

MAPPING OF BLOCKCHAIN TECHNOLOGY WITH INDIAN FINTECH SECTOR FOR SECURING FINANCIAL OPERATIONS

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Abstract. The term "Fintech" (Financial Technology) refers to software and other spearheading technology utilized by different organizations to automate and enhance financial services. It refers to the technology that improves the backend system at traditional financial institutions. In FY22, \$8.53 billion was invested in India's Fintech industry. It has been anticipated that FinTech industry will generate around \$200 billion revenue by the year 2030 and overall throughput will be \$1 trillion. Fintech is expanding quickly, yet there are several problems in the current fintech market including interacting with legacy systems like banks, data and payment security, compliance, lack of end-user awareness, retaining users, and user experience. Due to the development of fintech, more data is now accessible in digital formats, which facilitates analysis and the generation of insights but also increases the risk of security breaches. Blockchain is disruptive technology using which one can securely transfer money from one account to another account without using bank or any financial organization. The term "distributed ledger technology" is often used interchangeably with "blockchain technology" in the financial services industry. Each transaction has a trustworthy record, thus there is no chance of changing to earlier ones. In essence, blockchain technology can completely ensure the accuracy of every transaction. In this study, the problems facing India's fintech industry are described in detail, and possible solutions employing blockchain distributed ledger technology are suggested. Additionally, it finds blockchain technology has the potential to enhance the security and efficiency of financial operations in the Indian fintech sector, there are challenges such as regulatory uncertainty and scalability that need to be addressed. The paper concludes with recommendations for the future development and adoption of blockchain technology in the Indian fintech sector.

Keywords: FinTech, Blockchain, FinTech India, Security, Cryptocurrency, DeFi

1. INTRODUCTION

Fintech is a term used to describe companies that incorporate technology to enhance or automate financial services and processes. The combination of "financial" and "technology" forms the term and refers to a rapidly growing sector that caters to the needs of both businesses and consumers. Fintech covers a wide range of uses, such as mobile banking, cryptocurrency, insurance, and investment apps. It encompasses a variety of financial transactions that are often done without human intervention, such as money transfers, smartphone check deposits, credit applications, raising capital for startups, and investment management. According to a report titled "The winds of change: Trends shaping India's Fintech Sector," released in September 2022, the global financial services sector has been greatly impacted by fintech in the past

decade. However, in the first half of 2022, fintech investment growth slowed down due to increased regulation, shifting customer preferences, uncertain global events, and ongoing geopolitical unrest. In spite of the obstacles, the global fintech industry experienced significant growth in 2021, although the pandemic caused some disruptions[1].

Supernova cryptocurrencies like Bitcoin and Ethereum have gained prominence and brought blockchain technology into the spotlight. The widespread adoption of blockchain has caught the attention of the finance and corresponding industry, resulting in the development of new cryptocurrencies such as ZCash, NameCoin, PrimeCoin and LightCoin. This has led to the emergence of a new way of financing innovative ventures and products, known as Initial Coin Offerings (ICO).[14]. In the recent time, there has been growing attention in the use of blockchain beyond cryptocurrencies, driven by the distinctive characteristics of distributed ledger technologies (DLT) such as cryptographic security, immutability, decentralization, and transparency. These features present exciting possibilities for a variety of industries. The fintech industry, including major financial organizations, insurance companies, and exchange corporations, has recently turned its focus towards blockchain technology. The term "distributed ledger technology" is often used instead of simply "blockchain" as it highlights the security, immutability, reliability, and auditability that the technology provides. Additionally, the use of smart contracts in financial operations is a significant advantage of DLT. As a type of distributed ledger technology, blockchain uses a one-way cryptographic hash function to maintain a secure, replicated, and distributed ledger of transactions that cannot be altered or disputed. This consensus-verified, unchanging record of transactions among peers' results in a single, agreed-upon version of the truth within the system. [12]. Due to the temper-proof nature of DLT, it is difficult for anyone to alter records, which boosts trust between parties. By using a DLT platform, fintech companies can improve their bank-to-bank (B2B) transactions and reach agreements faster compared to traditional centralized systems, which can take one to several days to process. DLT's ability to securely record digital representations of fiat currency, securities, and physical goods opens numerous opportunities for fintech to build smart contracts and provide secure and innovative financial services. This allows for seamless trading and settlement of securities without manual intervention [2].

Various blockchain platforms and technologies can be utilized in the Indian FinTech sector. Ethereum is a decentralized platform that allows the creation of smart contracts and decentralized applications (DApps) using blockchain technology. It is widely used in the FinTech space due to its open-source nature, strong set of tools, and frameworks for developing blockchain-based FinTech solutions. Hyperledger Fabric, on the other hand, is a permissioned blockchain platform that is designed for enterprise use cases. Its modular architecture enables customizations and integrations with existing enterprise systems, making it ideal for FinTech applications that require secure and efficient processing of financial transactions and data. Ripple is a payment protocol and cryptocurrency that enables faster, cheaper, and more reliable cross-border payments. It uses a consensus algorithm called the Ripple Protocol Consensus Algorithm (RPCA) to validate transactions on its distributed ledger. Other blockchain technologies and protocols, such as Corda, Quorum, and Stellar, are also being developed and adopted in the Indian FinTech space. The choice of platform and technology depends on the

specific requirements and use case of the FinTech solution, as well as factors such as security, scalability, and regulatory compliance.

