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BlockChain Beyond the Cryptocurrency: A Systematic Literature Review

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Abstract: A Blockchain is a public ledger that can be accessed by anyone but generally not managed by a central authority. It is a technology that enables individuals and companies to deal with trust and transparency. In recent years, blockchain adoption has spread beyond the financial sector into major industries like healthcare and education, where data security and integrity are paramount. This paper is a systematic review of blockchain technology based on PRISMA, focusing on cryptocurrency, healthcare, and education from 2018 to 2022. Initially, 319 records are identified. After removing duplicate papers, 254 unique studies are considered. These studies were filtered using some inclusion and exclusion criteria based on titles and abstracts. 145 papers were reviewed in full text to determine their eligibility. Ultimately, 22 studies are included in the qualitative systematic review. As the review shows, blockchain can enhance the integrity of data, its privacy, and its interoperability in the context of healthcare; facilitate academic credentialing and digital learning certification in the educational field; and increase financial transparency and the effectiveness of smart contracts in the realm of cryptocurrencies. Nonetheless, issues such as scalability, energy consumption, interoperability, and regulatory uncertainty still exist.

Keywords: Blockchain Technology, Decentralization, Distributed Ledger, PRISMA, Systematic Review.

1 Introduction

Blockchain Technology (BT) has become one of the most innovative developments, transforming digital ecosystems across various fields. Initially, blockchain was introduced as the key technology behind cryptocurrencies, but it has since evolved far beyond financial applications. Now, BT is showing its potential in various revolutionizing fields such as media, healthcare, real estate, supply chains, the Internet of Things, and education (Laroiya et al., 2020). A blockchain is simply an immutable ledger that verifies and secures transactions in a decentralized system, thereby removing the necessity of a centralized system. This is a decentralized paradigm that improves trust, traceability, and data integrity, and is particularly applicable to areas where high security and reliability are important.

Bitcoin (Nakamoto, n.d.) was the first cryptocurrency developed in 2008, which introduced the blockchain as a distributed infrastructure platform. It enables the decentralized peer-to-peer digital currency known as "bitcoin" to be sent directly from one party to another without passing through a bank (Nakamoto, n.d.).

BT has many applications in various domains, as shown in Figure 1, to establish trust among the users without the need for a third party. In this review paper, only three sectors are considered: healthcare, education and cryptocurrency. BT in healthcare encourages secure patient data exchange, Electronic Health Record (EHR) interoperability, and enhances drug supply chain transparency. These applications address traditional issues, including data privacy, interoperability, and patient authorisation, paving the way for a more patient-centred and secure healthcare infrastructure (Ben Fekih & Lahami, 2020). Similarly, in the education field, blockchain technology has proven its potential for academic credential verification, certificate issuance, student identity management, and intellectual property protection. These applications help to reduce fraud, streamline verification processes, and increase learners'

worldwide mobility (Loukil et al., n.d.). The use of blockchain in healthcare and education shows that it can create digital ecosystems based on trust that are not related to finance. Nevertheless, the uptake of blockchain in these various industries is fraught with issues of scalability, regulation, use of energy and lack of standardized frameworks (Rehman et al., 2020).

