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The Use of Blockchain in Banking System

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ABSTRACT:

Blockchain technology has emerged as a disruptive force with the potential to transform various industries, including the banking sector. This abstract provides an overview of the benefits and applications of blockchain technology within the banking system, highlighting its potential to revolutionize trust and security in financial transactions. Traditionally, banking systems heavily rely on centralized intermediaries to facilitate transactions, which often introduce inefficiencies, delays, and vulnerabilities to fraud and hacking. Blockchain, on the other hand, offers a decentralized and distributed ledger that provides a transparent and immutable record of transactions. This technology enables secure peer-to-peer transactions without the need for intermediaries, reducing costs and eliminating single points of failure. Blockchain contains blocks containing data that cannot be changed and uses cryptography to secure it. To tamper a record of a block in the blockchain, one needs to change records of all the connected blocks in blockchain, and one is required to change the distributed ledger too. This feature makes it nearly impossible to change the data entered in a blockchain. This technology acquired fame after the introduction of world's first cryptocurrency, called bitcoin. Banks are among the most authorized, long serving and greatest monetary middle entities in India. Modernization has been characterized by a few but massive changes in the banking sector. Blockchain technology if used effectively can restructure the upcoming future of the Banking System. Blockchain also enables greater financial inclusion by providing banking services to the unbanked and underbanked populations. Through digital identities stored on the blockchain, individuals can access financial services, create credit histories, and participate in the global economy. This paper aims to explore the opportunities offered by secure blockchain technology in the banking system by eliminating the need for intermediary entities and establishing a reliable blockchain-based network for transactions. Through a review-based analysis, this study highlights the potential benefits and challenges of integrating blockchain technology in the banking sector.

Keywords: Blockchain, Decentralization, Bitcoin, Cryptography, Distributed Ledger .

INTRODUCTION

Since the former times banks has been playing the role of a mediator in conducting monetary transactions throughout the world. They have been providing the trust required for inflow and outflow of funds. Banking system has always been greatly impacted by the improving technology. Banks have consistently redesigned their working system with the advancing technology and information and are constantly exploring new and different methods to carry out rapid transactions for evolved client services by guaranteeing transparency to the client and regulating cost efficiency. These days, the technological networks like SWIFT has been a support for the banks for their information flow. So, banks depend greatly on technology for their functioning.

