Research Article

A STUDY ON POTENTIAL APPLICATION AREA OF BLOCKCHAIN TECHNOLOGY IN INDIAN BANKING SYSTEM

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Abstract: *Digital technology is the most applied instrument in the current scenario concerning every field of business. One of the most disruptive changes in the digital area which has become very crucial in the present situation is the introduction of blockchain technology. It has created huge interest in a wide range of industries. As blockchain is creating new applications with new features which motivated industry leaders. They started customizing and tailoring the technology so that it can be put into multiple uses. Like other business areas banks are influenced by digital transformation and financial innovations. Using the decentralized approach for creating applications is developed by Blockchain technology. The present paper highlights blockchain technology, its working mechanism, and how it can be successfully used in the Indian banking system. The last section of the study shows a comprehensive analysis of the underlying technology in the Banking industry using the ABCD model. The primary aim paper understudy is to analyze the portrayal of Blockchain in Indian banking.*
Keywords: Blockchain, innovation, cryptocurrency, Bitcoin, decentralization, banking system.

Introduction

Technological innovations are the key aspect of the competitive market. Every field of the industry has taken up one or the other innovational concept in their functions to face the competitors in the global world. The banking sector is also not away behind. Currently, we can see more innovation and digital transformation in the field of the banking sector. Since liberalization and globalization, several changes happened in the functions of banking. Banking is the most significant field of business that connects all most all business ventures. So, all significant matters of these industries can be conveniently handled better in this digital world by way of innovative technology. Blockchain technology (BCT) has emerged as the most transformative technology in few years to transform all industries, media, and startups. Blockchain can transform the different industrial sectors and make processes more secure, crystal-clear, and rewarding. With the introduction of digitalization, a high volume of data getting generated every day, it becomes challenging &essential to manage the security threats effectively for every organization. Blockchain, along with decentralized ownership, perpetuation, and crypto-graphed design of providing security to information &managing cost efficiency, is catching the attention of various industries. Though Blockchain is in its formative years and newly evolving, industries are already seeing the vast capability of this

technology which can solve primary issues coming in the way their industry functions. Globally over the last three years around 2500 banks have applied for patents and 80% of the banks are proposed distributed ledger technology (DLT) termed as Blockchain. It is a portable decentralized transactional database, which allows real-time access anytime. It is a new technology but not a replacement for customary databases.

Review of literature

The related work undertaken in the field of Blockchain between 2017-2020 is shown below. The review work shows that the Blockchain system has benefited the Banking industry as well as the financial sector of the economy. It is understood that Blockchain with decentralization has become extremely important for transformative and disruptive changes.

1. Bhuvana, Madhushree & PS Aithal(2020), : the application of blockchain, in the healthcare sector results in data efficiency, flexibility in usage, kinship translucence, security & in financial service blockchain resulted in cost savings, labor savings, safety, decentralized form of maintenance. Blockchain has become a disruptive technology being used for different purposes from cost reduction to security in healthcare and financial services.

2. Zaina Kawasmi, Evans Akwasi Gyasi, Denise Dadd (2020) : The study under research aims to find out how Blockchain helped in successful adoption and implementation in the banking industry. They focused on three kinds of adoption factors such as supporting, hindering, and circumstantial, based on the performance identify a new adoption model and find the importance of the model. By proposing an adoption model for implementing blockchain in the banking industry it came out as a successful strategy.

3. Ashish Sharma & Dinesh Bhuriya (2019) : Due to the peer-to-peer nature of the technology and everyone having easy access to look into their block of ledger without any restrictions, data falsification is difficult. This automatically increased the consumer confidence level in these new technological disruptions.

4. Mahdi H. Miraz, Mrrauf (2018) : The main focus of the study is an implementation of blockchain behind the bitcoin cryptocurrency system. It can be successfully implemented in banking, insurance, healthcare, and other industries also.

5. Luisanna Cocco (2017) : The global financial infrastructure can be optimized with blockchain technology which is the most disruptive compared to the present system. It is

more transparent & helps in achieving sustainable development. It also leads to cost savings.

6. Treleaven, P., et al. (2017) : Business processes in the banking and financial services sectors are simplified with Blockchain. It results in more secure & confident records of agreements and transactions.

7. Stef and See bac her and Ronny Schüritz (2017) : As blockchain technology is mainly working based on a peer-to-peer network, results in a collaboration between different parties to facilitate the formation and coordination of a service system.

