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Harnessing Blockchain Technology for Transforming Society

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ABSTRACT

New technology brings transformation in lives and has the purpose of bringing efficiency in operations. Transparency and security of data and information have become the new challenge in the era of digitalization and thus result into new innovations in the area of technological advancement. Distributed ledger technology (DLT) and decentralized mechanism used in new innovative technology called blockchain provides solutions to these concerns. The present study focuses on all these aspects and tries to throw light on these areas. This paper focuses on the concept of block chain technology with an understanding of common terminology. The study also emphasizes several benefits this technology is providing in businesses. This paper also shows the functionality of blockchain and discusses its application in various areas and industries. This study will also discuss the concerns and challenges associated with the blockchain technology.

1. Introduction

Digital world has been gaining momentum in the recent years. The rapid growth in digital world paves the way to produce new innovative products, technology and better customer relationship globally by the use of cloud, IOT, mobile and analytics. Internet and cloud computing are the key players for originating the term "decentralization"; that transforms the existing centralized system to decentralized architecture. Cryptocurrency become a buzzword around the world nowadays and has attracted extensive attention from industry to academia**.** However, the main consideration has been to the core technology called Block Chain Technology (BCT). The growth of new technology transformed the way the transactions happened in the past. The technology behind cryptocurrency brought a revolutionby providing the new distributed systems for transactions without the requirement of any intermediaries. Decentralized nature of the BCT is the key property that made it so appealing to the globe. It has not given birth to digital currency but also transforming the businesses in several ways and bringing efficiency, transparency and security in transactions, data and information.

2. Literature Review

Emergence of new technologies have often indicated visible transformations in different areas of work and has brought disrupting social change (White & Kevin Brown, 2016). Blockchain also brought astounding disruption to business and society (Naughton, 2016). The blockchain technology has huge potential to reshape and transform various industries and change processes into more secure, transparent, democratic and efficient. The study emphasized that with high volumes of data getting generated on a daily basis due to digitalization in every day's routine, it is crucial for every business organization to manage the security threats effectively and achieve cost efficiencies (Shah & Jani, 2018).

The blockchain technology has certain features which are well applied within the banking industry and finance sector (Johansen, 2018). The financial sector is the first one to deploy this technology eventhough it is in its nascent stage (Narayanan, Bonneau, Felten, Miller, & Goldfeder, 2017).

The blockchain technology has a distributed public ledger which increases transparency in a way that participants in the network can do transactions without the intermediaries; and removes information asymmetry entirely thus matching almost all stakeholder's needs for evidence of authenticity (Gebert, 2017). Blockchain provides a trusted environment through its transparent and immutable nature, making data and information publicly accessible throughtout its network, at the same time also assuring the integrity and immnutability of information (Seebacher S., 2017).

It is a trusted open ledger of records or transactions which are independently verified by numerous agents; independent verification permeates the blockchain with a degree of robustness that enables its contents to be trusted (White & Kevin Brown, 2016). This technology can remove third party intermediary, reduces costs and eventually increases profits for multiple players / participants within the industry (Krause, et al., 2016). Blockchain can play an important role in financial inclusion process using blockchain for internal and cross border payments with reduced costs, reduced settlement time and provide better experience (Aggarwal, 2017).

The application of this technology is not limited to financial sector only; to industries as varied as supply chain management, fashion and publishing is a result of the innate flexibility of blockchain. This platform is equally beneficial to suit a variety of needs (Krishnan, 2018).

The new innovation, decentralization and digital innovation is amongst the most common concepts found in the literature; and study points out that the technological features are becoming the driving force for disruption and innovation (Johansen, 2018); targeting the reduction of bereaucracy and regulation without compromising legal provisions on business conduct (Gebert, 2017). There has been regulatory challenges

in the adoption of this technology; laws and regulations could be structured into the blockchain, so that they are enforced automatically for better implementation (Trautman, 2016).

3. Objectives

The objectives of the paper are as follows:

1. To understand the concept of blockchain technology and its basic terminology.
2. To know how blockchain works to understand its functionality.
3. To identify the benefits and advantages arising out of this technology.
4. To identify application areas of blockchain technology in diverse fields in society and organizations.
5. To identify the challenges and issues of blockchain technology application.