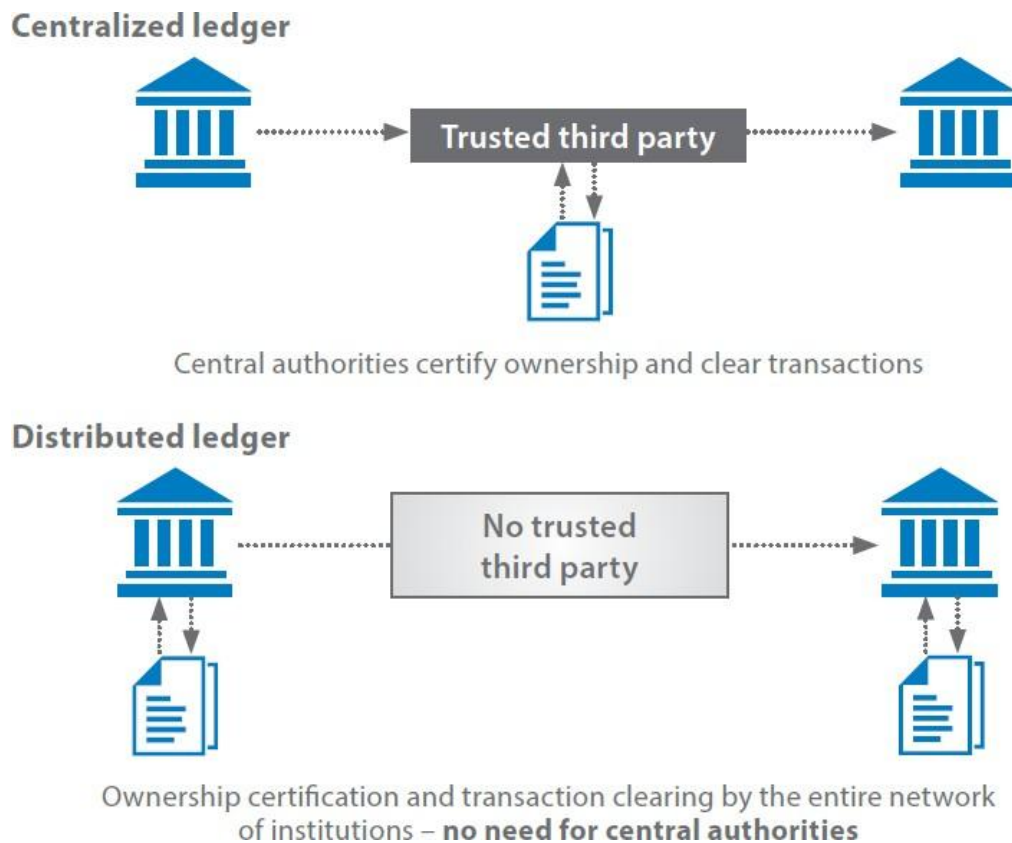
Hence, blockchain can prove to be a major catalyst in the working of the banking sector. Banks have often been denounced as incapable, costly, and non-transparent. Blockchain if used properly, can provide a solution for these denunciations and can even provide competitive advantage over the Fintech industry. Blockchain is a technology with propitious implementations in the banking sector these days. It can redesign the banking industry in a new way and make the processing more transparent, taut and well organized. Over the years, the interest in blockchain has grown immensely, and even the central banks and governments have begun ranging over its use cases. With several banks over the globe analyzing the potential of blockchain technology, the future assuredly looks bright.

BLOCKCHAIN

Blockchain is a decentralized and distributed digital ledger technology that records and verifies transactions across multiple computers or nodes. It is essentially a chain of blocks, where each block contains a list of transactions. These blocks are linked together using cryptographic hashes, forming a sequential and immutable record of all transactions.

Blockchain technology was initially developed to support cryptocurrencies like Bitcoin. However, its potential applications extend far beyond digital currencies, with use cases in finance, supply chain management, healthcare, voting systems, identity verification, and more. The underlying principles of blockchain—decentralization, transparency, security, and immutability—have the potential to transform various industries by enabling trust, efficiency, and new business models.

The elementary unit that records transaction, is unchangeable and contains all the information about the transaction is called a Block. The conventional ways of recording transactions are centralized, expensive, inefficient and redundant and this is where blockchain comes to rescue. Blockchain possesses many characteristics that can prove to be a panacea to tackle complications arising in various fields. The two major attributes of blockchain are decentralization and immutability. Blockchain is a decentralized ledger, which means that the records are shared among all the bodies rather than being in a central ledger. Through blockchain the participation of the third party is eliminated which enables faster and cheaper operation. Another intriguing characteristic of blockchain is immutability which means that the transaction cannot be changed once it has been recorded already. If there is a need of updating a transaction, a new transaction has to be created altogether and is updated to all the networks. All these transactions are checked by other computers in the same network, and when verified cannot be tampered with. This ensures reliability and trust. The most common application of a blockchain technology is a digital currency or cryptocurrency known as Bitcoin that allows online payment from one party to another without a need for third body.



Model of Blockchain :

Blocks in a blockchain can be identified with the help of hash in the block header. Every block consists of some data about the transaction, Hash and previous hash. Complete summaries of transactions are stored as arrays in the body of the block. Figure 1 illustrates how hash value and previous block hash value link to each other. The first block of a blockchain is called a genesis block and it contains its transactions with a unique hash value. Each block links to the previous block through its hash. In this way, transactions can be added safely. They are secured from tampering and revision. If someone changes the data of a block, its hash value also changes. Then it's effected for the next block because it contains the hash of the previous value. Therefore, no one can change the transaction data of a block. The main advantage is that Blockchain uses cryptography, which allows users to modify transactions on a secured network. If a majority of nodes or participants agree that the transaction performed looks valid, transaction information which matched with the blockchain's transaction history, then a new block will be added to the chain.

