PalArch's Journal of Archaeology of Egypt / Egyptology

BLOCKCHAIN IN THE STOCK MARKET: ASSESSMENT OF DRAWBACKS IN THE TRADING PROCESS AND PROPOSED SOLUTION FOR THE TRADING PROCESS USING BLOCKCHAIN

Shashwath Shetty [1], *Madhavi Damle* [2]

[1,2]Symbiosis Institute of Digital and Telecom Management,

Symbiosis International (Deemed University), Pune, India.

Email: mdamle@sidtm.edu.in

Shashwath Shetty, Madhavi Damle: Blockchain in the Stock market: Assessment of drawbacks in the trading process and proposed solution for the trading process using blockchain -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6). ISSN 1567-214x

Keywords: Blockchain, immutable, peer-to-peer, Stock market, transparency, Decentralization, Consensus mechanism.

ABSTRACT

Indian stock market consists of delays in days, for transactions, due to intermediaries, clearance, and regulations. Blockchain implementation solution proposed as a hybrid Blockchain model tweaked to defeat the inadequacies of the current system in the Indian trade and to build an efficient system. The study proposes that the utilization of such Blockchain can bring numerous advantages that different innovations as of now being utilized can't offer. Peer to peer exchange and consensus mechanism that is in place to validate transactions are the blockchain processes that can massively affect the current trading process. Due to the use of blockchain, there will be a reduction in transaction costs with increased transparency and increased pace in the clearing and settlement process which will probably draw in new ventures and increase liquidity in the system.

1. Introduction

Stock Exchanges play an exceptionally noteworthy job in the development and progress of the economy of any nation. Current stock trades are exceptionally

computerized and can deal with a massive number of transactions in a little proportion of time, guaranteeing their authenticity, execution, and security. This happens at the expense of the transaction fee and the transaction fee is usually proportional to trade value or fixed charge per trade (Bhandarkar et al., 2019).

The conventional stock exchanges are centralized. All the trading requests are collected or gathered in the centralized application. This design has numerous advantages by having a focal position that guarantees the genuineness, security, and legitimacy of the exchanges. Be that as it may, the centralization has additionally plenty of disadvantages, for example, a single point of failure, a potential performance bottleneck, or vulnerability to attacks (Bhattacharyya, n.d.). Besides, the focal authority regulates the charges and there is a lack of transparency for the trader. It additionally experiences different impediments, for example, various versions of the data being kept up in isolated systems and their advancement over various decades, making those frameworks complex. In the Indian context, it takes T+2 days (SEBI, 2017) for settlement of trade-in equity and the charge depends on the depository participant (broker) of the customer or investor.

This is the place blockchain technology proves important. Blockchain technology promises to maintain a single version of data, immutable data, and provide faster reconciliation process and trade settlement (Bhattacharyya, n.d.).

2. Dimensions affected in Traditional market

The present process of clearing and settlement adopted in the Indian stock exchange is centralised, complex and takes T+2 days for a transaction to get completed. In this section, we will go through various available literature in the application of blockchain in the stock market.

The authors of (Zheng et al., 2017) say that blockchain's main characteristics are Auditability, decentralization, persistence and anonymity. In the blockchain, it is important to validate the block which is done by consensus algorithms. Blockchain is immutable. This paper has compared various consensus algorithms based on properties like node identity management, tolerated power adversary, and energy-saving. It discusses the various challenges that stand in front of blockchain technology like scalability, selfish mining, privacy leakage. The authors in (Pop et al., 2018) proposed a decentralized stock exchange framework to handle the inadequacies of the centralized system by utilizing blockchain technology. They ran the Simulation one by following a traditional centralized system and another by using a decentralized system. They conclude from the simulation that for a decentralized system, fee changes as per the number of orders in the order book and not as per the value of the transaction. The fee charged in a decentralized system is lesser as compared to the centralized one. The time for a transaction depends on the amount that the user is willing to pay. More the user is willing to pay faster the transaction will be mined. The authors in (Bhandarkar et al., 2019) explain that digital stocks can be used by the buyer and seller to perform peer-to-peer transactions between themselves through a blockchain. Digital stocks are basically tokenization of real-world stocks. There would be no need

of intermediaries or brokers. Therefore, the cost of transactions would reduce as there would be no brokerage charges. Digital stock improves transparency as well.