2. EXISTING FINTECH SECTOR OF INDIA

Fintech refers to the utilization of digital technology to enhance and automate financial services and operations. According to the Financial Stability Board, fintech is defined as "financial innovation enabled by technology that may lead to new business models, applications, processes, or products that have a significant impact on financial markets and institutions and the provision of financial services". India is one of the world's fastest growing fintech markets, with over 2,000 recognized fintech businesses by DPIIT and counting. It has the highest global fintech adoption rate at 87%. Factors such as India's demographic advantage, rising national disposable income, large unbanked population, growing internet and smartphone usage, and booming e-commerce market are driving the growth of fintech in India. There are 23 fintech companies in India that have achieved "unicorn" status, with one-fifth of these being in the fintech sector. In 2021, India had the most real-time transactions globally, reaching 48 billion, or 6.5 times more than the combined volume of the five largest economies. This resulted in savings of \$12.6 billion for the Indian consumers and enterprises in 2021. Digital investment market is projected to grow in value from \$6.4 billion to \$14.3 billion by 2025.

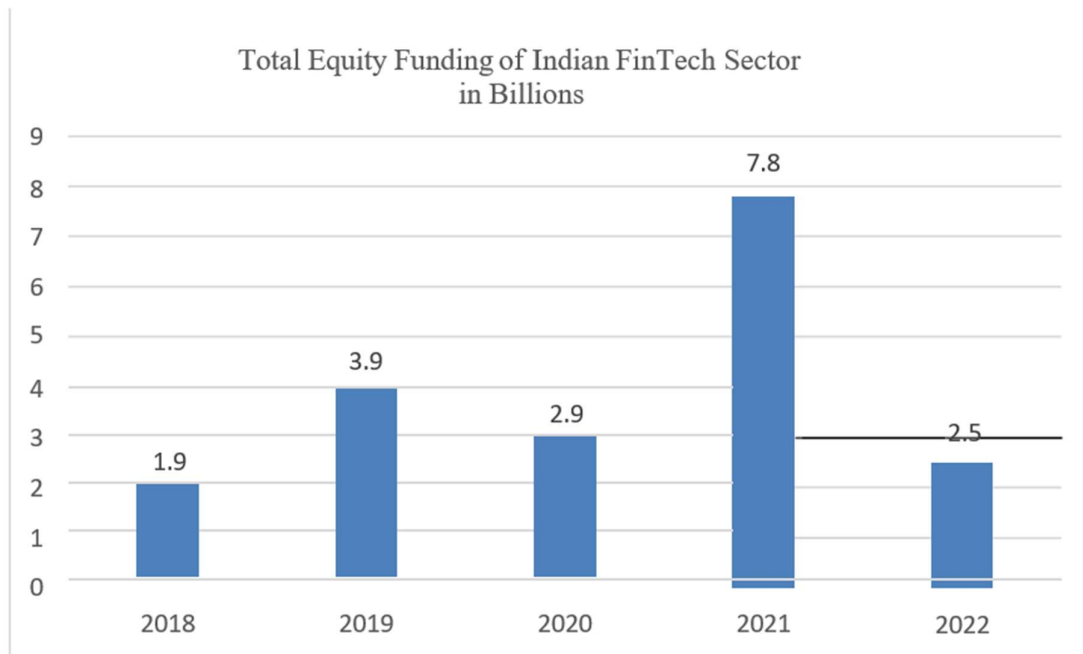


Fig.1. FinTech adoption in India

India has very high rate of fintech adoption as compared to global fintech adoption in all the aspects of fintech like financial planning, savings and investment, Money transfer, borrowing as well as insurance. As shown in Fig.1, the market saw a substantial fall in equity FinTech funding in the first half of 2022. The total amount of FinTech capital raised as of 30 June 2022 was \$2.47 billion. The decrease could have been influenced by several factors, such as

geopolitical and macro-economic issues such as the conflict in Ukraine, rising inflation, and underwhelming financial and stock market performance of prominent fintech organizations, which eroded investors' trust in the potential for future exits.

Many well-known Fintech businesses face several issues, such as extended funding cycles, missed objectives, and increasing losses [4]. However, the fintech sector is continually confronted with several additional serious issues like,

A. Dependency on Centralized System:

Fintech may appear to be user-friendly, yet the real control remains in the hands of other organizations. Even though transactions are carried out with approval from the higher-ups, consumers are still awaiting an endorsement that works in their favor.

B. Regulatory Laws:

Regulations inevitably impede the growth of Fintech startups in India's banking sector. These restrictions, which are not only difficult to comply with but also hinder the entry of Fintech companies into the Indian market, were created as a stringent regulatory framework to prevent fraud. However, they also present significant barriers to entry for new Fintech businesses, as they must meet a lengthy list of standards before they can even begin operations.

C. Liking of Cash Transactions:

Most Indians have a conservative stance and choose to conduct daily transactions in cash. Since they have relied on money as a sales medium for a very long time, it is challenging for them to alter their habits and adopt new strategies. Because financial services are commonly linked to internet fraud, providing them to an unbanked market is difficult. Many Indians lack the financial literacy necessary to fully appreciate the value that FinTechs provide through their cutting-edge goods and services.

D. Numerous people without bank accounts:

The development of FinTechs was delayed because of inadequate infrastructures, including low internet penetration and low literacy rates in India. The benefits won't be felt right now, even though the Indian government is tackling these issues with liberal policies. Another obstacle to the development of fintech in India is the low level of financial knowledge in Indian society.

E. Threats of Cybersecurity:

Private customer information is handled by financial technology companies. Numerous cybersecurity issues result in huge financial losses for online transactions. These are totally unnecessary for the customers. The same technology that simplifies daily tasks also makes it simpler for con artists to steal money from online accounts. This is a constant driver of FinTech expansion. Threats issued by hackers must be avoided by FinTechs. massive amounts of digitally available financial data about individuals and companies. The likelihood of cybersecurity breaches increases as a result.

F. Lack of Government Support:

Government incentives and assistance for fintechs to safeguard their interests in the Indian financial markets are severely lacking. This can be quite discouraging for up-and-coming Fintech players. Fintechs are essential for promoting economic growth, so it is critical to provide them with all the tools necessary for success.

