

A STUDY ON BLOCKCHAIN TECHNOLOGY, IT'S IMPLICATIONS ON THE FINANCIAL LANDSCAPE AND IT'S FUTURE

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Abstract : Blockchain has been around for the past 2 decades and it's pragmatism towards the industries where it is being used is simultaneously a cause of joy and fear. It's **transparency** and **decentralization** have proven to be a game changer for all the industries, **cryptocurrencies** that essentially have to function on the Blockchain technology also employ this trait thereby being widely accepted. In this paper Blockchain technology, it's implications on the financial landscape and it's future are studied. With **virtual currencies** getting popular in the past two decades, this paper compares it with the traditional and modern currencies to learn the points of discord and the challenges that it faces against the latter. This paper also informs about these technologies and what it takes to utilize them for instance the concept of **mining**. With the advent of technological reform and evolution this technology shows a lot of promise in the future to it's users.

Key Words: Blockchain, transparency, decentralization, cryptocurrency, virtual currency, mining

I. INTRODUCTION

An invention of the 21st century that has been making rounds is the inception of the Blockchain technology. A relatively simple idea, which is to decentralize the ownership of the data by storing it across the network, this therefore eliminates the risk that comes with data being held centrally and thereby also eliminating the centralized points of vulnerability. It was first proposed in 2008 and then implemented in 2009 by Satoshi Nakamoto. It was initially instituted for the use of virtual currency or cryptocurrency to all facets of industry be it Security, Internet of Things etc. and up until recently even the ability to create "smart contracts". These smart contracts can be used for voting systems, and since they trade digital tokens representing tradable goods the outcome of their own code can be effectively enforced. Apart from this, executing commercial transactions and agreements automatically and enforcing the obligations of the parties involved helps omitting the added expense of a middleman altogether. Blockchain employs the use of blocks by creating them with different information, each of the blocks that are created relate to the other blocks in this blockchain. The details of the blocks however can be seen by all the parties. For security and safety purposes the proof-of-work is used and therefore when the new block is connected to this blockchain it is almost impossible to change or delete these blocks, this helps eradicating hacking of these blocks as to do that it is necessary to have a huge processing power. So in essence there is security, decentralization and transparency orbiting this technology.

Review of Literature

Blockchain is described as a ledger, like bitcoin that keeps the record of every transaction with a timestamp by Forde (2017, p. 4), Nair and Sutter (2018, p. 529) state that this opens up various opportunities for new kinds of co-operation and contracting. It has also been stated that this helps develop the digital currencies that can't be backed by governments or agencies even at the time of economic icebreakers such as demonetization, which thereby enables to develop smart contracts not requiring any form of human intrusion; Siba and Prakash (2016, p. 29). Perry (2018, p. 28) goes on to say that the transparency achieved by blockchain is because it doesn't rely on a specific server, it although relies on the networks on computers making known as distributed ledgers, this is also continuously updated by the users numbering in the thousands and hence to hack this is considered a mere impossible task, also to do this would be too high a cost. Forde (2007, p. 4) also concluded that when recorded on the public blockchain, the data is permanent as if something is embedded on stone.

Gupta (2017, p. 2) claims that the invention of databases resulted in the revolution of Blockchain. Every aspect and crevice of our civilization encompasses the storage and retrieval of data and this has always been in a centralized form. But, with Blockchain, decentralization has been achieved in an accurate manner. Gupta (2017, p. 2) also states that this also provides smooth co-operation and co-ordination amid the members of the network who can add value without the presence of middle men. With the initiation of this system of decentralization began a new age of global payment, corporate governance and capital market functions making Blockchain not only an innovative method that ensures security but also consensus of all the participants involved. With the immutability of transactions and online vetting this technology has learned to build trust in the architecture of it's system, concluded Arlen (2018, p. 4). In summart Blockchain is a controlled mechanism that is decentralized and comprises interest of all but exclusively can't be owned by anyone describes Halamka et al (2017, p. 5).

Filippe (2017, p. 3) has emphasized on 5 basic principles on the working of Blockchain:

1. **Computational logic-** Blockchain transactions could be linked to the computational logic, users can thereby set up algorithms and rules that triggers transactions.
2. **Transparency with Pseudonymity-** Every user or node has 30 plus characteristic alphanumeric addresses that provide one's identification. These blockchain address are the medium of transaction amongst users and it also depends on the user if they want to stay anonymous or provide identity proof to others
3. **Irreversibility of Records-** Blockchain technology comprises of various algorithms which makes it impossible to alter or change the records therefore once the transaction is done, it cannot be altered.

