# Bibliometric Analysis of Blockchain Research in Health – Year 2020 as Catalyst for Development

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***Abstract*—** In 2020, substantial impact occurred around how technology was used due to COVID-19. This may have reignited interest in blockchain technology, and understanding the research overtime can help in predicting future directions in health domains. From performing several bibliometric analyses, several changes were identified around 2020. Web of Science database and Scopus were harvested. Smart contracts, HyperLedger Fabrics, and Electronic Health Record themes are growing research hotspots. After understanding recent shifts, these findings inform scholars and practitioners of trends and significance area for blockchain technology research in health-related domains.

## I. Introduction

The blockchain structure is set up to use nodes of a network to create a distributed record of transactions, without the need for a trusted third party[1]. Blockchains can allow stakeholders to interact with data management to a degree where security is maintained. This can built confidence among patients, physicians, insurers, and others [2]. The use of blockchain in health education primarily surrounds data storage management and security[3], [4]. There is a lack of bibliometric studies of blockchain technology in the industry of healthcare [5]. The main question arising is 'what directions will research diverge into?' Analysis was performed to understand the current research that investigates blockchain technology in healthcare.

## II. Method and Results

Two bibliographic databases were harvested- Web of Science and Scopus. Inclusion criteria were the articles to be in English language and be one of the following types: articles, proceedings papers, books, book chapters, and conference papers. The final amount was 1905 documents. The final date range was Jan 2014 - May 2021. Bibliometrix and Biblioshiny in RStudio and VOSviewer were used. There were 813 articles, 89 book chapters, 619 conference papers, 371 proceedings papers, and 7 books. There were 53787 references, 5266 authors, and 3675 authors keywords. From 2016 to 2017 there was a 62% increase in production (62), a large 390% increase in 2018 (247), 225% in 2019 (553), and 136% in 2020 (753). Top corresponding author countries were China, with 234 articles (12.3%), and 171 from India (9%). Topic Evolution analysis showed distributed ledger, industries, smart contracts, covid, and 'HyperLedger/EHR' are becoming primary focus. There were two main concentrations of research institution geography distribution that categorized the top affiliation of authors: The primary concentration surrounded several links between UAE, Saudi Arabia, and West India universities. The global leading author for citations was Dr Neeraj Kumar, Thapar Institute of Engineering and Technology, India.

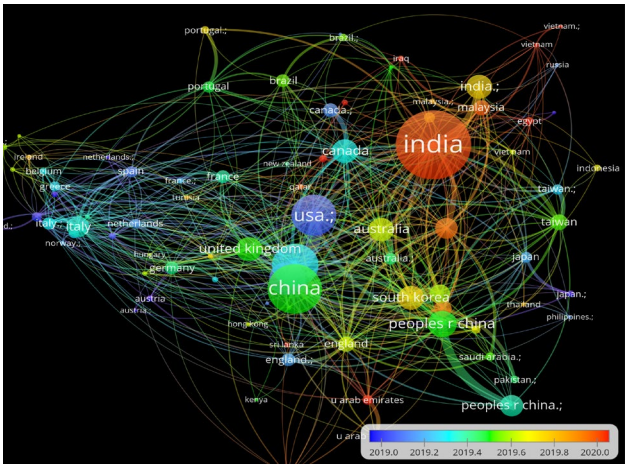


Fig 1: Collaboration world map of citations. North America and China have majority of collaboration (betweenness=286-USA; 153-China).

In summary, prediction of dominant journals falls to the IEEE access to absorb the majority of new documents. The international synergy between USA, China, and India may accelerate themes from each country's top authors specialisms surrounding security, privacy-preservation, and blockchain based diagnosis from health records. Future themes may investigate patient- centric data management, to understand influential factors on successful uptake. This is the next step to global integration of blockchain technology into health-related systems.

## Acknowledgment

This work is supported by the ERASMUS+ Strategic Partnership "Education Program for Carers in Facilities with Neuro Disabled Subjects (EPoCFiNDS)" (2018-1-EL01-KA202-047936).

## References

[1] A. Sahani, J. Arya, A. Patro, and S. B. B. Priyadarshini, "Blockchain: Applications and Challenges in the Industry," in *Smart Innovation, Systems and Technologies*, 2021, vol. 194, pp. 813–818, doi: 10.1007/978-981-15-5971-6_87.

[2] T. Judd, "Journal of Medical Education and Training Virtual Reality Medical Training: A Non-Inferiority Randomised Controlled Trial of VR vs Face-to-Face Training," 2020.

[3] C. C. Agbo, "Blockchain in Healthcare Opportunities, Challenges, and Possible Solutions," doi: 10.4018/IJHISI.2020070105.

[4] S. Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System." Accessed: May 04, 2021. [Online]. Available: www.bitcoin.org.

[5] A. Rejeb, H. Treiblmaier, K. Rejeb, and S. Zailani, "Blockchain research in healthcare: a bibliometric review and current research trends," doi: 10.1007/s42488-021-00046-2.

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