

# Cryptocurrencies And Blockchains: Will It Be The Vaccine Against Corruption?

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## ABSTRACT

In traditional sense, the word corruption was used against the Kings and the nobles who served for the common disadvantage. Therefore, the word 'corruption' was chiefly associated with the public office and administration. However, with time, the corruption, a habit, has become so deep rooted in the society that it has now transcended the boundaries and has entered almost all affairs of the economic cycle, be it bad loans, black marketing, monopolies, tax evasion or recent surge in the medicinal prices in the wake of Covid-19. People are fighting with corruption in own ways and this fight gave birth to some new technological inventions which could ultimately be a vaccine for corruption, Cryptocurrency and Blockchain. Could these new fintech help combatting the corruption?

**Keywords:** Corruption, Bitcoin, Blockchain, Financial Inclusion, Land Registry.

## A. INTRODUCTION

Corruption, in plain terms, is the dishonest behaviour of the governmental institutions and policy makers involving embezzlement of public resources to private advantage. It is estimated that financial bribes alone account for almost \$2 Trillion a year or 2% of the Global GDP. Corruption hampers not only the economic, but also, the social, educational as well as moral development of a nation. It is now no secret that the financial crash of the 2008-09 was a result of the bad and corrupt practices of the banking and financial institutions of the world across, which were so tied up to each other that when the base card fell, the whole house of cards collapsed, eroding trillions, or probably zillions of dollars, of the global wealth. It was in this backdrop that a white paper titled as 'Bitcoin: A peer to Peer Electronic Cash System' surfaced. This paper was written by a person or a group of person using 'Satoshi Nakamoto' as moniker, an identity which has remained inconspicuous till the time of writing this paper.

## B. THE CRYPTOCURRENCY

Cryptocurrency a term originally coined by Wei Dei, a Chinese professor in 1998, is relatively a new term made popular by bitcoin, a hypothetical

coin, which does not exist in physical form but only in digital bits and algorithm. Bitcoin and cryptocurrencies have gained a lot of traction in the recent years. After opening to a very sluggish start with the rate of \$0.0008, bitcoin went on to become the most sought after cryptocurrency, of this century and has been a highly potential financial innovation, leaving the whole world awestruck. Bitcoin, as of today, is trading at a massive price of \$ 50,000.00 with almost 70 Million users across the globe and having made penetration into almost all the countries of the world, legally or illegally. Bitcoin represents a class known as cryptocurrency and there are many other currencies in the world, presently, which are competing with cryptocurrency and operate on almost similar patterns to the bitcoin, however, bitcoin is leading the bandwagon as of now and it would be safe to take bitcoin as a representative of the bigger class.

Is it possible for bitcoin and underpinning technology to tackle the mammoth giant, Corruption? The answer may be yes. Bitcoin brought with itself a phenomenal technology called the blockchain. Blockchain or distributed ledger is a technology which can distribute a ledger or accounts to the public at large while maintaining its authenticity simultaneously, with or without a

central authority. Further, the blockchain technology operates upon a sophisticated system of the mathematical and computational algorithms which keeps on adding each time an algorithm is solved, this is called a block and every time a new block is created, it adds to the distributed ledger which can then be accessed and verified by the public across the spectrum. This distributed ledger technology further makes the use of hash function and the public and private keys. Now, questions may be asked about the security risks associated with this public ledger and the chances of manipulation in same, however, in order to hack one block, the hacker will be required to hack the whole block chain generated so far, which is humongous as new blocks keep emerging every few seconds and also, same would require a massive computer strength and power, along with coordination of all the participants involved in the system, almost impossible. UK Government Chief Scientific Report issued in 2016 evaluated all the characteristics of the block chain technology and concluded the blockchain to be safe and resistant to unauthorized attacks. Therefore, we could begin

by safely assuming a public ledger to be a fool proof system. Now, comparing corruption with the block chain will give exactly opposite results, while corruption is a conspiracy hatched behind the four walls and involving limited number of participants, the blockchain on the other hand involves huge public participation and is available for the public at large to inspect and point of time. It is often said that the sunlight is the best disinfectant, could block chain and bitcoin be the new sunlight? This research paper shall delve upon those aspects of the block chain and shall try to understand how far could this be successful in getting rid of the ever-growing menace of the corruption.

