BLOCKCHAIN TECHNOLOGY IN BANKING AND FINANCE SECTOR IN INDIA

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Abstract

Titled "Study on the Impact of Implementing Block chain Technology in Banking and Finance Sector in India". This study aims at finding out the possible impact of implementation of block chain technology in the finance sector in India. The need for the implementation of block chain technology (distributed ledger) has stemmed out of the inefficiencies in the existing system. We have used the case study form of research where block chain technology has been implemented in foreign countries to arrive at the conclusion of our project. After conducting our research, we have arrived at a conclusion that block chain technology is revolutionary and has the potential to replace existing technologies. Although it is in its infancy stage of implementation in the Indian economy, we estimate that it will be implemented in all banks and the finance sector in India within the next five years.

Keywords: Block chain Technology, Distributed Ledger, Finance Sector, Banking, Economy.

I. INTRODUCTION

Conditions that have created the requirement of this Study. In India, there is wide scope of automation which can replace the manually convened business processes. There are unnecessary intermediaries in the process cycle who contribute towards increasing the cycle time and costs. Even today, many business houses are following traditional methods of accounting which includes maintaining centralized traditional ledgers for recording transactions and rely on data files that are swapped among the participants.

Futuristic Alternative - Block chain Technology

Block chain technology is a peer to peer software technology that protects the integrity of a digital piece of information using different forms of math and algorithm. It is also defined as a shared ledger which gives access to any participant in a business network. In this system, the facts can be verified with great ease and the records stays confidential.

Block chain technology is based on a network of computers (the "nodes") and open algorithms and protocols (the "consensus") as opposed to traditional centralized system that rely on trust between the two parties. Block chain

allows financial institutions to execute and verify transactions discretely without any human interference. Experts believe that blockchain architecture can significantly bring down the costs and reduce inefficiencies in the financial sector.

Smart Contract execution using Blockchain Technology

Before executing such contracts, all the implied business rules are embedded in the blockchain and the blockchain technology ensures that the contract is being carried on in accordance to those rules. The blockchain technology leverages on these smart contracts and a large number of applications can be built up using smart contracts. Blockchain technology helps in enabling transactions as small as a migrant worker remitting money to their families in a different country.

Capabilities of Blockchain Technology

It is envisaged that the technology will have a huge impact on different industries, especially in the financial service sector in the near future. Blockchain technology aims at completely replacing the traditional method of recording transactions by automatically processing it without human intervention. Blockchain technology would substantially eliminate the human efforts and reduce the processing time of each transaction. Despite the fact that blockchain technology reduces human intervention which leads to lesser employment opportunities, it is widely accepted in the financial sector due to its reduced processing time and safety of data.

Applications of Blockchain Technology

Blockchain technology is an effective replacement framework for several revenue generating business processes such as trade financing, vendor financing, cross border payments, adhering to KYC norms and organisation of syndicated loans. The concept of smart contract execution is instrumental towards conducting these business process using Blockchain Technology. Blockchain technology is critical to certain success factor which can help the banks and financial institutions adopting this technology, to become the preferred financial institutions for the next generation.

Literature Review

Guy Zyskind, Oz Nathan & Alex Sandy Pentland, Decentralizing Privacy: Using Blockchain to Protect Personal Data. (2015). This study proposes a decentralized personal data management system that ensures that users own and control their data. The need for this system arises because of the increasing volumes of data and increase in incidents of data leaks and security breaches which has resulted in a breach of user's privacy. This article is extremely helpful for our project as it shows how blockchain technology can be used to safeguard data and prevent hacking, phishing or any other form of data leaks.

Ayushi Gupta, Jyotirmay Patel, Mansi Gupta & Harshit Gupta, Issues and Effectiveness of Blockchain Technology on Digital Voting. (2017). This study focuses on the impact of using Blockchain Technology in the voting system in India. The authors recommends a digital voting system that is powered by Blockchain Technology and digital verification system. This article is used in our research to find out the possible impact of Blockchain Technology for voting in Annual General Meetings and other meetings of a Company.

Steve Fromhart & Lincy Therattil, Making blockchain real for custromer loyalty programs. (2017). This research paper mainly emphasis on how blockchain can help banks and financial centers in providing customer loyalty programs to their faithful customers. According to the authors, by using the smart contract feature of blockchain it would be easier to implement loyalty programs by

banks for their customers. The paper introduces a system of loyalty token which would facilitate in implementing in crediting loyalty points to the customers Digital wallet by interacting with the Bank and it is based on the set of protocols and algorithms as set up in the Smart Contract. Through this paper we are able to understand how blockchain can be used by banks to provide add on services to its customers, thus helping in improving the performance of banks and changing the entire dynamics of banking globally.