4. Research Methodology

The study is exploratory in nature and uses secondary sources of data collection. The sources were majorly used for the study were national and international research journals, researchreports by the corporate houses and agencies, various websites and blogs, conference and seminar proceedings and literature, magazines articles etc.

5. Concept of Blockchain

Blockchain can be defined as digital, immutable, distributed ledger that maintains the transactions in blocks. Blockchains are called peer to peer network as the record of transactions are retained across several computers which are connected together in a chain. Each and every transaction is highly secured with the help of hash keys and no one can tamper the transaction. In the design of block chain network no one can modify, delete or append any record to the ledger without consensus of the peers in the network. BCT generally stores the data in the form of blocks and the blocks are chained together, thus named blockchain.

5.1 Basic Terms

To understand the blockchain technology concept there is a need to understand the driving force behind the CryptoCurrency which is playing with the following magic keywords:

***Block**:* It is a collection of data that stores the data and information, transaction details etc. for example: banking transaction details, timestamp, link to the previous block which is generated by secure hash algorithm.

Transaction: Action performed by the users / participants of the network.

***Mining**:* It involves the creation of hash code for the block of transaction that cannot be easily forged. It protects the integrity of the entire blockchain without the requirement of a central mechanism.

***Node** :* Node is an electronic device that is connected in the network and holds the copy of a transaction in a network.

Type of BCT: Since Blockchain is a continually evolving technology, the type of BCT depends on the scope of the application.

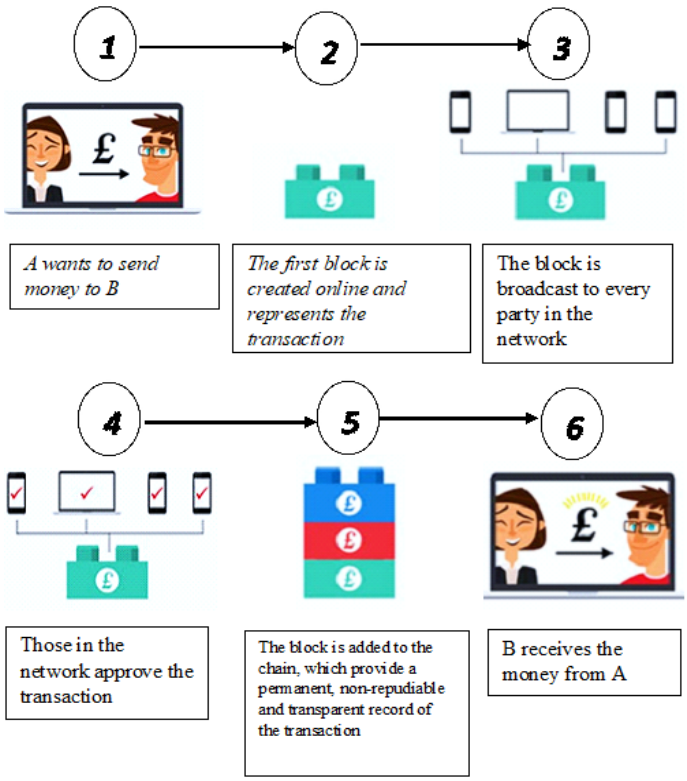
***Public**:* There are permissionless ledger and any participant can contribute to the network. They can read or write into the network. All participants will be having same copy of the ledger.

***Private**:* Private BCT are permissioned ledger and limits the access to only selected participants. Those participants are trusted participants of the network. Each participant in the network will have the complete record of the transactions and the associated blocks. All blocks are encrypted by a private key and cannot be interpreted by anyone.

***Hybrid**:* It is a combination of public and private blockchain. Also called as consortium blockchainand is semi-decentralized. This network supports characteristics of both public and private blockchain.

5.2 How blockchain Works?

The functionality of blockchain is depicted through the below mentioned figure.



Source: https://www.spectator.co.uk/2017/05/blockchain-an-investors-guide/

Party A is initiating the transaction request in the network. The request is going to the network. The block that represents transactions is created. Then the block is propagated to all nodes of the network. Block has to be validated with the help of well-known distributed consensus algorithms. A verified transaction can contain any information such as cryptocurrency, smart contracts etc. After the block is verified it has to be attached with the existing block chain network. Then the transaction gets completed and becomes immutable and unalterable.

