



## A Review on Emerging Trends in Block Chain Technology and its Applications

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### ABSTRACT

Supply chain management, healthcare, banking, and other sectors are just a few of the industries where block chain technology has found widespread application. New trends that could change the block chain ecosystem are developing as technology progresses. Including DeFi, NFTs, CBDCs, interoperability, privacy & security, and sustainability, this paper presents an overview of new trends in block chain technology and its applications. In order to provide a thorough analysis of these trends and their potential effects on the future of block chain technology, we study recent advancements, academic research, and market insights.

**Keyword:** Block Chain, DeFi, NFT, CBDC, interoperability, sustainability

## INTRODUCTION

Traditional database technologies present a number of challenges when it comes to recording financial transactions. Take, for example, the sale of a home. Ownership of the property is transferred to the buyer once the money is exchanged. Both the buyer and the seller can independently record monetary transactions, but neither source can be trusted. The seller can easily claim they have not received the money when they have, and the buyer can equally claim they have paid when they have not. To avoid potential legal issues, transactions must be supervised and validated by a trusted third party. This central authority complicates the deal and introduces a singular point of failure. Both parties could suffer if the central database was compromised. Block chain addresses such concerns by establishing a decentralized, tamper-proof system for recording transactions. In the case of a property transaction, block chain creates separate ledgers for the buyer and seller. All transactions







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must be approved by both parties and are automatically updated in real time in both of their ledgers. Any tampering with historical transactions will taint the entire ledger. These characteristics of block chain technology have led to its application in a variety of industries, including the creation of digital currency such as Bit coin. Block chain is a distributed ledger technology that allows for secure, open, and unchangeable transactions. It has the potential to transform a variety of industries by enabling decentralized applications that can improve trust, transparency, and efficiency. As technology advances, new trends that have the potential to change the block chain environment emerge. This essay attempts to provide a thorough analysis of current developments in block chain technology and its applications, as well as their potential effects on the field's future.

A block chain is distinguished by its resistance to censorship, immutability, and global usability, and it is supported by a global network of validators known as miners, who maintain it through block rewards known as cryptotokens (Jeremy Gartner, in Shulman, 2018). According to Ethereum creator VitalikButerin (2017), decentralization ensures fault tolerance, attack resistance, and collusion resistance. Furthermore, the block chain is decentralized on two of the three possible software decentralization axes:

- It is politically decentralized, which means that no one controls it.
- architecturally decentralized - there is no infrastructure central point of failure;

Logically centralized - there is one commonly agreed-upon state, and the system behaves like a single computer. Anyone has the ability to access a block chain, download a copy, and participate in the maintenance of the block chain, converting that computer into a node. The copy will be actively updated along with every other node's copy; changes to the block chain can only be made with general consensus among the individuals running a node (ConsenSys, 2018). Mining refers to the process of adding a new block (containing thousands of transactions) to a blockchain using hash verification procedures. The new block in blockchain is linked to the previous one.

## LITERATURE REVIEW

Researchers and developers are already aware of the new technology's capabilities and are investigating various applications in a wide range of industries (Christidis and Devetsikiotis, 2016). Three generations of block chains can be distinguished based on the intended audience (Zhao et al., 2016): Block chain 1.0, which includes applications enabling digital cryptocurrency transactions; Block chain 2.0, which includes SCs and a set of applications extending beyond cryptocurrency transactions; and Block chain 3.0, which includes applications in areas beyond the previous two versions, such as government, health, science, and IoT. A block chain, in theory, should be viewed as a distributed append-only timestamped data structure. Block chains enable us to have a distributed peer-to-peer network in which non-trusting members can interact with each other in a verifiable manner without the need for a trusted authority (Christidis and Devetsikiotis, 2016). To accomplish this, consider block chain as a collection of interconnected mechanisms that provide specific features to the infrastructure, as shown in figure 1. The signed transactions between peers are at the most basic level of this infrastructure. These transactions denote a contract between two parties that may include the transfer of physical or digital assets, the completion of a task, and so on. This transaction is signed by at least one participant and distributed to its neighbours.

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the rules of Block chain. The majority of the research focused on improving existing block chain technologies, with a significant amount on security and privacy concerns. In contrast, little research has been conducted on other issues such as usability and wasted resources. Surprisingly, much of the research at the time was focused on Bitcoin (Yli-Huumo et al., 2016).

## METHODOLOGY

You may have observed that many companies have been incorporating Blockchain technology in recent years. But how does Blockchain technology actually operate? Is this a substantial modification or merely an addition? Let's start by demystifying Blockchain technology since it is still in its infancy and has the potential to be transformative in the future.