### C. THE BLOCKCHAIN

A blockchain consists of the numerous blocks which are sequenced to the earlier proceedings blocks, these blocks are immutable and cannot be reversed at all. As explained earlier, the blockchain works upon the platform using hash functions, public key and private keys. The figure 1 below will demonstrate how a blockchain functions.

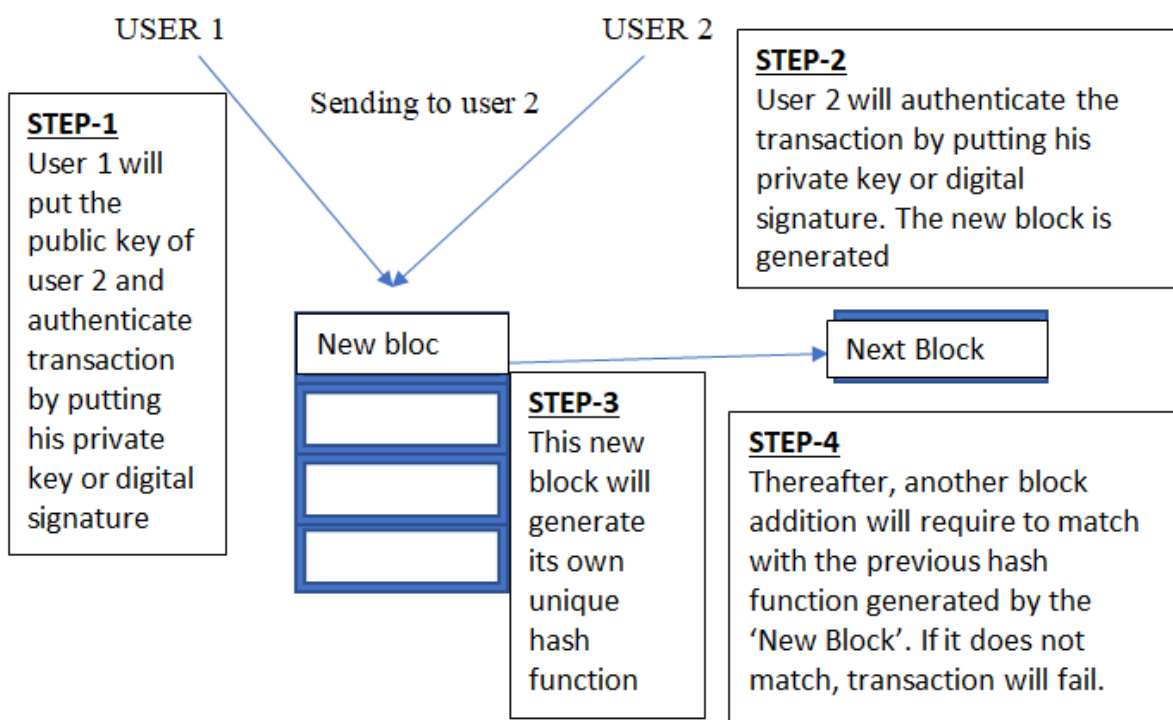


Fig. 1

This is a representational figure which explains the working of a block chain. This new block which is generated will be added to the other blocks of the chain and will then become the base block for the new block, to be generated. For every fresh block

generation, the hash function so generated must match with the hash function generated by the previous block, otherwise, the transaction will fail. This hash function is automatically generated by the block upon the entry on authentic information like the private key or the digital signature. Thus,

when a USER 1, an authentic user, puts in his private key and sends something to User 2, putting his Public Key, an intimation goes to the user 2 who then authenticates the transaction using his own private key, thereby generating the new block, thus if any unauthenticated entry occurs in the system and private key used is not authentic or does not match with the public key, the hash function will not match the previous block and the block will be rejected. This process makes the blockchain a highly secure, transparent and reliable feature. It is just like the software used by the banking companies wherein a Password or the OTP is used to authenticate the transaction.