The idea of the utilization of a consortium Blockchain was put forth by the authors for the process of clearing and settlement. The consensus algorithm to be used in this framework would be Proof of Stack (PoS). According to them, blockchain technology would bring down the cost as compared to already existing legacy systems. Additionally, the Settlement of securities can be done in minutes rather than days with an enhanced degree of transparency and trust. All of this will lead eventually to an improvement in liquidity (Miraz & Donald, 2019). The paper (Malinova, 2016) tells that the three properties of distributed ledger namely 'electronic nature of blockchain securities', 'possibility and simplicity of peer-to-peer interactions', and 'possibility of linking ownership to public key' are critical and allow new market designs as compared to present-day security trading. The paper in a simplistic view, says that it only considers it to be an efficiency upgrade as blockchain-based trading simplifies and accelerates the exchange and settlement process. The authors in these papers (Seretakis & Seretakis, 2019), (Lee & Lee□, 2016) say that distributed ledger technology can radically alter the current clearing and settlement cycle. The technology can lead to the reduction of costs and the shortening of the time required for clearing and settling securities transactions. Also, the technology will lead to increased transparency as the transactions are public. Various areas of the capital market are explored by the author in (Bhattacharyya, n.d.) which can embed blockchain and says that blockchain leads to more trustworthy data as it is stored on a consensus basis. The need for a costly reconciliation process gets eliminated as the records in the distributed ledger are immutable and it can be viewed and verified by everyone due to high transparency in the system. This leads to faster settlement as transactions can be settled in real-time. The author of (Blostein et al., 2016) estimates how the application of blockchain in the clearing and settlement process of equity markets will help capital markets in America. They believe that US cash equities trading could benefit from the usage of blockchain, mainly in the clearing and settlement process. They believe that back-office functions would be streamlined, trade errors will get reduced or eliminated and settlement times would get reduced. They also estimate that blockchain could lessen the yearly cost base in equities trading.

3. Objective:

Blockchain technology, the emerging technology is viewed as the next enormous thing and is relied upon to change the way exchanges are done over the web. In this paper we will look at:

1. The functioning of blockchain technology.
2. Understand the various participants and the flow of trading of equity in the stock market in India.
3. Understand Shortcomings or areas of improvement in present-day transactions.

4. Understand how blockchain can help in the current process of Stock trading and overcome the shortcomings.

In this paper, we will understand the flow of only equity trading in India and propose a system using blockchain to overcome the shortcomings in the present-day equity trading.

4. Methodology

Through this study, we will be looking at the advantages that blockchain brings along with it by going through different research papers published in the field related to the application of blockchain in the stock exchange. It is a concept paper and considering the complex operational process of the stock exchange in India, this paper proposes a hybrid Blockchain model, tweaked to defeat the inadequacies of the current system in India, and satisfying the need of the current stock exchange.

5. Overview of Blockchain Technology

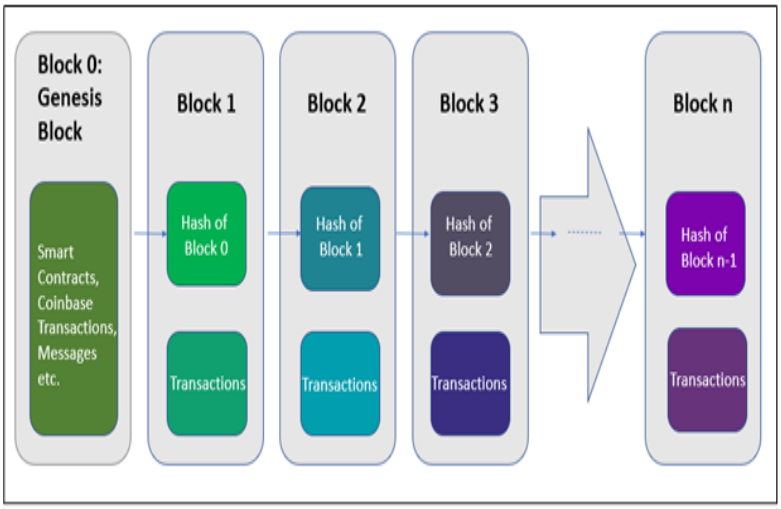

Figure 1: An example of blockchain transaction.[Adapted from: (Miraz & Donald, 2019)*]*

Miraz and Donald in their paper say that Blockchain in simplest terms can be described as a chain of blocks like a progression of connected metal rings utilized for affixing, or for pulling loads. The metal rings of a customary chain get replaced with blocks in the blockchain. A collection of transactions finished inside a particular time period is contained in each block. The inside components of the block need to be understood (Miraz & Donald, 2019). The leading block of the chain, also known as the genesis block is unique when compared to different blocks because it contains smart contracts. An agreement between non-trusting participants is encoded in a smart contract (Alharby et al., 2018). Smart Contracts contain the guidelines for the nodes that should be followed for validation and verification of different nodes as well as for instructions for the routine operations. It might alternatively contain transactions. The above figure shows that the previous block's hash is present in each block.

Figure 2 below shows that a block contains version number which accounts for 4 bytes, previous hash which holds the hash of the previous block, and

accounts for 256 bytes. It also contains nonce (4 bytes), the timestamp in seconds (4 bytes), Merkle root hash, and bits which contains the current difficulty level (4 bytes).