G. Industry Specific Issues:

Fintechs are designed to operate using a sophisticated operating model. As a result, they find it difficult to maintain positive relationships with other financial organisations like banks. In contrast, banks are reluctant to work with fintechs because they are worried about their reputation.

3. POTENTIAL SOLUTION USING PROPOSED SYSTEM

Blockchains are networks of distributed digital ledgers that record all transactions. With distributed ledger technology, any transactions—in text, picture, spreadsheet, or PDF format can be stored across the whole network. Every member or node in the blockchain network has a complete copy of the blockchain, which facilitates peer-to-peer distributed network. Decentralization, immutability, and transparency are the three pillars on which the blockchain's whole operation is built. As blockchain operates on a dispersed network, decentralization means that there is no single governing body. Transparency means that a copy of every transaction in the form of a ledger is available, and immutability means that once a transaction has been recorded on the blockchain, it is permanently set and cannot be changed or modified. Numerous research papers and projects on Blockchain primarily concentrate on Bitcoin. However, Blockchain has vast potential and can be utilized in many different fields. By combining Blockchain with other technologies, the impact can be significant. Unlike the centralized banking system, Blockchain is decentralized. Therefore, if the technology underlying Blockchain can be implemented in centralized systems, it could also be applied in the banking industry. One example of blending Blockchain with other technologies is by combining it with big data, as the transactions on Blockchain can be utilized for big data analysis. Additionally, users can forecast the potential growth of trading activities. The enhancement of Blockchain technology can lead to numerous new opportunities, with the exception being that it may create some unforeseen challenges as well [16].

Blockchain technology is considered as a potential game-changer for financial services due to its ability to provide efficient, cost-effective, and secure solutions. The financial sector can benefit from blockchain in various areas, including cross-border payments, remittances, trade finance, and digital identity verification. Traditional cross-border payments and remittance services are often time-consuming, expensive, and lacking transparency. Blockchain can address these issues by reducing intermediaries, fees, and increasing transparency. For trade finance processes, blockchain can streamline documentation, reduce fraud, and enhance trust. Lastly, blockchain can provide a more secure and reliable way to verify digital identities, which is crucial in the digital age where traditional identity verification methods can be costly, prone to data breaches, and lack interoperability. Blockchain is a decentralized distributed ledger technology that operates on a dispersed network of computers called nodes. Each node in the network runs the blockchain software and has a copy of the blockchain ledger. When a transaction is made, it is broadcasted to the entire network and each node validates it using a consensus mechanism. Once validated, the transaction is added to the blockchain ledger, which is a continuous chain of blocks, with each block linked to the previous one. This ensures that the data in the blockchain is immutable and tamper-proof. The consensus mechanism ensures that all nodes agree on the state of the blockchain, preventing malicious actors from tampering

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with it. Incentives such as earning cryptocurrency are often used to encourage nodes to maintain the network. This decentralized approach provides a high degree of security and transparency, making the blockchain resistant to tampering. In blockchain data encryption can be achieved using hashing, asymmetric encryption, as well as homographic encryption [15]. Commercial banks are increasingly leveraging Blockchain technology to enhance the current centralized banking system. By utilizing the security, immutability, and transparency of Blockchain, financial organizations can bypass intermediaries. However, Blockchain can bring both opportunities and challenges to the banking industry. Banks' attitude towards Blockchain is often conflicted as they have traditionally acted as intermediaries and received compensation for their trust-building role. Blockchain, on the other hand, is a technology that seeks to eliminate the need for intermediaries.

To overcome different issues related to FinTech sector of India, Blockchain technology can be used, which can provide following security solutions [5]:

Table 1. Fintech potential solutions using blockchain.

| FinTech Issues | Potential Solution using Blockchain |
|-----------------------------|---|
| Centralized Dependency | Blockchain is decentralized and peer to peer system, <u>where</u> data and transactions can be accessed by every individual connected to the system, so no dependency on centralized financial institutions Confidentiality and Data Integrity Blockchain uses different cryptographic algorithms like Asymmetric Cryptography, Digital Signature and Hashing to provide security for financial transactions. Also, to maintain confidentiality of data, third party removal and consensus mechanism will be used. It uses the concept of Smart Contract to maintain the conditions and terms for financial transactions |
| Authentication | Membership Service Provider (MSP) is used to identify every user and only authenticated users can join the network and participate in transactions |
| Access Control | Only those members, who has corresponding rights can access or execute the transactions, which can be achieved using MSP |
| Non-Repudiation | Blockchain uses digital signature for transactions in block and once the transaction is recorded it cannot be reverted. Also, even if fraudulence activity is done, it can be easily detected and punished |
| Verification and Validation | No third party is involved, and all members or miners can be used to verify and validate every transaction, whether it is valid or not |
| Transparency | Blockchain protects transparency by storing data in a way that it cannot be changed without leaving a record of the modifications made, as well as by implementing the required encryption and control systems. |
| Tracking | Tracking and traceability can be achieved using smart contract and distributed ledger always ensure that all the information is available to all user at same time |
| Temper-proof transactions | For temper proof <u>transactions,</u> blockchain uses consensus mechanism and digital signature <u>is</u> used for digitization operation |

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We can propose following algorithm for Integrating Blockchain Technology with the Indian FinTech Sector:

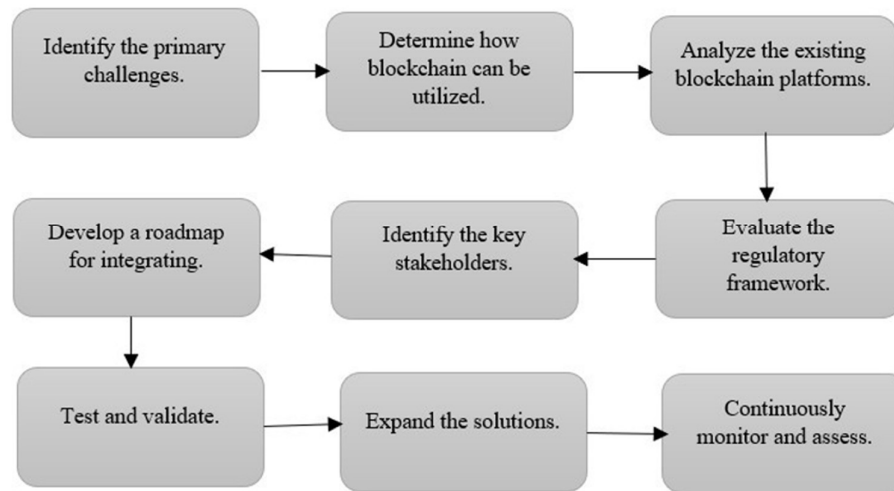


Fig.2.Stepsfor Integrating Blockchain Technology with the Indian FinTech Sector

1. Identify the primary challenges that the Indian FinTech industry is facing when it comes to securing financial operations. Examples of such challenges include fraud, data breaches, and a lack of transparency.
2. Determine how blockchain technology can be utilized to address these challenges. For instance, blockchain can offer decentralized identity management, secure data sharing, and transparent record-keeping.
3. Analyze the existing blockchain platforms and technologies that are suitable for FinTech use cases in India. Ethereum, Hyperledger Fabric, and Ripple are some of the platforms that can be leveraged.
4. Evaluate the regulatory framework for blockchain and FinTech in India, including government policies, regulations, and guidelines.
5. Identify the key stakeholders in the Indian FinTech ecosystem, such as banks, financial institutions, startups, and regulators.
6. Develop a roadmap for integrating blockchain technology into the Indian FinTech ecosystem, considering the technical and regulatory challenges, as well as the interests and incentives of different stakeholders.
7. Test and validate the blockchain-based FinTech solutions through pilots and prototypes, and measure their effectiveness in terms of security, efficiency, and cost-effectiveness.
8. Expand the successful blockchain-based FinTech solutions and promote their adoption across the Indian financial industry.
9. Continuously monitor and assess the impact of blockchain technology on the Indian FinTech sector, and adjust the strategy as needed to address emerging challenges and opportunities.

The popularity of blockchain can be attributed to its favorable features, including transparency, security, immutability, and lower transaction costs. Distributed operations can be conducted either on a permissioned ledger or a public ledger. The effective handling of key storage is ensured through several stages, including public key cryptography, encryption service, and double signing and verification.

As shown in Fig.3, every customer who wishes to participate in blockchain enabled FinTech ecosystem needs to have his/her corresponding public and private key wallet. The transaction can be signed by initiator's private key and broadcasted to blockchain network for miners' approval. A miner or blockchain validator will verify the transaction using ledger data and validate it through customers' public key. If the result happens to be successful, then validator will approve the transaction or if some error occurs during validation or verification phase then validator can reject the transaction.

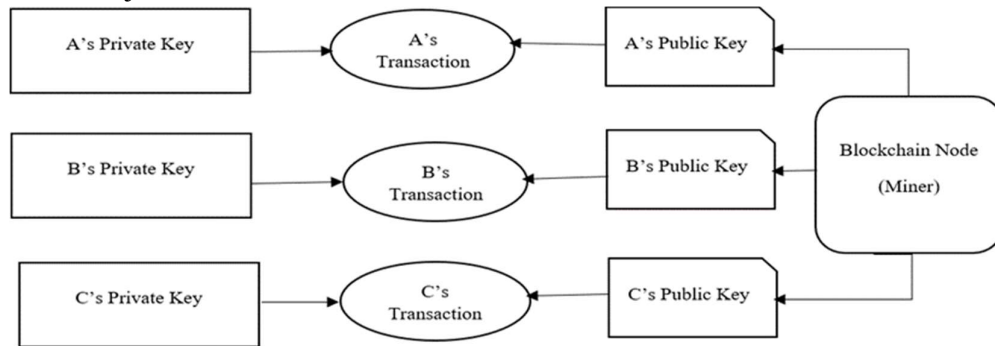


Fig.3.Security handling in transactions

4. PROPOSED METHODOLOGY

The following are different modules that can be used in FinTech financial operation after integration with blockchain.

A. Issuer:

It is used to transfer funds from the source entity through online blockchain system by entering details such as information of sender, recipient as well as information about transaction details.

B. Receiver:

Upon successful completion and acceptance of the blockchain validation process by the financial organization or other approving authority, this module is used to receive the transferred funds from the issuer entity at the end of the settlement.

C. Validation:

It contains following different elements:

Table 2.Validation elements and operations

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| Validation Elements | Operations |
|---------------------|---|
| Key Generator | This component generates header information, which includes information in encrypted form about the transaction and data validation. The header information is transmitted as part of a blockchain transaction. |
| Key Validator | This component utilizes an interpreter to gather transaction data and validation information depending on the financial <u>organization regulatory</u> requirements which are specified by approving body. It retrieves the transaction block node that received from the sender. |
| Key Interpreter | As directed by the approving entity, this component transforms the encrypted data received by the sender into the validation comments that are used by the validation component during the validation. |

The process of recording transactions on a blockchain involves broadcasting each transaction to the network, where it is validated by multiple nodes using a consensus mechanism. This ensures that the transaction is verified and accurate before it is added to a block with other validated transactions [16].