4. **Peer to peer Transmission-** Communication occurs between peers via nodes, since there is no central node present each node is subjected to store information and the same information is forwarded to other nodes.
5. **Database Distribution-** Every participant in the block chain has access to the database can verify the record with partner directly without any involvement of a middle-man. Hence, no single party can control the database.

The figure below illustrates the benefits that the blockchain technology brings, along with transparency and decentralization it brings efficiency and co-ordination to the table as well. Since it is virtually impossible to edit the transactions it is therefore a seamless process.

Benefits of Blockchain

Benefits	Author	Description
Coordination	Primavera De Filippi (2017) Koetsier (2017)	-Direct interactions amongst stakeholders along with governance. -Initiating cashless transaction. -Records of the transaction amongst individuals. -Suppliers can perform their checks and balances on real time basis.
Efficiency	Gupta (2017)	-Elimination of Middle men and other friction forces, hence making process smooth. -Efficient way of tracking transactions in terms of material, goods and money.
Efficient value network	Tapscott and Tapscott (2017) Gupta (2017)	-Easy locking and location of multiple partners. -Provides digital wallet for personal identifications and assets ownership. -Secured network -Eliminates the opportunity of double spending or fraud.
Better procurement	Tapscott and Tapscott (2017)	Companies can cache the correct information of their employees and upload, store and manage in a database supported. For example- In terms of procurement, the information regarding suppliers could be uploaded in the similar way.
Accurate Finance and accounting information	Tapscott and Tapscott (2017)	-Historical picture of any company can be extracted - Transaction of even last few hours or minutes could be extracted. -Live information regarding the finances of the company.
Legal affairs	Tapscott and Tapscott (2017) Siba and Prakash (2016)	-Smart contracts can be developed which provides the digital rights, betting and loaning conditions between 2 parties. -Smooth contracting in both long and short term -Companies can mimic guaranteed execution, payments and enforcements to automate terms of agreement. -Possible for both the parties to check the account balance, changes in commodity price, alerts and payments. -Self-enforcing

Hence all these benefits point to a completely transparent process eliminating all the complex tasks like multiple reporting, paperwork, complex network and fraud.

Claeys G., Demertzis M. and Efstathiou K. (2008, p. 7) quote money to tend to be defined by the three functions it traditionally performs: first, a unit of account, as it serves as a common measure of value of goods and services traded in an economy; second, a medium of exchange, as an item accepted for the payment of goods and services, and for the repayment of debts; and the third, a store of value that is a way to store wealth in order to transfer purchasing power from the present to the future. They go on to claim that to perform the tasks, money takes various forms including non-perishable goods and non-financial and financial assets, moreover various goods and assets have been used and even co-existed as money, where some have been very successful some have led to monetary instability and have been replaced.

Price stability and a huge network of users have defined the success of currencies be it the United States Dollar or the Great British Pound. To be used money should also stabilize in time, otherwise it would be quite difficult to use it either as a medium of exchange or as an accounting device. One more crucial aspect to it is the value of the currency, high inflation and deflation are to be avoided. Claeys G., Demertzis M. and Efstathiou K. (2008, p. 7) also claim today's fiat currencies issued by the world's major central banks to perform well all three traditional functions of money, even in jurisdictions where central banks are independent and have a price stability mandate and fulfil it, currency is a reliable store of value, the predominant medium of exchange and the unit of account.

Blockchain according to Golosova J. and Romanovas A. (2018) demands a high price. Ivaschenko (2016) terms the blockchain product to be a strong volatile substance, almost all of the ups and downs of the BTC value depend directly on the declared statements of the governments of different countries. This volatility according to previous experience has been known to create problems in the short term. Another problematic avenue is the untraceable characteristic of this currency, there is a lot of fear in the people towards investing in it in regards to the risks of money laundering and other illegal activities of financing. Traditional

currencies and Modern currencies have central banks issuing them but the cryptocurrencies aren't issued by anyone and in the case of an event of bankruptcy there isn't any formal legal entity to guarantee. Although with blockchain the use of cryptocurrency becomes streamlined, it does demand high energy as well. Another major drawback of cryptocurrency due to its pseudo-anonymity is its ability to evade taxes. Vishwakarma P., Khan Z. and Jain T.(2018, p. 213) have found that in countries such as the United States where cryptocurrencies are considered to be a taxable asset, while bringing large sums of foreign currency into a country can destabilize the economy to a large extent and can cause issues of taxation thereby bringing volatility in the financial market. The online route of bringing and storing these cryptocurrencies makes it easier to transport them across border checkpoints, where they can then be cashed while inside the country; loopholes in the legal and taxation systems such as this can be exploited in a major way.