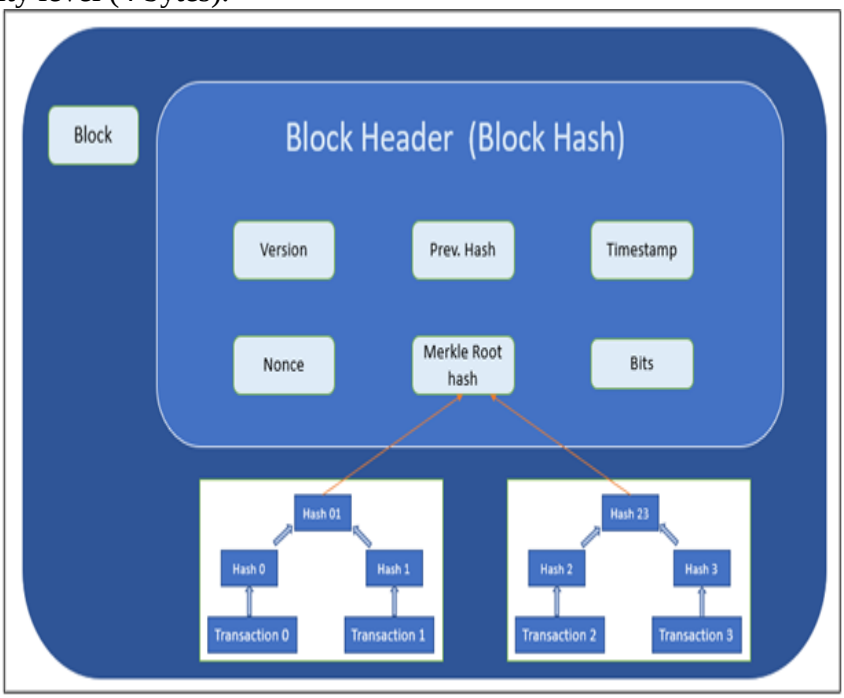

Figure 1: A simplified example of a block [Adapted from : (Miraz & Donald, 2019)]

Public key cryptography is being utilized by blockchain, to prevent the leaking of any sensitive information and to ensure that trades between users happen in a safe and secure manner. Every user needs to create a private key. The private key should be owned by the user and should not be disclosed to anyone. If the user loses private key then the user will not be able to transact on the network, therefore it should be backed up. A random private key number gets generated by the software which is made up of 256-bit binary numbers. This 256-bit binary number can be compressed to a 64-digit hexadecimal number. Using their private keys, a corresponding public key must be created. Elliptic curve cryptography is used for private to public key conversion. The private key cannot be figured out if any user has the public key, yet in the event that the user has the private key, a similar public key outcome will be obtained consistently (Lee & Lee□, 2016).

A cryptographic hash is calculated with the help of a mathematical algorithm. This algorithm accepts data of any size as input and gives an output of fixed size known as "hash (Miraz & Donald, 2019). As shown in fig 3, message and private key are used to derive the digital signature cryptographically. Therefore, a digital signature will get altered if any changes are made in the message. Any participating node can trigger a transaction on the condition that the participating node must have a public/private pair of keys. The node which triggers the transaction with the help of the private key "digitally" signs it by encoding it. The transaction message is then verified by different nodes by decoding it with the help of the corresponding public key. In Asymmetric

cryptography, for every public key, there will be one corresponding private key. This kind of asymmetric cryptographic verification framework gives non-repudiation and integrity and also hides the identity across the network. Figure 3 shows the formation of a digital signature.

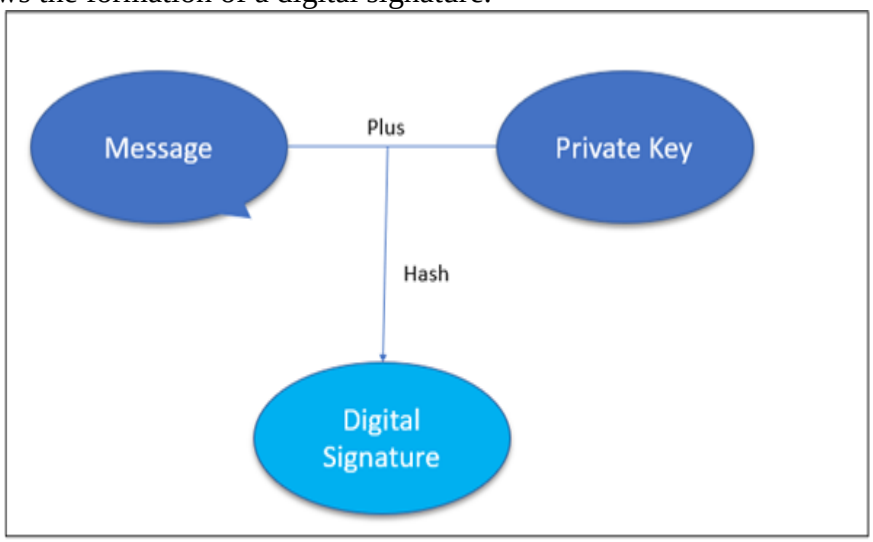

Figure 1: Formation of digital Signature [Adapted from : (Lee & Lee, 2016)*]*

It is a challenge to arrive at a consensus in a distributed and decentralized environment like blockchain. Proof of work is one of the consensus algorithms that blockchain uses to ensure that ledgers in all the distributed nodes are consistent. In POW, nodes would calculate the hash value of the block by changing the nonce in the block header frequently to arrive at a hash value which must be lesser or equal to a specific value. If the node arrives at the desired hash value then it would disseminate the block to other nodes in the system. Other nodes must undergo the same process so that all the nodes mutually validate the block. If the block is not validated, then the node discard/reject the transaction/block. Once the block is validated then that particular block is appended in the existing blockchain. Blocks might get validated by different nodes simultaneously in this decentralized network. In this consensus algorithm, a chain that ends up being longer from there on is decided as the credible one (Zheng et al., 2017). A lot of computational power is spent by the miners in solving PoW. The use of hashing procedures consequently helps effectively distinguish any misrepresentation or alteration in a block. This makes the Blockchain forgery-proof, secure, and for all intents and purposes unbreakable. A chronological approach is adopted by blockchain while building and adding blocks to the already present blocks. During this process, the previous block's hash is also recorded in each block. The current block’s hash consequently fills in as a combined hash of all the previous blocks. Alterations are required to be made in all the subsequent blocks if transactions in any one block are altered. Any past block’s transaction data cannot be altered since the previous block’s hash is present in each block. In this way, PoW helps in establishing immutability (Miraz & Donald, 2019).

