Blockchain -The Emerging Technology

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ABSTRACT

Blockchain is an emerging Technology that leads to significant changes in business, finance, government, healthcare, real estate industry and will have a huge impact in the upcoming year. It is way through which economy will going to transform. It is chain of blocks that contain information. It is a shared immutable ledger that facilitates the tracking of assets in a business network (assets can be tangible: a house, a cash or intangible like intellectual property, patent, copyright, branding) and it keeps track or process of transactions. Blockchain is system where no one can hack data, make changes or cheat the system. As Blockchain is **Decentralized** system and distributed **Ledger** that aims to ensure security, transparency and integrity. Since it can't be forged. Most of current research related to Blockchain technology focusing on applications like CryptoCurrency such as Bitcoin, Ethereum, etc. The number of live Blockchain is growing everyday at ever increasing pace. As of 2022, there are more than 10,000 active CryptoCurrency based on blockchain with several hundred now CryptoCurrency blockchain. It's another application are like Government, Healthcare, Banking, Finance, Accounting, and Business Process Management therefore it is very important to study and explore this technology that is being used to solve the real world challenges. Thus large number of published studies were carefully reviewed and analyzed based on their contribution to the body of blockchain Knowledge.

Keywords: Blockchain, Technology, Ledger, Application, Business, CryptoCurrency, Decentralized.

I. INTRODUCTION

Blockchain is constantly growing technology that keeps the permanent records and process of all the transactions that have taken in a very secure chronological and immutable way. It can be used for secure transfer of money property, contract etc. The fundamental element of blockchain is **Ledger.** It is same as the book we keep record in it or we can say it is a database. Blockchain is made up of two words that is Block + Chain , where "Block" is nothing but keeps encrypted digital records of transactions then this each block get linked with another block which is termed as "Chain" in chronological order. These block

will contain copy of last transaction since previous block was added. In this way this is a shared block or ledger which is linked to all participants who can use their computers in the fully fledged network to validate or confirm transactions and in turns which don't require any third party. Blockchain is used to protect and distribute data in a very trending new way. There is no single intermediate rather than it will have distributed environment. This transaction cannot be hacked, manipulated or disrupted.

Data is immutable it means that once it has been written to block then nobody can change it, delete it or alter it not even System Admin. It can't modify in Simpler form. Through the cryptographic signature each block is get linked and this blocks are timestamped. Blockchain technology can be applied in any kind of transaction such as money, goods, land ownership, medical records, stocks, voting system, etc.

Blockchain doesn't support migration in a project. All the important transaction data is stored on the ledger and status will be then derived from it. Since Blockchain is a distributed system without a central control point or authority and it is not regulated by a single control center as there might be with a system administration, there's no single point of failure. Hence, in an enterprise, theoretically, there would be no need for an IT professional to monitor security on a blockchain database.

Despite these possibilities,it becomes very important to emphasize that Blockchain is a very new technology. As a result, there are only a small number of examples in which the technology has been applied. A proven example, could be the Bitcoins which is the most successful implementation of the Blockchain Technology, and has confirmed to be a viable solution in creating trust in a trust-less ecosystem without central authority.The purpose of this paper were mainly: data collection and grounded theory. Data collection and ground theory were done in very several ways. For example, the paper thoroughly searched all published works found in the existing literature, books, academic journals, presentations, conferences, technical reports, searching several databases using keywords. The objective of this study is to present a review of Blockchain Technology and its current or future practical applications. Thus, in the next section we present a systematic literature review to identify current Blockchain applications and discuss future practical applications. The remainder of the paper is organized as follows: Section II presents an overview of the Concept of Blockchain Technology; Section III describes in detail the Applications of Blockchain Technology in Business; Section IV presents the Challenges and Barriers of Blockchain Technology; and finally Conclusions and Recommendations are drawn in Section V. II. The Concept of Blockchain Technology Blockchain Technology is a continuously growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a cryptographic hash code of the previous block, a timestamp and transaction data , which was designed so that these transactions are immutable.

