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Conceptual Analysis of the Blockchain Technology and Feasibility of its Industrial Application

Dr. Ivneet Kaur Walia
Department of Law, Rajiv Gandhi National University of Law, Punjab, INDIA
Email: ikwalia@gmail.com

Abstract
Blockchain is an innovative technology, primarily functioning on the ideology of a distributed ledger, peer-to-peer validation with consensus, with a decentralized and transactional data shared across a large network. This technology ensures transparency, accountability and accessibility and distributed ownership. This technology eradicates the essentiality of central entity/third party to validate transactions. Blockchain when put to industrial applications can be used to create and enable smart contracts, supply chains for various government processes, trusted inter-department communication and record keep storage facilities. Blockchains can verify the proof of documents containing essential information or formulas immune to tampering. Potential blockchain applications include, Digital certificate management including sale deeds, pharmaceutical supply chains, Duty payments, public service delivery etc. The main issue that needs to be pondered upon is in regard to regulatory framework, which leaves behind a jurisprudence of wither developing a new law or upgrading technologies for self-governance.

Key Word: Blockchain Technology, Industrial Application, Encryption, Decentralization, Regulation

"*There is something new and fundamental happening in the world which could be the start of the next enlightenment period. The core of this is shifting from centralized to decentralized models in all aspects of our lives, both individual and societally"*

- Melanie Swan

I. INTRODUCTION

Shakespeare famously advised readers to be on watch for tides in human history. It is overwhelming to know how the blockchain technology is seen as a paradigm-shifting technology, which may be looked upon as the next everything. From Techno-Moguls to the governance kinship everyone regards Blockchain as an upcoming model of technology transitioning the world around. An exhilarating introduction to cryptocurrencies like Bitcoins is like unlocking the door, to the similar emerging applications and technologies. Most of the nations across the world are glorifying the unhackable and unchangeable characteristics of the block chain technology.

Blockchain is a digitalized ledger operating on a decentralized peer-to-peer digital networks which facilitates financial transactions of various kind, by minimalization of the role of central banks and financial institutions. Blockchain transmits unrestricted data and information which may or may not have the economic value, circumventing the national borders.

II. DEFINITION AND CONCEPT OF BLOCKCHAIN

The Co-founder of Ethereum uses an apt definition of blockchain: A blockchain is a magic computer that anyone can upload programs to and leave the programs to self-execute, where the current and all previous states of every program are always publicly visible, and which carries a very strong

crypto-economically secured guarantee that programs running on the chain will continue to execute in exactly the way that the blockchain protocol specifies.

Blockchain is a digital ledger and works on the principles of already existing system of Distributed Ledger Technology. In this process, the data and information are stored in the form of blocks which are vertically connected in the form of a chain. Blockchain technology do not completely work on anonymity principles, but the identity is pseudonym, so if required the identity can be discovered. Pseudonymity is guaranteed through multiple encryption and cryptographic techniques such as hashing-functions that create information pseudonyms and key generators or key gens. Key gens create cryptographic keys that are strings of numbers and letters with the use of very advanced mathematics involving prime numbers. There are two sets of keys that are used in all transactions: public and private. Public keys are 'wallets', or addresses publicly visible to all nodes; private keys are used as digital signatures for the conduct of transactions and are therefore to be kept secret. Blockchain works on the principle of cryptography thereby making the transaction data open to vulnerabilities in the form of intrusions and alterations. New blocks of information are added to the chain by miners which are specialized nodes that place the block in the chain by successfully solving a Proof of Work or other problems. This proof of work is a complicated algorithmic proposition along with hash functions. Which makes it difficult for miscreants to hack into a system. This requires validation by way of consensus from other nodes, to execute and complete the process. This indicates that even if anyone with the help of the sophisticated software change the cryptographic hash and keys still the alteration made would need the consensus of other nodes to accept the changes made in the blockchain. These features ensure accountability, transparency, non-hackability and democratic participation. A block contains a timestamp, a reference to the previous block, in the form of the hash of that block, the transactions and the computational problem that had to be solved before the block went to the chain and the hash of the last block. This complex process purports to do away with intermediaries and replace trust in them with trust in digital decentralized cryptographic system, 'a trustless trust'. This technology is unique in itself as it is tamper-proof. Every transaction is to be endorsed by digital signatures.

If a miner produces a block that is approved by an electronic consensus, then the miner is rewarded with coins or tokens. The block reward is not the only incentive for miners to keep running their hardware. Miners also get transaction fees that users pay. Even though the fees are usually voluntary on the part of the sender, miners will always prioritize transfers with higher transaction fees. That is why the blockchain economy has been characterized as a "free economy". The blockchain technology is malleable in nature and it can be used in multiple organizational and social situations. The blockchain technology has profoundly impacted the concepts of data sharing, data collection, data analyses and processing.

III. CATEGORIES OF BLOCKCHAIN AND ITS APPLICATION

There is a categorization of blockchains depending upon their characteristics. For instance, there are public and private blockchains. In case of a public blockchain, no single entity has any control over it, whereas, in case of private blockchains, the digital ledger is either controlled and maintained by a single entity or by a cohort of companies. There is a further characterization of blockchain technology into permissioned blockchain and permissionless blockchains. As the name suggests, the permissionless blockchains can be accessed by anyone whereas, the permissioned blockchains, not

everyone has the access. These permissioned blockchains are restrictive in nature and restrained to be used by only those who have the permission to access it. To give an example, bitcoins and Ethereum are the public permissionless blockchains which means they can be accessed by any individual by using a computer system from any part of the world. There is also a hybrid public-private form of blockchain, in which a part of it is restricted and access given to few entities.

