BLOCKCHAIN

IN

STOCK MARKET

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1. ABSTRACT

Blockchain as driving force of future stock markets

In the world of blockchain, the regulators are perceived as the biggest barrier or enablers for its adoption. However, research suggests that a major section of organisations do not believe regulatory issues will be a barrier for increasing blockchain investments. This is also because many market regulators and global exchanges across geographies, including the NYSE and Deutsche Borse, have already shown their intent to evaluate the feasibility and advantages of blockchain.

Distributed ledger technologies is an exciting technological advancement in the information technology world. Blockchain technologies offer an infinite range of applications benefiting from sharing economies. More generally this paper evaluates the potential of distributed ledger technologies and implementing a blockchain-based application that improves security.

2. INTRODUCTION

- India's financial sector has shown the promise, which blockchain can bring in and is largely invested in the exercise to reap the benefits it can provide.

- Securities and Exchange Board of India (Sebi) is taking early steps to understand how the technology is being used in markets globally and possibly derive the benefits gradually. Recently, Sebi appointed an advisory committee called as Committee on Financial and Regulatory Technologies (CFRT) for conducting research on the blockchain platform and other technologies making waves in the sphere of fundraising, asset management and post-trade settlement.

- Japan's Financial Services Agency has allowed the Japan Exchange Group, which operates the Tokyo Stock Exchange, to use blockchain as its core trading infrastructure. In 2015, Nasdaq unveiled the use of its Nasdaq Linq blockchain ledger technology to successfully complete and record private securities transactions.

What does blockchain bring to the stock market?

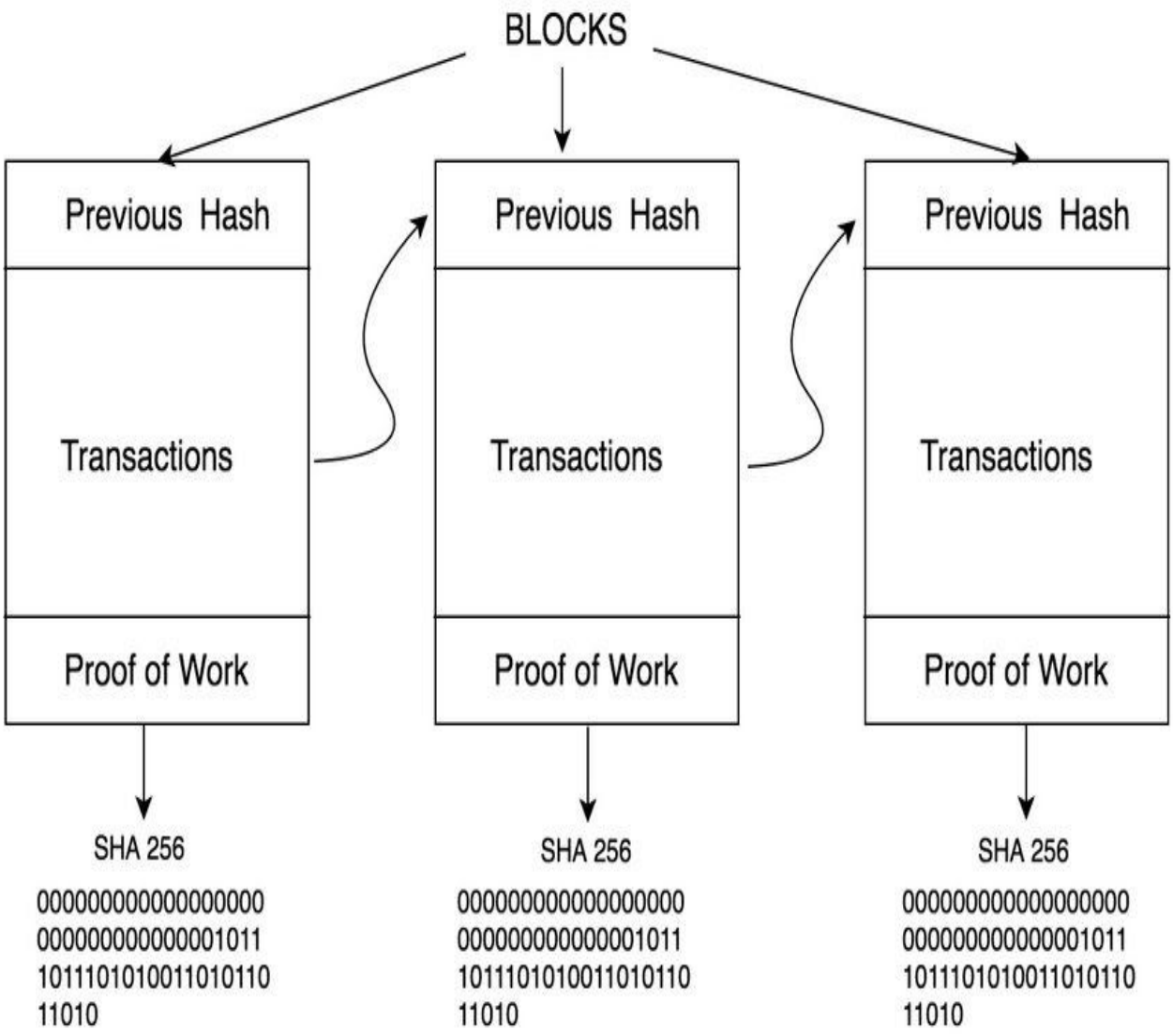
- Blockchain can be the answer to interoperability, trust and transparency issues in fragmented market systems.