Hayes A. (2017, p. 4) suspects that given the relative cost of production a rational agent wouldn't undertake production of bitcoins and use of Blockchain if they incurred real losses in doing so. The sheer computational effort which requires the consumption of electricity at a higher level for employing the Blockchain technology as well along with the Bitcoin mining and a sense of competition among the miners at our present reservoir of resources has proven to be known as non-pragmatic. Miners have to now mine from countries such as Serbia where the cost of electricity is quite low. And with the introduction of Application-Specific Integrated Circuits (ASIC) claims Hayes A. (2017, p. 1317) which were solely designed to solve the encryption underlying cryptocurrencies the difficulty level has increased to a drastic extreme.

Blockchain

One of the most popular definitions of the Blockchain was developed by Don and Alex Tapscott (2016) where they go on to say that the Blockchain technology is an incorruptible digital ledger of economic transactions that can be programmed to record virtually everything of value and aren't limited to just financial transactions. The Blockchain consists of a sequence of blocks in a linear fashion which are added to the already established chain with regular intervals (Bahga A & Madiseti V, 2016, p. 533-546). Depending on the Blockchain network the information is stored in the blocks although, the timestamp, transaction and hash exist in all the variants of the Blockchain. The working of blockchain could be explained with the help of an example. The hash is cryptographic and every block contains the hash of the previous block. Since all the information is generated automatically, it is at the very least impossible to change any information in the hash, and the more number of blocks in the chain the more secure and reliable is the Blockchain as the next block amplifies the verification of the previous block. A block is also assigned a public key and a private key, public key that can be viewed by all and the private key which is unique to each block. Fig.2 shows the signing process which includes the signing process with the private key which is issued to each block and also the certificate. As soon as the signing process ends the verification process begins, where the verification is only valid if both the hash values are equal.