Steve Huckle, Rituparna Bhattacharya, Martin White & Natalia Beloff, Internet of Things, Blockchain and Shared Economy Applications. (2016). This research paper primarily talks about how Internet of Things coupled with blockchain technology can be instrumental in developing shared economy applications. The main area of focus is how blockchain technology can be exploited effectively which allows people to monetize, securely, their things to create more wealth.Leftover Foreign Currency (LFC) – cross border payments concept coupled with smart contract exchange that predominantly uses blockchain technology. This paper is relevant to our project as it focusses on smart contract execution with the help of blockchain technology.

Jason Killmeyer & Mark White, Will Blockchain transform the public sector? (2017). This article primarily discusses blockchain as a technology can be used by Government and the Public Sector to improve its own functioning and bringing about improved efficiency in the functioning of the public sector. The authors introduces us to the current status of implementation of Blockchain in the public sector around with major improvements taking place in Europe and United States of America. This article has given us insight that blockchain technology can make certain existing processes in the Finance sector such as voting at board meetings and KYC much more efficient, if implemented effectively.

Research Design

Statement of the Problem

There are many operational inefficiencies in the finance sector caused by manual intervention by financial intermediaries resulting in increased administrative costs, longer processing cycles and increased risk of fraud. Automation is necessary for advancement in the finance sector. The main objective of this research is to understand the impact of implementing blockchain technology to overcome these inefficiencies. Many foreign countries like United Kingdom and Australia are in advanced stage of implementing blockchain technology. However, India is still in the initial stages of implementation and it has a long way to go.

II. OBJECTIVES

1) The specific objectives of this research will be:
2) To understand blockchain technology and its relevance in the Finance Industry.
3) To assess the impact of implementation of blockchain on banks, stock markets and crypto currencies.
4) To evaluate probable challenges that will be faced while implementing blockchain technology in the Finance sector.
5) To analyse the prospects of blockchain technology in India.

Limitations of the Study

Blockchain technology is a new concept, and hence, not many people are aware about its wide scope. The lack of awareness has been a major limitation as it has resulted in non-availability of primary data. Blockchain technology is in its infancy stages of implementation in India. As a result, it was difficult to collect quantitative data regarding the effect of its implementation in India. The results achieved in foreign countries

were used to estimate the quantitative impact of implementing blockchain technology in India.

Research Methodology and Sources of Data

A descriptive and diagnostic method of research is used in this project in order to analyse the current situation of the finance sector in India and predict the impact that the implementation of blockchain technology would have on it. We have focused on the case study method type of descriptive research. Due to lack of availability of sources of primary data, we have selected cases where blockchain technology has been implemented in other countries, analysed the results and have used the findings from this analysis to arrive at our conclusion of what impact blockchain technology would have in the Indian finance sector. An analysis of the pilot transaction between ICICI bank and Emirates NBD, and the R3 Consortium has been done to cover the banking sector. A study of the Australian Stock Exchange (ASX), NASDAQ, Japan Exchange Group (JPX), Moscow Exchange (MOEX) and the Korean Exchange has been done in order to understand how blockchain technology can be used in the capital markets. Bitcoin, Rupee Blockchain, INR Falcon and Laxmi Coin are the cryptocurrencies covered in this project.

Data Analysis and Interpretation

Banking Sector

ICICI Bank and Emirates NBD

In September 2016, ICICI Bank (India) and Emirates NBD (Dubai) collaborated with Edge Verve, a wholly owned subsidiary of Infosys to pilot a blockchain framework designed specifically for the banking sector. Edge Verve created a blockchain framework for this purpose which was distributed and permission. It was created in a manner that reduces operating and transaction costs, without compromising on data security. This blockchain experiment between ICICI bank and Emirates NBD focused on two main areas: open account trade finance and cross-border remittances.

Open account trade finance

Blockchain was used to replace all manual, paper-based processes with digital assets where all parties are able to see where the goods are in the supply chain, so that funds can be released promptly. The transaction was the import of steel scrap by a Mumbai Company from a Dubai supplier. All parties to the transaction were allowed to view the data and shipment in real time. The parties could track trade documents and authenticate ownership of assets digitally. The transaction was executed through series of encryption and secure digital contracts without human intervention. Thus, blockchain provided a secure environment for online verification by all parties and the transfer of title and original trade documents.