II. THE CONCEPT OF BLOCKCHAIN TECHNOLOGY

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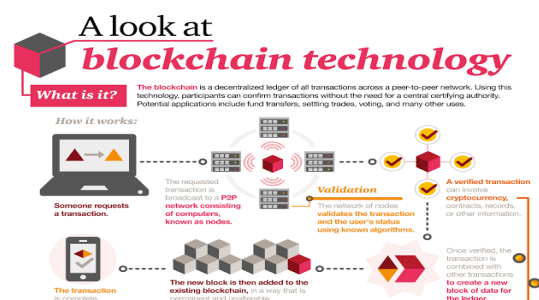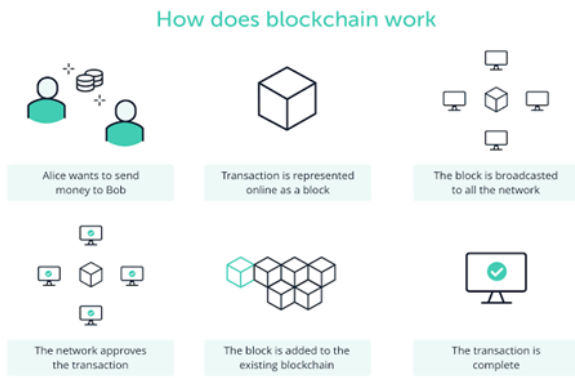

Figure 1: The Concept of Blockchain Technology
Source: World Economic Forum

Figure 2: The Concept of Blockchain Technology:
Source: Ledger

Hence, the Blockchain Technology has the following characteristics:

1) Distributed ledger
2) Decentralized data management
3) Data security
4) Transparency and integrity
5) Anti-tampering and anti-forgery
6) High efficiency
7) Low cost
8) Programmable features that increase flexibility and reliability and no risk of a centralized database failure.

There are several types of Blockchains, some of the most important are:

A) Public Blockchain
B) Private Blockchain
C) Consortium Blockchain (hybrid Blockchain).

Each type has its advantages and disadvantages.

Figure 3 illustrates the Types of Blockchain Technology. Specifically, using

a) Public Blockchain, anyone can transact on the network transactions which are transparent and are anonymous.

A Public Blockchain, such as bitcoin, is completely decentralized. The system operates based on users' consensus; there is no central point of failure.

However, Public Blockchain is vulnerable to system attacks. For instance, an attacker could recreate and properly chain all the blocks that had been modified, without being detected by the participants.

b) Private Blockchain, the transactions are secret, the data is not available for public view, but the members are known.

In a private Blockchain network, a participant cannot read or write the Blockchain unless the participant has a permission or an invitation to join the network.

Private Blockchain is usually used by large companies with permissions defined between various stakeholders of the enterprise Blockchain. For instance, a bank can have its own Blockchain network for its private use with restricted access to its various stakeholders such as customers, employees and suppliers

c) Consortium Blockchain is a hybrid model of both Public and Private Blockchain. Choosing this model, enterprises or institutions can have their own Private Blockchain network to share the data among the consortium participants (such as banks, institutions and other enterprises or firms).
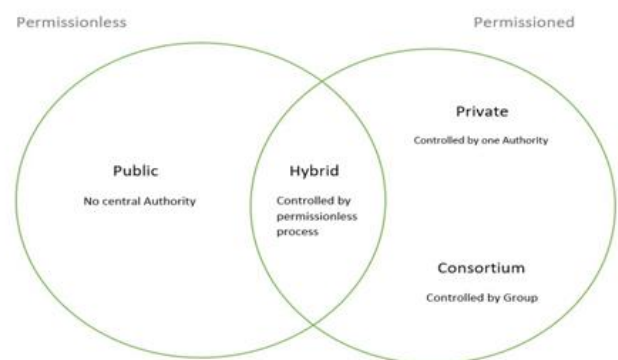
Figure 3: Illustrates the Types of Blockchain Technology

III. THE APPLICATIONS OF BLOCKCHAIN TECHNOLOGY IN BUSINESS

Some of the practical applications of Blockchain Technology in different sectors are given below:.

Applications have been categorized into the following groups:

1) Smart Contracts
2) Government
3) Financial industry
4) Accounting
5) Business Process Management

1. Smart Contracts

A Smart Contract is a computerized protocol that executes the terms of a contract. Simply, Smart Contract is an ordinary contract, but it is written in computer code to be executed in the Blockchain environment. Therefores, such agreements in the IT-environment are mainly referred to as Smart Contracts.A Smart Contract is designed to assure one party that the counterparty will fulfill his promises with certainty. The Blockchain concept aims to remove third-party intermediaries for transactions. Traditionally this third-party is responsible for maintaining and executing the contracts and building the trust between any involved parties. Therefore, Smart Contracts can reduce moral hazard problems such as strategic default, and they can dramatically reduce costs of verification and enforcement. One of the most promising areas of implementation of Blockchain Technology is its use for creating fully automated Smart Contracts, which are performed without human involvement. Smart Contracts allow for automatic procedures for repeat transactions, or transactions with a certain level of importance.