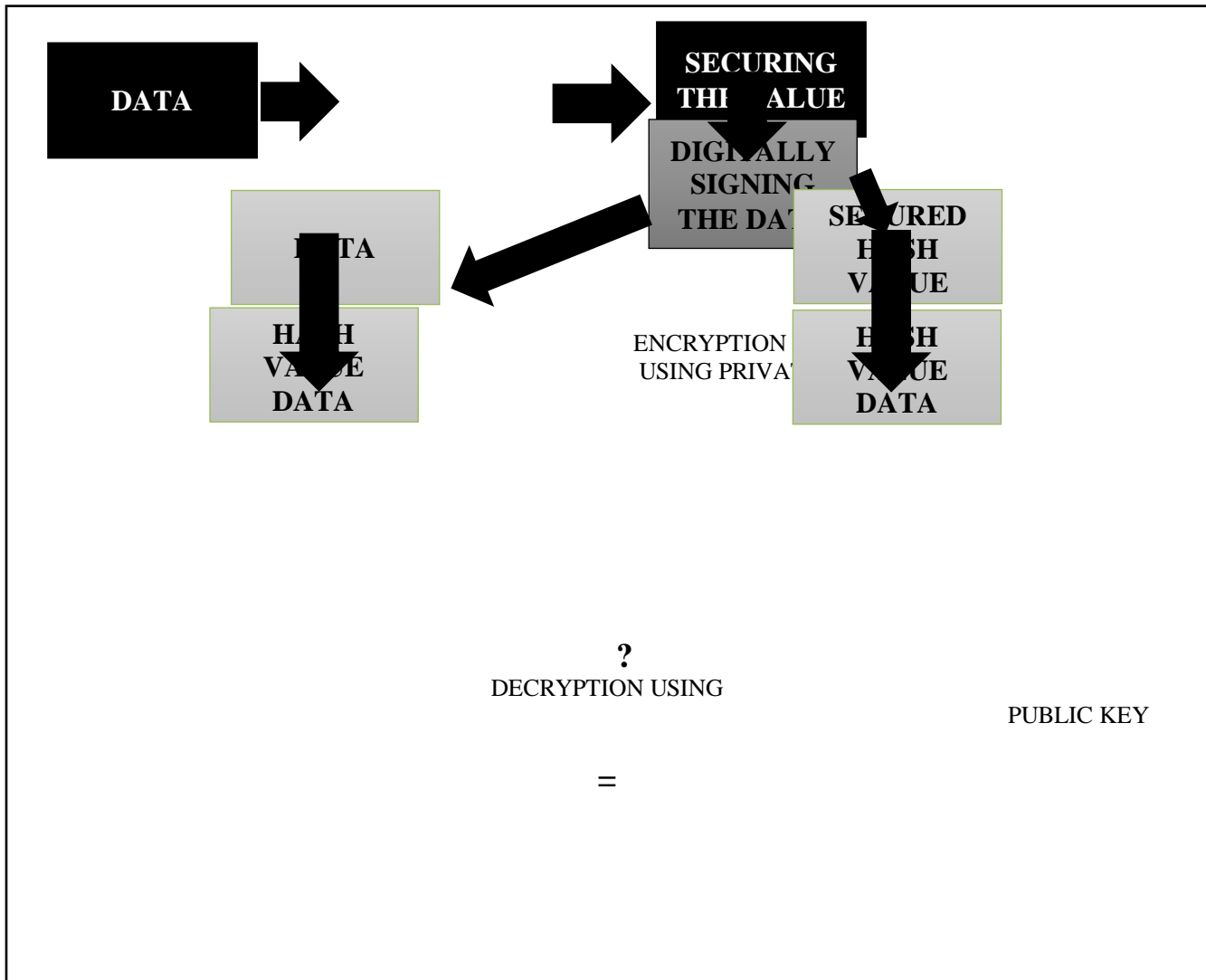


Figure 2

With the registration of each transaction in the block the transparency of the Blockchain is achieved and it also allows for the information to be viewed by all the users in the chain. Due to organizing data using different and various methods, the chain of blocks have no access to the external information. For instance, there is a factory that manufactures cars, every time they manufacture a car, they simultaneously create a block of data as a proof of its existence along with its features, price, fabrication, shipping and more. This block gets a unique hash key, more like a finger print, that cannot be altered and replicated. Every time the table experiences any activity, a new block of data is created for the same, getting a new hash key, carrying the hash key of the preceding block. Hence, this hash function links all the blocks of the chain and provides them with the unique identification, keeping the blockchain secure. The data can be added to the blockchain, resulting in the formation of a new block with the unique hash key. If someone tries to alter the information inside the block, it will result in the formation of a new block of data with a unique hash key. This feature of the blockchain provides transparency and security in the entire process.

Role of Blockchain in the Financial Landscape

The incorporation of Distributed Ledger Transactions (DLT) has seen practical implications throughout the Finance Sector, and it is also being known as a disruptive technology. It is slowly and widely being looked into, the technology helps keep multiple distributed copies of a ledger. The parties that hold the copies of this ledger achieve consensus to agree on the contents of the ledger and manage it in a manner that cannot be in any way altered as claimed by Ferraro P, King C. and Shorten R. (2018, p. 1). They also went to state that the ledger could be used not only to keep track of the financial transactions, but also record the actions of the blocks with the timestamps for a whole lot of non-financial transactions as well. DLT is suitable for a vast multitude of applications where the accuracy and honesty of the recorded transactions are crucial. Workie H. and Jain K. (2017, p.2) have explained the DLT as involving a distributed database maintained over a network of computers connected on a peer-to-peer basis, such that the network participants can share and retain identical, cryptographically secured records in a decentralized manner, thereby helping multiple entities to maintain a shared database and conduct a series of secure transactions over a network of computers. Since the data maintained on the database is encrypted courtesy the private keys and the ability to read and write is also limited, the record-keeping and the transaction verification process is securely validated by the participants of the network. This concept and piece of technology has also been discussed and promoted as a solution to the people who don't possess a bank account given its potential to reduce costs and increase a large number of access points for consumers (Committee on Payments and Market Infrastructures; Higgins; Walport; Mills and others; World Economic Forum; He and others; Baruri). DLT could potentially lead to cheaper and faster transfers by the decentralization of records into a shared digital ledger. Maniff J. and Marsh W. (2017, p 7) feel that the DLT's real time value transfer ability could also help improve cheque processing, drawing unbanked

consumers to banks in the process., although cheque processing speeds have increased, cheque clearing times are still an obstacle for some unbanked consumers who need quick access to funds to pay bills or purchase household goods; and since presently they rely on cheque cashing services DLT could streamline the cheque clearing process for banks by reducing the number of counterparties involved in the transactions and under a shared ledger third party intermediaries are unnecessary thereby allowing cheque processing and settlement to be near- instantaneous. It is still unclear though whether it can cater directly to the needs of households with no bank accounts. Therefore it is detrimental to research on this extensively to figure out the intricacies of this technology to benefit equally everyone that can use it. The next chapter focuses on one major aspect of Blockchain which is Cryptocurrency.