5.3 *Benefits of Blockchain Technology*:

The distributed nature of blockchain offers a lot of benefits:

Transparency *:* Since BCT is a distributed ledger, all participant of the network shares the same copy of the transaction. Thus BCT ensures the most accurate, consistent and transparent data.

Speed: BCT enables the real time settlement of transactions by reducing risk and increasing speed.

Reduced Cost *:* Any two parties can transact without the intervention of third party and brings the cost efficiency in the system and thus cost of the transaction is reduced drastically.

Reduced Fraud*:* Since the transactions are immutable and irreversible, all transactions can be easily verified by participants of the network; thus minimizes fraud in the system.

Security : Enhanced security is assured in the BCT, by means of cryptographic functions through hash code generation.

5.4 ***Application of blockchain in various areas:***

- ***Financial Services Sector***

Blockchain technology is striving to transform the whole financial services industry by optimising the business processes by data and information sharing in secure, transparent and efficient manner. This technology is used in financial services in a number of ways using smart contracts. It allows various events in financial services without any intermediary, and has the ability to manage bonds, stocks, claims, deeds and settlements. In the centralised banking system, funds transfer has been an extremely slow and expensive process. With the help of peer to peer networks, millions of transactions can be easily processed across various time zones in almost real time. The bureaucratic nature in the existing capital markets infrastructure makes the financial transactions slow, expensive and has the involvment of intermediaries. The blockchain technology allows the financial entities to provide better, secure and transparent services to businesses and indivuduals. This technology also benefits in the areas of cross border transactions, smart bonds, point of sale systems, lending and borrowing, trading platforms, clearing and settlements, book keeping and auditing, hedge funds etc. This technology will not only transform the financial services sector at national level but also at the international level.

- ***Government Sector***

The Blockchain Technology also known as Distributed Ledger Technology (DLT)) can provide vast improvement in the government services and foster transparency in the government to people relationship. This technology can be deployed in variety of applications in the public sector viz. better delievery of services, governement to public (G2P) payment mechanism, prevention of tax frauds, elimination of bureaucracy and reduction of waste etc. Blockchain intrusions in government practices can transform the whole system across all government functionaries such as from healthcare benefits to social security benefit, distribution to improved document management and storage.

- ***Healthcare Industry***

Immutable and unalterable data and information which is stored in the blocks can be analyzed and updated in real-time and can reshape and transform the healthcare landscape entirely. Existing centralized systems in health care industry have been inefficient in delivering affordable quality health care to the people. The blockchain application is highly efficient to redefine the healthcare institutions operations from National Healthcare Systems to private hospitals. It will not improve the direct health care systems but also prescription compliance and healthcare insurance systems. The existing system has lot of challenges and concerns in terms of speed, cost and involvement of intermediaries. With the help of blockchain technology, government and hospitals can provide comprehensive care which can be easy and affordable to monitor and administer and easy for public access; thereby improve the quality of life and increase life expectancy for the people.

- ***Identity Management***

Blockchain technology helps in tracing and managing the digital identities in secure and efficient way, and results in seamless sign-on and reduction in frauds to some extent. Banking, healthcare, national security, citizenship documentation, online retailing or hotel booking, everywhere there is a requirement of identity authentication and authorization. Due to the lack of common platform and often-unchecked cyberspace of personal information, identity from the perspective of technology has been facing significant issues. Problems such as hacking of databases and breaching of accounts are stressing on the need of a technologically sound solution for society. Blockchain technology provides solutions to various digital identity concerns and issues, where the identity can be distinctively authenticated in a secure, inevitable and immutable manner. Blockchain-based authentication systems have been found on indisputable verification of identity using digital signature which is based on the public key cryptography. Blockchain provides brilliant solutions to the personal security distresses and chaotic identity verification processes in the world for transformation of society.