- Stock market participants such as traders, brokers, regulators and stock exchange are required to go through a cumbersome process (which takes 3+ days to complete transactions, mainly due to the role of intermediaries, operational trade clearance and regulatory processes).

- Blockchain can make stock exchanges much more optimal through automation and decentralisation. It can help reduce huge costs levied on customers in terms of commission while speeding up the process for fast transaction settlements.

- The technology can have viable use in clearing and settlement, while securely automating the post-trade process, easing paperwork of trade and legal ownership transfer of the security.

- Blockchain can eliminate the need of third party regulator to a large extent, since the rules and regulations would be in-built within smart contracts and enforced with each trade in order to register transactions with the blockchain network acting as a regulator for all transactions.



What is a Blockchain ?

Blockchain technology : Invented back in 2008, blockchain technology has depicted the change that it can bring in different business areas. The technology, even in its infancy, has disrupted different industries and sectors. A blockchain is a distributed, immutable, incontrovertible, public ledger.

This new technology works through four main features:

(i) The ledger exists in many different locations: No single point of failure in the maintenance of the distributed ledger.

(ii) There is distributed control over who can append new transactions to the ledger.

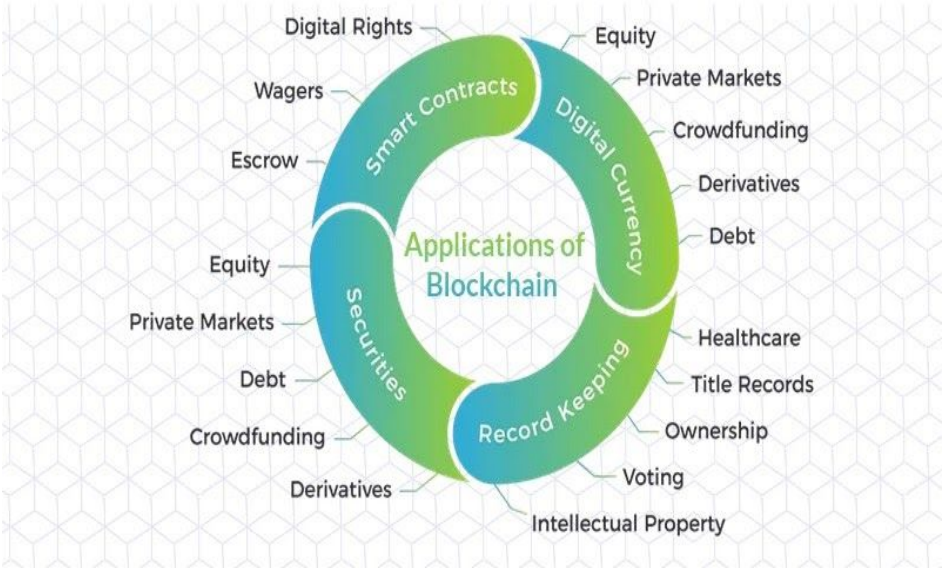
(iii) Any proposed “new block” to the ledger must reference the previous version of the ledger, creating an immutable chain from where the blockchain gets its name and thus preventing tampering with the integrity of previous entries.