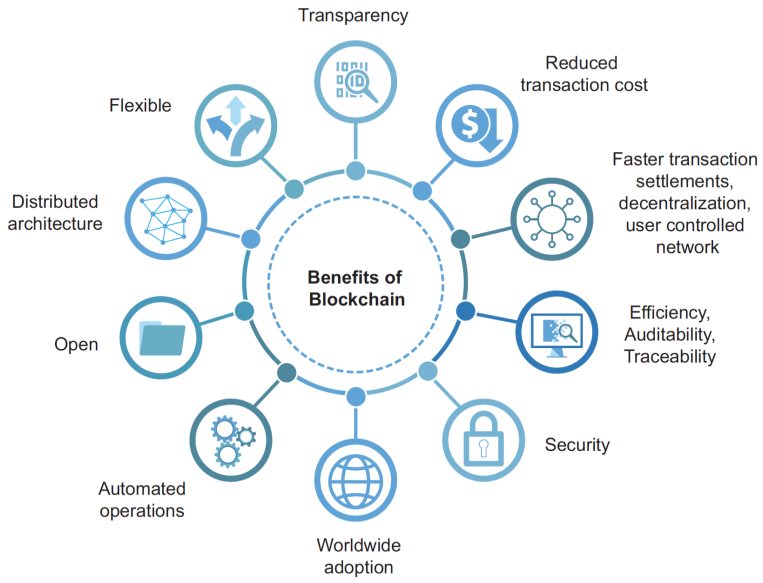

Figure 1: Benefits of Blockchain technology(*Screenshot-2020-03-25-at-09.16.38-1536x1173.Png (1536×1173)*, n.d.).

The main objectives of this systematic review are:

- To explore how BT is being applied across various fields.
- To identify the benefits, challenges, and research trends emerging from the existing literature review.
- To highlight future research directions and opportunities.

Examining the current evolution of knowledge in this area, with an increasing number of studies, a systematic review is needed to assess existing research, trends, and gaps. Thus, the current research is a PRISMA-based systematic literature review examining the use of blockchain applications in healthcare, education, and the cryptocurrency industry.

2 Research Methodology

This section outlines the methodology for conducting a Systematic Literature Review (SLR) of blockchain applications across various domains. The review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, which enhance transparency and reproducibility in the research selection process (Hutton et al., 2015).

2.1 Inclusion and Exclusion Criteria

To ensure relevance and quality of the articles, the inclusion and exclusion criteria were applied during the screening process, which are discussed in Table 1:

Table 1: Inclusion and Exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Peer-reviewed journal or conference papers	Non-peer-reviewed articles, editorials, or blog posts
Published between 2018 and 2022	Articles before 2018
Written in English	Non-English language papers
Focused on blockchain applications in healthcare, education, or cryptocurrency	Studies discussing blockchain in unrelated domains
Full-text available	Abstract-only or inaccessible papers

2.2 Screening and Selection Process

Initially, 319 records were identified from the SCOPUS database. After removing duplicates, 254 unique studies remained. The titles and abstracts of these studies were screened based on inclusion and exclusion criteria. Full-text reviews were conducted for 145 papers to assess their eligibility. Finally, 22 studies were included in the qualitative SLR. This process was performed in alignment with the PRISMA 2020 flow diagram, as illustrated in Figure 2.

