

Blockchain Technology In Finance

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1. Introduction

Also known as technology of detailed ledger, Blockchain technology assists in keeping a record of transactions which is accessible to all the parties involved in the transaction. If party A needs to transfer the funds to party B, the transaction will have to be recorded separately by the respective banks of both the parties. This means that all the parties will have their own database of transactions and thus, there is a lack of uniformity and transparency. So, if any changes or modifications are required, all the parties will perform them separately in their own ledgers and database. This is where Blockchain comes to the rescue. Under this technology, there will be a common ledger for all the parties, which will be equally accessible to all of them. It is a technology imbued with the features of security, immutability, transparency and efficiency. Blockchain technology can be understood as a platform for the creation and maintenance of a chain of globally distributed ledgers. This technology can therefore, act as an excellent mechanism for the creation, modification and maintenance of an exceptionally large database and that too with complete security, ensuring transactions to remain tamper resistant. Blockchain can even be used in civil registries by the Governments, hospitals to maintain a detailed database of the employees and patients, banks to keep an updated record of information, insurance companies etc. In the field of finance, Blockchain is mostly applied in trade finance. However, its application can create a revolution in the banking and insurance industry due to its excellent features of security making it immutable and tamper resistant.

2. Need for the study:

The ever changing and dynamic financial environment around the globe has resulted in various financial innovations, one of them being the application of Blockchain technology in the field of finance. Efficiency, immutability, security and transparency in Blockchain technology has led to an increase in its user base and enthusiasm to apply the same in various sectors such as manufacturing, banking, insurance, medical etc. However, Blockchain can prove to be extremely beneficial in the field of banking and insurance as it will transform and reengineer the operations in this industry and lead to higher transparency and decentralisation of the relevant processes.

3. Types of blockchain

Blockchain technology is no less than a revolution in the area of finance. Primarily, there are three types of blockchains:

1. Public Blockchain Ledgers:

The most common form of blockchain ledger that is in a decentralised form and open to modifications by all the nodes in the network is known as a public blockchain ledger.

2. Private Blockchain Ledgers:

A detailed ledger account that is created for certain authorised users only and which can be accessed by these selected users alone is known as a private blockchain ledger. These ledgers are created for performing confidential work and are extremely useful in providing security for the same due to their cryptographic mechanisms.

3. Hybrid Blockchain Ledgers:

Ledgers that have the features of a public blockchain coupled with private blockchain ledgers are known as hybrid ledgers. They are accessible to all the nodes in the network however, the modifications can only be made by the authorised nodes. Hybrid blockchain ledgers are extremely useful in providing important and valuable information to all the users by still keeping it safe and secure from any modification or manipulation.

4. Blockchain and Crypto currency:

Cryptocurrency in simplest terms can be explained as a digital currency that can be used globally. An individual in India can make purchases from an individual in United States using cryptocurrency, without being exposed to foreign exchange risk. Cryptocurrency will soon be regarded as a separate asset class due to its growing acceptability and adoption around the globe. The first cryptocurrency to come into circulation was Bitcoin in 2009. This digital currency, created by Satoshi Nakamoto has continued to be the top digital currency ever since it was launched, with the highest market capitalisation till date. Cryptocurrencies run on Blockchain technology therefore, they have all the security and operational features of the latter.

5. Bitcoin:

Bitcoin is the most traded cryptocurrency amongst all the digital currencies in circulation. Created by an anonymous person or organisation, Satoshi Nakamoto, Bitcoin is a digital currency with an excellent operational mechanism, supported on Blockchain. The creation of cryptocurrencies is only one of the applications of Blockchain. This detailed ledger technology, providing excellent features of uniformity and transparency has still remained unexplored to a large extent.

6. Features of Blockchain Technology:

Blockchain technology as described above is the technology of detailed and universal ledger system across the globe. It eliminates various risks relating to security, transparency and regulation. The features of blockchain are:

1. Digital Timestamp:

All the transactions that are recorded on this network of chains is automatically digitally timestamped meaning thereby,

that there is no chance of tampering related to date and time of the transaction. In traditional ledgers, such tampering was relatively easy. However, with the advent of this technology, the digital timestamp feature has made it very suitable for industries where records are of high importance such as banking, insurance and medical industries, to name a few.

2. Consensus:

The transactions that are recorded in this ledger are decentralised. Therefore, the authenticity of a transaction is gained using consensus of the nodes involved in the network. Even if a hacker, by hook or crook, manages to hack to hack the chain, he has to achieve a consensus of more than 50% of the nodes in the network to gain authenticity, which is nearly impossible.