(iv) A majority of the network nodes must reach a consensus before a proposed new block of entries becomes a permanent part of the ledger. These technological features operate through advanced cryptography, providing a security level equal and/or greater than any previously known database. The blockchain technology is therefore considered by many, including us, to be the ideal tool, to be used to create the new modern processes.

2.1. PURPOSE

The purpose of this project is the implementation and showing effects of using blockchain at the core of trading infrastructure and handling security transactions.

Blockchain offers huge potential for tracing securities lending, repo and margin financing and monitoring systemic risk and our aim is to implement the above.



2.2. INTENDED AUDIENCE AND READING SUGGESTIONS

Blockchain can be the answer to interoperability, trust, and transparency issues in fragmented stock market systems. Stock market participants such as traders, brokers, regulators and stock exchange are required to go through a cumbersome process (which takes 3+ days to complete transactions mainly due to the role of intermediaries, operational trade clearance and regulatory processes).

Blockchain can make stock exchanges much more optimal through automation and decentralisation. It can help reduce costs levied on customers in terms of commission while speeding up the process, resulting in fast transaction settlements. The technology can have a viable use in clearing and settlement, while securely automating the post-trade process, easing paperwork of trade and legal ownership transfer of the security. At the end, the faster and efficient trade cycle will lead to higher liquidity and investments.

2.3. PROJECT SCOPE

The general scope on how blockchain technology can keep disrupting industries and markets in the near future:

- Blockchain will kill the need for established third parties
- Blockchain to secure the right talent for any company
- Creating, encouraging, and maintaining Digital IDS
- Aiming to Eliminate corruption and ensuring efficient flow and transactions
- Owning and functioning a large database that is secured and transparent
- It will enhance relationships and instant verification
- Last but not least, Creating employment opportunities

- A lot of industries have already invested in blockchain technology and there are more in the pipeline. To mention a few, industries like banking, security, insurance, healthcare, real estate, education are investing and impacted by technology. The future of their businesses and databases and networks are in line with blockchain technology.

3. OVERALL DESCRIPTION

3.1. PROJECT PERSPECTIVE

- **User description:** It includes name, contact information, etc. This information may be used for keeping the records of the user for any emergency or for any other kind of information.

- **Transaction description:** It includes the amount, date and time, users involved and the public key of the sender, etc. This can be used to tally and verify the transactions.

- **Nonce:** It is the extra number, basically a dummy field that miners use to help them get a block hash.

- **Smart Contracts:** The application of smart contracts can prove particularly important in the banking and finance sector. A smart contract is a self-executable piece of code that runs when certain conditions written on it are completed.Smart contracts, when used for financial transactions, would be helpful in increasing the speed and simplifying complex processes. This will also ensure the transfer of accurate information as the transaction will be approved only if all the written conditions of the code are met. Moreover, as these terms are

visible to all the parties involved in the transactions, the chances of error at the time of execution are dropped drastically.