8. Guo Y, Liang C (2016) : the clearing of payment in day-to-day operations and credit information systems in banks could be revolutionized with the blockchain. This will enhance efficiency and also upgrade banking technology.

9. Dhar, S., et al. (2016) : The technology can be leveraged with approved ledgers, smart contracts, and smart property applications to create a decentralized network that can improve transparency and confidence in bank-wide loan management.

Objectives

- To grasp the working of blockchain technology in practice.
- To access & highlight the major changes brought in by blockchain in Indian Banking Sector.
- To study various challenges in the implementation of blockchain technology in the Banking Sector.
- To interpret the movement of blockchain technology in the Banking Sector through ABCD analysis.

Research methodology

The study is Conceptual. Various journals and articles, RBI reports, NITI ayog reports have been referred to. An Analysis of blockchain technology has been done using the ABCD framework.

Meaning of Blockchain

The term Blockchain was first introduced with continuous efforts of a group of researchers who wanted to create a tool that can store all the documents in digital form so that they need not be backdated or changed. So, it was first introduced in 1991. Later the blockchain technology has been changed and adapted by Satoshi Nakamoto. A system of recording transactions digitally known as distributed ledger technology (DLT) is termed

Blockchain technology. The records maintained are called blocks. Those blocks are associated with using cryptography. Transactions can be modified by different users under a network mostly secured where anyone in the network will access the node of data relevant to them. If the transactions performed look valid a majority of nodes will agree, compare the information with the blockchain's history, and if it is valid then-new a block is added to the existing chain of blocks. It helps in the tracking of assets in a business network. It can be tangible or intangible assets. It is managed by a peer-to-peer network that collectively complies with a protocol for inter-node transactions. It runs by a network called a hash algorithm which cannot be altered by anyone. Plentiful blockchain platforms serving at present are Ethereum, Ripple, R3 Corda, IBM Blockchain, Hyperledger. It gained eminence for developing unique and multiple benefits that will overcome the existing challenges.

Classification of blockchain technology

Major three classifications of Blockchain systems are public, private, and consortium...

 (a)Public blockchain: If a blockchain is read and write by anyone without permission granted by any authority, it is called the public blockchain. these provide an open platform for people of various organizations like banks and other financial organizations to read, write, transact, and mine by the decentralized consensus mechanisms. It involves huge cost and complexity in its installation E.g.: Bitcoin. they do not require any permission to operate the so-called permission-less blockchain.

 (b)Private blockchain: This system facilitates the exchange of data and information only among the selected individuals or limited people and multiple organizations which are controlled by one organization or selected individuals. Any unauthorized access is denied in this system . So, it is called a permission blockchain.

 (c) Consortium Blockchain: It is a type of blockchain technology which partially centralized and decentralized. It gives both read and write options for the users in the network. Rather than a single organization, multiple organizations can work on the platform. It is not a public blockchain but a permission system. This is not a fully centralized system, but it can control some selected validator participants or peers.

Need for blockchain system

Technological innovations have brought in various databases to simplify the working procedures and make them more efficient. But still, these traditional systems are consuming more money, time, and vulnerability. It is also difficult to monitor the true ownership of an asset and evaluate when it is transferred under a trusted business network. These drawbacks

have pulled them into a decentralized database system called the blockchain. It is a dynamic technology that is slowly becoming a leader in its implementation because the market scenario is the most unpredictable. In a blockchain, the crowning benefit of unanimity, provenance, immutability, completeness are the various aspects that ensure that each party record will be available to every other person in the system.

