A Review on Crypto Currency with Distributed Ledger Technology for Blockchain Technology

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**ABSTRACT**

This paper conducted a detailed examination of block chain-based technology across a wide range of fields. The objective is to discover the current state of block chain technology and its applications, as well as how certain facets of this innovative technology can change conventional business practices. Multiple academic papers published in high-ranking scientific journals have theoretical background. As a way of streamlining our assessment and documenting the constantly evolving block chain domain, this study includes publications from the last decade as well as several reports from the literature. Based on a detailed, systematic review and thematic content analysis of the discovered literature, we present a comprehensive classification of block chain allowed applications across various industries. We also address the exposure found in the related literature, specifically the limitations of block chain technology and how these limitations manifest themselves across various sectors and industries. We recognize numerous research gaps and potential exploratory directions based on these results, which are expected to be of great benefit to both academics and practitioners. The race toward trustworthy distributed networks have generated a lot of interest recently, thanks to developments in crypto currency platforms like Bitcoin. Multiple Distributed Ledger Technologies (DLTs) are fighting right now to show off their skills and how they might overcome the shortcomings of others. Both distributed ledger systems rely on a distributed, open peer-to-peer network and a set of modular frameworks, such as cryptographic hashes and consensus mechanisms. As a common denominator, all distributed ledger systems depend on a shared, distributed peer-to-peer network and a set of modular structures such as cryptographic hashes and consensus mechanisms. However, their implementations vary greatly in terms of data structure, error tolerance, and consensus approaches. In terms of cost, protection, latency, and efficiency, this divergence affects the design of each DLT case. We present four current DLT implementations in this paper. Each technology's characteristics are discussed, as well as a preliminary comparison.

**Keywords**—Block chain; Digital Ledgers; Crypto Currency; Distributed Ledger Technology (DLT); Internet of Things; Hashgraph.

# INTRODUCTION

Block chain technology is a new technique with potential applications for industries, allowing for secure transactions without the need for centralized authority. Since Bitcoin's use of block chain technology in 2009, there has been an increase in the number of blockchain technology-based technologies.

The first implementations were electronic cash structures that distributed a global ledger that contained all payments. These payments are encrypted with cryptographic hashes and verified and checked with asymmetric-key pairs. Payment history records a chain of events in such a manner that any attempt to revise or alter a previous payment necessitates a recalculation of all subsequent blocks of transactions.

Although block chain technology is now in the initial stages, it is based on well-known and secure cryptographic principles. There can currently be a lot of buzz surrounding the technique, and many potential applications for it. Moving forward, the hype is going to fade, and blockchain technology will become another technique to be used.

**1.1 Blocks:**

Users of the block chain network send applicant payments to the network using software (desktop applications, Smartphone applications, digital wallets, web services, etc.). Such payments are sent to a node or nodes within the blockchain network by the software. Non-publication complete nodes and also some publishing nodes can be chosen. The uploaded payments are then generated to the rest of the network's nodes, but this does not guarantee that the payment will be included in the block chain. Once an outstanding payment has been released to nodes, it must wait in a queue until it is implemented by a publishing node in many blockchain implementations.

When a publishing node publishes a block, payments are added to the blockchain. A block is made up of two parts: a block header and block data. This block's metadata is contained in the block header. A collection of authenticated and authentic payments that have been uploaded to the blockchain network is contained in the block data. Legitimacy and authenticity are guaranteed by ensuring that the payment is properly designed and that the suppliers of online services in each payment (listed in the transaction's "input" values) have each crypto graphically authenticated it. This confirms that the suppliers of online services for payment had access to passwords capable of signing over the valid online services. The legality and authenticity of all payments in a released block will be checked by other full nodes, and a block will not be accepted if it contains illegal payments.

**1.2 Block chain Technology:**

Blockchains enable us to have a decentralized peer-to-peer network in which non-trusting people can communicate with each other in a verifiable manner with no need for a centralized intermediary. To accomplish this, consider a blockchain as a collection of interconnected processes that provide unique features to the network. The signed payments between peers are at the most basic level of this technology. Recognizing the value of an agreement between two parties may facilitate the transfer of online or in-person assets, the execution of a task, or other similar activities. This transaction was signed by at least one person and forwarded to its neighbors. A node is usually any company that communicates to the blockchain. Full nodes, on the other hand, validate all of the blockchain guidelines. Such nodes combine payments as blocks and are responsible for deciding which payments are legitimate and must be kept in the blockchain and what is not.

