DLINE JOURNALS

Information Security Education Journal (ISEJ)

Print ISSN: 2349-8161
Online ISSN: 2349-817X
ISEJ 2025:12 (1)
https://doi.org/10.6025/isej/2025/12/1/10-20

A Brief Review of the Awareness of Blockchain Technology and Cryptocurrency

Prathima D
Computer Science Department
Jain College, Vasvi campus
VV Puram, Bangalore. India
Pratima-279@yahoo.in

ABSTRACT

The technology through which records are kept will complicate hacking systems and even forging data stored in the blockchain, which is connectible to safety. It is known as distributed ledger technology or public ledger: distributed digital recording devices which record transactions and supplementary data appearing in various locations simultaneously. A digital currency transacts business in which a decentralised network does receipt and verification through a public ledger and cryptographic methods instead of a bank or other central authority. Decentralised cryptocurrencies such as Bitcoin now provide an outlet for personal wealth beyond restriction and confiscation. "As Bitcoin gains ground, more companies have started accepting the cryptocurrency.

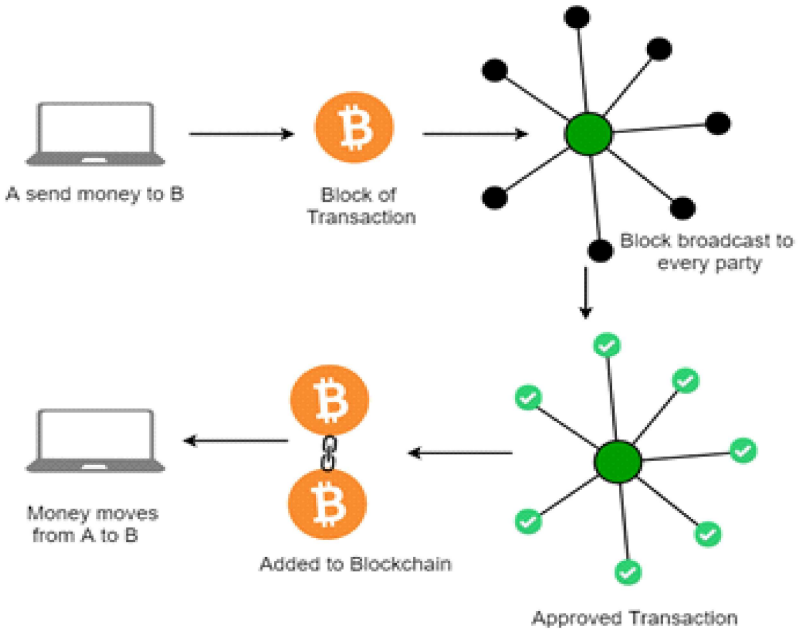
Keywords: Blockchain, Cryptocurrency, Bitcoin, Digital Currency

Received: 23 October 2024, Revised 3 January 2025, Accepted 20 January 2025

1. Introduction

The blockchain is a distributed database of records of all executed transactions or digital events shared among participating parties. Most of the system's participants verify each transaction, and it contains every single transaction record. Bitcoin is the most popular cryptocurrency and an example of blockchain technology. Blockchain Technology came to light when a person or group named Satoshi Nakamoto published a white paper on "*BitCoin: A peer-to-peer electronic cash system*" in 2008. [1]

• One of the famous uses of Blockchain is Bitcoin. Bitcoin is a cryptocurrency used to exchange digital assets online. It uses cryptographic proof instead of third-party trust for two parties to execute transactions over the Internet. Each transaction is protected through a digital signature.



• Bitcoin blockchain stores transaction details such as sender, receiver, and bitcoin amount. A blockchain is a highly secure, communal chain of data. It helps business networks exchange assets, store information, and record transactions. These digital ledgers use consensus and permanent record-keeping to make processes more efficient, trustworthy, and safe for all involved parties**.** Blockchain security is a comprehensive risk management system for a blockchain network. It uses cybersecurity frameworks, assurance services and best practices to reduce risks against attacks and fraud.