As PoW requires a tremendous amount of computational power, there is an alternative consensus algorithm named as Proof of Stake (POS). Less amount of computational power is utilized in POS but in this consensus algorithm, miners must prove that the amount of currency belongs to them. It works with the supposition that the tendency to attack the system is lesser in individuals having more monetary power. The selection of miners based on the assumption is very unjustifiable on the grounds that the richest miner will undoubtedly try to be dominant in the system. Therefore, numerous arrangements are being put forth with the blend of the stake size (Zheng et al., 2017). But the selection of a consensus algorithm depends on the application. Fig 4 explains the blockchain transaction in a simpler way.

Blockchain can be differentiated based on who has the read and write access:

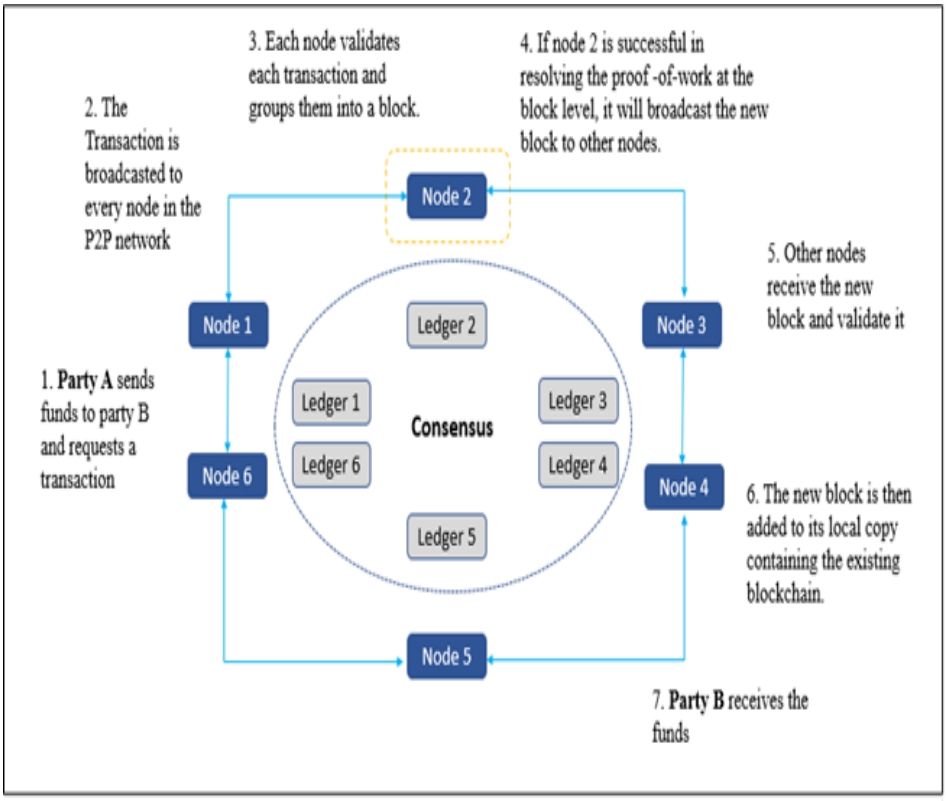

Figure 1: Simplified view of entire blockchain transaction [Adapted from: (Bhattacharyya, n.d.)]

a) Public (Permission less) Blockchain

Public blockchain also known as permission less blockchain does not require preapproval. It is open for anybody to join in (Miraz & Donald, 2019). Any participant can read, view, and make changes to the data due to its permission less nature. Validation of transactions is done by all the participants. The level of transparency is very high in public blockchain as data is visible to each participating node.

b) Private (Permissioned) Blockchain

Private blockchain also known as Permissioned Blockchain permits just some "trusted" nodes to join the framework (Miraz & Donald, 2019). Nodes generally have the authorization to read and write. However, role-specific permissions to write can also be given. There is improved privacy in this system as the data is visible only to selected nodes. Nodes can be added and removed by enterprises based on demand.

c) Hybrid (Consortium) Blockchain

Hybrid Blockchain also known as the consortium blockchain system resembles private Blockchain as far as providing write access is concerned. In this type, access to writing is provided to certain nodes. As in public blockchain, read access is open, unlike private blockchain. In this manner, Hybrid Blockchain is a combination of above both types (Miraz & Donald, 2019).

