# BLOCKCHAIN TECHNOLOGY AND ITS POSSIBLE APPLICATIONS IN VARIOUS SECTORS: AN EMPIRICAL REVIEW

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## Abstract

Blockchain era is one of the rapidly evolving technologies in ultra-modern generation and quite a few studies has simply began out concerning this generation. It is a distributed ledger allowing the transactions take place without involving a central authority and at the same time ensures the security, immutability and transparency of the the records. It received popuparity with the launch of Bitcoin(a cryptocurrency or virtual currency) which is the most successful instance that enploys the blockchain technology. After the release of bitcoin many cryptocurrencies have been released using this technology. It is the interesting and current subject to evaluate and it is the breakthrough in technology revolutionizing the entire world. This paper represents a detailed evaluation on blockchain technology. Throughout this paper, a brief introduction in relation to this technology , its history, advantages and disadvantages are given. We will also go into the fundamentals of this emerging technology and some technical challenges . We will also discuss its implementation in various sectors. Some hints on destiny studies instructions are furnished for researchers. We additionally lay out feasible destiny developments for blockchain.

**Keywords-** Blockchain, Bitcoin, Cryptocurrencies, revolutionizing, virtual currency


## INTRODUCTION

Blockchain may be described as "a decentralised and distributed virtual ledger used to record transactions through numerous computer systems in a sort of manner that the record can't be modified retroactively without affecting all next blocks and requiring network collusion." A blockchain (a combination of two words; block and chain )is an incresing list of records or information in the form of blocks. Cryptography is used to bind all of the blocks together. Each block (save the first, which is sometimes known as the genesis block) comprises transaction data, a timestamp, and a cryptographic

hash of the preceding block, preceeding block making data more safe, transparent and irreversible. In other words, a chain of blocks that contains information is known as blockchain. It is a distributed database which keeps track of a growing number of transactions while keeping the data immutable, transparent and permanent. This technology ensures that the history of any digital asset is irreversible and clear by combining decentralisation and cryptographic hashing. It is a decentralised, distributed ledger Technology maintained by a network of participants. It is built on a peer-to-peer network that allows for the storage of any form of transaction in a verifiable and trustworthy manner. It functions as an immutable ledger in this way, allowing transactions to take place in a decentralised fashion.

It provides a high level of security because all transactions are completely anonymous. In a blockchain if it is decided by the majority of the users taking part in this procedure. This technology is particularly promising and innovative since it reduces risk, eliminates fraud, and proved to be an evolving platform for developing decentralised applications and data storage over and above its position as the technology that underpins cryptocurrencies.

**Origin of Blockchain**

In 2008, a person or organisation widely recognised as 'Satoshi Nakamoto' written and published for the first time a white paper titled "BitCoin: A peer to peer electronic cash system," which brought this technology to light.It has received extensive attentions thereafter. The core attributes that enable security, anonymity, and data integrity without any third-party organisation in charge of the transactions are the reason for this interest.

**i.        Components of Blockchain technology**

Blockchain is made up of three key principles:

a)blocks

b)nodes, and

c)miners

**a)  Blocks**

Blocks are documents wherein imformation is completely recorded. A block is similar to a ledger or document book . When a block is 'completed,' it clears the way for the next block to be added to the blockchain.As a result, a block is an infinite book of information that cannot be changed or removed once printed. There are more than one blocks in every chain and each block has three main elements:

Data : Data means any facts or information being stored.

Nonce: A 32-bit complete number is known as a nonce. The nonce is created at random while a new block is created, which then generates a block header hash.

Hash: Hash is a 256-bit range which is paired with the nonce. It would have to start with a large number of zeros (i.e., be enormously small). A nonce produces the cryptographic hash when the primary block of a sequence is generated. The statistics contained within the block are deemed verified and thus forever associated to the nonce and hash.

**b)    Miners**

Miners are particular servers whose role is to validate the hashes of unverified blocks in the blockchain. The verified block is uploaded to the blockchain once a miner validates a block.