A blockchain is a distributed ledger with an enlarging list of files or records, also called blocks, that are safely interlinked using hash technology. Hashing in blockchain converts input data into a fixed-size output using a specific algorithm. It establishes data integrity and avoids fraudulent transactions. At the core segment of this process are hash functions, which help create different digital fingerprints for data. The output, known as a hash value, is unique to the input data. The hash value will differ even if the input data is altered slightly.

• **Smart Contracts** are computer programs that run on blockchain technology and dynamically execute the terms of an agreement when certain conditions are satisfied. These conditions are coded/converted into the contract, and once the conditions are satisfied, the contract is executed without intermediaries or human intervention.

2. Possible Applications

Blockchain technology may face numerous difficulties and challenges across various industries, owing to its features such as transparency, decentralisation, tamper-proof nature, and encryption security. Food safety has recently received increased attention, primarily due to economic development. The causes of problems concerning food safety and state-of-the-art blockchain technology overview-thus covering a definition of blockchain, development history, classes, structures, characteristics, and main applications-were taken into consideration for discussing the validity and future relevance of blockchain technology in the fields of plant food safety, animal food safety, and processed food safety.(2).

Blockchain is one of the revolutionary innovations that strongly contribute to modern businesses. It is heading towards enhancing formal innovation and revolution. Blockchain technology is a digital ledger of transactions in which every block contains a record of transactions linked by cryptographic references. Each block contains information and guarantees mutual trust according to the distance. Blockchain is a data retention system, and security is guaranteed. Stimulation provided by such an emerging prospect, accompanied by boosted activities in the last couple of years, has prompted scholars and specialists to investigate possible new ways around blockchain technology's application in a wide-ranging health spectrum. In continuation with this fast rise in the field of blockchain technology, we see the creation of many various and endless possibilities. In a work by Sadia et al., a review of blockchain technology in healthcare was presented. (3) Stallone(4) seeks to study Blockchain Technology's (BCT) applications in the marketing field by precisely locating, selecting, and analysing existing companies operating with BCT in marketing because of its evolving nature of integrating BCT into various business fields concerning interactions between companies and their clients.

A blockchain circuit can be helpful in the healthcare industry for storing and transferring patient records. The actual application of blockchain technology can often identify serious mistakes that are too dangerous to be overlooked in this medical field. Deception in clinical trials is also addressed by blockchain technology, which aims to improve health outcomes.(5)

3. Challenges

Blockchain has been and is used in various applications on the Internet. Its decentralised nature could also be viewed as a possible replacement for many of the legacy systems of transactions. Blockchain systems should be offloaded to an accelerator system to enable its scalability, interoperability, and sustainability (scalability, interoperability, and sustainability). Some solutions could be offloading public key operations such as signature generation and verification to a secure public key infrastructure engine. They have combined a load dispatcher with our Public Key Crypto Engine (BA414EP) to design our blockchain hardware accelerator. As the transaction load is shared across several components, the overall transaction throughput and precision increase. The architecture is a high-performance offloading architecture, providing support for all cryptographic algorithms including ECC. These ECDSA operations, which we support, include those used by Ethereum, Ripple, Bitcoin, Hyperledger, and EdDSA using the Edwards 25519 curve for the Libra blockchain (6). Bitcoin is estimated to consume about 127 terawatt-hours (TWh) of electricity annually.

Compared to about four transactions per second (TPS) for Bitcoin, Visa can do something like 1700 TPS. Bitcoin's enormous energy consumption problem cannot be solved by reverting to centralized networks such as Visa. After all, the central promise of Bitcoin should be to eliminate intermediaries such as the card networks and their concentrated power over finance. However, the advocates of Bitcoin have some other options as well. We can switch to renewable energy, transitioning to proof of stack systems, embrace pre-mining and introduce carbon credits (7).