Combining three popular technologies, blockchain:

- Keys for cryptography
- A common ledger on a peer-to-peer network
- A computing method for storing network events and records

Two keys make up a cryptography key: a private key and a public key. These secrets aid in the execution of successful transactions involving two people. These two keys are unique to each person and are used to create a secure digital identification reference. The most significant component of Blockchain technology is this protected identification. This identification is known as a "digital signature" in the world of cryptocurrencies and is used to approve and manage transactions. The peer-to-peer network and the digital signature are combined; many people who serve as leaders use the digital signature to agree on transactions and other matters. As soon as they approve a transaction, it is mathematically verified to ensure that it is valid, which leads to a successful protected transaction between the two network-connected parties. In conclusion, cryptography keys are used by Blockchain users to conduct various kinds of digital transactions over the peer-to-peer network. The methodology of the Block chain has been illustrated in the following diagram figure 2

## DISCUSSION

This research paper is a review of existing block chain literature and research. Academic journals, books, whitepapers, and reports from reputable organizations such as the World Economic Forum, the European Union, and the International Monetary Fund were used as information sources. The study focuses on the technical aspects of block chain technology, as well as its potential applications and impact on various industries. A few of the newest developments in blockchain technology and its uses:

**DeFi**(Decentralized Finance) is a financial system built on blockchain that aims to do away via mediators in financial transactions. Users can exchange, lend, and borrow cryptocurrencies using DeFi without using regular banks or other financial institutions. Known as **NFTs** (Non-Fungible Tokens), these special digital assets are kept on a database. Due to their ability to enable the creation and sale of distinctive digital artwork with a traceable possession history, NFTs have gained popularity in the art world. Central bank digital currencies, or **CBDCs**, are electronic money that are distributed by central banks. The purpose of CBDCs is to offer a reliable and effective replacement for conventional monetary currencies.

**Sustainability:** By enabling transparency and accountability in transactions, blockchain technology can be used to support sustainability.

**Interoperability:** The capacity of various blockchains to communicate and cooperate without any issues is referred to as interoperability. As it enables the integration of various blockchain-based solutions and apps, interoperability is an emerging trend in blockchain technology.







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Decentralized autonomous organizations, or DAOs, are businesses that are managed by blockchain smart contracts. The goal of DAOs is to develop a more decentralized and open method of organizational decision-making. Blockchain technology is enabling users to retain control over their personal data, making privacy an emerging trend. Applications that prioritise anonymity, like secure messaging services and decentralized identity management systems, can be developed using blockchain-based solutions.

Beyond cryptocurrencies, block chain technology has many potential applications, including supply chain management, voting systems, and digital identity management. The decentralization and transparency features of the technology make it suitable for these use cases. Block chain has the potential to transform the way businesses and governments operate by increasing efficiency, decreasing fraud and corruption, and increasing transparency. Scalability, interoperability, and security are some of the technical limitations of block chain technology that must be addressed before it can be widely adopted. These issues are being addressed through ongoing efforts such as the development of new consensus mechanisms and the integration of block chain with other technologies. We've talked about what block chain is, but why should anyone care? Despite the fact that block chain appears to be a rather ambiguous technology to the general public, a monetary application of the block chain has received significant financial support. With the price of a Bitcoin currently around \$10,000 (Wikipedia & Contributors, 2018a), it appears important to understand why people are investing in it.

Block chain has implications for a wide range of fields, as demonstrated by the thematic analysis above. Some seem more hopeful or useful than others. While applying block chain to highly complex and regulated industries such as securities may be difficult at the moment (Tranquillini, 2016), we can see that it has already had some success.

### CONCLUSION

Block chain technology is a revolutionary technology with the potential to transform a variety of sectors. Its decentralization, transparency, and security characteristics make it suitable for a wide range of applications. However, wider adoption will be contingent on overcoming technical limitations and regulatory challenges. More research and development in this area is required to realize the full potential of block chain technology.

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Table 1: Current and Future Research in Block chain

|                           |                  |                    |
|---------------------------|------------------|--------------------|
| Current research - review | Food Security    | Banking            |
| Securities services       | Product          | Finance            |
| Supply Chain              | Higher education | sharing services   |
| City Planning             | Management       | Employment         |
| Real estate               |                  | Library Management |