The blockchain could be of different types with its own advantages and disadvantages such as Permissionless blockchain which do not require any permission to join the blockchain software as its party and is open to public at large, the bitcoin uses a permissionless blockchain where anyone from the world could join it. The feature like this makes this blockchain as a truly public blockchain and therefore also known as public ledger or decentralized blockchain. Permissioned blockchain on the hand is the exactly opposite of the public blockchain as the entry into this kind of blockchain is always dependent upon the previous approval of the network operator or administrator. These types of blockchains are more suitable for closed working environments such as business projects and government schemes. The third type of the blockchain is a hybrid blockchain which allows the ease and benefits of both these blockchains and can allow the parts of the blockchain software to be public while also maintaining the private nature.

#### **D. CRYPTOCURRENCY AND BLOCKCHAIN AGAINST CORRUPTION**

The World Economic forum conducted a survey in 2015, wherein 800 financial and economic experts around the world participated. The survey showed that a majority of experts, 57%, believed that by 2025, around 10% of the World's GDP would be registered on the Blockchain. This shows the promises the technology hold for the coming future. Back in 2010, the Electric Cars appeared to be a far fetched dream, however, enter 2020 and we see a slew of cars running purely on electric

batteries and have a phenomenal range of up to 1000Km in a dingle charge, Tesla, leading the race has become one of the most popular brand name of the decade 2010-2020. Science has shown that behavioural changes could be taken up swiftly with new technology and can easily alter the consumer pattern, therefore, it would not be an overstatement if by 2030, most of the consumer products are tracked via a blockchain network. Now, researcher shall attempt to explain how blockchain and cryptocurrencies could be used as a tool against, a massive elephant of \$2 Trillion a year, corruption.

#### **I. SMART CONTRACTS**

Smart contracts are the self executing contracts, based upon the automated algorithm stored in the blockchain, this algorithm controls the execution of whole or parts of the contract and once entered, the contracts are secure, permanent and irreversible. The code enabling the contracts works upon pre-decided and set parameters, if a party initiates a transaction, upon successful compliance with parameters, the code will initiate a transaction. However, if party initiates a transaction without fulfilling set parameters, the code will reject the transaction. The original idea was originated by computer scientist Nick Szabo somewhere in 1996, however, the real impetus has been provided by the sudden surge in the popularity of the cryptocurrencies and the blockchain in recent years, especially by Ethereum. These contracts help people enter into contracts without any middleman acting and thereby go long way in reducing the middleman costs, favouritism and ensure transparency, decrease legal costs thereby bringing the corruption down and ultimately increase efficiency as well. These smart contracts can be then made automated and payment could be automatically deducted upon happening or non happening of certain event just like an 'Auto Debit' feature used by google and some other applications. Kennedy, senior economist at The World Bank, estimated that almost 10-20% costs of a government project are used for paying bribes for various stages of clearances and such costs and willingness to par bribe is higher in developing countries like India, which could easily be made automated using smart contracts.

These smart contracts, coupled with security features like making transaction involving cryptocurrencies less anonymous and more compliant with the KYC norms will help track any unauthorised use of cryptocurrency and also enable to locate the movement and final destination of such cryptocurrency. Privacy concerns regarding the trackability of the cryptocurrency could be offset by the safety, transparency and less crime it would promote in the society. Involving these technologies, governments could then simply allocate cryptocurrencies for the project work and then can easily track the flow of the cryptocurrency and the progress of the public developments projects which will go long way in ensuring the corruption free execution of work. This will eradicate the wide spread corruption in the government offices.

Govt could also issue specialised cryptocurrencies which could be utilised only by the govt agencies involved in the public platforms and then could make purchases only at the designated supply stores or raw materials suppliers and ultimately this cryptocurrency could then be routed back to the Reserve Bank of India or its supported branches and exchanged in monetary terms, this would help in safe, sound and transparent execution of the contract by the agencies. Recently, The United States National Aeronautics and Space Administration (NASA) has also announced that it would incorporate smart contracts based upon blockchain technology in its Sensor-Web programme.

## II. PUBLIC DISTRIBUTION SYSTEM

The public distribution system in India is an elaborate and a lengthy process, it involves the passage of grains and commodities through various hands. The food grains at the central level are purchased and stocked by the Food corporation of India, thereafter it is distributed to the food departments of the state governments. After reaching the state governments, the food grains are then further distributed to the district committees, these district committees further distribute the food grains to the block committees, these block committees distribute the food to the Public Distribution Shops or Ration Shops, as popularly called, from these ration shops, the food grain is ultimately released to the last beneficiary.