Division of the blockchain architecture: Blockchain is the merging of various computers, each one is linked in the form of a decentralized network, instead of using a single server. The whole concept of blockchain is made up of various components such as decentralization, digital signature, data mining & data integrity.
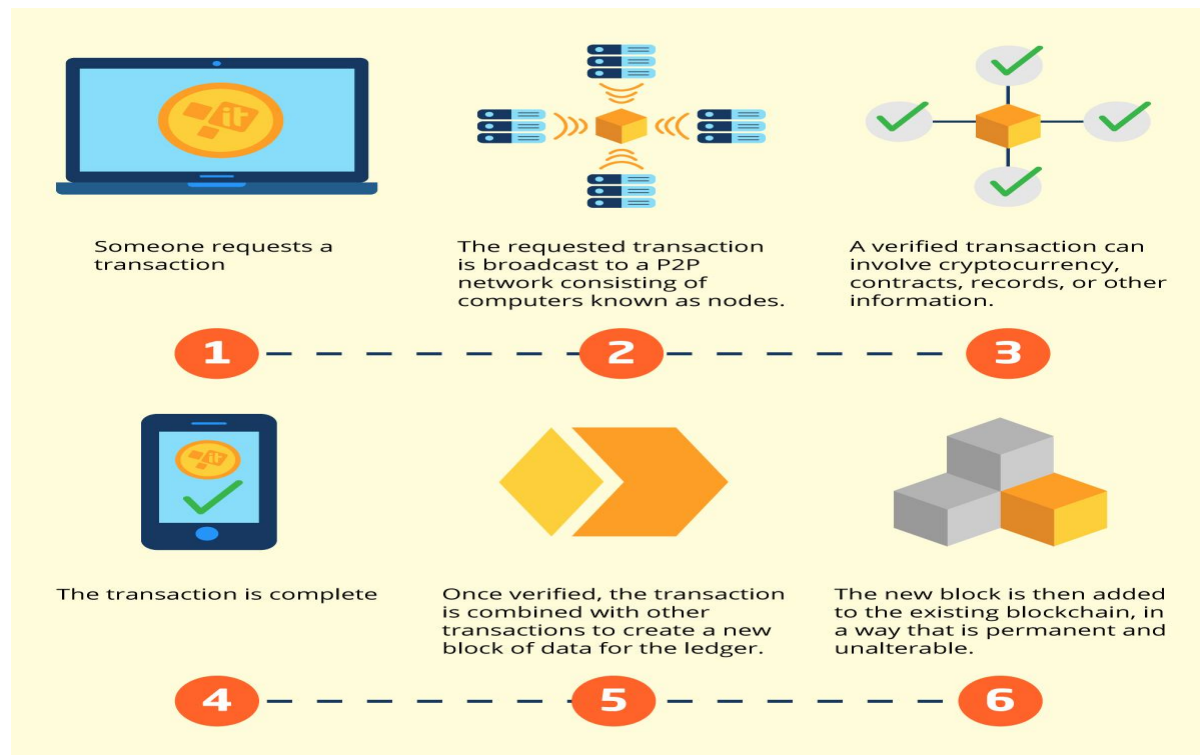
(i) Decentralization: Under the Blockchain system, instead of a single authority ruling others in the ecosystem like in traditional banking, the control system is completely distributed among all nodes in the form of a transaction chain.

(ii) Digital signature: To check the authenticity of transactions digital signature is very useful. Every user in blockchain will be given a private key& public key. the private keys are known only to the owner to create ownership and signing the transactions. the digitally signed transactions can be accessed by everyone in the network by using the public keys. so the signing phase and verification phase are two phases of digital signature. An exchange of transactional value with the public keys is enabled with the unique technique of digital signature used under the blockchain. digital signature technology can well satisfy various specific application properties of blockchains and meet the security requirements in different situations.[14] This code for decryption is known to everyone on the network, whereas.

(iii) Data Mining: In blockchain data is deeply evaluated considering cryptographic rules. This helps in the verification of the validity of the transaction and acknowledges others in the blockchain.

(iv) Data integrity: Blockchain contains distributed ledgers made up of Complex algorithms.it consists of agreement among users mainly about the authenticity of records.. so that once the transaction is approved by everyone it cannot be tampered with and thus remains unaffected. Data gathered on blockchain acts as proof for the transaction data & reduces the risk of fraud for all parties involved.

