaction costs, and decentralized transfer operations (Beer & Weber, 2015). This appeals to merchants, as adopting Bitcoin not only helps reduce costs but also attracts new customers (Seetharaman et al., 2017). Bitcoin enables quicker transaction processing compared to conventional online payment systems (Panda et al., 2023). In contrast, while Bitcoin serves solely as digital currency, Ethereum boasts faster transaction speeds and functions as a flexible database that businesses utilize to create and operate new applications. (Anwar et al., 2020).

Yellow Cluster (Role and Example)

Blockchain plays a vital role in enhancing the security, transparency, and efficiency of cryptocurrency transactions through the use of a decentralized ledger that eliminates intermediaries, safeguards data privacy, and ensures information integrity (Ahamad et al., 2022). Cryptocurrencies are essential in global trade by promoting economic growth through enhanced access to capital and liquidity, enabling inexpensive and swift cross-border transactions, and attracting investments in green technologies (Miśkiewicz et al., 2022). Cryptocurrency facilitates anonymous,

secure, fast, and low-cost financial transactions without third-party approval, but its applications are still somewhat limited despite gaining global acceptance (Almajali et al., 2022).

Blockchain technology can tackle the issue of counterfeit drugs in global trade by providing transparency and accountability within the supply chain, ensuring the safety and authenticity of pharmaceutical products (Mackey & Nayyar, 2017). User trust in the Mano River Union member states, shaped by the transparency of blockchain and the integration of technology, plays a significant role in influencing citizens' behaviors toward adopting cryptocurrencies for global trade. However, ethical concerns may pose challenges to these relationships (Koroma et al., 2022).

DISCUSSION

The four clusters discussed in this analysis provide a thorough overview of the intricate relationship between blockchain, cryptocurrency, and global trade. While each cluster offers valuable insights into specific aspects of these topics, it is important to acknowledge the interconnectedness between them.

Global Trade and Supply Chain (Green): Blockchain plays a significant role in addressing challenges in global trade and supply chains. The technology is able to automate processes, increase visibility, and ensure regulatory compliance more efficiently. In addition, blockchain can help overcome documentation complexity, operational risks, and low transparency. By leveraging real-time tracking and transaction automation through smart contracts, blockchain creates a more secure and efficient supply chain. However, further efforts are needed to strengthen governance in tourism management, international trade operations, and reduce dependence on third parties to reduce operational and relational risks.

Ethereum Blockchain and Challenges (Blue): Ethereum offers a robust decentralized system for managing smart contracts and decentralized applications. With features such as virtual machines that enable transaction automation, Ethereum provides high efficiency in various trading processes. Smart contracts can also replace the role of intermediaries, thereby reducing costs and speeding up transactions. However, the application of Ethereum in global supply chains faces various challenges, such as ineffective tracking of goods, high protection costs, security risks, and obstacles to document digitization. The solutions required include the development of digital infrastructure that supports end-to-end document tracking, reduced reliance on third parties, and operational risk mitigation.

Market and Digital Currency (Red): Cryptocurrencies such as Bitcoin and Ethereum have brought about a major shift in the global payment system. Bitcoin offers a decentralized solution that enables fast, secure, and anonymous transactions at low costs. Meanwhile, Ethereum has greater depth, enabling the development of new applications and faster transactions. However, the volatility of cryptocurrency prices, especially due to regulatory influences, is a major challenge. Tighter regulation often has a negative impact on price stability. Moving forward, a balance between technological innovation and regulatory policies is needed to support market stability and increase trust in global traders.

Role and Examples (Yellow): Blockchain plays a critical role in improving the security, transparency,

and efficiency of transactions by leveraging a decentralized ledger that eliminates intermediaries and protects data. Cryptocurrencies have made a significant contribution to global trade by facilitating access to capital, accelerating cross-border transactions, and encouraging investment in environmentally friendly technologies. However, their adoption remains limited, mainly due to ethical challenges and reduced user trust, especially in developing countries. In addition, blockchain has great potential to address global issues, such as counterfeit drugs, by increasing transparency and accountability in the supply chain. Efforts are needed to build user trust and overcome ethical barriers to support wider adoption of this technology.