**c)    Nodes**

In context to a Blockchain community, nodes are the digital gadgets linked to the community and owning an IP address. Generally, nodes are the verbal exchange endpoints ,this means that that any consumer or software that desires to have interaction with the Blockchain does so through nodes. Therefore, nodes also are a factor of community redistribution.  A node is liable for keeping the transaction document and running the community of the Blockchain.

**OBJECTIVE**

A.  To study about the origin and types of Blockchain.

B.  To Study theapplication of Blockchain technology.

C.  To study the working steps of Blockchain technology

**REVIEW OF LITERATURE**

**( Xu, Chen, & Kou, 2019)** This study focused on the overview of A systematic review of Blockchain.This study will conduct a systematic and objective review based on data statistics and analysis of 756 publications related to Blockchain.According to the author, businesses can benefit

greatly from Blockchain Application of Blockchain to be Considered When Business Accounting Settlement & Crowd funding, Data Storage and Sharing Requirements.

**( Casino, Dasaklis, & Patsakis, 2019)**   This study shows a systematic literature review of Blockchain-based applications: Current status, classification and open issues.In this research, the author has analyzed 260 research papers and explained the current status of Blockchain.According to the author, Blockchain is being used widely, but many flaws in it are yet to be resolved.Technology and its applications which can make the block chain more efficient and durable.

**( kitsantas, Vazakidis, & Chytis, 2019)** This paper demonstrates the Review of Blockchain Technology and Its Applications in the Business Environment.Blockchain technology has numerous

uses outside of cryptocurrencies, including government, finance and banking, accounting, and business process management. this research is to analyze and explore the benefits and drawbacks of Blockchain technology for present and future applications.Implementing Blockchain Technology in a variety of sectors might be prohibitively expensive. Organizations must invest a substantial amount of money to migrate or move outdated systems.

**(Jani, 2018)**The research paper is an effort to understand the Growth of Crypto currency in India: Its Challenges & Potential Impacts on Legislation.In this paper the author has describe the crypto currency market, virtual currency and the business involved in it.The paper also highlights the major challenges and issues facing the implementation of virtual currency. This study also discussed about the different laws involved in the virtual currency industry.Along with this, what is the nature of law regarding crypto currency in different countries has also been told about it.
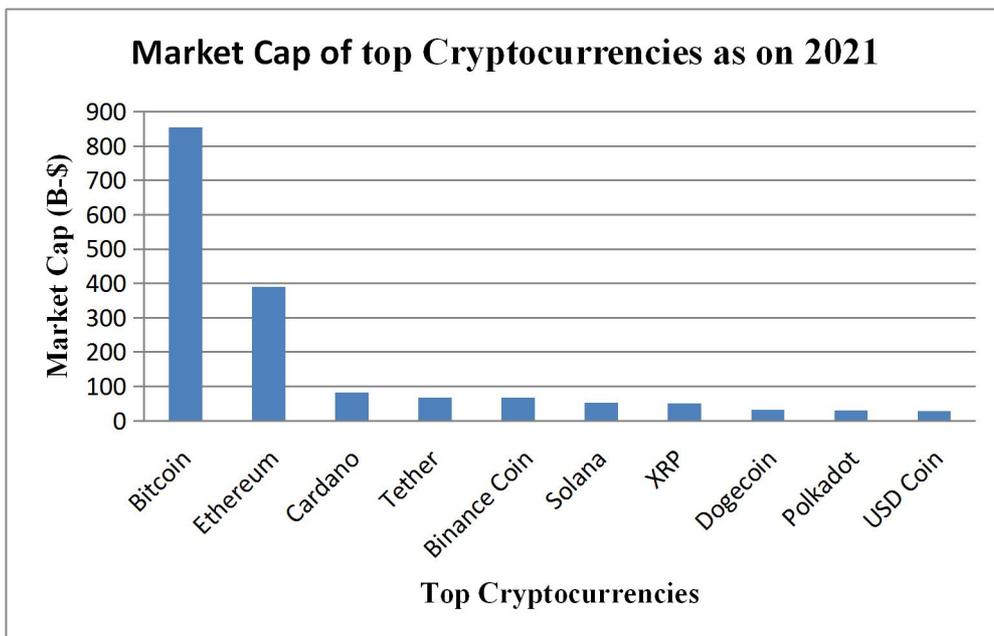
## RESEARCH METHODOLOGY

The research depends on secondary data gathered from multiple of financial websites, books, national and international journals, and articles, research paper that focused on various elements of Blockchain.