Functioning of Blockchain System: Blockchain is a data structure where the information stored is perceived to be immutable and irreversible.
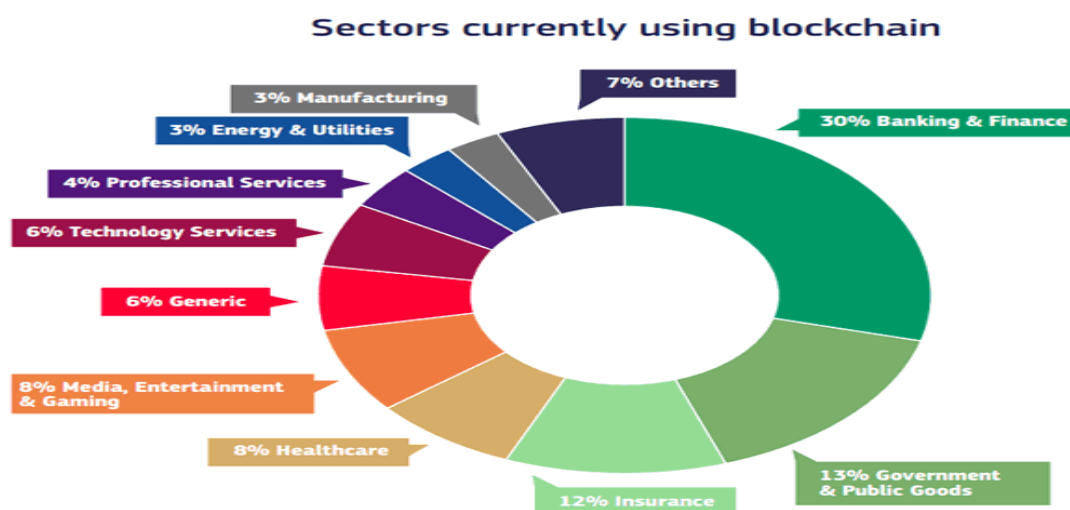

One of the famous examples of blockchain is BITCOIN, a digital phenomenon also known as cryptocurrency. It is software mainly used to attempt to create virtual money by using the science of making & breaking the codes. The essence of the blockchain is that protocol is applied in running the network of Bitcoin transactions. Here the data is reproduced after implementation. In the network, every participant will be having a complete list of Bitcoin transactions, and no single person is given control rather a group of people will retain control. In the bitcoin network, participants are reinstated by people who are considered as the validators in the network created for the transactions.[15] This validator is also called a node that does a verification job, then validates the transaction and nodes receive a reward for proof of work in cryptocurrency. Then the block will be added to the existing chain. To create economies of scale, a large group of miners often pool their resources together through companies. Then share the rewards and fees given by the blockchain network. To retain the structure of the blockchain technology, the bitcoin system also working a decentralized network system, not giving control to a single authority. so, they are inseparable from the transaction ledger of the blockchain.

Let us consider an example of Blockchain technology in the Bitcoin system. There are 5 participants in the blockchain system namely P, Q, R, S, T who are connected through a

decentralized distributed network. P wants to send 100 bitcoins to Q. This transaction is shown online as a block to every participant in the network [R, S, and T]. the block will be a newscaster. In this example, R, S, and T are the validators in our network who by using cryptographic algorithms figure out and verify the antiquity of the individual blockchain. This approval shows transaction is authentic. (5) then added to the blockchain. (6) The 100 bitcoins will come to Q's account. If the evaluation proves the hashes are invalid, the block will be rejected and not be added to the blockchain. As a page in a book contains book name, page number, characteristics, a blockchain consists of blocks made up of hash values of the previous block and contents about the bitcoin transactions. Whenever new blocks are created, they will be linked by adding them to older blocks of the blockchain in which blocks will be continuously updated. Blockchain is considered a valid technique as a hash value is present in it. Modification if needed in any block, then other blocks also need to be modified in respect of the hash values which results in the regeneration of the blockchain system.

Use cases of Blockchain in the Indian banking Systems

Sectors currently using blockchain

- 7% Others
- 3% Manufacturing
- 3% Energy & Utilities
- 4% Professional Services
- 6% Technology Services
- 6% Generic
- 8% Media, Entertainment & Gaming
- 8% Healthcare
- 12% Insurance
- 13% Government & Public Goods
- 30% Banking & Finance

Source: www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/global-blockchain/#.Wms8ZrPtypo

Blockchain is a promising underlying technology that revolutionizes the elemental aspects of payment clearing & credit clearing systems in banks. The technology has made banks upgrade & transform themselves digitalized sector. During 2016 and 2017, after its initial introduction blockchain started to attract various types of audiences with its cryptographic techniques. It led to a significant increase in the proposed services and new software applications, under the algorithm of blockchain. With the use of Bitcoin & other cryptocurrencies, there has been a boom in the application of Blockchain, especially in the

financial sector. Hileman & Rauchs have estimated that blockchain is applied by many sectors of business. The blockchain use cases are related to banking and financial services are estimated at 30%. It has also gained some traction in other sectors, other sectors such as government undertakings using 13%, insurance sector using 12%, and 8% used by the healthcare sector.[16] There are various use cases of blockchain technology that can be extensively used in Indian banks and financial institutions, make them realize its momentous benefits.