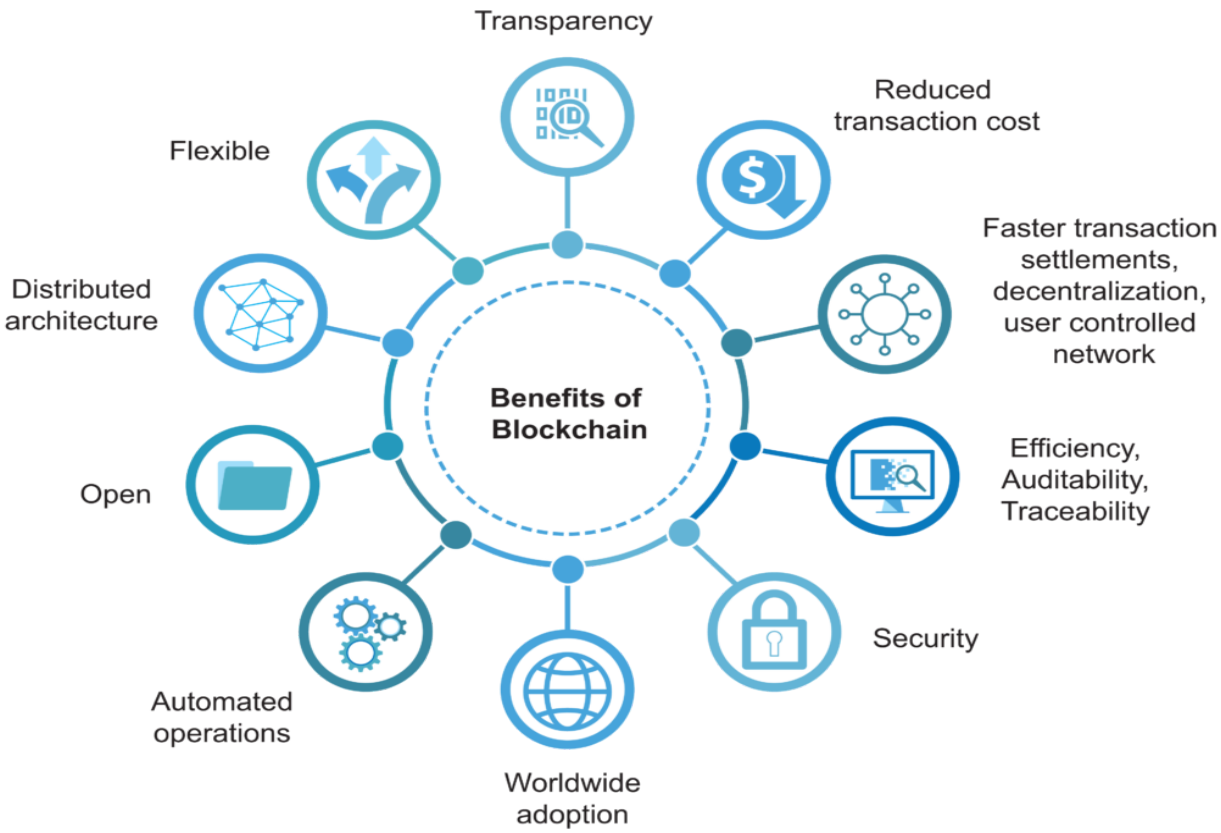
3.2. PROJECT FEATURES

Automation of post-trade events

Applying blockchain and smart contracts to post-trade activities can eliminate the need for intermediaries, reduce counter-parties and operational risk, while providing the infrastructure for faster trade settlement.

Financial institutions can settle securities in minutes instead of days, with the major benefits being streamlined real-time settlement, improved liquidity, supply chain optimisation and increased transparency.

Blockchain can offer a solution to the post-trade events processing to maintain a single source of truth jointly owned by all participants in the system.



Mechanism for fairness and transparency

If implemented, blockchain can act as an online automated surveillance system for each transaction. A blockchain-based exchange can have inbuilt characteristics to track, block and report illegitimate attempts made by anyone on the network, and can provide a robust platform to implement the security policy and standards.

Since the blockchain ledger is designed in such a way that all participants have full record of transactions and, therefore, holdings of investors, it can bring in complete transparency and trust in the market.

Lower transaction costs

Blockchain transactions are faster, as trade confirmation is done through smart contracts by peers instead of any intermediary. As the intermediaries in the system get minimised, costs associated with them, like trades record keeping, audits and trade verifications also get eliminated or reduced.

Mechanism for risk containment

Through blockchain technology, margining system and payment of margin can be done instantly and the frequency of valuation of securities deposited as capital can be done daily compared with the weekly process prevalent now, minimising the risk.

Higher liquidity

Blockchain can reduce the inefficiencies through automation, which also leads to reduction in cost and thus lowering entry barriers resulting into increased market base. For people, who could not access the markets due to cost barriers will be able to participate, ultimately increasing liquidity and investment.

3.3. TRANSACTION ACTIVITIES

3.3.1. NEW TRANSACTION

Customers create a transaction request using a decentralized app (DApp). This request is transferred to the memory pool.

3.3.2. ADDING TRANSACTION

After the transaction is being initiated by the customer, miners receive a request from the memory pool, build a block and validate it. After a consensus is reached between the majority of corresponding nodes, the block is added to the blockchain. The sender receives a transaction ID for his transaction for verification purposes.