**1.3 Ledger:**

An accounting cycle is a corporation's economic transaction history system, with debit and credit funds transfer verified by a trial balance. The accounting cycle keeps track of every financial transaction that occurs during the life of an operating company.

General ledgers are categorized based on their purpose. This identification makes it easier to prepare financial statements. The categorization is as follows:

• Payroll Ledgers: All costs will be recorded in this ledger. The group includes Purchase Accounts, Rent Accounts, Electricity Accounts, Maintenance Accounts, and other similar accounts.

• Revenue ledgers: Every account will contain all accumulated income. This category includes accounts for sales, interest received, and discounts received.

• Capital ledger: Each transaction will contain all accounts relating to capital introduced/drawings.

• Asset ledger: All asset-related accounts will be recorded in this ledger. This category includes cash, bank accounts, debtors, machinery, and furniture accounts, among other things.

• Liability ledger: All statements relating to the organization's debts and liabilities will be presented there. Borrowings, creditors, accounts payable, and so on would be included.

**1.4 Distributed Ledger Technology:**

DLT is a cutting-edge technique that enables many advantages, including transparency, resiliency, auditability, and cryptography-enabled security. This is a thriving innovation with a thriving R&D community and a growing variety of applications.

The article describes an in-depth examination of DLT, focusing on its key advantages, risks, and potential uses. It addresses issues of data encryption and data security. It also shows how DLT can enable viable, valued FinTech applications, based on the preliminary results of three solid evidence exercises – mortgage loan application, trade finance, and digital identity management.

The article was enhanced by important contributions from professional banking experts as well as few other DLT-focused organizations.

A diagram of a property valuation report

Description automatically generated

**Fig 1 : Distributed Ledger Technology**

Concrete evidence: A DLTenabled asset evaluation in which the DLT system functions as a protected ledger shared by different banks and quantity surveyors.

**1.5 Hash Function:**

Demonstration of a Hash operation that translates data of any size to fixed-size unique values, irrespective of how significant the data differs from one another. The sale of Alice's property to Bob is safely recorded in various banks and at the Land Title.

A diagram of a blockchain

Description automatically generated

Our research contributed to a comprehensive understanding of blockchain features and offers a glimpse of existing public blockchains across industries. Based on a learning approach, we emphasize the intellectual community's increasing interest and recognize three key streams of research:

(i) Categorization of block chain-based technology across different sectors.

(ii) The suitability of block chain technology to generate value in these sectors in light of the different constraints that this technology presents, and

(iii) guiding researchers by providing a roadmap of promising research avenues, challenges, and opportunities that require additional study. It is important to note that this review is by no means exhaustive, as blockchain technology is constantly evolving at a breakneck pace.

(iv) A comparison of the characteristics and prerequisites of blockchain versus traditional databases.

(v) Significant DLT Developments in India.

# LITERATURE SURVEY

Since blockchain applications eliminate the need for a centralized authority or intermediary, they have the potential to accelerate payments. Furthermore, distributed ledgers have the potential to minimize transaction costs. Experts also believe that blockchain technology is much more secured since each node of the network holds records, resulting in a system that is harder to handle or effectively attack. Many people believe that a digital currency is a much more effective way to handle records because the data is released and thus witnessed across a network, making a successful cyberattack much more unlikely.

Users should use digital currency technology to record, share, and integrate records in a distributed network with many users. It can also be viewed as a set of innovations with similar structures that can be implemented in a variety of ways with separate regulations. Based on whether the ledgers are accessible to everyone or by the devices, digital currency technology can be categorized as public or private (also called nodes). It can also be classified as permission or permission less, depending on whether participants need permission from a specific entity to make changes to the ledgers.

**1.1 Distributed ledger benefits**

The implementation of blockchain technology in money transfers sparked a lot of early interest. That is understandable considering that cryptocurrency bitcoin has achieved widespread adoption while still demonstrating that DLT can work. Banks and other financial institutions were also early adopters in this space.