6. Participants and flow of equity trading in India

A platform created to empower the exchanges of securities among brokers or users with low trade costs and high liquidity is known as a Stock exchange. Stock exchanges are governed by public laws and regulations. The stock exchange also has its own interior rules. These rules and regulations are formed to bring down instances of default, fraud, and mistake.

i) Introduction to participating bodies

Indian securities exchange is one of the well-known security exchanges in the world, that caters to the huge population of this country and provides them with investment opportunities. Bombay Stock Exchange (BSE) was set up in 1875. The depression after independence resulted in the closure of many Stock exchanges in the country. NSE and BSE are the two major stock exchanges in the country currently. In any ecosystem, there is a need for a regulatory body. SEBI is the regulatory body in the country. The other participating bodies include depositories, clearinghouses, investors, and brokers.

ii) Securities and Exchange Board of India (SEBI)

In India, SEBI regulates Securities and Commodity market. Established in 1992, Statutory Powers were given to the institution through the SEBI Act, 1992 (SEBI, 1992) on 12 April 1992. Indian government owns the Institution. Main responsibilities include laying down rules and regulations for the security exchange in India and charge entities or individuals with a penalty in case of fraud.

iii) NSE and BSE

The primary focal point of stock exchanging India is on the organizations that are enlisted with the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). There are numerous other stock exchanges in India but these two are the biggest ones. The Bombay Stock Exchange lists close to 5518 Indian organizations. The approximate market capitalization of companies listed on BSE was of 2.2 trillion dollars (BSE, 2020) as of April 2018, making

it one of the biggest stock exchanges in Asia and the entire planet (Rawal, 2015).

NSE is another big stock exchange in the country and has a market capitalization of around 2.27 trillion dollars and in excess of 1799 listings. An open electronic order book is utilized for trading activities in both organizations and for trade matching, a trading computer is used. Both follow the T+2 rolling settlement for equity trade.

iv) Clearing Houses

A clearinghouse goes about as a middle person between a purchaser and dealer and tries to guarantee that the procedure from the commencement of trade to settlement is smooth. Making sure that agreement obligations are being respected by both purchaser and dealer is the principal job of clearinghouses. Duties incorporate clearing trades, reporting trading data, settling trading accounts, and regulating delivery of the bought/sold instrument. While performing the above activities, a clearinghouse gives the effectiveness and security that is fundamental for the stability of the market.

In India, the capital market regulator SEBI has said that NSE clearing limited once in the past known as National Securities Clearing Corporation Ltd (NSCCL) of NSE, Indian Clearing Corporation Ltd (ICCL) of BSE, India International Clearing Corporation of India International Exchange (IFSC) Limited (India INX) and NSE IFSC Clearing Corporation Limited of NSE IFSC Limited (NSE International Exchange) are the clearing corporation related to stock trading. India International Exchange (IFSC) Limited (India INX) and NSE IFSC Limited (NSE International Exchange) are the subsidiaries of BSE and NSE respectively. There are clearinghouses for the commodities market as well (SEBI, n.d.-a).

v) Investment types

Investing is the demonstration of submitting cash to an undertaking with the desire for getting extra pay. Basically, it implies giving the cash something to do for you and in the process earn some income from it. The various investment types are as follows:

1) **Bonds**: - Bonds are debt securities and are also known as fixed-income securities. Bonds are raised when the government or company needs money. At the point when you buy a security, you are loaning out your cash to an organization or government. Consequently, they pay the interest on your money and in the long run repay you the sum you loaned out (S.Sankar, 2013).

2) **Stocks**: - If an investor holds an organization's stock, it implies that the investor is one of the numerous proprietors (investors) of an organization and has a stake in the ownership of the organization. As a proprietor, you are entitled to receive dividends and for the voting rights in the important matters of the organization. The dividend is received only if the company books profits (S.Sankar, 2013).

3) **Mutual Funds:** - Mutual fund is an investment fund where you pool your money along with many other investors. The experts manage the mutual funds

who invest your pooled money in stocks or bonds or both. Experience and time are not required while investing in a Mutual fund.

4) **Futures**: - Futures contract are financial derivatives wherein the buyer gets into an agreement to make or take conveyance of an item later on, at a value set in the present. Futures are either used for hedging in order to avoid losses in the future (Gautami & Kalyan, 2018).

5) **Options**: - Option writer sells the financial derivative that represents a contract to option holder. Because of the contract, the buyer has the right to sell (put) or buy(call) a security or other at a settled upon cost during a certain timeframe or on a particular date. But while doing so, the buyer is under no obligation (Gautami & Kalyan, 2018).

6) Gold, Forex, Real estate, etc. are some other investment types. In this paper, our focus is to understand the flow of equity trading.

vi) Trading Account and Demat Account

"Dematerialization of shares or Demat" is the conversion of physical share certificates into electronic form. Shares are saved in electronic form in the Demat account. Currently in Indian stock exchanges around 99 percent of shares are traded in Demat mode (S.Sankar, 2013). If a person desires to buy or sell stocks, then he should open a Demat account. Dematerialization of shares has helped in avoiding endless paperwork and delays and has made trading easier.

A trading account functions as a middle person between the Demat account of the trader and the savings account. Through the trading account, an investor can place buy and sell orders. At the point when a trader wants to purchase shares, he needs to place an order through the trading platform. After this, the cash is moved from the trader's bank account to his trading account. Following this, the number of shares bought gets transferred to the Demat account.

vii) Depository and Depository Participants

Any investor needs to open a Demat account with any of the depositories through a registered depository participant. An entity where securities are held in an electronic form in the Demat account is a depository.