The overall procedure consists of the following steps:

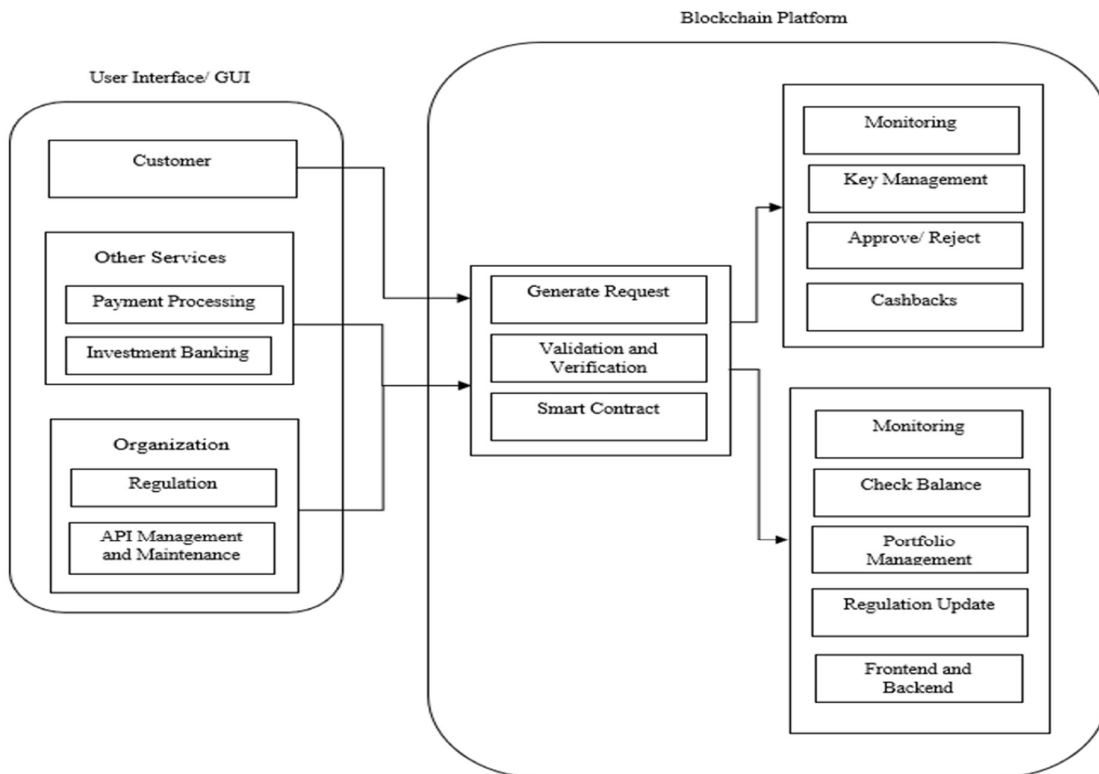


Fig.4.FinTech Architecture with Blockchain Integration

- To initiate a money transfer, the user visits the appropriate financial institution or organization. They obtain the necessary information for both the sender's and recipient's accounts before beginning the process through a web-based platform. The information is then consolidated into a single block of data, with separate sections for the sender's information and the details of the transaction and transmitted via the blockchain channel for processing. The

gathered data is encrypted and kept in the node's header for the transaction's initial block of data.

- Until it reaches the receiving bank, the transaction information is used in its current form throughout the blockchain communication. Every block transfer in the channel updates customer information according to the specifications of the receiving bank. For instance, while a few banks prefer to require the customer's address or contact number as part of the transfer, others may not be interested in these details.
- Every block ID is unique to the group that issues it or sends it, so if the same user tries to create duplicate transactions, they will be rejected when a block is created because they will have the same ID as another transaction.
- To establish a connection between nodes in blockchain communication, the receiving bank determines the location for a new node to be created and linked to the received node through a smart contract. This chain of nodes continues to grow until the validation process is initiated by a validating bank. The consortium responsible for creating the underlying blockchain platform prioritizes security by using encryption to protect the data as it is transferred among the network's nodes throughout the transaction.
- The blockchain transmission process involves grouping nodes generated during a transaction into a cluster of transactions, resulting in a single, unified network of nodes. The sender bank initiates a transaction block which holds client and transaction information, as well as a unique identification generated in block's header. This header information is transmitted through all blocks in accordance with the blockchain transmission protocol and is replicated to each new block as it is formed. The customer data is then transmitted in accordance with validation requirements. The process of broadcasting the block ID and header continues with every new block which is created until the last block is formed at the receiver or when transaction is validated and completed by the validator.
- A practical clustered data store approach is introduced to improve the validation process for various blockchain transactions. The network of nodes is organized into a cluster, and the information exchanged between the transaction's nodes is stored in this tree structure and included in the node when the customer's information block is created and sent for validation. The validation node then uses the clustering data in the node to connect to the approval process used by the receiving bank to either accept or reject the transaction. Additional communication components within the transaction chain can also be added to the clustered information to enhance it. Once the validation process is completed, the information is recorded in the ledger transaction of the receiving bank.
- In the banking process for transactions, the validation unit takes the block for validation and separates the significant customer information from the node. This extracted data is then prepped for approval by an authorized individual and once the green light is given, the transaction is finalized. The data is decrypted and transmitted to the approver through a non-volatile memory transfer and then deleted after the validation process is completed to secure that the transaction is only handled between the sender and recipient banks.
- Once the validation is completed, the approval status information is added to the last block of transaction and has been sent to the receiving bank. The sender initiates the transaction

by instructing the receiver bank to either actualize or credit the transaction to the receiver's account, and the receiver bank follows these instructions.

- A node that includes information about the customer, account, and currency is created in the validation process based on the specifications of the approver. The node is then utilized in the subsequent stage to transfer data to the approver for further processing. This is the outcome of a typical blockchain hierarchy process after validation. Based on the validation outcome, the next step is either to complete the payment or reject the transaction. This verification step sets a boundary for the information necessary to assemble a clustered block in a ledger-based blockchain transaction that adheres to specific conditions. The information transfer encompasses crucial details from customer, account, and currency blocks.