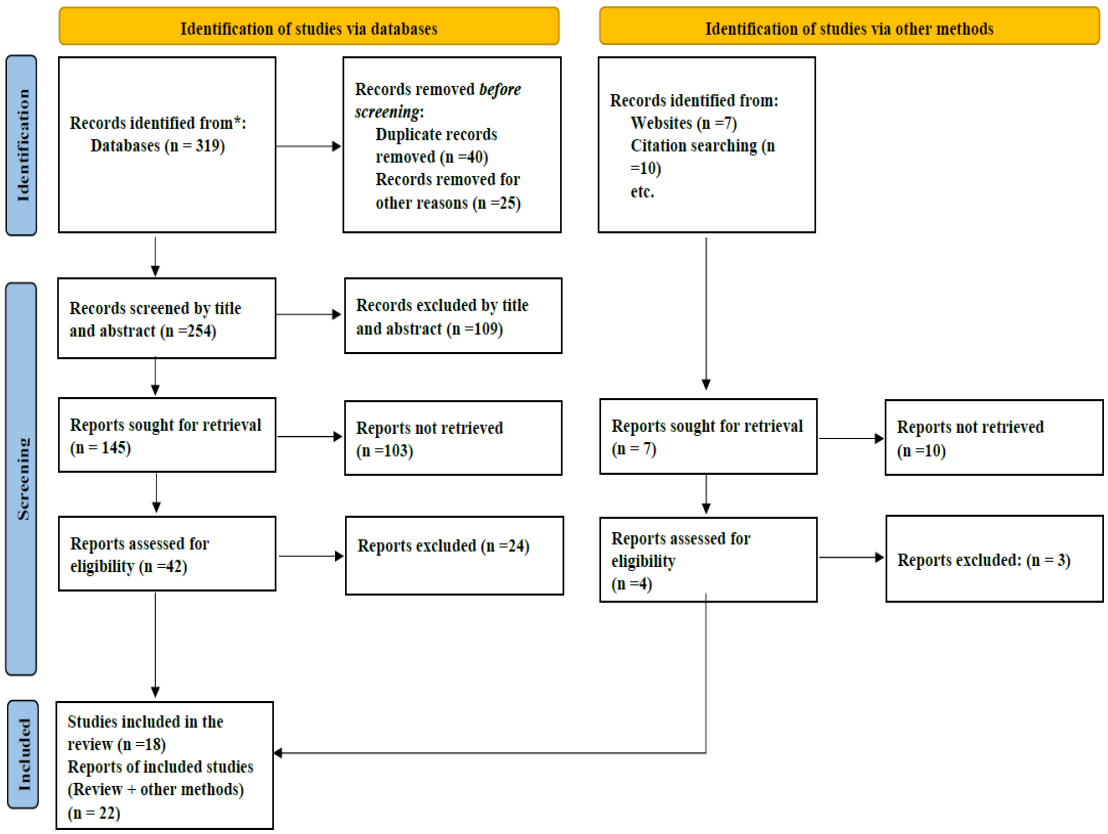

Figure 2: Flowchart for screening and selection of papers.

3 Results and Analysis

This section represents the findings of the SLR conducted. The results summarize year-wise publication trends, domain-wise distribution, and blockchain applications across healthcare, education, and cryptocurrency. During the comprehensive search and screening process, 22 research studies were selected for this review paper. These studies were published between 2018 and 2022 and cover a wide range of BT applications.

3.1 Year-Wise Publication Trends

The trend in publications from 2018 to 2022 shows an exponential increase in blockchain-related research across the three domains. The distribution of papers is shown in Figure 3.

3.2 Domain-Wise Distribution of Research

The domain-wise analysis reveals unique research goals within each subject. Of the total studies, 30% focused on the healthcare domain, 20% on cryptocurrency, 40% on the education field and 10% on other domains. The studies reveal that healthcare and education research increasingly emphasize trust, security, and verification, while cryptocurrency research focuses on financial innovation and decentralization, as shown in Table 2.

Summary of Reviewed Studies on Blockchain Technology Across Domains is shown in Table 3.

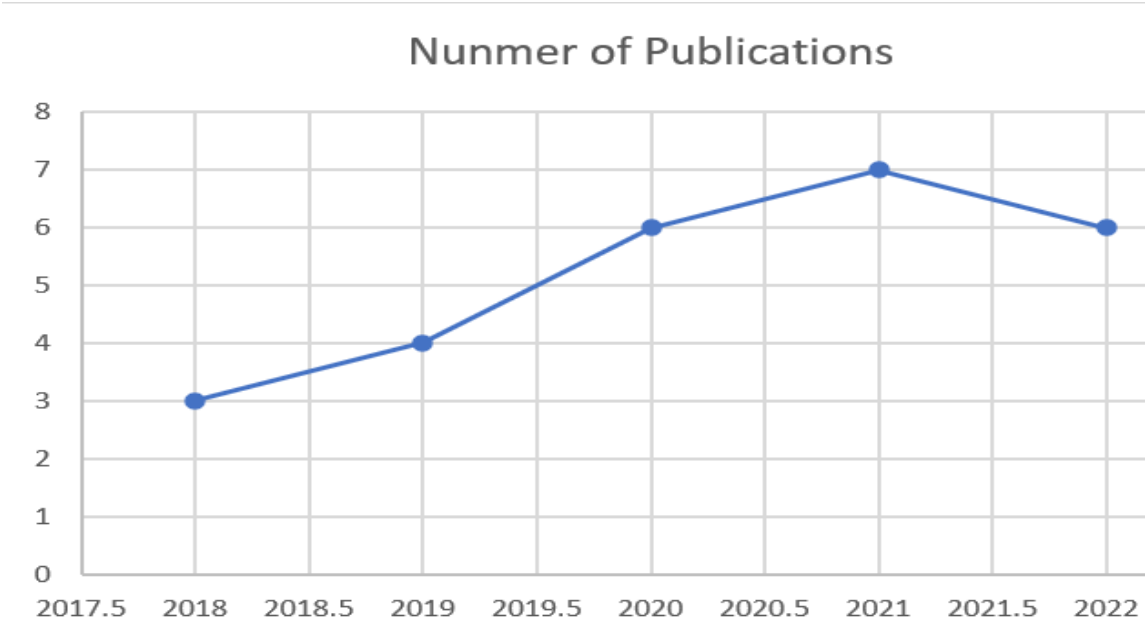

Figure 3: Distribution of publications year-wise.