The two depositories that are functional in India are (SEBI, n.d.-b):

- National Securities Depository Limited (NSDL)
- Central Depository Services Limited (CDSL)

The risk associated such as Delays, bad delivery, thefts, fake securities, etc. with physical certificates gets eliminated due to depositories. A convenient and safe way of holding securities is provided by depositories and securities can be transferred instantly.

Depository Participant (DP) acts as the middle man between the investors and the depository. An agreement under the Depositories act governs the relationship between depository and the DP. Hence a DP goes about as a custodian or caretaker of your securities present in the Demat account and performs any sort of actions on your securities only as per your instructions. Depository-related services can be offered by a DP only after obtaining a

certificate of registration from SEBI, under the provisions of the subsection 1A of Section 12 of the SEBI Act, 1996 (Ahmad, 1996).

viii) The flow of equity trading in India

Below is the table explaining the stepwise processes that happen while stock is traded in India (BSE, n.d.).

Day	Process
On T Day	1) The buyer/seller places the order through a broker. 2) Order gets placed on BSE's/NSE's Trading platform. The order gets executed on the trading platform through an automatic order matching system. The automatic order matching system works in a manner such that it will match the order of the buyer and seller until they decide on the same price. 3) Executed order details are provided to the clearinghouses of both the stock exchanges These order details are advised to the client(buyer/seller). 4) Money is deducted from the buyer's account and credited to the buyer's broker's account. The broker is also known as a clearing member. Likewise, on the seller front shares will get deducted and get credited to the seller's broker's account.
On T+1 day	1) Clearinghouses will make the trade available for confirmation to the clearing members. 2) On Confirmation, clearing member needs to transfer money to the clearing bank. Clearing bank is a dedicated bank account of the buyer's broker in a bank Similarly, a clearing member on the seller side will transfer shares to the pool account of the seller's broker in the depository.
On T+2 Day	1) On T+2 day, the clearing bank on the buyer's side will transfer money to the clearing bank on the seller's side. Similarly, Shares will get transferred from the pool account on the seller's side to the pool account on the buyer's side. 2) Finally, the money will get credited in the seller's account from the clearing bank and shares will get deposited in the Demat account of the buyer.

Table 1: Processes that take place during stock trading

The below figure tries to explain the process.

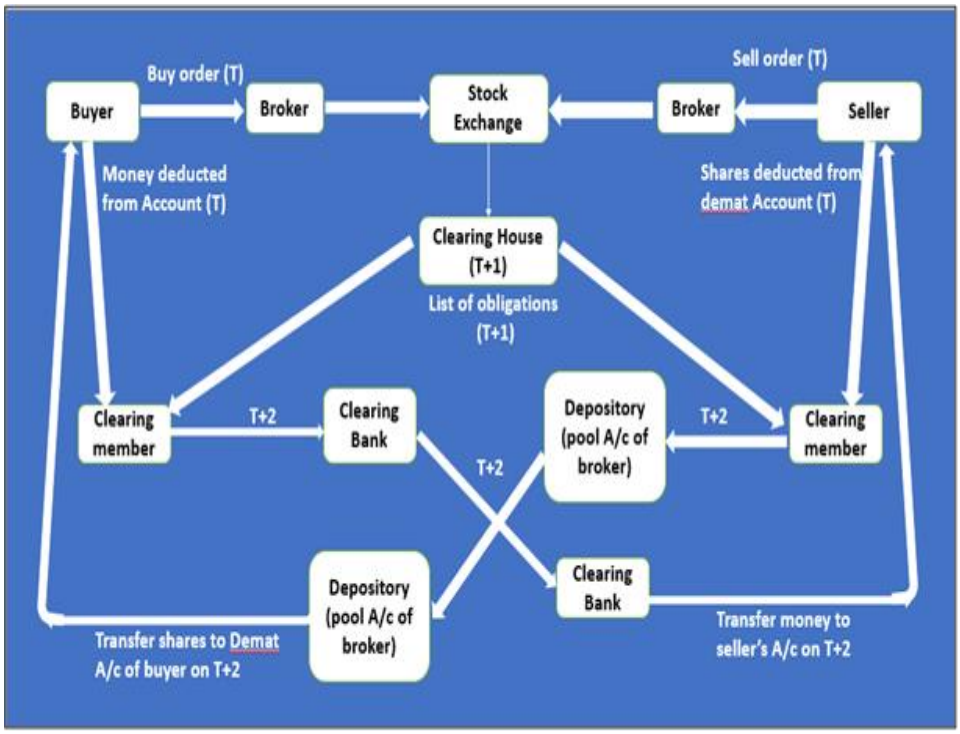

Figure 1: Flow of equity trading in India

7. Proposed Solution: Application of blockchain in Stock market

Blockchain is being gradually embraced by different leading security exchanges. NASDAQ was one of the first institutions that worked in the direction of adopting Blockchain. They have used blockchain to complete private securities transactions for chain.com (Bajpai, 2017). Another institution that has moved in the direction of adopting blockchain is ASX (Australian Securities Exchange). They have adopted blockchain to replace its current clearing and settlement framework. IBM and the Japan Exchange Group (JPX) are testing the capability of technology in low transaction markets. London Stock Exchange (LSE) joined forces with tech giants IBM in the direction of using Blockchain in a significant manner in July 2018. Korea Exchange, Santiago exchange are other exchanges working in the direction of adopting blockchain in their system. (Bajpai, 2017).