The most talked about application of blockchain technology is that of cryptocurrencies. Cryptocurrencies are not exactly virtual currencies. Virtual currencies are digital representation of value, not issued by a central bank, credit institution or e-money institution, which in some circumstances can be used as an alternative to money, cryptocurrencies on the other end would depend on peer-to-peer cryptography for validation. The use of this technology has not only facilitated financial transactions as third party or intermediaries like central banks are left with no role to play but has also wiped out the foreign exchange costs because the virtual currencies are fluid and own an uninterrupted transnational presence. There is also an added form known as the cryptoassets. These crypto assets are digital assets in which the cryprographic techniques are used to regulate the generation of units of an asset and to verify the transfer of those between parties in a decentralized way. There are three main categories of cryptoassets. First, there are payment tokens, second are the utility tokens and another category is the security tokens. Stable coins are one of the recent developments in the domain of cryptoassets.

Being decentalized and global in nature, they cannot be identified as legal tender in the same way as national currencies. In the United States, only the U.S. dollar is legal tender, accordingly, only the mint and the Federal Reserve can produce coins and currency. Different jurisdictions take different views on the legal nature of cryptocurrencies, sometimes treating them as money, sometimes as commodity. Others identify their nature by focusing on their background technology.

Different jurisdictions look at cryptocurrencies in different forms. For instance, some jurisdictions treat them as money, where they are treated as legal tender just like the traditional currency. Some of the foreign jurisdictions also allow for the free flow of cryptocurrencies in their jurisdiction, giving them the status of foreign currency. To add to this, in the European Union, the crypto currencies are recognized in the form of value added tax as a form of money. In other jurisdictions, the government treat the cryptocurrencies as commodity, like the People's Bank of China, which has issued a 'Notice on Precautions against the Risk of Bitcoins', classifying them as virtual commodities.

When it comes to private sector uses of blockchain technology, they work on the foundations of the smart contracts. A smart contract is self-executing in nature, where the terms of both parties are written in the form of an agreement by way of codes, thus reducing the cost and providing the comfort of transacting without the interferences of third party or intermediaries. These contracts are executed the moment particular conditions are met. The benefit of such contract is that it can be signed or rather coded between any two parties from anywhere in the world, irrespective of its location. These kinds of social arrangements on blockchain have further led to the development of Decentralized Autonomous organizations, which are constituted by coded rules of a blockchain held by stakeholders with voting rights when it comes to funding.

Important public sector applications of such technology include: identity management and attestation, the keeping of the government records, such as land registration and corporate registration records; citizen services management in areas such as healthcare; and the conduct of government activities, such as voting, taxation, customs and public procurement. The unique part about the above stated situations is that it may not need the government interferences. There are many countries that have accepted these technologies and have moved its complete record keeping onto digital form by using blockchain, for example, Estonia, Dubai etc. Moreover, the blockchain is also being used for bond issuance and lifecycle management.

It is also pertinent to mention that the technology is making a shift from the Proof of Work consensus protocol to the proof of stake. The difference between the two is that the later, deals not with much of mining but rather validation. People who want to validate a block must also spend digital currency to enable them to validate transaction. This way the person will hold a financial stake to correct and validate a blockchain transaction. Looking at how the centralized institutions handle, store and manage significant mass of personal data and sensitive information without adequate measures to protect, a proposal has thus been made to decentralize privacy. Keeping in mind that blockchain technology works in a structured network, future improvements are suggested to the technology itself and also creation of a personal data management platform based on a combination of a blockchain and off-blockchain platform. This suggested platform comprises of three entities, users, services and nodes. The proposal gains strength from the argument that blockchain is tamper-proof and the users manage their keys very well. After looking at the intricacies of the functioning of the blockchain, by use of encryption, codes and keys, only the user will have the control over their own data.

There are certain global initiatives in regard to blockchain technology applications, such as; Cosmos, Polkadot, Aion, Ark, Wanchain, Atomic Swap and chainlink are research initiatives in field of blockchain interoperability. Samsung Blockchain Wallet powered by COSMOCHAIN Blockchain has developed CosmeeDApp for purchase by cryptocurrency. The Countries like Brazil, Canada and Chile have been using Ethereum to run transparent governance. The United Arab Emirates are working tirelessly towards the project ‘Smart Dubai’, thereby making all efforts to be the first city fully powered by Blockchain.

IV. CONCLUSION

Although, blockchain technology is grand and profoundly magnificent with immense potential, still there are lot of challenges and incumbrancers when it comes adoption, adaptation and execution of such disruptive technology. There are challenges in regard to performances, for example, the decentralized process may take more time of processing and that would again be hampered by scalability issues like configuration of blockchain, block size, consensus etc. Resource allocation, interoperability and storage issues may also cause hindrances. Issues pertaining to skillset and awareness, may delay the societal acceptance and trust that it requires to function and above all manpower well versed with both domain and technology may not be widely available. Despite the accountability, integrity, transparency and democratic benefits, the technology may also face legal issues pertaining to data protection, privacy and concerns of sovereignty may also be raised. The clarity of whether developing a regulatory framework or depending on self-governing technology still remains unresolved in many jurisdictions.

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