3. Platform for Smart Contracts:

Blockchain is a platform over which smart contracts run and function. These are basically the computer programs that are set on the blockchain with the characteristics of a normal legal contract. When a contract is put on a digital platform with programming done according to its terms and conditions relevant for both the parties, a smart contract comes into

existence. It facilitates to decrease the chances of conflicts and disputes within the parties.

4. Peer-to-Peer Network:

In this technology, there is an absence of any intermediary like a bank or any financial institution and therefore, this network runs entirely on trust and consensus of the peers. Thus, it is referred to as a Peer-to-Peer Network (P2P Network). With blocks that are chained to one another, containing transactions and data, are run by the nodes participating in the network without any need of a regulatory mechanism.

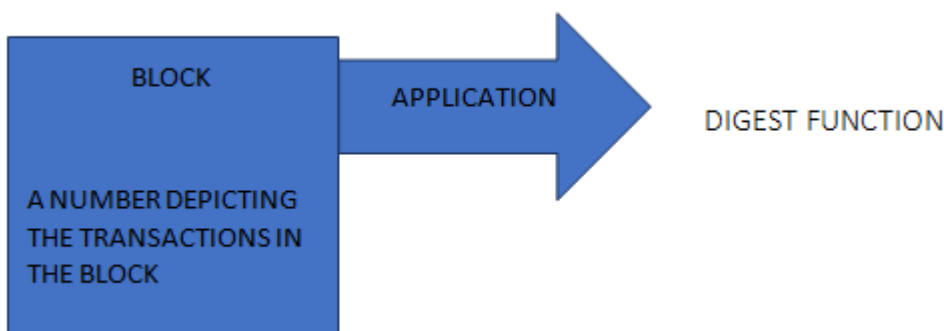
7. Operational Mechanism of Blockchain Technology:

As stated earlier, blockchain is a technology of a detailed, distributed and universal ledger system. To state it in other words, it is a suite of distributed ledger that can be programmed to record and track anything of value. What makes it better than other digital databases is the presence of cryptographic functions. All the blocks in this technology are chained to each other and there are millions of blocks in this chain. Next block is created when the previous block's data capacity is full. They are chained to each other as shown in the diagram.



When one block is full, it is locked using a cryptographic function and the next is formed. Locking a block is the toughest part in the process and this is where proof-of-work originates. A proof-of-work is a complex mathematical process which includes finding an appropriate input for a given output using hit and trial method. Proof-of-work is highly complex and requires the use of special computer softwares and a lot of computer power. Millions of people try to solve this complex mathematical puzzle and the one who does it first, locks the

block and is rewarded for the same. Also, each block has a separate hash function, which can be understood as a unique digital fingerprint for each block. Every block has its own hash and the hash of previous block mentioned on it. Therefore, to change anything in the block would mean modifying the hash of that block and thereby, changing the hash of the previous block too. So, the hacker would have to perform proof of work for millions of blocks, which is impossible. A simplified presentation of the operational mechanism is given below:



8. Blockchain technology in finance:

The financial world is ever changing and highly dynamic with new innovations always pouring in. From Barter system of

exchange to paper currency to electronic transfer of funds, global financial scenario has seen major changes. The time has come when even the use of smart cards will be replaced

by the use of digital currency. Smart cards such as Debit or Credit cards involve a whole lot of intermediaries, thereby increasing the overall cost of transaction. Digital currency, on the other hand, involves no third party and still proves to be highly secure, transparent and operationally efficient. Cryptocurrency can be used globally and therefore, can be termed as a 'Global Currency'. The presence of global currency removes political, sovereign and foreign exchange risk. Various cryptocurrencies presently in circulation are Bitcoin, Namecoin, Ripple, Litecoin, Bitcoin Cash etc. Bitcoin was the first cryptocurrency to come into circulation and has the highest market capitalisation till date.

