

# Bibliometric Study and Visualisation of Research Trends in Hybrid Blockchain Technology



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**Abstract** This paper is a summary of literature from the Scopus database on hybrid blockchain technology, since 2016. The bibliometric patterns of research trends were visualized using a VOS viewer and the scope for future research was discussed. The most active authors, countries, and organizations were identified. The most active author was Byun C and the most active country was China. The most active research organization was Beijing University of Posts and Telecommunications, China. Future research can be on implementation challenges of hybrid blockchain technology and finding newer horizons for application. This paper highlights the domination of China, Chinese authors, and Chinese research organizations on research related to hybrid blockchain technology.

**Keywords** Social media · VOS viewer · Bibliometrics · Wireless sensors · COVID 19

## 1 Introduction

There are various types of blockchain technology, like a public blockchain, private blockchain, and hybrid blockchain. Better performance and effect of blockchain technology can be ensured in a hybrid model, which has the benefits of both private and public blockchain technologies. The various aspects of hybrid blockchain technology had been discussed in the following paragraphs.

There are several applications for hybrid blockchain technology. Hybrid blockchain technology can be used for the proper and secured land records management. The mistakes, frauds, duplications, omissions, and other challenges associated

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with land records management can be rectified by the implementation of hybrid blockchain technology for land records management [1, 2]; fake news detection using hybrid blockchain technology [3]. Hybrid blockchain technology was also used in improving the effectiveness of mobile wallets [4].

Hybrid blockchain technology can be used for the exchange of health data. Sharing of health data maybe for better treatment or sharing with other stakeholders like health insurance companies. High-level data privacy and security can be ensured through the implementation of hybrid blockchain technology while sharing health care data [5–7].

Hybrid blockchain technology can create radical changes in energy sharing in microgrids [8]; for privacy-preserving and trusted energy transactions [9]; application of hybrid blockchain technology for marginal pricing for energy applications [10]; for load balancing in P2P energy trading markets [11].

The other applications of hybrid blockchain technology can be for better transparency and security to supply chain management [12]; hybrid blockchain technology can improve supply chain visibility [13]; ensuring trusted supply chain finance [14] the security and trust of networks can be ensured through hybrid blockchain technology [15]. The hybrid blockchain technology can be used for identity authentication [16]; authentication system for smart homes [17]; health of underground structures [18]; for the industrial internet of things [19–21]; for pre-owned electric vehicle supply chain management [22]; hybrid blockchain technology for crowdsourcing [23–25].

This paper had the objective of consolidating the literature on hybrid blockchain technology. The active authors, regions, and research organizations engaged in research on hybrid blockchain technology had been assessed through bibliometric analysis. VOS viewer software was used for the visualization of research trends. The future agenda for research on hybrid blockchain was noted in the concluding section.

## 2 Research Methodology

Scopus database was searched on 24/06/2021, with the Boolean “Hybrid blockchain” to draw resources. English documents were included and all the non-English documents were excluded from this review. The work in Refs. [26, 27] was the main motive for the development of the methodology of this paper.

## 3 Discussion

Four hundred and seventy-nine research papers from Scopus were used in this review. Four hundred and seventy-one English papers were used, and the non-English papers were in the Chinese language. The number of papers published on this research

domain since 2016 had been shown in Fig. 1. The details of various types of English documents used in this study was shown in Figs. 2, 3, 4 and 5.

The most dominant authors were highlighted in Fig. 3 and the co-authorship links of authors were highlighted in Fig. 4

The most active organization of the research domain was the Beijing University of Posts and Telecommunications, China as shown in Table 1.

The most influential keywords were highlighted in Fig. 6. The highly used keywords were blockchain, the internet of things, and network security. The recently used keywords were highlighted in red color (refer to Fig. 6).

The dominant country of this research domain was China, followed by the United States of America (refer to Fig. 7). The co-authorship links were shown in Fig. 8.

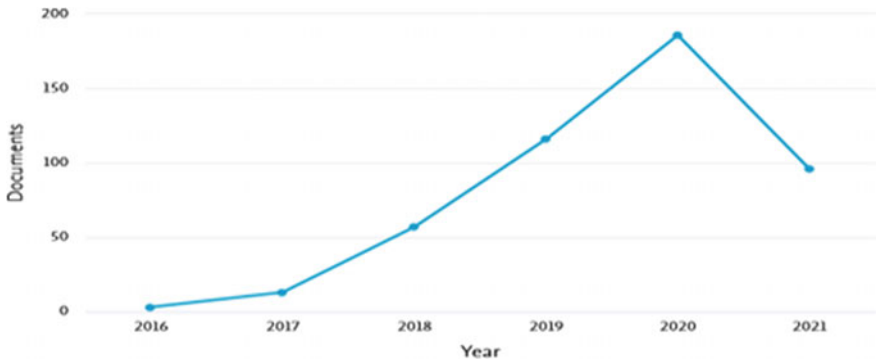


Fig. 1 Publication of documents since 2016

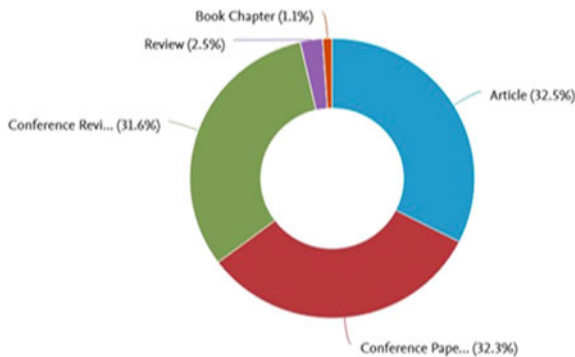


Fig. 2 Details of Documents used in this review; Source [www.scopus.com](http://www.scopus.com)