Cross border payments:

This transaction was carried out to test the feasibility of performing cross-border payments over a blockchain technology network. The transaction involved transfer of funds from the Emirates NBD branch in Dubai to the ICICI Bank branch in Mumbai. The use of blockchain technology eliminated the need for exchanging messages/letters between the banks which happened according to the traditional method, which can take a few hours.

R3 Consortium

R3 is an enterprise software firm which uses the distributed ledger technology to provide various financial services. R3 was formed in September 2015, as a result of frustration amongst different banks due to various inefficiencies and unnecessary costs with the existing system. At present, R3 is working with over hundred leading banks, financial institutions and IT companies in

order to provide financial services using the distributed ledger technology.

R3's efforts have resulted in the launch of Corda, which is an open source distributed ledger technology platform which carries out complex transactions for various clients. Corda aims at removing costly friction in business transactions by eliminating middle men. Corda's main focus is on three areas: the finance sector, which includes cross border payments, equity trading and asset re-hypothecation; supply chain management and trade financing.

Finance Sector (Capital Markets)

Australian Stock Exchange (ASX)

ASX has always been looking out for replacement options for the Clearing House Electronic Subregister System (CHESS) since 2015. After evaluating blockchain technology and its potential, ASX made an investment of about $14.9 million in an US based blockchain start-up Digital Asset Holdings, LLC. The project that kick-started in January 2016, had definite milestones set and is currently in the stage of actualizing the substitute framework. With the implementation of private and permission blockchain technology, ASX will have the capacity to regulate market participants who are appropriately licensed and known to regulators.

NASDAQ

NASDAQ had initiated the project "Linq", which is a blockchain technology based solution that empowers private companies to digitally represent share ownership. Linq allows businesses such as Nasdaq Private Market to address the existing limitation of liquidity in private securities by streamlining payment transactions between multiple parties. Nasdaq, Inc. has partnered with Citi Bank in order to establish an automated payment processing system. Citi Treasury & Trade Solutions is a new integrated payment solution that processes all the payments and automates reconciliation by using a distributed ledger that records and transmits payment instructions.

Moscow Exchange (MOEX)

MOEX is one among the first stock markets to conduct an e-voting for bondholders using blockchain technology at the National Settlement Depository (NSD). During the testing period, it was ascertained that the submission speed hit about 80 voting instructions per second. The system records all the changes made in the voting procedure in the distributed database. The record can be accessed by all the network members – nominees and NSD, and can be easily traced thereby proving transparency and authenticity.

Korea Exchange (KRX) or Korea Start-up Market (KSM)

Korea Start-up Market is a platform dedicated for the new ventures to list out their securities and freely raise capital. KSM having partnered with a blockchain based start-up Blocko, had produced Coin stack which provides a blockchain-as-a-service platform. In this platform, the equity shares of the newly started companies can be freely traded in the open market. KRX and Blocko has envisaged the replacement option for domestic over-the-counter stock market processes using Blockchain.

Crypt Currency Market

Rupee Blockchain

Rupee has been dubbed as the first cryptocurrency for South Asia. Rupee was created in 2016 and it is an open source cryptocurrency based on the Litecoin source code. Rupee was initially launched in India by developer Adam Syed and it was made available on a few exchanges. Rupee is listed on various exchanges like Coin Exchange, CryptoAPI, YoBit, Coin gather and Trade Satoshi. Rupee crypto currency works on Proof of Work mining algorithm and requires

energy and computing to be mined. Rupee aims to generate revenue by developing a payment gateway applications to merchants who accept Rupee in their online transactions. Rupee team has sold 90% of the pre mine to early investors on exchanges for development funding. Currently there are around 23,012,632 RUP coins in circulation.

Rupee Blockchain is still in its early days and it is hard to say whether the crypto currency will have an impact on the Indian economy and the people. However RBI and the Government have envisaged the idea of bringing crypto currencies in India and establishing an exchange that facilitates fair trade of crypto currencies.

ThroughBit - INR Falcon

Through Bit is a blockchain startup based in Bengaluru, India. It offers a platform where people can buy, send, sell, receive, store and trade bit coin, ether and Falcon. Through Bit has come out with the first intermediary crypto currency called INR Falcon that is pegged to the Indian Rupee. INR Falcon is a stable and close crypto currency that can be traded only on the Through Bit 24x7 platform. INR Falcon is a smart contract built on the Ethereum platform and it combines the advantages of a crypto currency and the stability of fiat currency. It is to be noted that by meaning stable what falcon tries to achieve is that the value of one INR Falcon is always fixed i.e., 1 Indian Rupee Falcon (INRF) = 1 Indian Rupee (INR).