5. USE CASES FOR BLOCKCHAIN IN FINTECH

Payment Processing

One of the most promising uses of blockchain technology in the FinTech sector is for secure and transparent payment processing that reduces the risk of fraud and other financial crimes. This can improve the efficiency and speed of payment processing. For example, Ripple is a global payment solutions platform that uses blockchain technology for fast, secure, and low-cost cross-border payments.

Peer-to-Peer Lending

Blockchain technology can also be used to create a decentralized platform for peer-to-peer (P2P) lending that allows borrowers and lenders to connect directly without the need for intermediaries like banks. For example, Bitbond is a blockchain-based P2P lending platform that provides loans to small business owners. Bitbond uses blockchain technology to establish a secure and transparent platform that connects borrowers and lenders directly.

Identity Verification

By creating a decentralized identity system on the blockchain, users can verify their identity without relying on third-party identity verification providers. For example, Civic is a blockchain-based identity verification platform, is another possible case study. Civic employs blockchain technology to create a decentralized identity system that enables users to verify their identity securely and anonymously.

Supply Chain Finance

Blockchain technology can improve supply chain finance by creating a secure and transparent platform that reduces the risk of fraud and other financial crimes. For example, IBM's Food Trust platform is a blockchain-based supply chain management system for the food industry, is an example you could consider. Food Trust leverages blockchain technology to create a transparent and secure platform that mitigates the risk of food fraud and enhances food safety.

Insurance

A decentralized platform for insurance on the blockchain can help reduce the risk of fraud and improve the speed and efficiency of insurance payouts. For example, Etherisc is a blockchain-based insurance platform that provides parametric insurance solutions, is another potential case study. Etherisc utilizes blockchain technology to create a transparent and decentralized platform that minimizes the risk of fraud and facilitates fast, automated insurance payouts.

Stock Trading

Blockchain technology can improve stock trading by creating a secure and transparent platform that reduces the risk of fraud and improves the speed and efficiency of trades. For example, Nasdaq's Linq platform is a blockchain-based platform for private market trading, is another example you could explore. Linq harnesses blockchain technology to create a secure and transparent platform that decreases the risk of fraud and streamlines the trading process.

Asset Management

By creating a decentralized platform for asset management on the blockchain, it can help reduce the risk of fraud and improve the speed and efficiency of asset transfers. For example, Harbor is a blockchain-based platform for alternative investments. Harbor employs blockchain technology to create a secure and transparent platform that simplifies the process of buying and selling alternative investments.

The potential future developments in blockchain technology are numerous and could greatly impact the Indian FinTech sector. Decentralized Finance (DeFi) and Central Bank Digital Currencies (CBDCs) have emerged as potential game-changers that could revolutionize the financial sector. Additionally, researchers are actively addressing the challenge of scalability and interoperability, and the development of more efficient and interoperable blockchain platforms could further enhance the impact of blockchain on the Indian FinTech sector. Other areas of development include blockchain-based identity management, smart contracts, and supply chain management. Given the dynamic nature of blockchain technology, there are likely to be numerous other developments that could impact the Indian FinTech sector in the future.

6. BENEFITS OF THE SYSTEM

A comparison of blockchain technology with other technologies used for securing financial operations in the Indian FinTech sector involves an evaluation of the strengths and weaknesses of each technology to determine their effectiveness in securing financial transactions. This comparison typically involves analyzing the features, benefits, and limitations of blockchain technology against those of other technologies such as traditional databases, encryption, and biometrics. For instance, traditional databases are known for their high speed and ease of use in storing financial data, but they are also vulnerable to hacking and data breaches. Encryption, which is used to protect data from unauthorized access, can also be vulnerable to attacks and can be difficult to manage on a large scale. Biometrics, such as fingerprints and facial recognition, are increasingly used in financial transactions to enhance security, but they are also subject to privacy concerns.

In contrast, blockchain technology, with its distributed and decentralized nature, offers unique benefits such as immutability, transparency, and security. It has the potential to prevent fraud and enhance transparency in financial transactions. However, blockchain technology is still in the early stages of development and faces challenges such as scalability, interoperability, and regulatory uncertainty.

By comparing these technologies, it is possible to identify the most suitable technology for securing financial operations in the Indian FinTech sector based on the specific needs of each application. This analysis can help to better understand the strengths and weaknesses of each

technology, and to determine the most effective approach to securing financial transactions in the Indian FinTech sector.

One example of Blockchain and FinTech integration is, Yes Bank collaborated with Cateina Technologies to develop a blockchain-based solution for supply chain financing in India, called "Yes Transact" The solution leverages the security and transparency of blockchain technology to process invoices and payments between parties involved in the supply chain, reducing turnaround time and improving cash flow management. This adoption has resulted in several benefits for Yes Bank, including an increased customer base, reduced operational costs, and improved risk management practices. Furthermore, the success of this solution has inspired other banks and financial institutions in India to explore the use of blockchain technology for various FinTech use cases, driving innovation and growth in the Indian FinTech sector [17].

P2P Payments

Peer-to-Peer (P2P) refers to a decentralized network architecture where nodes communicate directly with each other without the need for intermediaries. In the context of cryptocurrencies, P2P transactions allow users to directly exchange cryptocurrencies with one another without the involvement of a central authority, such as a bank or exchange. P2P transactions are facilitated using blockchain technology, which enables secure, transparent and tamper-proof transfers of digital assets. The use of encryption ensures the anonymity of the parties involved in the transaction, further enhancing the security and privacy of the exchange. [6].