Additionally, proponents of DLT argue that digital ledgers can be used in a variety of settings, including government and business dealings, in addition to financial transactions. Digital ledgers, according to experts, could be used in tax collection, property deed transfers, social benefits distribution, and even voting processes. They also claim that DLT can be used to process and execute legal documents as well as other similar transactions.

Some believe that people should use this technology to store and better control private information, then selectively share portions of those records as needed; use cases include personal medical records and corporation supply chains.

Proponents also claim that digital ledgers can help better track property rights and ownership for art, goods, music, film, and other media.

**1.2 The future of distributed ledger technology**

It is unclear whether digital ledger technologies, such as blockchain, can transform how governments, organizations, and businesses operate. Articles in the academic and financial press have discussed whether distributed ledger systems, as they currently exist, are credible enough to be used on a large scale. The lack of rules for this new form of exchange, as well as security concerns, are issues.

**1.3 Distributed Ledger Technology and Blockchain Technology**

The terms blockchain and distributed ledger technology are commonly used interchangeably. However, they are not the same. Blockchain applications make use of a variety of technologies, one of which is distributed ledger technology. Blockchain is a type of digital currency that employs cryptography to make it difficult to handle. It is an immutable and distributed ledger used for recording transactions, transferring ownership, and monitoring assets. Blockchain provides security, transparency, and trust in a variety of digital asset transactions.

Because as the name implies, data in blockchain technology is packaged and stored in bundles known as blocks, and the blocks are chained together. The blocks in the chain cannot be edited because blockchain technology only allows for the addition of new blocks of data.

Additionally, blockchains are typically public, which means that everyone can view transaction histories. Anyone can become a node and join in the operations of a blockchain. As a result, blockchain is permissionless.

Mostly on the opposite, not all decentralized ledger systems rely on blockchains. They do, however, continue to use cryptographic validation. Digital currency generates a decentralized ledger to gain consensus from participants who mistrust each other. As a result, new information is only included when all participants agree to the act.

Unlike blockchain, digital currency typically places restrictions on its use, access, and who can be a node. It also employs a cryptographic signature to periodically timestamp new entries.

The public and private features of distributed ledger technology are both available. It can also be both permissioned and trustless.

**1.4 Blockchain in crypto currency**

This technology is well-known, and it is expanding daily. There are several Cryptocurrencies in the world, but the most well-known are Bitcoin and Ethereum [3]. It also functioned as a conventional currency, allowing users to easily purchase goods and services [4]. People are beginning to trade in cryptocurrency and save their assets using this technology [5]. Cryptocurrency is regarded as a well-established industry [6].

Cryptocurrency is a method of exchange process that is constructed and stored in a chain economically. These payments are properly secured because this technique enables encryption and decryption techniques to inspect financial units and safely record all payments [6]. This technology is not objectively considered; rather, it is only visible through a network chain. This cryptocurrency is not controlled or controlled by any bank, but rather by the blockchain network, which is highly decentralized.

Only when payment is performed in the chain, the payment must be verified to other blocks whether it is legitimate or not, then after a new block is established in the chain and transaction history is maintained in a new block, when any development of a new block is done for a unique identifier, the hash of a block is created via confirmation. Similarly, it is legal in some Asian and European countries but is mostly prohibited by the government in many countries due to state problems.

There are numerous advantages to using cryptocurrency. It increases awareness of every transaction that is permanently documented, as anyone can view and observe it due to public access [6]. Because of the proper block hash and prior hash, no one can simply send his transaction, which is also known as a forward payment. In this innovation, a permanent ledger is used to keep a record of all transactions [4]. Direct trading reduces transaction costs by saving both time and money. The settlement was quicker and less costly, saving a significant amount of money. Polling can also be done using this technology via smartphones and tablets, with accurate and instant results.

**1.5** **Hash Functions**

Cryptographic Hash Functions are a type of hash function that is used to store the use of cryptographic algorithms for many operations is an important element of digital currencies. Hashing is a way of adding a cryptographic hash function to data, which produces a unique output (known as a message digest, or simply digest) for inputs of nearly any size (e.g., a file, text, or image). It enables individuals to independently take data input, hash that data, and derive the same result demonstrating that the data has not changed. Even minor changes to the input (such as changing a single bit) result in a completely different outgoing tract.