Working mechanism

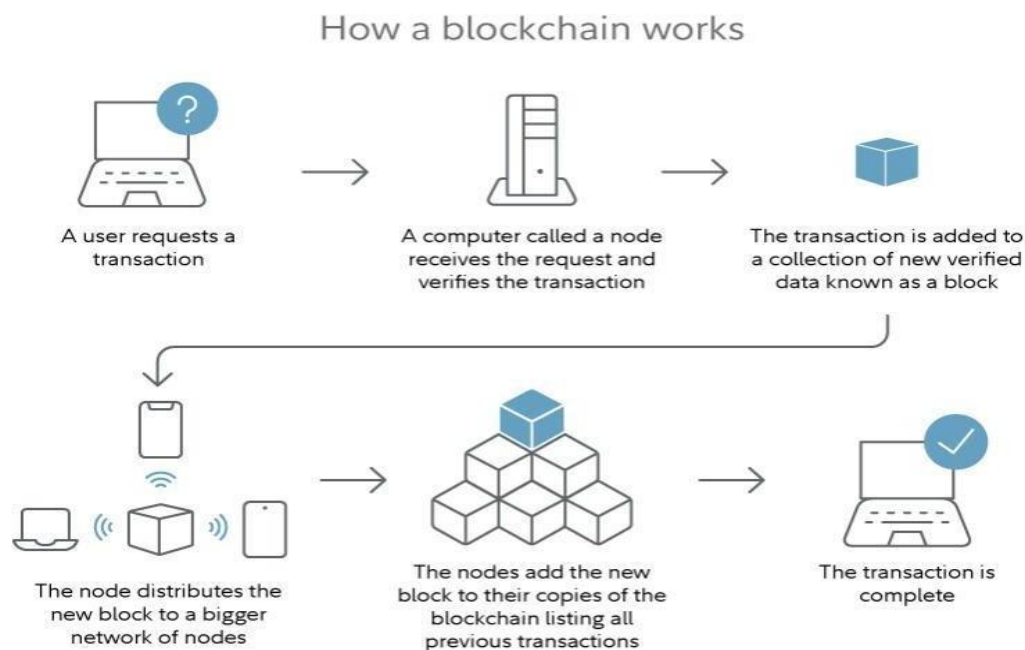
Blockchain, as the name suggests, is simply a chain connecting blocks. The transaction recorded in a block contains a hash value, which is a type of digital signature, hash of the previous block, and the stored ledger of all valid transactions. Using the hash, one block in the blockchain links with the next one, and then strengthens the verification of the previous block, because of which an immutable blockchain is formed.

The five essential concepts to know about the working of the blockchain are: a network of nodes, tokens, a structure, a consensus mechanism, and rules. Each connected participant (computer) in a network sums up to making the network of nodes. The connected nodes examine the validity of each

transaction. The verdict formation is a collaborative process where every single node present in the network engages to check the appropriate version of the ledger also known as consensus mechanism. Any niggling fault or a blunder like double payment or manipulating the transaction are prevented by the nodes.

Proof Methods in Blockchain

There are two main methods used in blockchain systems: proof-of-work and proof-of-stake. In a proof-of-work system, nodes in the network must solve complex problems to add new blocks to the blockchain. This makes it extremely difficult for any third party to manipulate transactions, as they would need to surpass the combined computational power of the entire network. Bitcoin is a well-known example of a proof-of-work cryptocurrency.



On the other hand, in a proof-of-stake system, the ability to create new blocks is based on the ownership of tokens. Participants who hold the highest number of tokens in the network have a greater chance of generating new blocks.

Rules governing the communication between participants in a blockchain network are referred to as protocols. These protocols define the characteristics and features of the ledger system. When these five concepts (proof-of-work, proof-of-stake, network nodes, ownership of tokens, and communication protocols) are combined, they form the foundation of a blockchain.