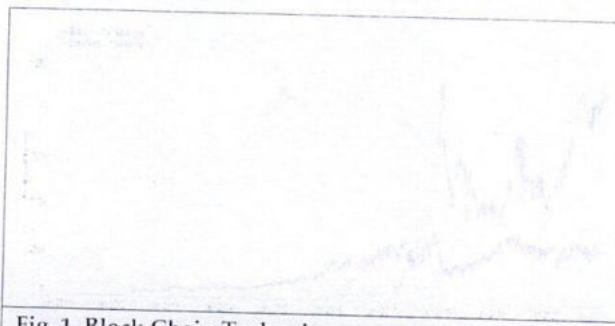


Fig. 1. Block Chain Technology

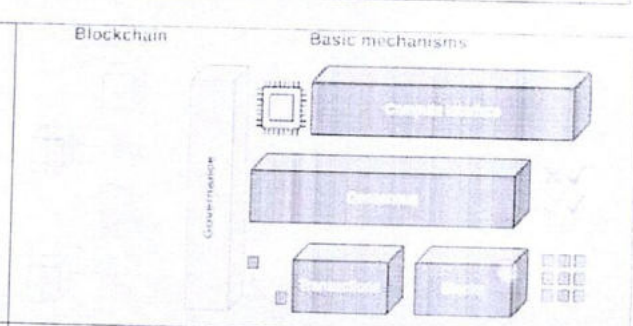


Fig. 2. Basic mechanisms of Block chain

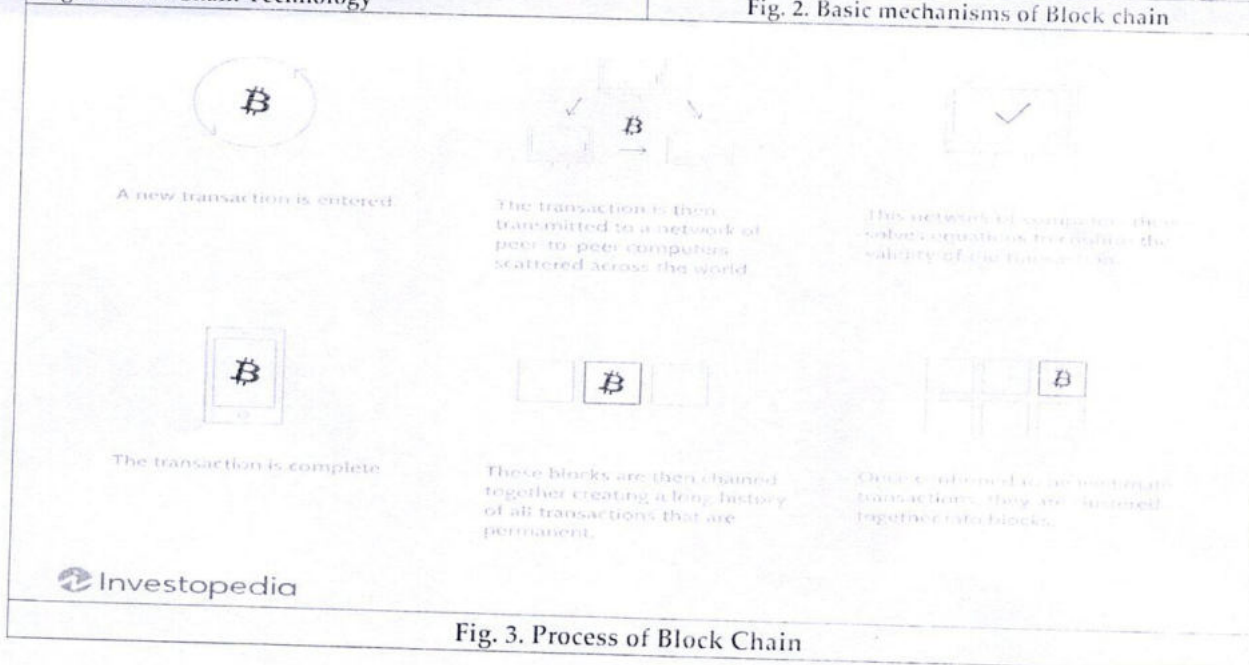
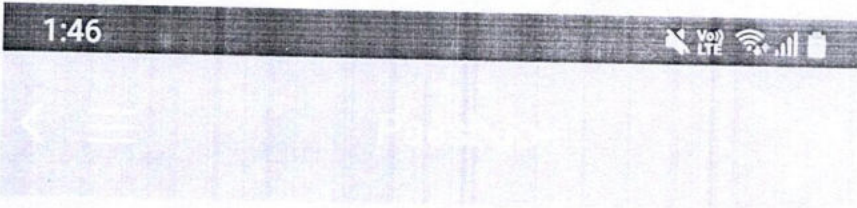


Fig. 3. Process of Block Chain







Transaction ID S22775514

Transaction Date 08 Apr '23

Transaction Description MMT/IMPS/309815059502/Payment for Ash/INDIANJOUR/IDIB000P137 /chgRs5.00GSTRs0.90

Amount ₹ 3005.9

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