Trade Finance

The implementation of blockchain-based smart contracts in financial trading will do away with the need for manual data element validation and verification. Blockchain technology can offer authorized access with real-time visibility for all parties including regulators. Blockchain offers a secure shared ledger that can produce a clear shared understanding of the terms and conditions of a contract as well as providing the status of commodities for importers, exporters, banks, shipping companies, port authorities, and customs. Additionally, blockchain offers automation that enhances accuracy and transparency and incorporates flexibility to model a range of restrictions [7].

Crypto lending

Crypto lending provides an alternative to traditional lending methods in the banking industry. The use of cryptocurrencies and blockchain technology offers advantages such as efficiency, transparency, and flexibility in the lending process. Borrowers can use their crypto assets as collateral and receive loans in either fiat currencies or stablecoins, while lenders can earn interest on their assets. This new lending mechanism has the potential to revolutionize the traditional banking system and bring new opportunities to both borrowers and lenders.

Digital Identity

Blockchain technology offers a solution for digital identity management. Once individuals have undergone verification, they can utilize their digital identity to carry out global transactions. Moreover, the use of blockchain can improve the experience of financial consumers by giving them control over their identity data, allowing for electronic signature of documents like claims and transactions, and minimizing security risks during data sharing with others.

Crowdfunding

The aim of crowdfunding is to gather funds by soliciting small contributions from a large number of individuals, often through online platforms. As opposed to conventional financing methods, blockchain-based fundraising is more efficient and transparent, facilitated by the use of Initial Coin Offerings (ICOs) and similar approaches.

Auditing

The integration of a transaction into a reliable blockchain can provide adequate evidence for auditing specific financial statement claims, like the existence of the transaction [8].

To enhance the security of financial operations in the Indian FinTech sector, it can leverage blockchain technology by adopting several solutions. Firstly, developing interoperability standards to enable seamless transactions across different blockchain networks. Secondly, exploring the use of smart contracts for automating payment processing, settlement times, and financial reporting. Thirdly, implementing blockchain-based Know Your Customer (KYC) and Anti-Money Laundering (AML) solutions to streamline compliance processes and enhance security. Fourthly, developing decentralized identity solutions that offer greater privacy and control over personal data. Additionally, exploring blockchain technology for cross-border payments can reduce transaction costs and improve efficiency. Finally, developing blockchain-based solutions for supply chain finance can increase transparency, traceability and efficiency in supply chain finance operations. These solutions can provide greater efficiency, transparency, and security while reducing costs for the Indian FinTech sector.

7. CHALLENGES ASSOCIATED WITH BLOCKCHAIN

The decentralized or peer-to-peer structure of blockchain technology enables all participants in the network to view transaction records and add new information to the database. The open and decentralized characteristics of the system, which also pose challenges and limit its use, are the foundation of blockchain technology [9].

Scalability

The Blockchain grows as there are more transactions, and it's been noted that these transactions take longer to complete because they're complicated, encrypted, and distributed.

The 51% Attack

A 51% attack is a potential vulnerability in public blockchain systems, caused by the architecture of blockchain technology. When a group of attackers acquires more than half of a blockchain's computational power, those nodes can launch a 51% attack and gain control over the network, effectively dominating it. [13].

Privacy

Blockchain technology enables users to create multiple addresses, rather than using their real-world identities, which is considered a secure way to prevent information leakage. However, due to the transparent nature of blockchain, which makes all transaction and balance information publicly accessible, it is not possible to prevent transactional information from being disclosed.

High Energy

The Bitcoin network requires a significant amount of energy, with a single Bitcoin transaction consuming several terawatt-hours of electricity.

Cybercrime

Public blockchains foster innovation, efficiency and competition, but because they don't enforce participant authentication, they can pose challenges for laws related to money laundering, terrorism financing, and tax evasion.

Regulatory Laws

In 2017, the Reserve Bank of India (RBI) issued a circular that prohibited banks and other regulated entities from providing services to individuals or entities involved in cryptocurrency trading. This circular made the buying or selling of cryptocurrencies by Indian citizens effectively illegal. The RBI's directive effectively banned the provision of banking services to anyone dealing with cryptocurrencies. [11].

The regulatory framework for blockchain technology in India refers to the set of laws, policies, and regulations that govern its use in the country's financial sector. The Reserve Bank of India is responsible for overseeing blockchain technology and has issued several guidelines and regulations related to its use. While blockchain technology is generally recognized as legally valid in India, there are still uncertainties about how blockchain transactions and contracts are treated under Indian law. Other regulatory issues include Know-Your-Customer (KYC) and Anti-Money Laundering (AML) regulations, data protection and privacy laws, and intellectual property issues. The dynamic regulatory landscape presents both challenges and opportunities for businesses and investors seeking to leverage blockchain technology in the Indian market. Although blockchain technology offers many benefits for the fintech industry, there are also potential drawbacks to consider. Regulatory challenges can make it difficult to comply with regulations and laws that are still developing.

Scalability issues can slow down the overall speed of the blockchain network as the size of the blockchain grows. Energy consumption can be a concern, as the process of verifying transactions can be energy-intensive and increase a business's carbon footprint. Adoption barriers may exist for businesses that lack the necessary resources to invest in new technology. Lastly, while blockchain technology is generally considered secure, security breaches and hacks have occurred in the past. Thus, businesses that use blockchain technology must ensure the security of their networks and data. It's crucial to evaluate both the benefits and risks of integrating blockchain technology into fintech before deciding.