Faster payments

The Indian banking sector has become more innovative and implementing several advanced ways of electronic payments techniques to enhance the efficiency of overall banking functions. From the age-old period, most of the Indian bank's payment systems always been overshadowed mostly by paper-based transactions, the new evolving digital payments are becoming the more preferred system of the present-day customers. Both commercial and central banks are going to use this blockchain technology for the payment process. faster payment and lesser processing fees, high level of security for sending, and low cost are the services provided that have helped the banks to compete with fintech startups.

Clearance & settlement system

Average bank transfers and clearance generally take few days to settle along with additional cost & extra time. When blockchain is used banks can keep track of all transactions publicly and transparently with less period as transactions are decentralized in this system.

Buying & selling off assets

Financial markets which deal with stocks, shares, commodities, derivatives & debts are generally used traditional methods for buying and selling activities through a complex network of exchanges, brokers, custodian banks, etc. These transactions are paper-based, inefficient, and not trustworthy. Blockchain has brought a huge revolution in financial markets by creating a decentralized database of digital assets. This has helped in cutting out the middlemen, cutting down asset exchange fees, and quicken the process significantly.

Raising of funds

Blockchain helps in finding an alternative way to accelerate the fundraising practices such as IEO, ETO, security token offering (STR).

Credit and loans

Traditionally banks used to underwrite loans by using credit reporting provided by specialized credit agencies. They need to evaluate the loan application with various factors like credit score, debt-income ratio. such centralized systems are more harmful. But blockchain is processing loan applications by

offering a more reasonable, secure, and productive way.

Trade Finance: All the trade-related activities involve more time and paperwork especially financial activities related to international trade& commerce. These are called trade financial activities or trade finance. All the participants used to maintain their database for maintaining transaction-related documents and used to continuously reconciled so as reduce the errors. Blockchain with a network of blocks will streamline the trading process by removing all time-consuming manual processes and paperwork.

KYC: Know your customer is the most complicated processes are generally repetitive, inconsistent, which banks have to do for every customer of it, which is leading to high administrative overhead costs. By using Blockchain technology banks can minimize duplicative record-keeping, minimize the number of errors, eliminate the reconciliation and also facilitate faster payment process& management of assets. Currently, using the internal database KYC documents are Collected and stored internally. On an individual basis, it has been validated so it will be shared with multiple external agencies. After successful validation, it will be stored by the banks for their reference and will be supplied to central agencies. Multiple agencies have taken initiatives such as banking consortiums, The Society for Worldwide Interbank Financial Telecommunication (SWIFT), and government bodies to promote the KYC formalities using blockchain system which has led to a boom in the registration number of KYC. They act as single centralized depositories that store all documents and information related to KYC compliance. This central registry agency stores the collected data in digital form and tagged to each customer by allotting a unique identification number. Every bank has to perform the KYC process individually to collect the required details of customers and upload the validated information and documents to the central registry. Whenever banks need to collect information they will make use of the reference number given by central agency banks can retrieve the necessary information about the customer whenever a new service is requested by them either in the same banking or another bank. If registration is with Blockchain, it will remove the duplication of work involved in checking KYC information. This will be very helpful in detecting fraudulent

activities.

Challenges in implementations of blockchain technology in Banking systems

1. The principal challenge in the implementation of blockchain is a lack of awareness among people about new technology. There is a huge challenge to understand the working of the Blockchain system. This will hamper Investment and exploration of ideas.

2. Blockchain involves 20% technology implementation and business process changes contribute 80%. It shows that a more imaginative approach is needed to understand the opportunities as well as its working mechanism.

3. Blockchain offering huge savings in transaction costs and time but the high initial capital costs could be an obstacle, so Banks are considering this as a major concern for smooth functioning.

4. If government regulation is stricter in respect of implementation, banks and financial institutions will face a bundle of hindrances in the widespread implementation of blockchain in their functions.

5. Adoption of blockchain technology may require significant changes in the current operations or it may replace old methods with new technological products for that the banks must be ready to strategize the transition that is transformed from traditional banking system to digital banking.

6. proof of concept around blockchain has been started experimented by most of the banks.

7. Lack of strict legal framework both at national and international levels.

8. Another challenge is there is a scope for errors and mistakes while entering the data but the information stored as blocks is irreversible and immutable.

9. The success of the Blockchain depends on the participant's group of networks. The absence of a grid of networks makes it impossible to reach the benefits.