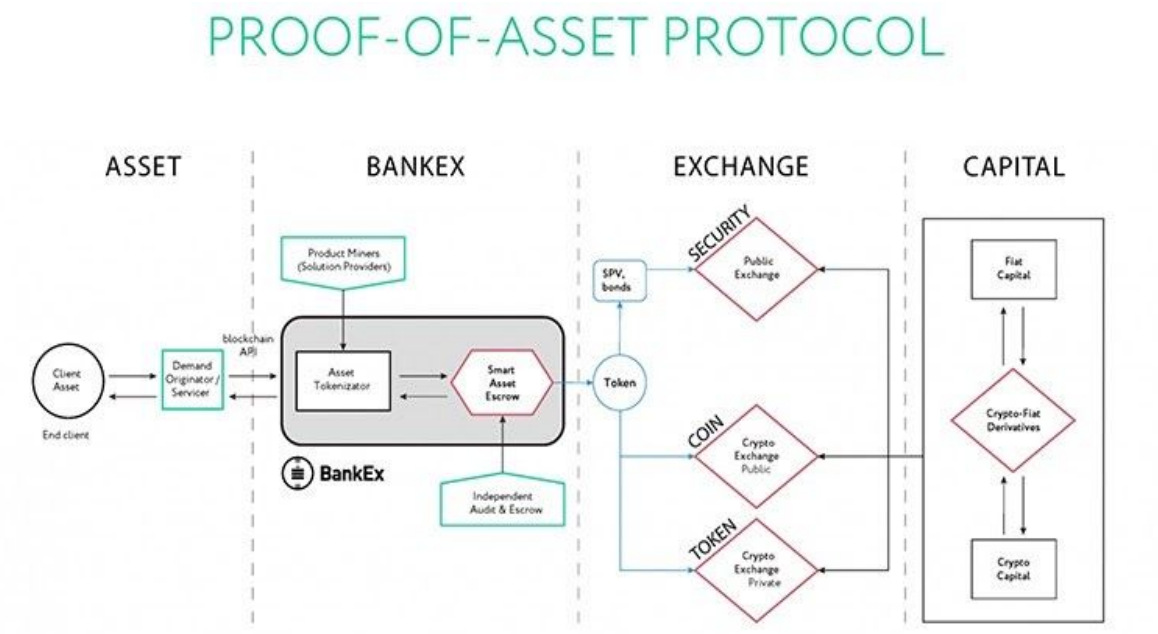
3.3.3. TALLYING TRANSACTION

The desired amount is deducted from the sender's wallet and added to the receiver's. This helps in keeping the wallets updated.

3.3.4. VERIFYING TRANSACTION

As each customer receives a transaction ID after each transaction, they can locate the corresponding transaction and verify it anytime.

3.4. DESIGN CONSIDERATIONS



4. CHALLENGES AND REQUIREMENTS

4.1. Challenges:

It is potentially attractive to regulators due to increased transaction security and reduced risk of manipulation, but this new technology can also give rise to difficult legal and regulatory challenges that regulators are grappling to understand.

The financial market ecosystem is currently uncertain about the extent to which blockchain, particularly as applied to capital markets, will live up to its promise.

The implementation of blockchain also brings along the risks of maintaining security standards across a decentralised database, legal and regulations and concerns around scalability. Blockchain looks to combine elements of trading, clearing and settlement but current legal and regulations ascribe them separately.

Since blockchain provides hand to hand settlements so the short selling

In markets and thus trading is endangered .Also it will take too much effort to develop all the elements in the same way and the maintenance is very costly as the contract once deployed can't be changed so we have to create a new one.

4.2. Security Issues:

Security issues are also a concern in the initial days of the exchange however as the network will grow it becomes almost impossible to hack into blockchain.

4.3. Speed Issues:

Speed of execution of trade always matters in trading so since the blocks are being mined it will take some time hence speed is indeed a issue for this technology however the iota overcomes this as there the speed increases with increasing network unlike in some other cryptocurrencies.

5. Conclusion

While the market monitors potential regulatory developments, effective governance is the key to the successful implementation of blockchain to protect participants, investors and stakeholders while ensuring that the system is resilient in the face of systemic risk, privacy concerns and cybersecurity threats.

Blockchain has the potential to disrupt the financial services, particularly in automating market surveillance events processing and in automating post-trade events processing.

The technology promises to address problems such as loss of data, data fragmentation, insider trading, review of margin system, reconciliation and ticket matching.

However, the full potential value from restricted mutual distributed ledgers and smart contracts will require widespread changes in business processes and investments from firms, virtually from buy-side and sell-side of the industry.

Regulators will also have to play an active role by adopting shared data arrangement for regulatory reporting.