Table 2: Domain-wise distribution with common platforms.

Domain	Primary Research Focus	Common Platforms / Technologies
Healthcare	Electronic Health Records (EHR), Data Security, Drug Traceability, Clinical Trials	Hyperledger Fabric, Ethereum, MedRec
Education	Digital Credentialing, Certificate Verification, E-learning Authentication, Academic Records	Ethereum, Blockcerts, IBM Blockchain
Cryptocurrency	Secure Transactions, Smart Contracts, Decentralized Finance (DeFi), Tokenization	Bitcoin, Ethereum, Binance Chain

Table 3: Summary of Reviewed Studies on Blockchain Technology Across Domains.

Authors	Domain	Methodology	Purpose
(Yaqoob et al., 2022)	Healthcare	Comprehensive Survey, Systematic Literature Review	To study BT's merits, demerits, challenges, opportunities and future recommendations in the field of healthcare.
(Singh et al., 2022)	Cryptocurrency	Review Paper	To investigate the popularity, growth, and development of blockchain technology, including its application in cryptocurrencies and blockchain-based smart contracts.
(Lejmbach & Perouli, 2022)	Education	Experimental Research Study	To develop and implement a customized, publicly available learning platform that teaches core computer science topics using a blockchain environment, incorporating blockchain modules into undergraduate courses.
(Fang, 2021)	Healthcare	Scoping Review, Qualitative Research	To identify and understand real-world blockchain healthcare projects that have achieved commercial success within the highly competitive blockchain market.
(Autade, 2021)	Cryptocurrency	Analytical Study, Review Paper	To investigate the influence of BT on financial security in the banking sector, with an emphasis on fraud prevention, compliance, risk management, regulatory and transaction efficiency.
(Xie et al., 2021)	Healthcare	Exploratory Research, Systematic Review	To provide a systematic review of the current and projected uses of BT in health care.
(Reis-Marques et al., 2021)	Education	Exploratory Research, Bibliometric Analysis	To perform a bibliometric analysis of blockchain-related research in higher education, identifying major applications, research gaps, and future possibilities for integrating technology like artificial intelligence and digital innovation.
(Anjum et al., 2020)	Healthcare	Bibliometric Analysis,	To map the academic research related to BT in healthcare by employing a

		Quantitative Research	bibliometric analytical method to understand the current trends.
(Rehman et al., 2020)	Cryptocurrency	Analytical Study, Review Paper	To examine and assess trust-related challenges in the Bitcoin ecosystem, as well as provide alternative solutions for increasing governance, transparency, and security.
(Ben Fekih & Lahami, 2020)	Healthcare	Review Study	To survey the current applications, limitations, and future research directions of BT in the healthcare domain.
(Bhaskar et al., 2020)	Education	Systematic Literature Review	To study BT's merits, demerits, current uses and prospects in the field of education.
(Patel & Reagan, 2019)	Healthcare	Technical Research, Experimental Research Study	To construct and verify a blockchain-based framework for secure, decentralized sharing of medical imaging data that is not reliant on third-party middlemen.
(Teichmann & Falker, 2019)	Cryptocurrency	Conceptual Study, Analytical Review	To investigate the potential of BT and cryptocurrencies to replace traditional banking institutions, examining their role in financial stability, regulatory risks, and compliance issues.
(Yakovenko Ph et al., 2019)	Education	Exploratory Study, Risk Analysis Method	To explore the application of blockchain technology in education, including its features, benefits, implementation challenges, risk analysis, and potential directions for educational development.
(Hölbl et al., 2018)	Healthcare	Systematic Literature Review	To conduct an SLR and analysis of cutting-edge blockchain research in healthcare, identifying possible applications, challenges and future research directions.
(Grewal et al., 2018)	Education	Exploratory and Qualitative Study, Review of Studies	To research and highlight the past, present, and future of retail technologies and education.
(Bhatia et al., 2018)	Cryptocurrency	Descriptive Study, Conceptual Research Study	To describe the concept and workings of BT, its origins in cryptocurrency, and its growing use in other verification and certification applications, rather than digital money.