Laxmicoin

Laxmicoin is all set to make its entry in India. Laxmicoin is going to be a state run Crypto currency, which has received the nomenclature from the Hindu goddess of wealth and prosperity. RBI has mentioned that it is looking forward to introducing fiat crypto currencies. Fiat Crypto currency is a crypto currency which is officially launched by a statutory or designated authority. Laxmicoin is expected to be launched by 1st March, 2018.

III. FINDINGS

Banking Sector

- In the trade finance transaction carried out by ICICI bank and Emirates NBD, blockchain provided a secure environment for online verification of all the parties and the transfer of title and original trade documents. The parties had real time information of the location of the goods and transfer of documents. Thus, the use of blockchain technology has reduced manual intervention by reducing the dependency on physical documents, thereby reducing the risk of fraud. The cross-border payment transaction using blockchain technology proved to be quicker and much more cost effective than the existing system. The dependency on the manual exchange of letters between the banks is eliminated, resulting in lesser settlement time and reducing the processing costs.
- It's been over two years since R3 was formed and the consortium has shown extremely good results, proving that blockchain can be used in the finance sector and has the potential to replace the existing redundant processes.R3 has partnered with leading banks and financial institutions across the globe, including Barclays, Bank of America, Citi Group, HSBC and Goldman Sachs. The potential and scope of blockchain is further substantiated by the fact that the Company has received $107 million funding in 2017.
- The reduction in operating costs in the banking sector, as seen in both cases, due to the implementation of blockchain technology, would result in a reduction in the marginal cost of funds based lending rate. This would reduce the interest rate charged by the banks, encouraging the public to take more loans.

This would result in an increase in investments in the country, thereby increasing the GDP.

- At present, the Indian banking sector is faced with a high percentage of non-performing assets (NPA's). Blockchain technology can be leveraged by banks in order to create a decentralised system which increases transparency, which would ultimately result in a significant reduction in the percentage of NPA's. The process of identity verification and KYC of borrowers becomes much quicker with the use of blockchain's smart identity application. The use of smart contracts reduces the risk of non-payment of instalments due. Based on the above mentioned uses of blockchain, we estimate that if blockchain technology is implemented in banks, we can expect a reduction in the average rate of NPA's in India from 9.60% to around 8%.

Finance Sector (Capital Markets)

- Using Blockchain Technology as a replacement option for the existing business processes has shown marvellous results in the performance of the capital markets. The efficiency achieved using this technology has made this technology, a lucrative replacement option.
- Blockchain Technology promises a radical reduction in the process cycle time. Certain transactions that take around 3-4 days times to be executed using the existing system, can be efficiently transacted in few hours using Blockchain Technology. The speed of transaction and level of security displayed by Blockchain Technology is something the foreign capital markets are trying to capitalize upon.
- The Japan Exchange Group and its strategic business partner, IBM have created a Proof of Concept using Hyper ledger fabric, the open source DLT platform.
- Point 1: Launch of a financial institution consortium for PoC
- Point 2: Facilitating technological development
- Point 3: Collaboration between engineers and financial institutions

This concept proved instrumental in establishing an effective blockchain enabled technology in the capital markets around the world.

- Currently, the financial market transactions are carried out on the basis of trust that the traders have on ever-more powerful intermediaries and regulators. Lack of transparency, certainty and several layers of intermediaries are the existing problems that can possibly disappear with the implementation of blockchain technology.

Crypto currency Market

- In the case of Rupee Blockchain, the idea of bringing about a crypto currency in India should be appreciated. It can only be hoped that as time passes by, the RBI and Government understand the importance of Crypto currency and bring out favorable decision for the fair trade of crypto currencies.
- Blockchain Crypto currency is still not implemented in India on a large scale. So it is hard to comment upon the impact it has on the Indian Economy. In order to have an impact on the economy, it is important that the Government and other regulatory/statutory authorities like Reserve Bank of India take up the initiative of coming up with a State-backed crypto currency and by implementing such a model in the economy, there can be a favorable growth and development in the economy.