**Data Analysis and Interpretation**
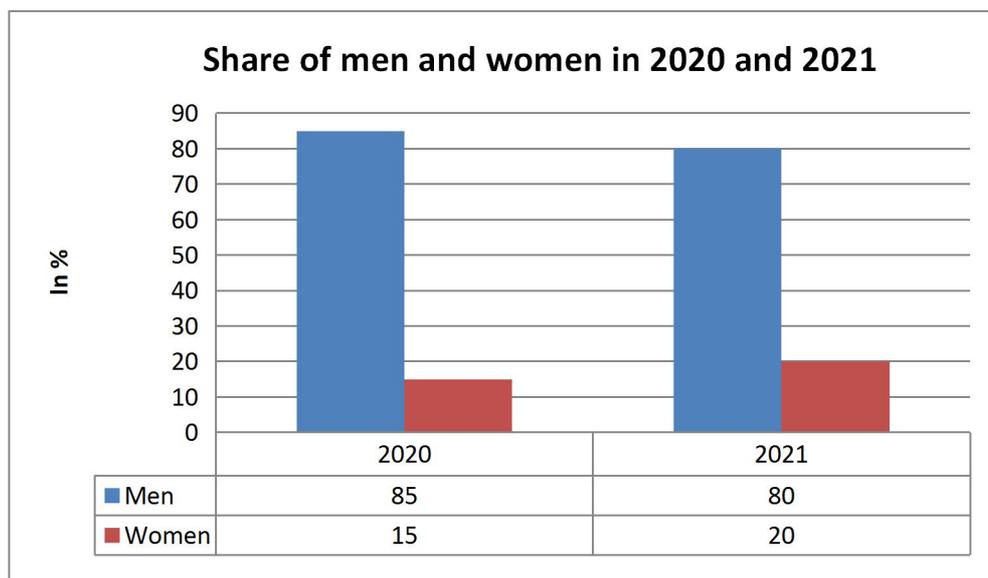
**Market Cap of top Crypto currencies during 2021**

| Name | Symbol | Market Cap |
|---|---|---|
| Bitcoin | BTC | $854.87B |
| Ethereum | ETH | $390.31B |
| Cardano | ADA | $82.29B |
| Tether | USDT | $68.39B |
| Binance Coin | BNB | $68.29B |
| Solana | SOL | $52.62B |
| XRP | XRP | $50.29B |
| Dogecoin | DOGE | $31.74B |
| Polkadot | DOT | $31.19B |
| USD Coin | USDC | $29.21B |

### Market Cap of top Cryptocurrencies as on 2021

*(Bar chart: Market Cap (B-$) vs Top Cryptocurrencies — Bitcoin highest (~850), Ethereum (~390), Cardano, Tether, Binance Coin, Solana, XRP, Dogecoin, Polkadot, USD Coin in descending order.)*

Top 10 crypto currencies and their market cap are shown by Table&Charts ,Where Bitcoin at number one with $854.87B, Ethereum at number two with $390.31B and Cardano is at number three with $82.29B.

**Share of men and women among the customer base of cryptocurrency exchange CoinDCX who own a cryptocurrency in India in 2020 and 2021**

| Year | 2020( in %) | 2021( in %) |
|------|-------------|-------------|
| Men | 85 | 80 |
| Women | 15 | 20 |

### Share of men and women in 2020 and 2021

*(Bar chart showing "In %" for 2020 and 2021 with Men and Women bars.)*

| | 2020 | 2021 |
|------|------|------|
| ■ Men | 85 | 80 |
| ■ Women | 15 | 20 |

This data shows the participation of men and women in cryptocurrency during 2020-2021, with 5% increase in the participation of women in 2021 compared to 2020.