There is the absence of a technological route that can reasonably address these issues given the prevailing conditions such as privacy, security, and ecosystem interoperability. (8) Frequent security breaches have impacted the blockchain industry in the recent past. (9) The challenges in blockchain technology are evaluated and ranked by the hybrid developed methods by the integration of the concept of grey numbers into the grey stepwise weight assessment ratio analysis and the grey evaluation based on distance from average solution (10)

4. Overview

• The concept of cryptocurrency is a system for issuing tokens to be considered mediums of exchange, in general or for limited purposes. In contrast, their issuance is certified through an oftentimes collectively-maintained digital ledger, which uses cryptographic techniques to substitute for trust in institutions to a greater or lesser extent. Thus, theoretically, cryptocurrency could designate a token as a general or limited-purpose medium-of-exchange issued through a cryptocurrency system. (11). As much as blockchain technology empowers cryptocurrencies, transaction records are irreversible and recorded in blocks. These transaction records are rich in information and serve as a complete trail of financial activities that can be publicly accessed, thus giving an unprecedented opportunity for researchers in data mining and knowledge discovery. (12)

• **Bitcoin (BTC)** Bitcoin has become very popular in financial markets in the past few years. Because of its characteristics, Bitcoin is often regarded as digital gold, thereby creating considerable interest in studying its behavior during uncertain times. (13)

Bouri et al. assessed the risk spillover between Bitcoin and equities, bonds, currencies, and commodities. (14)

• **Ethereum(ETH)** This cryptocurrency introduced smart contracts, allowing for the creation of decentralised applications (DApps). It is the second-largest cryptocurrency by market cap. Ethereum smart contracts analysis tools such as taint analysis, symbolic execution, and fuzzing techniques are studied. (15)

• **Altcoins** This category includes a wide variety of cryptocurrencies with different features and use cases, such as Ripple (XRP), Litecoin (LTC), and Cardano (ADA). It is found that the price movements in Bitcoin impact altcoins, and Bitcoin has a short-term relationship with all altcoins. (16).

Adoption and Impact

Cryptocurrencies have gained popularity as investment assets, payment methods, and enablers of decentralised finance (DeFi). Investigation into how cryptocurrency is likely going to influence the investment market revealed several independent factors that seem to gain positive effects: development of financial technology companies and solutions for cryptocurrencies, particularly neobanks (virtual banks fostering the growth of online banking), the developing legal frameworks for the regulation of digital currencies, particularly by central banks as well as the introduction of digital currency projects. (17) Both financial literacy and investment experience were positively associated with investing in cryptocurrencies; investment experience was more influential in cryptocurrency investment.(18).

5. Challenges

The cryptocurrency space faces significant challenges, particularly regarding security, regulation, and volatility.

- Security
- Regulation
- Ethical Considerations in Blockchain Technology and Cryptocurrency

5.1 Privacy and Anonymity

5.1.1 Data Privacy

• **Public Ledger** Blockchain's transparency means that transaction data is publicly available, while personal IDs are not directly linked to any transactions.

• **GDPR Compliance** It is a conflict with the General Data Protection Regulation (GDPR)

• **Anonymity** Cryptocurrencies like Bitcoin offer a degree of pseudonymity, which can be corrupted.

• **Ethical Dilemma** Balancing the privacy benefits and misuse by malicious actors poses a significant ethical challenge.

5.2 Security

5.2.1Cyber Security

• **Vulnerabilities** Despite blockchain's robust security, vulnerabilities in smart contracts, exchanges, and wallets can be exploited, leading to significant financial losses.

• **Hacks and Thefts** High-profile hacks, such as the Mt. Gox and DAO incidents

5.2.2 Consumer Protection

• **Scams and Frauds** The rise of Initial Coin Offerings (ICOs) and other crypto investments has led to numerous scams and fraudulent schemes, raising questions about the ethical obligation to protect investors.

• **Education and Awareness** The ethical responsibility is to educate users about the risks and safe practices in handling cryptocurrencies.

6. Environmental Impact

6.1 Energy Consumption

• **Proof of Work (PoW)** Blockchain networks like Bitcoin use PoW consensus mechanisms, which are highly energy-intensive. This raises ethical concerns about the environmental sustainability of such systems.

• **Climate Change** prompting calls for more environmentally friendly alternatives like Proof of Stake (PoS).

6.2. Regulatory Compliance

6.2.1 Legal and Regulatory Challenges

• **Regulatory Uncertainty** the lack of clear regulatory frameworks for blockchain and cryptocurrencies can lead to ethical dilemmas as companies and users navigate a complex and evolving legal landscape.

• **Compliance and Innovation** There is an ethical tension between ensuring regulatory compliance to protect consumers and fostering innovation in the blockchain space.