10. Though the private blockchain is safer and encrypted still the cases of cybersecurity is implemented before the public is properly

ABCD analysis of the Blockchain technology on Indian Banking

Here is an effort to analyze the digital payment system of banks with the latest qualitative tool in Business management called ABCD analysis, in which A=Advantages, B=Benefits, C=Constrains D=Disadvantages.

Advantages by using Blockchain Technology:

- Verifying and tracking transactions is the main advantage of blockchain. Without the help of a third party and central bank individuals and organizations can process transactions.

- Data stored once in Blockchain will be considered more secure and transparent as it cannot be altered easily.

- For various banking functions such as cross-border payments, trading activity, and settlement procedures requires middlemen. Blockchain has resulted in the elimination of the middleman for processes and become quicker, more reliable, and less expensive banking functions.

- Blockchain data is complete, systematic, and decisive as it brings every transaction under a single decentralized ledger.

Benefits of using Blockchain Technology

- Payment or credit settlements become user-optimized with the use of blockchain which will help the parties involved by saving their significant amount of time and money.

- It eliminates the complexity and errors involved in maintaining multiple ledgers.

- Transaction fees of Banks can decrease significantly by eliminating interruption of third-party and by reducing the cost of overhead of assets exchanges.

- Banks are benefiting from the use of digital currencies as with cryptocurrency, banks will be able to clear and settle financial trades easier and faster.

- Most Banks are using Blockchain to provide security to their customer transactions through the usage of hash encryption and building linkages between blocks.

- The existing standards were built in the 70-80s: with the old standard, it is not possible to work in the 21st century when every field is digitally forwarded.

Constraints of using Blockchain Technology

- The lack of qualified manpower to implement and maintain the blockchain system.

- There is no regulatory framework concerning the transfer of cryptocurrencies and secured contracts. Unless a proper regulatory framework established blockchain can not be implemented successfully.

- Blockchain is following a decentralized system that means no central authority can control the system which enables the database to share the details with the third party. So, chances of data hacking &corruption are more.

- Data mining costs are very high because of faster trade verification which leads to higher transactional fees.

Disadvantages of using Blockchain Technology

- High energy consumption is the major disadvantage of blockchain.

- In Blockchain each transaction must be signed with a cryptographic scheme, so signature verification is more challenging work.

- The high initial cost of the blockchain as each transaction cost around 75to 160 dollars is quite costly for the banks and financial institutions.

- Blockchain has its consensus mechanism to verify the transactions. Because of this number of transactions verified in a given period will be limited. The immutable distributed chain of blocks of Blockchain is growing at a faster space later will have to handle storage problems.

Recommendation

Digitization has brought in the huge volume of data generated every day, it is becoming necessary for each organization to productively manage the security threats and save expenses. Decentralized ownership of Blockchain, perpetuation, and cryptographed style of protecting data that can be best applied in the banking field where there are more problems related to manual errors. It also protects data and information from duplicating, counterfeiting, and changing according to needs. This technology leading towards the revolution of the underlying sectors in various services like digital verification, credit information systems, audit keeping systems payment clearing, lending systems, smart contracts, and KYC in banking. For all the functions separate multiple consensus algorithms are designed based on each function. Therefore, we should select the best algorithm for relevant banking services. Unwanted security flaws should be avoided by the developers. They should provide prior knowledge for the users about the working of the blockchain system.

Conclusion

Though banks have been transformed from ancient to digitalized banking, banking firms need to understand the areas where the specialized feature of the technology can be applied to solve the current business issues. The first Indian bank applied a financial Blockchain consortium of ten commercial banks is The State Bank of India (SBI) and IBM, Microsoft, and KPMG in 2017. Infosys and TCS are also establishing blockchain solutions in

anti-money asset registry and loan syndication. Blockchain has all budding techniques which will optimize the global financial infrastructure, leading to a most advanced digital financial system which revolutionizes the current financial systems. unlike other technologies, Blockchain has the potential to revamp the existing process with new sources having efficiency and value. In a race towards a cashless society, the time has come to take up suitable efforts for initiating towards digitizing the rupee through blockchain technology and application within the completely different areas for the closest future to unravel troublesome issues. The advantages and variety of applications offered by the underlying technology being given applause throughout the world. The level of security, privacy, and its potential countermeasures strongly suggest that the time is just right for the adoption of technology in India.

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