4 Limitations of this SLR

- Only English-language publications were considered and examined for this SLR.
- Only consider the publications between 2018 and 2022.
- Only the SCOPUS database is used to find publications. Relevant studies published in other databases may have been unintentionally excluded.

5 Conclusion and Future Directions

This systematic research focuses on blockchain's diverse influence in healthcare, education, and cryptocurrencies. The technology's main strengths—decentralization, immutability, and transparency—provide ground-breaking solutions to long-standing issues with data integrity, verification, and trust. This SLR examines 18 publications and 4 webpages that discuss the state of blockchain applications across various domains, their potential advantages for the industry, and the many issues that must be resolved before they are widely adopted. A detailed discussion of research limitations is also provided, which will help the researchers identify research gaps. Healthcare benefits from secure patient data sharing and supply chain integrity; education gains from verifiable academic credentials; and cryptocurrency continues to drive financial decentralization. However, challenges persist in scalability, interoperability, regulation, and environmental sustainability.

Additional research to be implemented in the future is on cross-domain collaboration, ethical frameworks, and energy-saving models to secure the responsible development of blockchain. The implementation of blockchain across industries will only define the context for a reliable, transparent, and inclusive digital environment for future generations.

REFERENCES

Anjum, H. F., Rasid, S. Z. A., Khalid, H., Alam, M. D. M., Daud, S. M., Abas, H., Sam, S. M., & Yusof, M. F. (2020). Mapping Research Trends of Blockchain Technology in Healthcare. *IEEE Access*, *8*, 174244–174254. https://doi.org/10.1109/ACCESS.2020.3025011

Autade, R. (2021). Financial Security and Transparency with Blockchain Solutions. *Turkish Online Journal of Qualitative Inquiry*. https://doi.org/10.53555/W60Q8320

Ben Fekih, R., & Lahami, M. (2020). Application of Blockchain Technology in Healthcare: A Comprehensive Study. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *12157 LNCS*, 268–276. https://doi.org/10.1007/978-3-030-51517-1_23/TABLES/1

Bhaskar, P., Tiwari, C. K., & Joshi, A. (2020). Blockchain in education management: present and future applications. *Interactive Technology and Smart Education*, *18*(1), 1–17. https://doi.org/10.1108/ITSE-07-2020-0102

Bhatia, R., Kumar, P., Bansal, S., & Rawat, S. (2018). Blockchain-the Technology of Crypto Currencies. *Proceedings on 2018 International Conference on Advances in Computing and Communication Engineering, ICACCE 2018*, 372–377. https://doi.org/10.1109/ICACCE.2018.8441738

Fang, H. S. A. (2021). Commercially Successful Blockchain Healthcare Projects: A Scoping Review. *Blockchain in Healthcare Today*, *4*, 166. https://doi.org/10.30953/BHTY.V4.166

Grewal, D., Motyka, S., & Levy, M. (2018). The Evolution and Future of Retailing and Retailing Education. *Journal of Marketing Education*, *40*(1), 85–93. https://doi.org/10.1177/0273475318755838

Hölbl, M., Kompara, M., Kamišali´c, A. K., & Zlatolas, L. N. (2018). *A Systematic Review of the Use of Blockchain in Healthcare*. https://doi.org/10.3390/sym10100470

Hutton, B., Salanti, G., Caldwell, D. M., Chaimani, A., Schmid, C. H., Cameron, C., Ioannidis, J. P. A., Straus, S., Thorlund, K., Jansen, J. P., Mulrow, C., Catala-Lopez, F., Gotzsche, P. C., Dickersin, K., Boutron, I., Altman, D. G., & Moher, D. (2015). The PRISMA Extension