6.2.2 Taxation and Financial Regulation

• **Tax Evasion** Cryptocurrencies can be used to evade taxes, raising ethical issues about fair contribution to public finances.

• **Anti-Money Laundering (AML)** Ensuring compliance with AML regulations is crucial to preventing cryptocurrency misuse for illicit activities.

7. Social Implications

7.1 Financial Inclusion

• **Access to Financial Services** Blockchain technology has the strength to improve financial decisions by providing access to financial services for unbanked and underbanked populations.

• **Digital Divide** There is an ethical concern about exacerbating the digital divide, as access to blockchain technology and cryptocurrencies requires a certain level of digital literacy and internet connectivity.

7.2 Decentralization and Power Dynamics

• **Decentralization** While blockchain promotes decentralisation, it also shifts power dynamics, potentially disrupting traditional financial and governance structures.

• **Ethical Governance** The decentralised nature of blockchain raises questions about accountability.

8. Problem Statement in Blockchain and CryptoCurrency

Several critical issues, including technical, regulatory, environmental, and social challenges, impede the adoption and integration of blockchain technology and crypto currencies.

8.1 Key Issues

8.1.1 Scalability and Performance

· **Problem** They face significant scalability issues. The ability to process transactions quickly and efficiently is limited, leading to high transaction fees and slow processing times.

· **Impact** Scalability limitations hinder the ability of blockchain to support high-volume applications, such as global financial transactions and large-scale enterprise use cases.

8.1.2 Security Vulnerabilities

· **Problem** Despite the inherent security features of blockchain, vulnerabilities in smart contracts, wallets, and exchanges present significant risks. Hacks and fraud have resulted in substantial financial losses and undermined trust in the technology.

· **Impact** Security breaches can deter individuals and institutions from adopting blockchain and cryptocurrencies, limiting their growth and acceptance.

8.1.3 Regulatory Uncertainty

· **Problem** The regulatory landscape for blockchain and cryptocurrencies is fragmented and rapidly evolving.

· **Impact** Regulatory uncertainty can stifle innovation, lead to legal challenges, and discourage investment in blockchain and cryptocurrency projects.

8.1.4 Environmental Impacts

· **Problem** POW consensus mechanisms have significant environmental implications, particularly in Bitcoin mining. This raises concerns about the sustainability of blockchain technology.

· **Impact** High energy consumption contributes to climate change and environmental degradation, prompting calls.

8.1.5 Privacy and Anonymity Concerns

· **Problem** Blockchain's transparency can conflict with privacy requirements, as transaction data is publicly accessible. Additionally, the pseudonymous nature of cryptocurrencies can be exploited for illegal activities.

· **Impact** Balancing transparency with privacy is challenging, and misuse for illicit activities can attract regulatory scrutiny and public distrust.

8.1.6 User Experience and Accessibility

· **Problem** The complexity of blockchain technology and the user experience associated with crypto currency transactions can be daunting for non-technical users.

· **Impact** Poor user experience and accessibility issues can limit mainstream adoption and the inclusivity of blockchain-based solutions.

8.1.7 Interoperability's

· **Problem** Different blockchain platforms often operate in silos, lacking interoperability with other systems and blockchains.

· **Impact** The lack of interoperability hinders the seamless exchange of data and assets across different blockchain networks, limiting the potential for integrated solutions.

8.1.8 Economic and Social Implications

· **Problem** The rise of cryptocurrencies has economic and social implications, including the potential for financial instability, inequality, and the impact on traditional financial systems.

· **Impact** These implications necessitate careful consideration of how cryptocurrencies affect broader economic and social structures, ensuring that benefits are maximised while mitigating negative effects.

9. Possible Attacks on BlockChain Technology and CryptoCurrency

Blockchain technology forms the foundation for cryptocurrencies like Bitcoin and Ethereum. Integrating blockchain and the technology and products it facilitates will continue to impact business operations significantly. Nevertheless, blockchain technology extends beyond merely providing a secure method for cryptocurrency transactions. It can be applied in fields beyond finance, such as healthcare, insurance, voting systems, welfare programs, gaming, and artist royalties. The global economy is gearing up for a blockchain transformation, with the technology already affecting business and society on multiple levels. If the term "transformation" seems too strong, consider that eight of the world's ten largest companies are actively developing various blockchain-based solutions. Any business or organization documenting and managing transactions stands to gain by transitioning to a blockchain-based system.