- ***Insurance Sector***

Blockchain technology is also transforming the insurance sector with its automated event based transactions mechanism and unalterable, immutable data storage. The existing insurance models problems can be removed with highly competent and efficient blockchain based tools and platforms for insurance sector. There are numerous benefits which can be availed by insurance companies and insurance policy holders with the help of blockchain technology. The distributed ledger technology in blockchain helps to reshape the back office operations and can bring total transformation with transparency and security benefitting all involved parties; which will further benefit the auditing and regulatory aspects of insurance. There are multtiple other innovations in blochchain which are ready to transform the insurance market in various categories viz. vehicle insurance, health insurance etc. Various fintech startups and insurance companies have started using blockchain platforms for fraud prevention, record tracking and process automation. There are more innovations to come in blockchain technology in area of insuarance which will bring tranformation for the benefit of the society.

• ***Real Estate Industry***

Real Estate is one of the industry which lags behind in adopting new and innovative technologies, and uses paper based exchange of documents. This industry can be transformed using blockchain technology by adopting it into essential functions such as payments, escrow and title; will not only bring efficiency into the system but also have cost savings. This technology will lead to the reduction in frauds, improvement in financial privacy, increased speed of transactions etc. This technology can play an important role in management of property title, improved property ownership, records tracking and all sorts of data retrieval services.

• ***Music Industry***

Blockchain technology can restructure the ownership rights in the music industry and help in providing fair payment to musicians for their work and at the same time it can bring transparency in the industry. There have been multiple problems which are prevailing in the music industry such as clarity of ownership, royalty distributions, transparency issues etc. The music industry has been struggling and finding ways to monetize digital music files which in today's times become non-scarce digital products. The data and its accuracy is very important in this industry in order to ensure that the music creators and owners get paid for their work. Furthermore, old copyright databases and complicated system of collection of royalty brings difficulty to get the music from authenticate sources. With the help of blockchain technology and smart contracts, comprehensive and accurate decentralised database can be created for music rights, which can make it possible to have instant and transparent diffusion of royalty to artists, real time distribution of payments to co-writers, producers, publishers, technology partners etc. and transform the entire music industry.

• ***Supply Chain***

Managing supply chain is very important function for smooth and efficient functioning of any business organization, which includes a series of processes that require seamless instrumentation between many moving parts and parties. Creating the links in order to distribute goods and services seems to be a web than a chain in the business world. Any system which invloves multiple stages of operations, multiple third party agents who are scattered across the globe, tend to become complex and less and less transparent. With every increase in either stage of operation or agent, the complexity increases multifold. This complexity can be made easy with the help of blockchain gtechnology. Supply Chain solutions which are based on blockchain are transforming the way organizations do business by providing end-to-end decentralized processes via the distributed and digital public ledger. It not only helpful for supply chain management but can also bring transformation in logistics industry, shipping, freights, trucking, and every other mode of transport which is used for transferring goods.

5.5 *Challenges*:

In the era of Internet, blockchain technology has huge potential for changing the world, but lot of challenges are to be addressed for its successful implementation:

Expertise in Technology: Due to its numerous benefits, Blockchain technology has been gaining popularity in various fields such as banking, healthcare, real estate, e-governance etc. and at the same time raises the issue of expertise in this technology. We are in nascent stage of BCT, but need more trained people for the future.

Initial Cost: Adoption of block chain technology provides promising key benefits in productivity, efficiency and reduced cost for the peer to peer transaction. But initial blockchain infrastructure is very costly. This process takes significant amount of time and extensive planning.

Privacy: Customers trust is the driving force in any organization particularly in banking and financial transactions, identity management etc. The transactions in the block chain are available publicly raises the question of privacy in BCT systems. Privacy of information leads to the need of private blockchain.

Legal Regulations: Legal regulations are mandatory for implementing BCT in all areas. Strong requirement of regulatory framework is visible in the country.

6. Conclusion

Blockchain technology has brought a revolutionary change in businesses across the globe and thus expected to bring positive change in people's life. Various industries and diverse areas are exploring blockchain technology to bring transformation in the society and bringing ease of doing transactions, better security of data and information, improved privacy and so on. Several industries can be benefitted with the help of this technology with its distributed ledger technology and immutability. However, there is a strong need of regulatory framework in order to adopt and implement it in India in a better way.

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