The Secure Hash Algorithm (SHA), which has an output size of 256 bits, is a special cryptographic hash function used in many blockchain implementations (SHA-256). This algorithm is supported in hardware by many machines, making it quick to compute. SHA-256 generates an output of 32 bytes (1 byte = 8 bits, 32 bytes = 256 bits), which is typically displayed as a 64-character hexadecimal string.

**1.6 Discussion**

The research is based on four main research questions to determine the relevant research paths in the domains of blockchain and big data. The study is based on the four key questions listed below.

RQ1: What exactly is blockchain technology and how does it work?

RQ2: What are the methods and methodology of the blockchain?

RQ3: What are the benefits and drawbacks of blockchain technology?

RQ4: How does blockchain deal with big data in real life, and how do they work in business and their applications?

**RQ1: What exactly is blockchain technology and how does it work?**

Blockchain is a distributed ledger, a global online portal that can be accessed by anyone and anywhere with internet access. Blockchain does not support the fabrication of papers, transactions, or other data [1]. Blockchain is a spreadsheet that has spawned hundreds of clones across the computer network [9]. After that, you can modify the ledger regularly and have a fundamental understanding of the blockchain concept [9]. Blockchain is a digital process and often submissive database. The Blockchain is a distributed ledger in which every block can obtain a copy of a new entrant’s record, implying that the info it stores is public and available to all, but no one can alter any of the records [8].

Every block contains an incentive for processing and confirming transactions [8]. As a result, these features make the block chain ideal for keeping records open and allowing everyone to use it [9]. A block chain is made up of many blocks in a chain, each of which contains data, the hash (address) of the block, as well as the hash of the previous block [8]. The data section included smart contracts, transaction records, and other sensitive information. The hash function is used to decode the block. When a new node is added to the chain, the hash of that block is automatically generated [11]. The following hash, also known as the prior hash, is the third element of the block. It is a hash or address of the earlier block in the chain [12]. The advantage of blockchain is that it eliminates the need for an intermediary between 2 people [8, 11]. Private signing is required for blockchain transactions [13]. Transactions can take many forms, including smart contracts, money, and so on. The data transaction process is made up of rules, logic, destination address data, and other authenticated information.

**RQ2: What are the methods and methodology of the block chain?**

Block chain technology is based on the peer-to-peer network principle, in which each node receives a copy of the previous node [9]. There really is no centralized entity in this chain, and each node of the chain or network acts as a client or server. Transactions on the blockchain must be validated and approved [12]. Every network node must check the other node, and as a result, the intermediary effort is eliminated from this innovation [1].

Block chain technology is also considered a decentralized network because it stores private customer records and manages them effectively [1]. Whenever a fresh transaction occurs in this network, existing molded it and make a track of the new transaction, and a data update is created in the chain, which is already known as extracted of payment, and after the establishment of the modern block, proof of work is performed automatically [12], in which hash of a block is produced for the authentication of the block, and previous hash also develop to involve block.

As a result, a chain of blocks is formed, which is also known as the blockchain. If someone wants to temper data, the hash of the block keeps changing, and the preceding hash of the next block is viewed differently. If an inaccurate block is formed because of tempering in any block, the chain of blocks is also disrupted [8].

If everyone wants to make a legal change, they will use the proper methodology known as proof of work, in which every node in the network legitimizes the node and obtains a copy of the node, and then the process will happen place [1]. So, in this innovation, short tempering in data is difficult [13]. The spreadsheet is used in this innovation to remove imperfection or transparency; the main concept of the ledger is community chain access for everyone [12]. If other nodes do not verify or reject an illegitimate operation, it is rejected outright, and no single block is created. All data or information in a network is authenticated [11].

**RQ3: What are the benefits and drawbacks of block chain technology?**

Each innovation has advantages and disadvantages; we have distinguished the benefits and drawbacks of block chain technology, but we will only discuss the benefits and drawbacks of this technology here. Once a new block is verified and added to the chain, it is permanent and cannot be changed or removed, and this feature of block chain is referred to as immutability. This block chain feature increases network security and makes network accountability easier [8]. To increase the security of this technology, encryption and decryption are used to keep data safe from unauthorized persons/users. Transactions in this technology often needed validation from other network nodes [8]. Because of the high protection and confidentiality of blockchain technology, anybody can easily conduct transactions [8].