As we could see that the stock exchange operations in India are very complex. Therefore, keeping in mind the nature of securities exchange in India, we put forth the idea of utilizing hybrid blockchain also known as consortium blockchain with proof of work in the clearing and settlement process. The design of the blockchain network can be done in a flexible manner (Bhattacharyya, n.d.). Different roles or permissions can be assigned to nodes in the blockchain. There will be nodes who will be able to both initiate/receive and validate transactions. Other types of nodes who will be member nodes will be able to only initiate/receive transactions. Central exchange systems will carry out the function of matching orders. Institutions like clearinghouses of both stock exchanges whose major role is in the clearing and settlement

process will act as a Validator node to validate transactions and regulation. Admin node will be one who will have the privilege of providing access to the system, dispute settlement. There can be two roles of admin; Super admin and admin. Super admin will be having the highest level of authority. Super admin will decide which bodies or institutions will have their respective rights. Then comes admin who will have a lower level of authority as compared to super admin but will be able to add member nodes. SEBI can act as the super admin of the system as it is the regulator of security trading in India. There will be no need for brokers because of blockchain. Requests for trades can be placed on the common platform provided by the exchanges and the distributed ledger will be visible to all the participating bodies.

Based on the overview of blockchain technology, BC if implemented effectively in stock exchanges could bring genuine advantages.

1) It will result in better transparency compared to the current approach as the same data is maintained in the distributed ledger.

2) Initially, costs would be high because of the initial investment required. But the blockchain would lower cost as compared to legacy systems and will require less maintenance which would eventually lower transaction costs in the long run. Also, blockchain results in the removal of third-party vendors or intermediaries. Therefore, users will not have to pay brokerage charges resulting in a reduction of cost.

3) Settlement in the traditional system takes T+2 days. With blockchain in place, the settlement and reconciliation process will be faster as the same copy of data is present with all the nodes.

4) Due to the use of hashing techniques, blocks get sequentially added in blockchain technology. Therefore, Blockchain will contribute towards a safe, secure, and reliable market.

5) Reduction in transaction costs over the long haul and reduction in post-trade inefficiencies with the use of blockchain will probably draw in new ventures and increase liquidity in the system. Comparison of the current traditional system and the proposed blockchain system:

Parameter	**Traditional system**	**Proposed blockchain model**
System	Centralized System	A decentralized system and the same copy of data will be present with all the nodes.
Cost	Cost is higher due to the presence of intermediaries and brokers. Users have to pay brokerage charges and account maintenance	Blockchain results in the removal of third-party vendors or intermediaries. Therefore, users will not have to pay brokerage charges resulting in a

	charges	reduction of cost.
Time	Settlement in the traditional system takes T+2 days. This happens because each institution has its copy of data resulting in a lengthy reconciliation process.	The settlement and reconciliation process will be faster as the same copy of data is present with all the nodes due to decentralization.
Immutable	Security systems in place but not completely tamper-proof.	Blockchain results in immutability and transactions once recorded cannot be tampered.
Transparency	There is low transparency.	Higher transparency and will help avoid unfair trading practices. Therefore, it will help in increasing trust in the market.

Table 2: Comparison between the current and proposed system

8. Discussion:

Inherent features of blockchain-like decentralization, distributed ledger, irreversibility, immutability, transactions in real-time offer some inherent benefits which the industry has been looking for quite some time. There are many challenges that come into play when the technology is transforming from its initial phases of development to the phase when it drifts from the research and development and when it paves way for moving to a large scale from fewer application deployments. The use-cases being considered initially, if successful, will definitely put forth the acceptance and adoption of blockchain that will be beyond the bars of the phases of experimentations and trials (Blockchain_The India Strategy, 2020).

1. Any emerging technology, in its early years of adoption, requires evangelists/champions across business functions, especially at the top. Besides, technical expertise is needed to ensure implementation. The requisite numbers for both are in short supply at present in India.
2. The actual issue and the challenge for large industries/corporations will be the integration of blockchain technology with the presently existing legacy systems that are complex as the implementation of blockchain will pave a way

from pilot trials/experiments to the adoptions made on a large scale. While adopting new innovations or technologies, risks like operational ones come into the picture.

3. The initial investment required to replace the old system will require huge money. The initial infrastructure cost of such a system, which unlike in a public blockchain could have been crowdsourced, must be borne by the business itself. The high cost of computing and development must come from the institution itself, and so will be the ongoing maintenance requirement.
4. The changes and modifications at regulatory and legal levels are very crucial to the implementation put forward, the deployment and implementation of blockchain even if it is at any scale. Whenever new technologies become part of the framework, new regulations are expected. Privacy of the consumer is of utmost importance; therefore, significant regulatory considerations are being done particularly around protecting personal information.
5. Indian stock exchanges see millions of transactions every day. Severe testing needs to be done to test the scalability of the technology before implementing it on a mass scale.
6. In the blockchain, no alterations can be done for the transactions that are recorded when there is an event where the contractual variables or parameters change or when while validating any particular exception is being thrown. To put forward another entry/record with an opposing characteristic is the best way to address and include such transactions. Such cases might be a hurdle for trade validation.