9.1 Phishing and Social Engineering

Phishing attacks deceive users into revealing private keys or credentials through fake websites, emails, or messages. This can lead to unauthorised access to wallets and funds.

9.2 Malware and Ransomware

Malware can be used to

· Steal private keys from infected devices.

· Hijack computing power for mining (cryptojacking).

· Encrypt user files and demand cryptocurrency payments for decryption (ransomware).

9.3 Smart Contract Vulnerabilities

Smart contracts are susceptible to bugs and vulnerabilities. Common issues include

· **Re-Entrancy Attack** This attack exploits the ability to call back into the same contract before the previous function execution is completed, often leading to fund drains.

· **Integer Overflow/Underflow** Bugs that result from numerical calculations exceeding or falling below their defined limit, potentially causing unintended contract behaviour.

· **Front-Running** Attackers exploit the transaction order to benefit from pending transactions.

10. Possible Solutions on Blockchain Technology and Cryptocurrency

Blockchain and cryptocurrency are theoretical ideas and dynamic elements shaping the hospitality sector's current and future landscape (19). Their benefits, including enhanced security, trust, and streamlined financial transactions, present compelling reasons to explore their potential within hospitality (20). The importance of this study goes beyond mere academic inquiry; it carries significant implications for those involved in the industry. It underscores the necessity for companies in the hotel sector to adapt to and adopt blockchain-driven solutions.

As we delve deeper into our research, we will illuminate the impacts, advantages, and challenges of integrating blockchain technology-based cryptocurrencies in the industry. In doing so, we aim to enhance the understanding of how these innovations can empower the sector by improving efficiency, strengthening security, and enhancing competitiveness in an increasingly digital world. Thus, this study serves as a beacon, guiding industry leaders toward a future where the hospitality sector can fully leverage blockchain technology and cryptocurrencies to address the evolving demands of a modern, tech-savvy customer base.

11. Conclusion on Blockchain Technology and Cryptocurrency

Blockchain technology and cryptocurrency represent transformative advancements with the potential to revolutionise various industries by providing decentralised, secure, and transparent systems. However, their widespread adoption comes with significant challenges and vulnerabilities.

Strengths and Opportunities

Given the intricate nature and opacity of conventional supply chains, the emergence and advancement of blockchain technology has garnered significant attention from the stakeholders engaged in the logistics sector, aiming to enhance logistics operations within the supply chain and promote sustainability. This study presents a comprehensive analysis of the logistics industry, exploring the undeniable advantages offered by blockchain technology. As we strive to identify our application strategies under sustainable development goals, it becomes evident that the logistics sector reaps numerous benefits by integrating blockchain technology. (21) To this end, a SWOT analysis has been conducted based on a review of existing literature on logistics management—one of the sub-disciplines of supply chain management that utilizes blockchain technology—furthering its applicability within the logistics field. Notably, some strengths that advocate for the adoption of blockchain in logistics include its decentralized framework, efficient information sharing, rapid response capabilities, strong risk management, and integrity across processes. Conversely, its weaknesses may consist of low performance levels, a complicated
structure, and significant energy consumption. Furthermore, the sector stands to gain opportunities such as time optimization, problem-solving capabilities, enhanced competitiveness, and improved sustainability; however, it also faces external threats, including the adoption of cross-integration, emerging technologies, and limitations related to data privacy.

12. Future Enhancement

The future of blockchain technology and cryptocurrency is promising, with potential applications extending beyond finance to healthcare, supply chain, voting, and more. Continued innovation, collaboration, and adherence to best practices are essential to overcoming current challenges and unlocking these technologies' full potential. As the ecosystem matures, the balance between decentralisation, security, scalability, and regulatory compliance
will be crucial in shaping the trajectory of blockchain and cryptocurrency in future years.

References

1] Bitcoin: A Peer-to-Peer Electronic Cash System. Satoshi Nakamoto (2008). https://bitcoin.org/bitcoin.pdf

[2] Xu, Y., Li, X., Zeng, X., Cao, J., Jiang, W. (2020). Application of blockchain technology in food safety control: Current trends and future prospects. *Critical Reviews in Food Science and Nutrition*, *62*(10), 2800–2819.