**Working of Blockchain technology**

Let's have a look at the working of Blockchain. Here is a step-by-step process of working of Blockchain technology;

Step 1: A transaction is demanded in the first step. The transaction may be for the transfer of knowledge or a monetary asset.

Step 2: To represent the transaction, a block is formed. The transaction, however, has not yet been authenticated.

Step 3: The network nodes will now receive the transaction-containing block.

If the blockchain is public, it is sent to each node . Each block is made up of the previous block hash , current block hash and information or data.

Step 4:  The nodes will now begin validating or authenticating each other using the consensus method. In the case of bitcoin, Proof-of-Work (PoW) is used.

Step 5: After good authentication, the node is rewarded for their efforts.

Step 6: Now the transaction is completed.

**Types of Blockchain Network**

There are three types of Blockchain technology

A. Public Blockchain.

B. Private Blockchain.

C. Federated or Consortium.

**A.      Public Blockchain.**

A public blockchain is the permission-less distributed ledger  that anyone can participate and conduct transactions. It is a non-restrictive variant of the ledger in which each client has a copy of the ledger. This also means that anyone can access the public blockchain if they have an internet connection. One of the first public blockchains that were released to the public was the bitcoin public blockchain.

**Examples;** Bitcoin, Ethereum, Litecoin, NEO

### B.    Private Blockchain

A private blockchain is defined as the blockchain that works in a restrictive environment, i.e., a closed network. It is also known as permissioned blockchain which is under the control of an entity. Private blockchains are suitable for using at a privately-held company or organization that wants to use it for internal use-cases. It offers the same features as that of the public blockchain, providing transparency, trust and security to the selected participants. But major difference is that it's a kind of centralized as only one authority looks over the network.  The concept of permissioned blockchain is much broader as it can include public blockchain. Examples of Private blockchain: Multichain, Hyperledger Fabric etc.

### C.    Federated Blockchain :

This is another form type of Blockchain Technology.A consortium blockchain (also known as Federated blockchains) is another option for organisations that need both public and private blockchains to solve their problems. Some elements of the organisations are made public in a federated blockchain, while others are kept private. More than one entity manages a federated or consortium blockchain. There is no one centralised power at work here. In a nutshell, it provides all of the benefits of a private blockchain, such as transparency, security, and reliability, without the need for one party to consolidate power.

### APPLICATIONS OF BLOCKCHAIN TECHNOLOGY

With the launch of Bitcoin(a cryptocurrency) in 2009, the blockchain technology gained importance.It is technology behind the bitcoin. The blockchain technology is much wider than cryptocurrencies or digital currencies. It has moved far beyond cryptocurrencies. A number of companies are using blockchain technology and developers of blockchain are working on the use cases of blockchain. The technology's ability of ensuring the accuracy of transactions allow the companies to process data more efficiently. This, in turn, can have an impact on a variety of industries. Blockchain technology has numerous applications across every industry.

**Some use cases of blockchain technology are as follows:**

### A.    Voting Systems

One of the most effective applications of Blockchain technology is in voting systems. This technology would be used to record and report votes, as well as to prevent various types of voter fraud in elections. Voter fraud is one of the most serious issues in the voting system. This is a problem that

blockchain's decentralised muscle can solve. The use of blockchain technology in the voting process can increase transparency in the voting system.

### B.    Heathcare

Another application of blockchain technology is in the healthcare.

It can help with the transition from institution-driven to patient-centered interoperability.  Patients can use blockchain technology to set access rules for their medical information, such as granting specific researchers access to the rest of their data for a set period of time.Patients can also use blockchain to automatically connect to other hospitals and collect their medical data. This technology enables the secure transmission of patient health records and maintains the medicine distribution network.Thus, blockchain has the power to change health care by putting the patient at the centre of the ecosystem and improving the security, data confidentiality and integration of health data.