9. Conclusion

Blockchain is a promising breakthrough technology. In this paper, the blockchain technology overview, a brief introduction to various variants of blockchain technology was given. We also looked at the flow of equity trading in India and listed its shortcomings. This paper puts forwards a proposal which would help in overcoming the shortcomings.

The potential of blockchain is immense. Blockchain has great potential in transforming the traditional capital market industry because of its great characteristics such as decentralization, immutability, consensus mechanism to maintain the same ledger copy across all participants. Blockchain technology is being explored in a bid to enable stock exchanges to increase the efficiency in the clearing and settlement process by the major institutions around the world. Issues such as integration with legacy systems, scalability, regulation, and legislation need to be resolved for the wider adoption of the technology. Many start-ups are working aggressively to create prototypes, to better understand blockchain's limitations and potentials, before taking the dive. To Understand the limitations and potentials of blockchain better, prototypes are being created by many start-ups before adopting it. In any case, in spite of the obstacles that lie ahead, experts believe that the core infrastructure systems of the capital markets could be revolutionized around the globe by the DLT, thereby bringing in greater efficiency and transparency.

Bibliography

Ahmad, A. (1996). Depositories Act, 1996. 26(4), 551–556.

Alharby, M., Aldweesh, A., & Van Moorsel, A. (2018). Blockchain-based Smart Contracts: A Systematic Mapping Study of Academic Research (2018). International Conference on Cloud Computing, Big Data and Blockchain, ICCBB 2018, June. https://doi.org/10.1109/ICCBB.2018.8756390

Bajpai, P. (2017). Blockchain implementation by different Stock exchanges. https://www.nasdaq.com/articles/how-stock-exchanges-are-experimenting-blockchain-technology-2017-06-12

Bhandarkar, V. V., Bhandarkar, A. A., & Shiva, A. (2019). Digital stocks using blockchain technology the possible future of stocks? International Journal of Management, 10(3), 44–49. https://doi.org/10.34218/IJM.10.3.2019/005

Bhattacharyya, D. B. (n.d.). How Blockchain is Transforming Capital Market.

Blockchain_The India Strategy. (2020).

Blostein, A., Lee, B., Kent, S., Groer, I., & Beardsley, E. (2016). AT.

BSE. (n.d.). FPI transaction Flow. Retrieved July 20, 2020, from https://www.bseindia.com/static/fpi/FPITransactionFlowEquityPurchase.aspx

BSE. (2020). BSE market capitilisation. https://www.bseindia.com/markets/keystatics/Keystat_maktcap.aspx

Gautami, S., & Kalyan, N. B. (2018). a Study on Financial Derivatives With Reference To Tata Motors Limited , Chittoor District of Ap , India. GJRA - Global Journal for Research Analysis, 7(4), 430–433.

Lee, L., & Lee□, L. (2016). How Bitcoin's Technology Could Reinvent the Stock Market. Hastings Business Law Journal, 12(2).

Malinova, K. (2016). Market Design for Trading with Blockchain Technology. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2785626

Miraz, M. H., & Donald, D. C. (2019). Application of Blockchain in Booking and Registration Systems of Securities Exchanges. Proceedings - 2018 International Conference on Computing, Electronics and Communications Engineering, ICCECE 2018, 2018(August), 35–40. https://doi.org/10.1109/iCCECOME.2018.8658726

Pop, C., Pop, C., Marcel, A., Vesa, A., Petrican, T., Cioara, T., Anghel, I., & Salomie, I. (2018). Decentralizing the Stock Exchange using Blockchain.

Rawal, D. P. (2015). Indian Stock market and Investor strategy. https://books.google.co.in/books?id=xLsoCAAAQBAJ&pg=PA12&redir_esc=y#v=onepage&q&f=false

S.Sankar, D. K. M. (2013). Market Trading in India - Customer Perception. Research Scholar, 3(2), 1–13.

SEBI. (n.d.-a). Clearing houses, SEBI. Retrieved August 10, 2020, from https://www.sebi.gov.in/clearing-corporations.html

SEBI. (n.d.-b). Depository. Retrieved August 10, 2020, from https://www.sebi.gov.in/depositories.html

SEBI. (1992). SEBI Act,1992. https://www.sebi.gov.in/acts/act15ac.html

SEBI. (2017). Securities and Exchange Board of India. Draft Securities and Exchange Board of India (Issue and Listing of Debt Securities) Regulations, 2008 In, 4(1), 1–8. https://doi.org/10.1051/0004-6361:20054158

Seretakis, A. L., & Seretakis, A. L. (2019). Blockchain, Securities Markets, and Central Banking. Regulating Blockchain, 425(September), 213–228. https://doi.org/10.1093/oso/9780198842187.003.0012

Zheng, Z., Xie, S., Dai, H., Chen, X., & Wang, H. (2017). An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends. Proceedings - 2017 IEEE 6th International Congress on Big Data, BigData Congress 2017, 557–564. https://doi.org/10.1109/BigDataCongress.2017.85