Throughout this technology, any transaction must be acknowledged by other nodes, and this move leads to block chain transparency [1]. Reversible transaction processes are not possible in block chain technology. Since this step eliminates fraud from the transaction, the transaction cannot be reversed in this technology [11]. Irreversibility is also a drawback because if anyone accidentally executes a transaction in this chain, it is up to the next block/customer to return or not. According to numerous studies, too much verification is considered a disadvantage; if anyone wants to alter his/her details or data, they must thoroughly conduct proof of work [11]. Since data in block chain technology is open to anyone and everyone can easily read it, we cannot store data in such a way that only validated users have access to data. The researcher suggested an emerging approach, but it is unclear if it would function efficiently or not [13]. The main disadvantage is the transaction delay. Transaction delays may occur because of proof of work, confirmation, or confirmation of transactions from all network nodes. In short, blockchain technology allows you to do a lot with data, such as protect it from fraud, temper it, and keep permanent records [7].

**RQ4: How does block chain deal with big data in real life, and how do they work in business and their applications?**

Both block chain and big data are separate technologies, but both are currently in full swing [12]. As we have already mentioned in previous sections regarding blockchain, it is a distributed ledger that stores records indefinitely [15]. In several ways, blockchain and big data boost data efficiency. Big data refers to large amounts of data that cannot be easily handled or processed [13]; it necessitates a great deal of effort and strategies.

Previously, large amounts of data were managed by different procedures, but they took a long time to process. As time passed, new techniques and technology were implemented, but they were rejected due to performance, security, and other factors. Blockchain technology has entered the market with the primary goal of increasing protection, eliminating scams and fraud, and managing data effectively; however, as time passes, this technology is advancing [13].

Furthermore, by using this new technology, businesses are storing their large amounts of data in block chain while saving a significant amount of money and time [11]. Blockchain technology can store a wide range of data and handle and process it effectively [11]. This technology also enables smart contracts to execute transactions automatically in a matter of seconds, reducing transaction effort [12].

This technology is now being used in a variety of industries. This system was used in the banking industry to keep track of user accounts. It is also used in the health care sector to maintain patient records that are open to staff [16]. In the field of education, educators have embraced this technology to provide material to students effectively and safely. A decentralized network enables authenticated consumers to connect data from anywhere [17].

Although cryptocurrency is the most common application of this method. Satoshi Nakamoto used this approach to create bitcoin technology for the first time in 2009[16]. When using this currency, every transaction is made by a proper non-removable record that can be easily monitored [16]. In this method, each transaction record is permanently and easily traceable, so no one can alter it [18]. Almost 50 banks in Japan's banking sector have agreed to use Ripple. Ripple is a network that is open to the public and is based on the blockchain technology principle [19]. This method allows for low-cost, dependable transactions [20]. The collaboration of these banks reduced transaction time [18, 21].

**1.7 Comparative analysis of traditional payment method vs cryptocurrencies**

A summary of the positive and negative factors gleaned from a comparison of conventional and crypto payment methods. Positive and negative aspects are depicted in table columns, showing the benefits and drawbacks of both payment systems.

**Social acceptance:** The conventional payment scheme is used all over the world and is the industry norm. However, the crypto payment system is prohibited in some countries, limiting its accessibility in comparison to the conventional payment system.

**Authority:** From their perspective, the conventional payment method offers a certain degree of protection; however, this security in the centralized system is not 100 percent safe.

In comparison to the conventional payment system, this is a significant change in the crypto payment system since all nodes in the decentralized network have their own copies of all completed transactions. One downside of this scheme is that there is no centralized body in charge of saving money for clients.

**Flexibility:** One benefit of the cryptocurrency payment method is the ability to submit worldwide transactions at any time with very low fees, whereas conventional payment systems take much longer to execute the transaction.

**Payment processing:** There is no need for a central authority to approve the transaction, and the crypto payment system has many other limitations.

**Transaction speed:** One advantage of using cryptocurrency as a payment method is that transactions are completed instantly.

**Transaction fee:** One benefit of using cryptocurrency as a payment method is that transaction costs are very low or non-existent. Irreversible: When using a crypto payment system, the client should think twice before performing the payment because there is no going back once the transaction is completed. Anonymity: The crypto payment system conceals information about the clients or nodes.