[3] Ramzan, S., Aqdus, A., Ravi, V., Koundal, D., Amin, R., Al Ghamdi, M. A. (2023). Healthcare Applications Using Blockchain Technology: Motivations and Challenges. *IEEE Transactions on Engineering Management*, *70*(8), 2874–2890.

[4] Stallone, V., Wetzels, M., Klaas, M. (2021). Applications of Blockchain Technology in marketing—A systematic review of marketing technology companies. *Blockchain: Research and Applications*, *2*(3), 100023.

[5] Haleem, A., Javaid, M., Singh, R. P., Suman, R., Rab, S. (2021). Blockchain technology applications in healthcare: An overview. *International Journal of Intelligent Networks*, *2*, 130–139.

[6] Niranjanamurthy, M., Nithya, B., Jagannatha, S. (2019). Analysis of Blockchain technology: Pros, cons and SWOT. *Clust. Comput.*, *22*, 14743–14757.

[7] Sedlmeir, J., Buhl, H. U., Fridgen, G., Keller, R. (2020). The energy consumption of blockchain technology: Beyond myth. *Bus. Inf. Syst. Eng.*, *62*, 599–608.

[8] Attaran, M. (2020). Blockchain technology in healthcare: Challenges and opportunities. *International Journal of Healthcare Management*, *15*(1), 70–83.

[9] Tripathi, G., Ahad, M. A., Casalino, G. (2023). A comprehensive review of blockchain technology: Underlying principles and historical background with future challenges. *Decision Analytics Journal*, *9*, 100344.

[10] Almutairi, K., Hosseini Dehshiri, S., Hosseini Dehshiri, S., et al. (2023). Blockchain Technology Application Challenges in Renewable Energy Supply Chain Management. *Environ Sci Pollut Res*, *30*, 72041–72058.

[11] Pernice, I. G. A., Scott, B. (2021). Cryptocurrency. *Internet Policy Review*, *10*(2). https://doi.org/10.14763/2021.2.1561

[12] Wu, J., Liu, J., Zhao, Y., Zheng, Z. (2021). Analysis of cryptocurrency transactions from a network perspective: An overview. *Journal of Network and Computer Applications*, *190*, 103139.

[13] Wüstenfeld, J., Geldner, T. (2022). Economic uncertainty and national bitcoin trading activity. *The North American Journal of Economics and Finance*, *59*, 101625.

[14] Bouri, E., et al. (2017). Does Bitcoin hedge global uncertainty? Evidence from wavelet-based quantile-in-quantile regressions. *Finance Research Letters*, *23*, 87–95.

[15] Kushwaha, S. S., Joshi, S., Singh, D., Kaur, M., Lee, H. -N. (2022). Ethereum Smart Contract Analysis Tools: A Systematic Review. *IEEE Access*, *10*, 57037–57062.

[16] Aksoylu, E. (2024). Examining the relationship between bitcoin and altcoins. *PressAcademia Procedia*, *18*(1), 92–94.

[17] Gapurbaeva, S., Orozonova, A., Zinchenko, A., Ovcharenko, T., Huliaieva, L. (2023). The Impact of Cryptocurrency on the Investment Market. *Review of Economics and Finance*, *21*, 647–652.

[18] Zhao, H., Zhang, L. (2021). Financial literacy or investment experience: which is more influential in cryptocurrency investment? *International Journal of Bank Marketing*, *39*(7), 1208–1226.

[19] Asadi Bagloee, S., Heshmati, M., Dia, H., Ghaderi, H., Pettit, C., Asadi, M. (2021). Blockchain: The operating system of smart cities. *Cities*, *112*, 103104.

[20] Talukder, M. B., Kabir, F., Haghi, A. K. (2025). Artificial Intelligence in the fields of Financial Management and Hospitality. In *Utilizing AI and Machine Learning in Financial Analysis*. IGI Global. Pages: 24.

[21] Yontar, Emel. (2023). Challenges, Threats and Advantages of Using Blockchain Technology in the Framework of Sustainability of the Logistics Sector. *Turkish Journal of Engineering*, *7*(3), 186–195.