An illustrative recommendation of adoption and effective implementation of Blockchain Technology in Banking or Finance Sector

Phase 1 – Strategic business partnerships and sharing of resources

It is not necessary that all banks or financial institutions would have the appropriate human resource who can develop and implement blockchain technology. For this very reason, a strategic business partnership has been encouraged. There are several start-ups which aim at capitalizing on the business idea of developing and implementing blockchain technology for several other business partners.

Phase 2 – Selecting the right type of Blockchain for the organisation

It is crucial for the banks/financial institutions to select the right type of Blockchain and train their employees in this particular technology and its infrastructure. This will also enable them to utilize the benefits of blockchain such as asset management and opportunities for cross-selling.

Phase 3 – Application of Blockchain technology in various business functions

Blockchain Technology has shown prospects of replacing almost all types of business functions. However, a cost-benefit analysis has to be carried out to take a scientific decision as to whether application of blockchain technology is required in the particular business function. Certain business functions that can be replaced with blockchain technology are centralising KYC adherence, cross-border payments, syndication of loans, trade-financing and capital market transactions.

Phase 4 – Continuous evaluation and improvement of Blockchain Technology

Banks and financial institutions must try and optimize the usage of this technology in the long run. In this phase, the banks can consider developing a shared infrastructure. The bank can tie up with the companies and start-ups that provide blockchain software and develop Application Program Interface. Another major objective of the bank in this phase includes the reduction of costs with fewer numbers of people.

Recommendations for the Crypto currency Market - State Sponsored Crypto currency

State sponsored Crypto currency could be the game changer in the digital currency world. The basis of state sponsored Cryptocurrency would be similar to Bitcoin, where users would use computer generated public addresses to do transaction. Payment could be made using the public address of the recipient. However, unlike the traditional Bitcoin system, banks and other financial institutions, appointed by RBI would act as custodians of the distributed ledger (blockchain). The currency in this distributed ledger would be fiat currencies of the respective country (say INR for India). The digital currency would be different from the paper currency and it would be given the same status as a legal tender.

The Reserve Bank of India would control the supply of cryptocurrencies in the economy and validate and authorize the ledger processors (participants) to the blockchain, hence keeping it distributed by trusted group of processors. Banks on the other hand would be the custodians of the blockchain and will be held with responsibility of registering the users of blockchain cryptocurrency by providing them with a public/private key and tying it to user's identity. Customers (end users) can obtain public/private key pair from the bank by providing personal information and the users will have control of their private key and the same can be used to transfer money through blockchain without any interference. Exchanges will be responsible for converting cryptocurrency to fiat

currency when transacting across different currencies and charges a small nominal fee for the same. The benefits of implementing Blockchain Cryptocurrency would be improved support for the unbanked people of the country, increased investments in the country, development of services, first mover advantage and cost savings for the Indian Government.

IV. CONCLUSION

Blockchain is a technology that will revolutionise the financial sector. The increasing popularity of bitcoins over the recent past has had a positive impact on blockchain as well. The Indian Financial Sector as a whole is at a point in time of imbibing the blockchain technology into their daily operational arena. Blockchain Technology is yet to be implemented on a wider scale in India. The reason behind this is mainly the lack of awareness among people about the applications of blockchain. If blockchain is implemented on a large scale in India, then it has the potential of becoming a disruptive force in the Indian Financial and Banking Economy. Blockchain brings along with it the benefits of automation which can lead to a more faster and efficient economic transformation of our country.

Blockchain technology is one such revolutionary technology which has the potential to change the existing traditional processes in the banking industry completely. The success of the pilot test conducted by ICICI Bank and Emirates NBD further substantiates the effectiveness of the technology. Blockchain is quickly gaining recognition in foreign countries, as seen in the R3 consortium, with over hundred banks and financial institutions being involved. However, in India, the major problem is the lack of awareness about blockchain and its scope. People generally associate blockchain with just bitcoins and cryptocurrencies, not realizing the impact it could have on various other sectors. Based on expert reviews and the knowledge acquired while conducting this research project, we can conclude that blockchain technology will be implemented widely in all banks in India in the next couple of years.

The Cryptocurrency environment in India has always been on a confused state of mind. The trading of cryptocurrency in the country is not regulated by any statutory body, which has put doubts in the mind of investors as well. However cryptocurrency in the long run can change the way people store and transfer value. The Indian Government and the Reserve Bank of India has shown interests in the cryptocurrency market and are planning to come out with their own cryptocurrency. The impact of this cannot be evaluated at this point of time. Bringing a State-backed cryptocurrency could help the Central Banks to reduce their cost involved in printing paper currency and provide for an environment-friendly solution to transferring value in the market.

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