8. CONCLUSION

The gap in financial services in developing countries is filled by mobile money offerings from financial technology companies. Mobile banking and agent banking serve to bridge the infrastructure gap for these populations. Blockchain technology, with its decentralized and unalterable database, is becoming increasingly popular among fintech companies to increase profits, improve customer experiences, streamline operations, enhance efficiency, and reduce business risks. By using blockchain, financial transactions can be securely made directly between individuals, bypassing the need for banks or other financial intermediaries. The financial sector often refers to blockchain as "distributed ledger technology" and it is considered a more reliable alternative to traditional databases. Although the potential benefits of Blockchain and financial technology have spread quickly, their associated concerns have not yet been adequately addressed. Currently there are many issues of current fintech sector of

India, but to overcome security related issues like transparency, trust, privacy, and programmability, blockchain is proven to be a good solution. Using blockchain we can implement the entire fintech ecosystem which will be beneficial in all security aspects for issuer, receiver as well as validator.

REFERENCES

1. Mahesh Makhija, Nilesh Naker, Sushil Zaregaonkar “The winds of change: Trends shaping India’s Fintech Sector: edition II”, September 2022, EYFinTech Team
2. Wei Lu, “Blockchain Technology and Its Applications in FinTech”, Springer Nature Switzerland AG 2018. Traore et al. (Eds.): ISDDC 2018, LNCS 11317, pp. 118–124, 2018,
3. C. Vijai, “Fintech in India-Opportunities and Challenges”, SAARJ Journal on Banking & Insurance Research (SJBIR), ISSN: 2319-1422 Vol 8, Issue 1, January 2019
4. Anupam Mehrotra, Satish Menon “Second Round of FinTech-Trends and Challenges”, 2021 2nd International Conference on Computation, Automation and Knowledge management (ICCAKM) 978-1-7281-9491-2/21/\$31.00 ©2021 IEEE | DOI: 10.1109/ICCAKM50778.2021.9357759
5. Neha Jain, Dr. R.R. Sedamkar “Blockchain Technology Approach for the Security and Trust in Trade Finance”, 2020 14th International Conference on Innovations in Information Technology.
6. SavinayMengi, Astha Gupta “P2P Payment using Blockchain Technology”, International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 11, Issue 1, November 2021
7. Swapnil Sonawane and Dilip Motwani “Issues of commodity market and trade finance in India and its solutions using blockchain technology”, Emerging Technologies in Data Mining and Information Security Proceedings of IEMIS 2022, Volume 1, pp 451–459
8. Chartered Professional Accountants “Blockchain Technology and Its Potential Impact on the Audit and Assurance Profession”, AICPA
9. Victor Chang, Patricia Baudier, Hui Zhang, Qianwen Xu, Jingqi Zhang, Mitra Aramid “How Blockchain can impact financial services – The overview, challenges and recommendations from expert interviewees”
10. Swapnil Sonawane and Dilip Motwani “Investigating the pervasiveness of existing FinTech sector of India”, International Conference on Wireless Technologies, Networks and Science-2022 (ICWTNS- 2022)
11. Hongdan Han, Radha K. Shiwakoti, Robin Jarvis, Chima Mordi, David Botchie “Accounting and auditing with blockchain technology and artificial intelligence: A literature review”, International Journal of Accounting Information Systems
12. Lan Di1, Zhe Yang, George Xianzhi Yuan “The Consensus Games for Consensus Economics Under the Framework of Blockchain in Fintech”, National Natural Science Foundation of China (Nos.11501349 and U181140002)
13. P. Krishna Priya, K. Anusha “Fintech Issues and Challenges in India”, International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-3, September 2019

14. Ariana Polyviou, Pantelis Velanas, John Soldatos "Blockchain Technology: Financial Sector Applications Beyond Cryptocurrencies", MDPI Proceedings 2019, 28, 7; doi:10.3390/proceedings2019028007
15. W. Jerbi, O. Cheikhrouhou, H. Hamam, H. Trabelsi and A. Guermazi, "A blockchain-based storage intelligent," 2022 International Wireless Communications and Mobile Computing (IWCMC), Dubrovnik, Croatia, 2022, pp. 635-640, doi: 10.1109/IWCMC55113.2022.9824790.
16. Victor Chang, Patricia Baudier, Hui Zhang, Qianwen Xu, Jingqi Zhang, Mitra Arami, "How Blockchain can impact financial services – The overview, challenges and recommendations from expert interviewees", Technological Forecasting and Social Change Volume 158, September 2020, 120166
17. Navin Gupta "Impact on Real-Time Cross-Border Payments", <https://www.yesbank.in/digital-banking/tech-for-change/financial-services/impact-on-realtime-cross-border-payments>
18. Chavan, Amrita B., And K. Rajeswari. "The Design And Development Of Decentralized Digilocker Using Blockchain." International Journal Of Computer Science Engineering And Information Technology Research (Ijseitr) 9 (2019): 29-36.
19. Miraz, Mahadi Hasan, Et Al. "Factors Affecting Consumers Intention To Use Blockchain-Based Services (Bbs) In The Hotel Industry." International Journal Of Mechanical And Production Engineering Research And Development (Ijimperd) 10.3 (2020): 8891-8902.
20. Miraz, Mahadi Hasan, Et Al. "Understanding, Supervision, Strategy And Acceptance Effect Into The Blockchain Employment In Malaysia." International Journal Of Mechanical And Production Engineering Research And Development (Ijimperd) 10 (2020): 8339-8360.
21. Adewoye, Jonathan Oyerinde, And C. O. Olaoye. "Usage Of Information Technology To Enhance Professional Productivity Among Accountants In Ekiti State." International Journal Of Accounting And Financial Management Research (Ijafmr) 4.2 (2014): 7-18.
22. Elgeldawi, Enas, Et Al. "Detection And Characterization Of Fake Accounts On The Pinterest Social Networks." Int. J. Comput. Netw. Wirel. Mob. Commun 4 (2014): 21-28.
23. Alturki, Khalid Hamad. "Corporate Governance And The Role Of Forensic Accountants In Saudi Arabia." International Journal Of Accounting And Financial Management Research (Ijafmr) 7 (2017): 17-24.