**Objective:**

The method, as well as some features of the PRISMA statement, have been adopted to provide a straightforward, reproducible, and scientific literature analysis of block chain-based applications. The following measures are part of the overall methodological approach:

1. Determine the need for the review, prepare a review plan, and establish the review procedure.

2. Identify the study, choose the studies, evaluate their accuracy, make notes, collect data, and synthesize the data.

3. Report the review's findings.

# SURVEY DISCUSSION

The review of the selected literature yielded several insights into the shortcomings of blockchain technology and its applicability across a broad range of domains. Blockchain is now being used in a wide range of science and business sectors, creating infinite possibilities for exploration. However, as with any new technology, problems and difficulties arise. In this segment, we explore some of the shortcomings of blockchain technology and propose some avenues of fruitful future research.

**Table 1: A comparison of the characteristics and prerequisites of blockchain versus conventional databases.**

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| Attributes | Prerequisites & determinants |
| Trust | a scarcity of trustworthy third parties  Immutability Accountability  a slew of untrustworthy authors  Transactions between individuals on a peer-to-peer basis |
| Context | Transaction tracability  Transactional verifiability  Notarization of background data/transactions  Data security Transparency  The right to privacy |
| Performance | Payment speed and latency  Costs of upkeep  Duplicate work  Adaptability |
| Consensus | Engagement Rules  Verified are needed.  Communication between payments of different writers that are autonomous/dynamic |

Relation to the study results, we highlight the criteria of each sector and created a structure (Table 4) to assess the suitability of blockchain-based solutions. More specifically, we compare blockchain's ability to conventional databases in four major domain areas: necessary confidence assumptions, background criteria, performance characteristics, and required consensus mechanisms. To determine the value of each requirement, a three-level scale (low, medium, and high) is used.

The platform serves as a robust tool for professionals attempting to determine whether blockchain can improve their processes. In terms of confidence, blockchain prevents the use of trusted third parties, on which databases depend, and thus improves information security and validity.

**Table 2: Major Developments related to DLT in India**

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| Report | Released | Select Takeaways related to DLT and Blockchain |
| WhitePaper: IDBRT, Blockchain Technology Applications in the Banking and Financial Sector in India. | January 2017 | To investigate the viability of blockchain technology in the banking and financial sectors, two proofs-of-concept (POC) use cases were created: domestic trade finance with a sight Letter of Credit and enhance data payments. |
| Inter-Regulatory Working Group on FinTech and Digital Banking of the Reserve Bank of India (Chariman: SudarshanSen). | February 2018 | Before effectively regulating this space, there is a need to develop a deeper understanding of various FinTech products and their interactions with the financial sector, as well as their implications for the financial system. |
| Finance Minister’s speech in Budget 2018-19 | February 2018 | The government will investigate the use of block chain technology proactively to usher in the digital economy. |
| Blueprint of Blockchain Platform for Banking Sector and beyond, IDBRT | January 2019 | The report goes into how to build a useful blockchain that can be used as a forum for launching various applications. |
| Report of the Committee to propose specific actions to be taken in relation to Virtual Currencies (Chairman: Subhash Chandra Garg) | July 2019 | The Committee recommends that the RBI investigate the feasibility of using DLT-based systems to allow faster and more secure payment infrastructure, especially for cross-border payments. |
| Report of the Steering Committee on FinTech Related Issues (Chairman: Subhash Chandra Garg). | September 2019 | Throughout the sense of public sector blockchain-based trade finance, the Committee recommends that the Ministry of MSME collaborate with DFS and the RBI to evaluate and introduce block-chain solutions in trade finance for MSMEs in public sector banks. |
| Enabling Framework for Regulatory Sandbox, RBI. | August 2019 | Scientific advances, such as smart contracts and Blockchain-based applications, may be considered for research under regulatory sandbox cohorts. On November 4, 2019, the RBI invited applications for its first cohort of Regulatory Sandbox with the theme of ‘Retail Payments.' |

# CONCLUSION

Blockchain technology is often appropriate where transactions and operations must be tracked (sequential chain of events) or when operations require high protection and privacy (centralized data structures are more vulnerable to malicious attacks than decentralized data structures). Since blockchain does not need hosting, it can offer substantial cost savings in terms of maintenance. Finally, the consensus mechanisms used in blockchain networks enable several writers to change the database and provide a definitive transaction log on which all nodes can be proven to agree.