THE IMPACT OF BLOCKCHAIN IN BANKING INDUSTRY

The banking sector has been serving people with the services of faithful financial services since its establishment.

Every financial transaction starting from trading going up to bank deposit is dependent on trust. Since, the clients remunerate for their trust they will naturally want their transaction to be managed securely and fairly. Banking systems are characterized to maintain the accounting systems and charge their clients for that. The work system in banking industry is monotonous, time taking and expensive. To resolve these issues, several major banks together with the central banks are exploring the application of blockchain in their existing model. Banks are basically focusing on significantly minimizing the backend operational cost.

Banks play an important role in the global economy and have faced many complications and hurdles in the past. The Global Financial crisis of 2008 clearly demonstrated that, economy is highly sensitive to the participant's action and it can recur again. Hence, there is a requirement to analyze both merits as well as demerits of blockchain. The query is basically about how can blockchain technology be utilized to construct a better financial representation model without causing any financial meltdown. Financial sectors including banks, and financial markets are completely resting over rapidly advancing technologies. Thus, blockchain technology has unending prospects to revolutionize the complete financial industry. Among the many impacts analyzed, the five most important impacts of blockchain on banking sector are discussed below.

- ***Cross-border payments***

Blockchain technology can smoothen for banks to make direct economical and efficient payments internationally. First of all, banks are required to have a blockchain networks of their own permitting them to pass on funds directly to another bank's network. All the transactions are recorded in the block and are immutable. Only the parties involved will be able to have access to the ledger and no middle men is allowed. This way blockchain technology has the capability to minimize the time and cost linked which is needed with SWIFT.

- ***Trade finance***

Banking sector plays a crucial role in financing the flow of goods around the World. According to the study done by the World Trade Organization (WTO) it was estimated that around 80 - 90% of worldwide trade was supported by trade finance. Trade finance is basically a payment guarantee provided by financial organizations to satisfy the trade transaction. Letter of Credit (LOC) is the most common form of trade finance. Letter of Credit is nothing but a written and recorded document created by a bank in the name of the buyer promising the payment of the purchase amount to the seller on the due date and if not then the banks will be responsible to pay the sum. Blockchain can uncomplicate the complicated process of drafting the LOC. Since the parties involving in trade will be having their own blockchain network so the information could be shared on a private distributed ledger and the agreement could be done with the smart paper work.

- ***Know your customer***

KYC an acronym for Know your customer is an another vital application of blockchain technology in banking industry. Banks usually require quite an amount of time to finalize the KYC process for a customer. It is the bank's wholesome duty and obligatory task to record the information related to a customer and make sure that the details are checked prior to establishing any kind of financial transactions. At present, KYC is governed by a lawful framework to keep away from threats including money-laundering and terrorism financing. Also customers are asked to submit their details to the bank in order to open an account with that respective bank. The information is recorded in the centralized system of that bank and can only be accessed by them. Through blockchain, a client information can be recorded in a block and the block can be distributed among the different banks. It maximises the effectiveness of operation and removes the redundancy.

- ***Capital markets***

Blockchain technology has a great potential to transform the capital market trading system. Capital market involves a heavy procedure and it often takes a long time to settle the accounts. There are many intermediaries in capital markets such as banks (mostly investment), brokers, investors, credit agencies and others who actively participates in the market. At present, these participants keep their ledger themselves and make the changes. This process is time and money consuming. (Gupta & Gupta 2018.) The current problem with the capital market is that there are different clearing and settlement systems. Since, there are many parties involved, it has a high counterparty risk. Blockchain can be used to increase the efficiency of trade and custody securities services. If the participating companies has a common blockchain platform, the transaction can be performed in a real time with the greater efficiency and transparency. It can be used to maintain the KYC process and removes the third person. It can also be used in Initial Public Offering (I.P.O).