### C.    Insurance

Another best use of Blockchain technology can be seen ininsurance industry also. This industry is adopting new technologies on daily basis.Blockchain is a decisive factor that is reshaping the insurance market and assisting it in breaking free from obsolete procedures. As insurance companies seek to employ blockchain developers to assist them, they are motivated by both curiosity and fear. Curiosity stems from blockchain's promise of saving time and lowering transaction costs. At the same time, insurers are feared of this invention as it may help pave the way for cyber-attacks. Simultaneously, insurers are concerned about this innovation because it may open up new avenues for cyber-attacks. Over 80% of insurance businesses have deployed or plan to utilise blockchain technology, as per the Accenture Technology Vision 2019 report.It improves the  productivity, security, and transparency of the insurance sector.

Insurance firms can be benefited  in various ways:

•       Insurance businesses can create far more consumer profiles and reduce the number of similar records. .Insurance firms will not challenge the veracity of data in a blockchain ledger since it is unchangeable.

•       . Consumers will be able to see what information their insurers have on them and how that information is used. Aside from that, claim processing can be quick, leading to faster payments.

•       Blockchain aids in the automatic verification of third-party claims being raised via personal devices.

Thus, Distributed Ledger Technology (DLT) seems to have potential uses for standardising insurance claims processing, improving cybersecurity protocols, and accelerating payments.

### D.      Banking sector

The banking sector is another area where blockchain technology can be used. It is reshaping the entire banking sector. Blockchain, a decentralized public ledger, stores transactions in an unbreakable chain in such a way that the parties involved in the transaction can view.The benefit of Blockchain seems to be that financial statements are quickly validated, cleared, and finalized without the need for a centralized authority. Since it serves  both irreversible as well as tamper-proof recording of financial statements in a decentralised network,it has the power to alter banking business processes and has a wide range of applications, including virtual currency, trade finance, Know Your Customer(KYC) ,cross-border payments, rapid payment processing, auditing, and so on.In this way, blockchain will completely alter the banking  industry in the near future.

### E.      Agriculture sector

Another appropriate example where blockchain can be used extensively is agriculture. Because agriculture is the primary source of employment and contributes to GDP, a much more efficient production process would be expected to address the needs of a growing population. The demand for food is projected to rise by 35% by 2030. With the advancement of new technologies, this sector has seen many modifications. The transparency and cost-effectiveness capabilities of blockchain have multiple applications in agriculture.

It promotes productivity and transparency throughout production chains by recording information regarding the origin of the goods, the date of manufacturing, and the details of manufacturer.

•       As a result of increased transparency and productivity,production processes can be improved with the implementation of blockchain technology.

•       Since there is an increasing consumer demand for information about the origin of the products they purchase, a door for implementing blockchain technology has opened.Transparency for end users is increased as a result.

•       The implementation of blockchain technology can make the management of financial, accounting, and administrative data more accessible and efficient.

### F.     Real Estate

Blockchain technology is becoming increasingly meaningful in the Real estate sector. Because the real estate sector in India is based on paper documents, transparency is extremely low.To disclose appropriate information, blockchain technology may assist investors in order to determine the identity of the land, ownership information of the land, list of transactions that have occured on the land, controversies, registration, cost structure,  and so on.Thus on the basis of above discussions, we can

say that blockchain technology is transforming the real sector and is being implemented across various sectors and industries.

## Conclusion

As a result of the above debate, it is concluded that blockchain is a promising technology that has the potential to change the nature of global transactions and commerce, as well as several online services we use. Blockchain when combined with other innovations, allows companies to rethink their processes and activities, eliminate waste and inefficiency, increase accountability and authenticity, and create a stronger business standards. The aim of Blockchain technology appears to be to establish a decentralised world in which transactions and data are not controlled by a third party.Moreover, further research is needed to address the significant governance and technical issues that this entails. Scalability issues, as well as a scarcity of talent and standards could curtail both its adoption and the creation of new blockchain applications. Meanwhile, these characteristics create a slew of technological issues and weaknesses that must be tackled.Despite these obstacles, scores of new applications using distributed ledger technology have emerged in almost all the sectors.

This study further suggests that there are extensive research possibilities in this field, so there is an essential need to investigate and pursue improvements simply by mitigating flaws and the performance.

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