##### REFERENCES

1. F. Casino, T. K. Dasaklis, C. Patsakis, “A systematic literature review of blockchain-based applications: Current status, classification and open issues, Telematics and Informatics”, vol. 36, pp. 55-81, 2019.
2. Aslam, Umair & Manzoor, Saad & Babar, Muhammad Imran, “Systematic Literature Review of Blockchain in Requisites of Big Data and Its Applications”, Journal of Software Engineering & Intelligent Systems, vol. 4, no. 2, August 2019.
3. M. H. Miraz, M. Ali, “Applications of Blockchain Technology Beyond Cryptocurrency”, Annals of Emerging Technologies in Computing (AETiC), vol. 2, no. 1 pp. 1-6, 2018.
4. S. F. Sun, M. H. Au, J. K. Liu, T. H. Yuen, “Ring CT 2.0: A Compact Accumulator-Based (Linkable Ring Signature) Protocol for Blockchain Cryptocurrency Monero”, Lecture Notes in Computer Science, vol. 10493, pp. 456-474, 2017
5. S. M. Gainsbury, A. Blaszczynski, “How Blockchain and Cryptocurrency Technology Could Revolutionize Online Gambling”, Gaming Law Review, vol. 21, pp. 482-492, 2017.
6. I. Eyal, "Blockchain Technology: Transforming Libertarian Cryptocurrency Dreams to Finance and Banking Realities," in Computer, vol. 50, no. 9, pp. 38-49, 2017.
7. D. Conte de Leon, A.Q. Stalick, A. A. Jillepalli, M. A. Haney, F. T. Sheldon, "Blockchain: properties and misconceptions", Asia Pacific Journal of Innovation and Entrepreneurship, vol. 11 no. 3, pp. 286-300. 2017.
8. J. Wang, S. Wang, J. Guo, Y. Du, S. Cheng, X. Li, “A Summary of Research on Blockchain in the Field of Intellectual Property”, Procedia Computer Science, vol. 147, pp. 91-197, 2019.
9. S. Jokić, A. s. Cvetković, S. Adamović, N. Ristić, P. Spalević, “Comparative analysis of cryptocurrency wallets vs traditional wallets” Ekonomika, vol. 65, no. 3, pp. 65-75, July 2019.
10. D. Yaga,P. Mell, N. Roby, K. Scarfone, “Blockchain Technology Overview”, NIST U. S. Department of Commerce, 2019.
11. L. Ajao, J. Agajo, E. Adedokun, L. Karngong, "Crypto Hash Algorithm-Based Blockchain Technology for Managing Decentralized Ledger Database in Oil and Gas Industry" vol. 2, no. 3, pp. 300-325. July 2019.
12. “Blueprint of Blockchain Platform for Banking Sector and Beyond”, Institute for Development and Research in Banking Technology, January 2019.
13. “White Paper on Applications of Blockchain Technology to Banking and Financial Sector in India”, Institute for Development and Research in Banking Technology, January 2017.
14. M. Jabarulla, H. Lee, "Blockchain-Based Distributed Patient-Centric Image Management System" Applied Science, vol. 11, no. 196, 2021.
15. S. Cho, D. Ko, S. Park, “Block Data Record-Based Dynamic Encryption Key Generation Method for Security between Devices in Low Power Wireless Communication Environment of IoT”, Applied Science, vol. 10, Sept. 2020.
16. G. Ciatto, S. Mariani, A. Omicini, F. Zambonelli, “From Agents to Blockchain: Stairway to Integration”, Applied Science, vol. 20, Sept. 2020.
17. S. Sayeed, H. Marco-Gisbert, “Proof of Adjourn (PoAj): A Novel Approach to Mitigate Blockchain Attacks”, Applied Science, vol. 20, Sept. 2020.
18. Md.A. Uddin, A. Stranieri, I. Gondal, V. Balasubramanian, “A Survey on the Adoption of Blockchain in IoT: Challenges and Solutions”, Blockchain: Research and Applications, vol. 2, no. 2, June 2021.
19. J. Ducrée, “Research – A blockchain of knowledge?”, Blockchain: Research and Applications, vol. 1, no. 1, 2020.