9. Operational mechanism of bitcoin :

To trade in or with Bitcoin, the user must possess a Bitcoin Wallet, which contains the public and private key of the user. Suppose, user A agrees to pay a certain sum of money to user B, by transferring Bitcoins of equivalent value to B then, the same will get transferred from the Bitcoin wallet of A to Bitcoin wallet of B. Now the question that arises here is that how does this transfer take place. When user A pays user B, an entry of this transaction is passed in the global, distributed ledger which is further authenticated and verified by the digital signatures of user A. These digital signatures, which are in a string of 0s and 1s, are done using the private or secret key of the user. Therefore, if a user loses access to the private or secret key, there is no way to recover it back and hence, users need to remain cautious while using Bitcoin. Also, only the user has access to his or her private key, using which digital signatures are done, meaning thereby that these signatures cannot be forged. The use of cryptographic functions enhance the security features of Bitcoin to a great extent. Apart from securing the transactions using digital signatures, every transaction on the ledger is secured using a unique, separate ID so that, no transaction is copied again and again on the ledger. This way the Bitcoin transactions are highly tamper resistant and it is almost impossible to hack them. PROOF OF WORK The complex computational work performed by the miners to seal a block of Bitcoin transactions is referred to as 'Proof of Work'. Blocks on the chain have a certain limit beyond which they cannot record the transactions anymore. Those blocks then need to be sealed by a group of trained professionals, called miners, who perform complex mathematical calculations, called Proof of Work, to create a number (input) which should match to create the hash function or digest for that particular block. Say, the given hash function for a block in the chain is 0000000000000001110101011. The miners will need to perform Proof of Work to create a number, which when acts as an input, provides the same hash function. There is no other method to do it rather than hit and trial. A lot of miners across the globe compete to find this number first. This requires and consumes a lot of CPU power. The miner or a group of miners, which solve the puzzle first and obtain the required number, seal that block in the chain. The hash function or digest of each block acts like a digital fingerprint of the same. The miners get rewarded to perform the Proof of Work in the form of Bitcoins. It is worth mentioning here that miners are the only source through whom Bitcoins are inserted in the market. The hash function of the preceding block is mentioned on the succeeding block. This way the blocks cannot be hacked. A chain consists of millions of blocks and to

hack them, all of the computational work, meaning Proof of Work, will have to be performed again for those millions of blocks, which is almost impossible. Therefore, Bitcoins are extremely safe to use even in the absence of any regulatory authority, regulating the same.

10. Bitcoin: A Boon or A Bane :

Everything has its pros and cons and so does Bitcoin.

1. The identity of the users of Bitcoin remains pseudo-anonymous, meaning thereby, that the personal identity of the user remains unrevealed. They trade using their Bitcoin address. This acts as a boon as well as a bane. Pseudo-anonymous identity implies that the trade done using Bitcoin is not prone to any kind of discrimination based on gender, caste etc. However, this also leads to financing illegal and terror activities using Bitcoin. Some users use it to trade drugs and finance terror related activities. This therefore, becomes a major drawback of this digital currency.
2. The bitcoin technology is a 'Peer to Peer' technology, which means that it requires no intermediary, third party or any regulatory authority of any kind due to its excellent operational mechanism. This is a biggest boon for this digital currency.
3. Yet another advantage of using Bitcoins are the security features that it offers owing to its cryptographic functions making the transactions secure and protecting against cybercrimes.
4. Because of the absence of any intermediary, the cost of transactions using Bitcoin is much lower as compared to the cost of transactions using any other means.
5. Bitcoin can be included in the portfolio of investors as a separate class of assets in order to diversify the risk. It can act as a good investment alternative for investors. If investors hesitate to invest in Bitcoins owing to excessive volatility, the investors can purchase index funds for more safety as well as for comparing the performance of the Bitcoin with a benchmark. Hehmer Index Fund is a fund consisting of top 14 cryptocurrencies, based on market capitalisation. The fund rebalances on the first of every month. The investors can opt for such alternatives for better comparison (Daniel P. Collins, 2015).
6. Complete adoption of Cryptocurrency can lead to Financial Liberalisation around the globe, with people from different countries and varying nationalities, using a common medium of exchange. Therefore, this form of currency has the potential to become the global currency.
7. Using Bitcoins, helps in trading using 'smart contracts'. They are created and modified digitally, enhancing mutual trust and security within the parties.
8. Most importantly, Bitcoin is based on the principles of mutual trust, transparency and security. Therefore, it is user friendly. Though, it is highly volatile in nature, it can still act as a good investment alternative for investors.

11. Conclusion:

With financial processes becoming more complex in nature, it is imperative to make a shift towards a technology that

is more transparent, reliable and immutable. Blockchain is one such technology. It will not only enable least third party interference and intervention but, will also ensure better operational efficiency in the performance of functions. Use of this technology in the domain of finance will enhance financial liberalisation across the globe and facilitate in creation of a global currency thereby, revolutionizing the financial industry

worldwide. Internet-of-Things (IOT) and Cloud Computing have recently gained a lot of momentum owing to the advancements in technology. However, it would not be an overstatement that Blockchain Technology is a step more advance and superior than them. It is important that the nations and governments enable complete usage of this revolutionary technology in all the domains to reap its innumerable benefits.

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