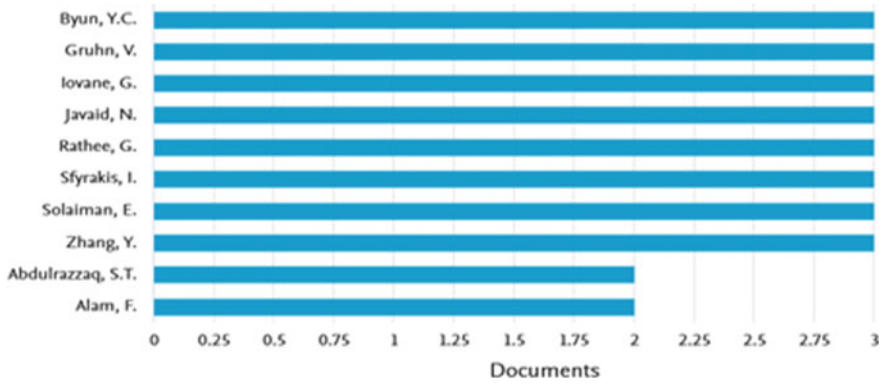


Fig. 3 List of dominant authors. Source [www.scopus.com](http://www.scopus.com)

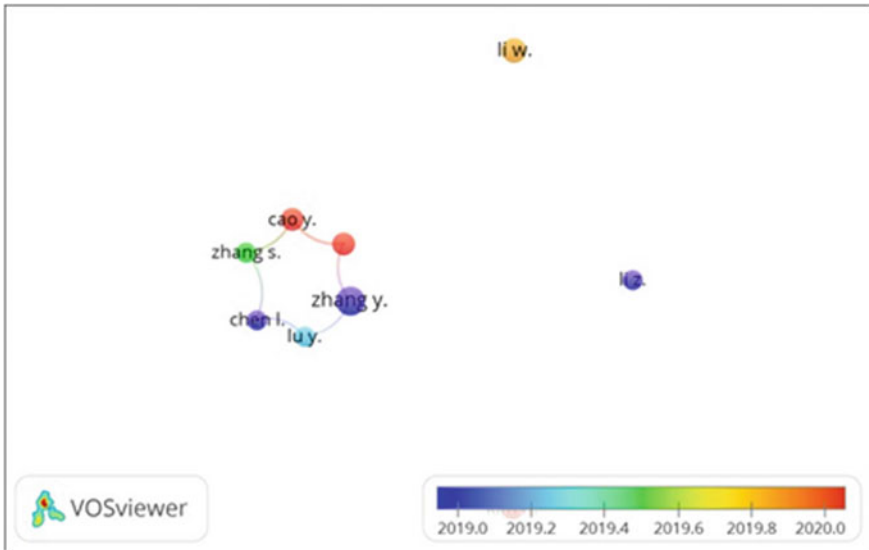


Fig. 4 Co-authorship links of dominant authors

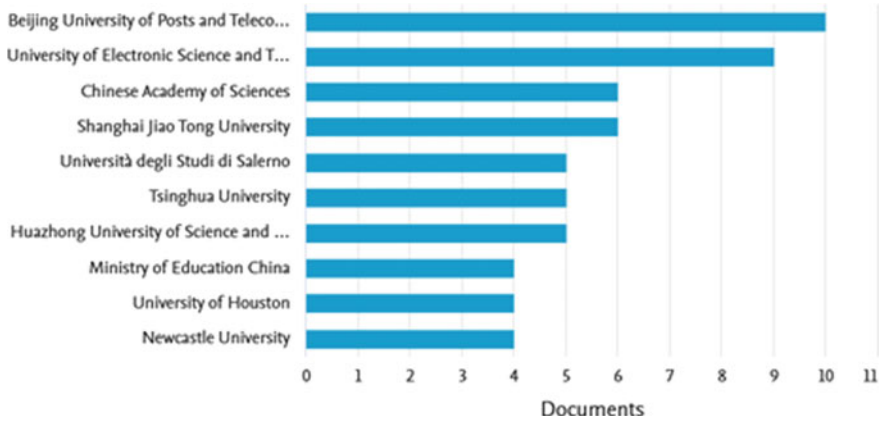


Fig. 5 Most active organizations of the research domain

Table 1 Active countries

Countries	Document	Citations	Average citations
China	94	141	15

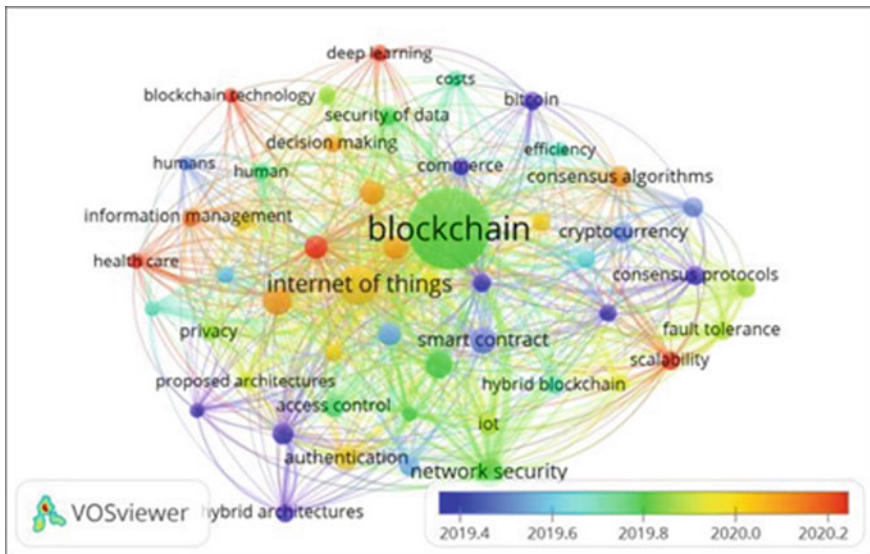


Fig. 6 Keyword analysis

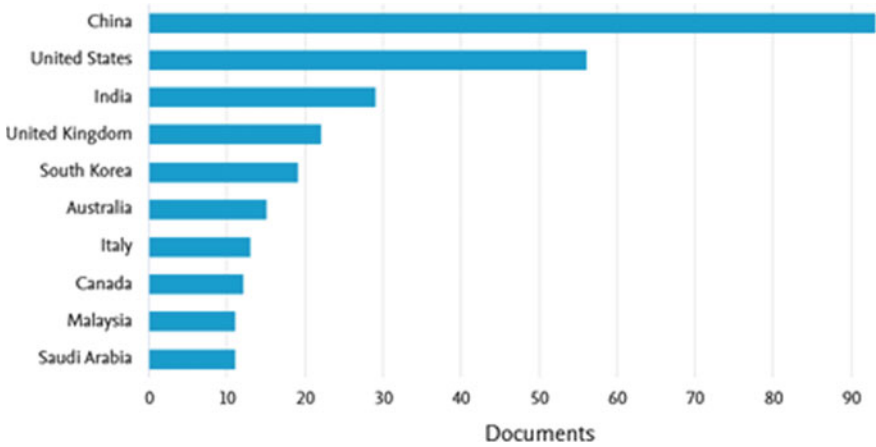


Fig. 7 Active countries

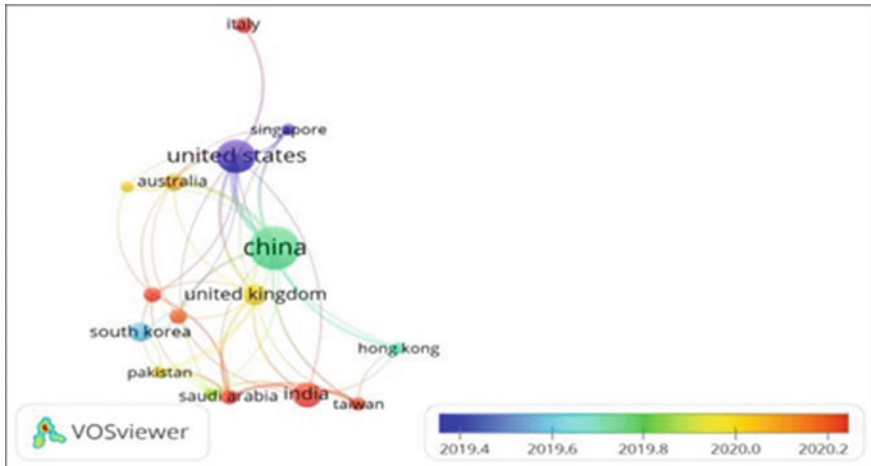


Fig. 8 Active countries and research collaborations

## 4 Conclusions

Four hundred and seventy-one research papers from Scopus were reviewed and the research trends were highlighted. Moreover, the research trends of this research domain were visualized using VoS viewer software. The various applications of hybrid blockchain technology had been reviewed in this paper and the scope for future research was discussed. This bibliometric analysis had identified the key authors, most promising research organizations, and highly active countries of this research domain. The most active author was Byun C and the most active country

was China. The most active research organization was Beijing University of Posts and Telecommunications, China.

This paper can be useful for practitioners and academicians to get a consolidated picture regarding research on hybrid blockchain technology. Future researchers can concentrate on active authors, organizations, and countries for further research on the topic. Future research can be on newer applications of this technology and solutions for meeting challenges associated with the implementation of this technology.

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