Cryptocurrency

The advent of Blockchain brought about the first truly functional cryptocurrency in the 21st century in 2009 and has ever since gained a lot of momentum. Since it wasn't an asset as liquid money and time had no effect on it to such an extent that with the passing of time it's value increased, it began to also be backed by gold by various economies to quench the volatility in the cryptocurrency. The most popular currency to be known was Bitcoin was widely accepted, especially due to the fact that there was no trace to the transactions of goods and services that involved the use of Bitcoin. According to Dierksmeier C. and Sele P.(2018, p. 1-14) with the advent of various cryptocurrencies such as Bitcoin, SETLcoin, Ether, Solar Coin, or Liberty Reserve existing since 2009, due to their decentralized control, they are often considered as a threat or alternative to the conventional centralized banking system. Through processes of "mining" the cryptocurrencies are formed, that is a user needs to spend time and specialized computer hardware, which has a certain amount of computational power, which is measured in hashes per second, according to Hayes A.(2017)the process of mining is quite competitive, in the sense that somebody mining with more computational power or with better efficiency has a better chance of finding new bitcoins than somebody else with less power and efficiency; hashpower, hashing Power, mining effort are some of the terms that are synonymous to computational effort. A hash is nothing but a single iteration of an algorithm used in cryptography, this is known as a hash function. What bitcoin is, is an open source software-based online payment system in which payments get recorded in a shared public ledger also known as the Blockchain, using it's own unit of account i.e. Bitcoin either symbolically represented by BTC or XBT. Transactions here occur over a peer-to-peer network without the existence of a single administrator, the nodes in this network are anonymous ergo the decentralized virtual currency is an apt definition of Bitcoin. This is also termed as digital gold by many people, due to the sheer complex method of gaining and producing bitcoins and due to it's intangibility nature unlike that of liquid money, which can't be stolen and which can last though time.

Traditional Currency VS Cryptocurrency

With incubation periods spanning over centuries for most currencies, they now have reached stability to the highest levels. These currencies also have helped establish empires over a large period of time with the help of their predecessors as well, case in point the various changes in the Roman currency over a span of centuries still helped it be economically very powerful. To topple such a long history of currencies and monetary power the cryptocurrencies of the 21st century would have to undergo the tumultuous unpredictability and unreliability of time to show it's worth. Since traditional and modern currencies have had time to stabilize, cryptocurrencies still have a lot to go as they are still climbing in value, optimization and seamlessness in the process of currencies have pitted them to be fairly better at competing with the cryptocurrencies as well and since they are backed by gold in most countries today with a healthy inflation rate they are accepted widely throughout the world. Money can also be taxed by governments thereby it adding value to a country's economy as well to a large extent, the taxes that the people pay are used by the governments to develop their countries and also invest in the forces that guard it's borders. The uses of money ergo have optimized to a large extent and have found uses in all facets of the country.

Blockchain as mentioned requires a powerful computation hardware and time, either of which aren't a realistic and pragmatic solution to the currency situation in this century. With the global economic growth stalled due to the tremors of the 2008 financial crisis throughout the world, and slowly picking up pace according the United Nations World Economic Situation and Prospects 2018 still there seems to be an uneven amount of growth throughout the world. In such a situation employing a high energy consuming process such as Bitcoin to be the next currency to be used won't be accepted by all. Thereby pushing the point forward that cryptocurrencies although a boom in technology, a decentralized transparent technology have to wait for some time before being used widely.

Conclusion

The future of cryptocurrencies is bright since it will remove trade barriers and intermediaries, it would also decrease the cost of transactions, and therefore boost the trade and the economy, although the cryptocurrency has reached the threshold of USD 20 Billion in value and has enjoyed trading as well, still it has to stabilize to a large extent to be widely used as a currency. Blockchain Technology's transparency and decentralization concept has proven it to be useful and versatile for our world. From a Financial standpoint there is still a lot to be learnt, the challenges to this technology however large can be overcome due to the repercussions and results that this technology provides, some of which being the fact that it is virtually impossible to edit the transactions once entered into the Blockchain(Safe and Secure) . Therefore Blockchain shows a lot of promise and it is extremely crucial and imperative to explore the nuances and intricacies of this technology to aid the world of Finance. The primary concern of the paper is to explore the Blockchain Technology and it's financial implications towards the people and it's future in the 21st century.

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