INTERCONNECTION BETWEEN THE CLUSTERS

Interconnection between Green (Global Trade and Supply Chain) and Blue (Ethereum Blockchain and Challenge): The green cluster highlights the importance of blockchain in addressing supply chain challenges, such as transparency, security, and efficiency. Ethereum, discussed in the blue cluster, plays a critical role in supporting these goals through smart contracts and decentralized virtual machines. By integrating Ethereum into the supply chain, real-time tracking of goods can be done, trade contracts can be automated, and reliance on third parties can be reduced. However, challenges such as ineffective document tracking and barriers to digitization in the green cluster indicate that Ethereum implementation still needs further development to fully support global trade.

Interconnection between Green (Global Trade and Supply Chain) and Red (Market and Currency): The green and red clusters are connected through the need for transaction efficiency in global trade. Blockchain in the supply chain provides transparency and cost reduction, which can be optimized by using cryptocurrencies such as Bitcoin or Ethereum for cross-border payments. Cryptocurrencies enable fast, cheap, and anonymous transactions, which are especially relevant for international trade. However, the volatility of cryptocurrency prices that is a challenge in the red cluster can affect the stability of transactions in the green cluster. Thus, a volatility mitigation strategy is needed so that the integration of cryptocurrencies into the global supply chain becomes more effective.

Interconnection between Red (Market and Currency) and Blue (Ethereum Blockchain and Challenge): Ethereum, discussed in the blue cluster, is not only a blockchain technology platform but also supports the cryptocurrency market in the red cluster. Ethereum enables the development of decentralized applications that support cross-border transactions, financial innovation, and even cryptocurrency market management. However, challenges in the blue cluster, such as high dispute fees and suboptimal tracking of goods, can affect the reliability of Ethereum as the main platform to support the crypto market. Meanwhile, price volatility in the red cluster can impact the stability of applications that depend on Ethereum. Therefore, the development of a more stable system is needed to support the relationship between the two.

Interconnection between Red (Market and Currency) and Yellow

(Role and Example): Cryptocurrencies in the red cluster play a critical role in creating access to capital, accelerating cross-border transactions, and encouraging investment in green technologies, as discussed in the yellow cluster. Fast and efficient crypto transactions allow users to adopt blockchain more widely in global trade. However, challenges such as ethics and trust in the yellow cluster may hinder the adoption of cryptocurrencies in the global market. Conversely, the potential of cryptocurrencies to provide solutions to global issues, such as environmentally friendly trade and tackling counterfeit drugs, shows a complementary relationship between these two clusters.

Interconnection between Yellow (Role and Example) and Blue (Ethereum Blockchain and Challenge): Ethereum's role as a platform that supports smart contracts and decentralized applications in the blue cluster aligns with the yellow cluster's goal of increasing the efficiency, transparency, and security of global transactions. Ethereum can be used to create greener solutions and address global challenges, such as tackling counterfeit drugs, which are the focus of the yellow cluster. However, Ethereum's technical challenges, such as transaction fees and document tracking, need to be overcome for the technology to fully fulfill its potential in the yellow cluster.