The use of block chain technology in tracking the movement of the food grains till the last beneficiary will help eliminating the middleman and pilferage at large scale. This pilferage is the chief reason why the Govt of India has been compelled to ultimately fall back upon AADHAR based distribution of subsidy in the bank account known as Direct to the Accounts Scheme. However, this scheme has its own demerits as ultimately it releases funds and not the product. These funds are then randomly used by the heads of family and the nutrition receives the last treatment in such methods. Further, the direct cash subsidy requires infrastructural changes as well such as setting up of bank branches in rural areas and India has only 32000 bank branches for nearly 6,00,000 villages. The shift to blockchain based digital currency attached to nearest PDS shop could save humongous costs and time upon infrastructure upgrades as well.

However, treating the PDS through block chain based upon Bar Coding system or the RFID tags, could simply allow the govt to sell food directly to beneficiary than the money. This will help in numerous ways, stoppage of pilferage, black marketing, wastage of surplus food in godowns and ultimately reaching the grains to the family of beneficiary as it would be lot less difficult to sell away the food grains than to mis utilize the direct cash subsidy. Similar models could be replicated in the distribution of other commodities like cooking gas, oil and electricity as well.

Alternatively, govt could initiate its own cryptocurrency for PDS system and this currency could also be sent directly to the beneficiary account with a peculiar feature that such currency would be acceptable only at the PDS shops and no other place. further, these PDS shops then could deliver the ration against these digital tokens or cryptocurrency and which could later be redeemed in monetary terms by the PDS shop licence owner, against his licence number and the invoices. Adopting this technology would help reduce red tapism, corruption in the PDS supply chain as well as prevent the wastage of the food grains, further, it shall help in determining, in real terms, the actual beneficiaries of the scheme.

UN agency for the Refugees, UNHCR, is also trying to work out an aid programme involving the

blockchain technology. The software known as PRIMES is an ecosystem which covers a wide range of services and accesses to the refugees. Another Nobel award winning Programme known as the World Food Programme, WFP, has been utilised in serving the Syrian refugees at the camps at Jordan. The user of the programme has saved the WFP around \$ 1Billion, which could now be better utilised in another programmes. The Gubelin Gem Labs has started a project wherein it is tracking each gem stone found in the mining and updating the data on real time at the blockchain and the details are available on Provenance Blockchain for Gemstones. De Beers, another Diamond giant of the world is also working on a similar project based upon the blockchain ap Tracr, this has resulted in combatting the blood diamond menace as well as preventing the use of diamonds for terror financing.

Bait to Plate is another pilot project sponsored by WWF and performed by Consensus in countries like Australia, Fiji and New Zealand. The project aims at tracking the journey of the rare yellowfin Tuna from the water to the restaurants by fitting Radio Frequency Identification, RFID, tags along with each fish, further, it aims at preventing and combatting the slavery among fishing industry as well as preserving the biodiversity. As per a report released by the technical giant, IBM, the food fraud is increasing due to lack of transparency and accountability. IBM initiated a Food Trust Blockchain and tagged shrimps from India. It is learnt that nearly 80 other brands have joined the bandwagon and registering their shipments on the food blockchain, these includes to the likes of Wall mart, Nestle and Unilever.

### III. NOTARY PUBLIC

Notarizing of various affidavits and documents is a basic feature in the legal system such as sale, purchase, rent and wills. The notarisation is also another method which is used to commit various frauds and forgeries. Real estate scam and stamp paper scams are highly notorious due to loosely followed principles of notarization. A empirical study conducted suggested that use of blockchain in notary services more transparent, economic and fool proof. Implementing mandatory connection with the blockchain could save numerous legal cases as well as frauds. Each notary officer could

be connected to the block chain technology and then required to put the details of all the affidavits and documents notarized in a given day along with the names of parties and witnesses and the type of transaction. This will put the transaction on the public platform and then can later on act as proof of document, proof of ownership and proof of authentication as well. Further, the parties involved in the transaction too could be mandated to enter the details in the transaction and to validate it by using their own private keys. Therefore, once entered, the transaction will become fool proof and will save lakhs of cases from reaching the courts along with weeding out all sorts of fool plays involved with the notarisation. In 2016, Bitfury designed a public bitcoin blockchain, Exonum, for notarised documents which is more secure and less energy intensive. Block Notary is one such mobile App which allows notary services through block chain software using timestamp techniques, Crypto Public Notary and Acronis are other such application.