Statement for Reporting of Systematic Reviews Incorporating Network Meta-analyses of Health Care Interventions: Checklist and Explanations. *Https://Doi.Org/10.7326/M14-2385*, *162*(11), 777–784. https://doi.org/10.7326/M14-2385

Laroiya, C., Saxena, D., & Komalavalli, C. (2020). Applications of Blockchain Technology. *Handbook of Research on Blockchain Technology*, 213–243. https://doi.org/10.1016/B978-0-12-819816-2.00009-5

Lejmbach, K., & Perouli, D. (2022). Developing a Modular and Interactive Blockchain Learning Tool for Undergraduate Computer Science Programs. *SIGCSE 2023 - Proceedings of the 54th ACM Technical Symposium on Computer Science Education*, *2*, 1324. https://doi.org/10.1145/3545947.3576271

Loukil, F., Abed, · Mourad, Boukadi, K., & Abed, M. (2021). *Blockchain adoption in education: a systematic literature review*. https://doi.org/10.1007/s10639-021-10481-8

Nakamoto, S. (n.d.). *Bitcoin: A Peer-to-Peer Electronic Cash System*. Retrieved August 23, 2019, from www.bitcoin.org

Patel, V., & Reagan, R. (2019). A framework for secure and decentralized sharing of medical imaging data via blockchain consensus. *Health Informatics Journal*, *25*(4), 1398–1411. https://doi.org/10.1177/1460458218769699

Rehman, M. H. U., Salah, K., Damiani, E., & Svetinovic, D. (2020). Trust in Blockchain Cryptocurrency Ecosystem. *IEEE Transactions on Engineering Management*, *67*(4), 1196–1212. https://doi.org/10.1109/TEM.2019.2948861

Reis-Marques, C., Figueiredo, R., & Neto, M. de C. (2021). Applications of Blockchain Technology to Higher Education Arena: A Bibliometric Analysis. *European Journal of Investigation in Health, Psychology and Education*, *11*(4), 1406–1421. https://doi.org/10.3390/EJIHPE11040101

Screenshot-2020-03-25-at-09.16.38-1536x1173.png (1536×1173). (n.d.). Retrieved October 23, 2020, from https://www.cloudcredential.org/wp-content/uploads/2020/03/Screenshot-2020-03-25-at-09.16.38-1536x1173.png

Singh, A., Jalota, R., & Gupta, V. (2022). Blockchain Technology in Cryptocurrency: A Review. *2022 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing, COM-IT-CON 2022*, 715–719. https://doi.org/10.1109/COM-IT-CON54601.2022.9850839

Teichmann, F., & Falker, M. C. (2019). Blockchain Technology and Cryptocurrencies: An Alternative to Central Banking? *Lecture Notes in Networks and Systems*, *129 LNNS*, 1532–1550. https://doi.org/10.1007/978-3-030-47945-9_164

Xie, Y., Zhang, J., Wang, H., Liu, P., Liu, S., Huo, T., Duan, Y. Y., Dong, Z., Lu, L., & Ye, Z. (2021). Applications of Blockchain in the Medical Field: Narrative Review. *Journal of Medical Internet Research*, *23*(10). https://doi.org/10.2196/28613

Yakovenko Ph, I. D., Professor, associate, South Russian, P., Subbotina, I., Zhanibekova Ph, G. D., University, K., Bizhanova Researcher, K., Yakovenko, I., Kulumbetova, L., Zhanibekova, G., & Bizhanova, K. (2019). Gaukhar Zhanibekova and Kenzhegul Bizhanova, the Blockchain Technology as a Catalyst for Digital Transformation of Education. *International Journal of Mechanical Engineering and Technology*, *10*(01), 886–897. http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=10&IType=01http://www.iaeme.com/IJMET/index.asp887http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=10&Type=01

Yaqoob, I., Salah, K., Jayaraman, R., & Al-Hammadi, Y. (2022). Blockchain for healthcare data management: opportunities, challenges, and future recommendations. *Neural Computing and Applications*, *34*(14), 11475–11490. https://doi.org/10.1007/S00521-020-05519-W/TABLES/1