- ***Financial reporting and compliance***

Finally, blockchain also has the potential to transform the financial reporting and compliance. Banks and other financial institution must perform reporting such as tax reports, audit, and other financial reports on a regular basis. It is mandatory for every bank to submit the reports timely and is specifically important to control the fraud and anti-money laundering activities. Preparing the reports regularly based on the regulation, consumes time and manpower. Blockchain could be helpful in automating the reporting and saving a lot of time and money. With blockchain, all the paper works can be eliminated. The transactions could be recorded and updated automatically. This would ease the work of both banks and regulation board. The transactions can be monitored which can help in activities related with anti-money laundering. (Petrov 2019.) Blockchain ability to record the transaction and track the history will facilitate auditor's and regulator's work. This could help banks automate financial reporting and compliance. Many banks and regulators are testing the ways to implement blockchain. (Collomb & Sok 2016.)

WHY DOES BANKING SYSTEM NEED THIS TECHNOLOGY?

Banking sector constitutes a major portion of global economy. Banks are the greatest and oldest financial intermediaries around the globe. The Digital World has reformed the banking sector and radically changed the banking industry. Over the years, the technology has cleared the way for electronic clearing service (ECS), online banking, Automated Teller Machine (ATM), real-time gross settlement (RTGS), electronic fund transfer (EFT), debit credit cards and mobile banking to the customers. In Today's World, the banking sector is highly dependent on technology and so, blockchain can prove to be a revolution in the industry. Blockchain pledges a significant modification in banking and financial industries as it allows recording of immutable transactions in a block as well as eliminates the third parties.

Banking industry was solid and unbreakable because due to the regulation and compliance but recently, banks have been facing a serious conflict from Fintech i.e. Finance + Technology. Fintech provides services like trading and investment, clearing and settlements, payments, digital currencies, and other services and are standing up and innovating a new method of providing high quality financial services to its clients.

Here are some considerations regarding the need for blockchain technology in the banking sector:

1. **Use Case Fit:** Banks should evaluate if blockchain technology aligns with their specific use cases and requirements. Blockchain is particularly beneficial in scenarios involving multiple parties, complex workflows, and a need for transparency, security, and immutability. For example, cross-border payments, trade finance, and identity verification are areas where blockchain can provide significant advantages.
2. **Operational Efficiency:** Banks can benefit from blockchain's potential to improve operational efficiency. By automating processes, reducing paperwork, and eliminating intermediaries, blockchain can streamline operations and reduce costs. However, banks must assess whether the potential benefits of blockchain outweigh the costs and complexities associated with implementing and integrating the technology into their existing systems.
3. **Industry Standards and Network Effects:** The value of blockchain technology increases with the number of participants in the network. If there is an established blockchain network or industry consortium relevant to a bank's operations, joining that network can provide benefits such as interoperability, shared infrastructure, and collaborative innovation. However, if the network effect is limited, the benefits may be diminished.
4. **Security and Data Integrity:** Blockchain technology offers enhanced security and data integrity through its decentralized and immutable nature. Banks dealing with sensitive financial data can leverage blockchain to mitigate security risks, prevent fraud, and maintain a tamper-proof audit trail. If a bank's operations require these attributes, blockchain can be a valuable tool.

CONCLUSION AND RECOMMENDATION

Smart contracts can be utilized in the banking sector to securely record, verify, and distribute customer identities through a blockchain network. This application can significantly save time and money for banks, while also assisting regulatory authorities in combatting money laundering and terrorism-related activities. Additionally, blockchain technology can enhance the efficiency and transparency of trade settlement in the capital market by facilitating real-time transactions. However, despite these advantages, blockchain implementation can be challenging and time-consuming due to various factors such as regulatory requirements, technological complexities, trust issues, energy consumption, and cost considerations. Although large banks have been exploring blockchain since 2015, they have yet to fully embrace it due to these obstacles. Nevertheless, extensive research suggests that blockchain will have a substantial impact on cross-border payments, trade finance, customer identification procedures, capital markets, and regulatory practices within the banking industry. In conclusion, while blockchain technology is still in its evolutionary stage and encounters certain barriers, it holds immense potential for revolutionizing the banking industry and establishing a more secure, efficient, and inclusive financial ecosystem.

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