OPPORTUNITY FOR FURTHER STUDIES

Based on the interconnections between the clusters and the findings from this study, several area could be explored to gain a deeper understanding of the blockchain, cryptocurrency, and global trade:

1. **Enhancing Blockchain Adoption in Global Trade and Supply Chains:** Future studies can focus on designing scalable blockchain frameworks that address the specific challenges in global trade, such as document digitization, compliance requirements, and operational uncertainties. Research could also explore the integration of advanced blockchain platforms like Ethereum into supply chain management to optimize transparency, reduce intermediaries, and enhance real-time tracking systems.
2. **Reducing Volatility in Cryptocurrency Markets:** Given the significant impact of cryptocurrency price volatility on global trade, further research could explore mechanisms to stabilize cryptocurrency values. This may include developing hybrid models that combine stablecoins with traditional cryptocurrencies or creating regulatory frameworks that minimize the adverse effects of market speculation.
3. **Strengthening Ethereum's Role in Digital Ecosystems:** Ethereum's capabilities in running smart contracts and decentralized applications offer immense potential for global trade and other industries. Further studies could delve into optimizing Ethereum's efficiency, reducing transaction costs, and addressing scalability issues. Additionally, research on how Ethereum can seamlessly integrate with existing financial systems and supply chain infrastructures would be valuable.
4. **Investigating Blockchain's Role in Ethical and Sustainable Trade:** Blockchain's ability to promote transparency makes it an excellent tool for addressing global challenges

like counterfeit goods, unethical labor practices, and environmental concerns. Future studies could evaluate how blockchain can support green technologies, sustainable trade practices, and ethical supply chains, especially in industries like pharmaceuticals, food, and energy.

5. **Bridging Trust Gaps in Blockchain and Cryptocurrency Adoption:** Adoption of blockchain and cryptocurrencies still faces trust and ethical challenges. Further research could explore how blockchain systems can enhance user trust through improved transparency, education, and user-friendly interfaces. Moreover, examining ways to align blockchain applications with cultural and regional trust-building practices could accelerate adoption in developing regions.
6. **Exploring Cross-Cluster Applications:** Future studies could investigate the practical applications of cross-cluster integration. For example, combining Ethereum-based smart contracts (blue cluster) with cryptocurrency transactions (red cluster) to create automated, low-cost, and efficient payment systems for global trade. Similarly, blockchain solutions designed for supply chain transparency (green cluster) could be adapted to address ethical concerns highlighted in the yellow cluster.
7. **Regulatory Frameworks for Blockchain and Cryptocurrency:** Research could focus on creating global regulatory standards that support innovation while ensuring stability and security. Studies could also evaluate the effectiveness of current regulations on blockchain and cryptocurrency adoption in various sectors and propose models for regulatory harmonization across different jurisdictions.

CONCLUSION

In conclusion, this study highlights the transformative role of blockchain and cryptocurrency in reshaping global trade. By employing a bibliometric approach, it has identified key clusters that represent the different aspects of how these technologies interact with global commerce. The Green cluster underscores blockchain's potential in enhancing supply chain transparency, security, and efficiency, addressing longstanding challenges in international trade. The Blue cluster highlights Ethereum's role in automating contracts and facilitating decentralized applications, though it also faces implementation challenges. The Red cluster emphasizes the growing significance of cryptocurrencies in revolutionizing payment systems and reducing transaction costs, but also points to the issue of market volatility. Finally, the Yellow cluster discusses the ethical considerations and examples of blockchain's application in global trade, stressing its potential to enhance trust, security, and sustainable practices.

The interconnections between these clusters reveal a complex yet promising ecosystem. For instance, the integration of Ethereum's blockchain into global supply chains can enhance real-time tracking and reduce third-party reliance, while the use of cryptocurrencies can further improve transaction efficiency. However, challenges such as price volatility, regulatory uncertainty, and trust issues need to be addressed to fully realize the potential of these technologies.

Opportunities for further studies include exploring ways to enhance blockchain adoption in global trade and

supply chains, stabilize cryptocurrency markets, optimize Ethereum's role in digital ecosystems, and investigate blockchain's contributions to sustainable and ethical trade. Bridging trust gaps and establishing global regulatory frameworks will also be crucial in facilitating the widespread adoption of these technologies.

In sum, blockchain and cryptocurrency hold immense potential to transform global trade by improving efficiency, transparency, and security, but continued research and development are essential to overcome the technical, regulatory, and ethical challenges that remain.

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