### IV. PROPERTY REGISTRATION

Further, the property registration has also been an area in India which requires various changes in order to be smooth, efficient, middleman free and corruption free. The properties are frequently sold and purchased upon notarised affidavits such as agreement to sell, will and a General Power of attorney, all these documents could be cancelled and remade any number of time. This has led to the rise of property mafia in India and a great many court cases.

The Georgia undertook a pilot project for digitisation of the land title registration on blockchain, known as 'Exonum', the project is aimed at safe title registration with reduced costs and transparency, the system used is a private blockchain based upon the bitcoin blockchain network. The results have been highly surprising as it has resulted in reduction of delivery time to few seconds from up to 3 days earlier, further, it was found out that this method led to reduction of operational costs by almost 90%. Further, it is learnt that the Government of Telangana is keen to start updating of land records upon the blockchain based technology in a bid to promote transparency and efficiency in the land deals and to weed out the

land mafia at the same time. Government of Karnataka has also joined to bandwagon and has decided to adopt blockchain technology in mapping the land registries. Sweden is also another country which has been working on developing a land record of the nation upon a blockchain based application and has found out that the total time taken in registry has come to be reduced from four months to few days. The project is underway and is making headwinds in positive direction and it hopes to serve as a model for the countries to follow. Further, various other countries such as Dubai, Brazil, Kenya, Ghana, Ukraine, Honduras etc are also working towards mapping of land records through the blockchain based technologies.

## V. FINANCIAL INCLUSION

Financial exclusion has been one of the biggest propeller of corruption, terrorism, crime and money laundering and can destabilise the overall growth of a country. Therefore, by improving the financial inclusion a country could kill too many birds with one stone and reduce not only corruption, but also, crime and speed up process of justice. It is believed that digital finance, cryptocurrency and blockchain have potential to boost the financial inclusion. Kiva, a crowd funded Not for Profit Organisation, based in Sierra Leone, seeks to provide micro financial aids to the citizens. The project has received around \$15 Million in funding by the UN. Therefore, the pilot projects could be carried on by the government wherein the micro financial loans, home loans, education loans could be provided to the institutions, people and the beneficiaries involving 25% as ready cash and rest 75% as digital tokens, which could then be realised only against particular services such as for home loans, only for purchasing building materials etc and then these digital tokens could later be redeemed at the bank branches by the receivers. The trackability of the financial assistance and monitoring the use may save hundreds of billions of Dollars each years. Further, it could also make the process of attaining loan much easy and swift with less requirement to visit the banks frequently and the loan accounts could be very well tagged along-with the AADHAR Cards. iSPIRIT a think tank in India has recently suggested that incorporating cryptocurrencies could result in financial inclusions of Small and Micro

Enterprises. This financial inclusion in turn will break the link between political patronage and poor public services as stated by Dr. Raghuram Rajan. Further a study by ASBANC also suggested that financial inclusion could be a potent tool in eliminating corruption.

## E. CRYPTOCURRENCIES AND BLOCKCHAINS FOR THE FUTURE

The blockchain and the cryptocurrencies have been the catchphrase of the preceding decade and hold long term promises of revolutionizing the field of finance, technology and development. Corruption is a cause of concern for fast developing countries like India since her birth. It is a social evil which could be eliminated through the use of technologies and financial advancements. However, these developments too come at a cost. Especially a new technology like blockchain and cryptocurrency rely upon the human behaviours and acceptance. Technological backwardness is one such road block which India could face in its fight against the corruption as block chain and cryptocurrencies demand more than just basic knowledge of computer and digital finance.

In a world savaged by corruption and financial scandals, the cryptocurrencies and blockchain possess enormous potential to combat financial fraud and corruption. These technologies can make crucial contribution in enhancing the transparency, accountability and integrity of the public system. Though these technologies alone cannot be treated as a panacea, yet, it is the appropriate time to experiment these technologies and take up pilot projects to assess their viability in real terms. Although, there is scope for more future developments in the technologies and further studies are required to completely unleash the potential of the new FinTech.

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