Blockchain will automatically verify, execute and enforce the contract terms between agreed parties. These contracts are called Smart because they can be partially or fully self-executing and self-enforcing . Some Blockchain Applications of Smart Contracts are the following:

- Contract Management - Blockchain Technology in a Contract Management provides a solution for companies validating contract information that could be highly beneficial for organizations and enterprises of all kinds of businesses, such as in the technical industries and construction. Thus, Contract Management via Blockchain Technology would allow organizations to optimize the performance of their supply chains, evaluating vendors and obtaining higher value and shorter lead times.

- Entertainment - Blockchain within Smart Contract provides a transparent transference of royalties in real-time distributions to everyone involved in both the music and film industries .

- Healthcare - The healthcare sector has already taken steps to use Blockchain Technology. Smart Contracts can be used in medical industries for keeping tabs between payers, providers, and drug manufacturers. Healthcare providers can set up Smart Contracts for any payer or supplier, which is then stored in their digital records.

- Insurances - Insurance is a new sector for Blockchain Technology where the industry is estimated to spend more than $2 billion each year on fraud and compliance. The use of Blockchain Technology has significant potential for the entire insurance value chain. Certain insurance products can be automated through Smart Contracts. Blockchain has the potential to eliminate error, negligence and detect fraud and verify the authenticity of customers and their policies.

- Blockchain Internet-of-Things - Internet-of-Things (IoT) is a system of interconnected computing devices to the internet, mechanical and digital machines, objects, animals or people that are provided with unique identifiers with the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It allows the collection and exchange of data with one other using sensors, embedded software, and a common language to communicate. It was predicted that there will be 20.4 billion IoT devices by the year of 2021. With this number of devices to join IoT hubs in the future, the system could show

vulnerability, such as network security, speed, and affordability. Blockchain Technology deals with the problems mentioned and strengthens the interconnectedness of IoT. Its network will enable devices to perform smoothly, securely, and autonomously by creating Smart Contracts that are only implemented upon the accomplishment of specific requirements. This encourages better automation, cheap transfers (no need for third-party to supervise transactions), scalability, and security (prevents overrides and compromise of network security.

2. Blockchain Technology for Implementing e-Government

The ability of Blockchain Technology to record transactions on distributed ledgers offers new opportunities for governments to improve transparency, prevent fraud, and establish trust in the public sector. Blockchain has the potential to make government operations more efficient by improving the delivery of public services and increasing trust in public sectors.Blockchain Technology presents a lot of benefits for governments such as data integrity, improving transparency, Enhance security, preventing fraud, and Establish trust and privacy by recording transactions on distributed ledgers for the state management system.

Thus, a distributed ledger is a unique tool for the improvement of transparency of the budgetary process and the reduction of corruption factors. Using Blockchain Technology, cryptocurrency tools and Smart Contracts, it is possible to build an e-Government. Since a distributed ledger contains legally valid information, a number of mechanisms and procedures of interaction between citizens and the state could be implemented through Smart Contract. The source code eliminates the risk of unauthorized changes and ensures the uniqueness of the execution of the contract algorithm at any time and at any node of the network. Thus, state documents, e-voting, auctions, public procurement

and the registration of companies could be possible through Blockchain Technology, preventing fraud, establishing trust between the citizens and the state, and enhancing business performance in the public sector . In the present, numerous countries such as the USA, China, United Kingdom, Sweden, Netherlands, United Arab Emirates and Estonia announced Blockchain initiatives to explore its uses in the public sector and in government. Some of the potential benefits such as trust and transparency can be especially beneficial for developing countries since they are more vulnerable to corruption, fraud, and lack of trust than developed countries. In closing, adopting Blockchain Technology and Smart Contracts will be possible to implement an e-Government. Thus, e-Government with Blockchain Technology will significantly reduce bureaucracy, exclude hard copy paperwork, minimize transaction costs, fully control officials, eliminate fraud, fight corruption and as a result, it will improve business performance in the public sector.

3. Blockchain Technology for Financial industry

Blockchain is a foundational Technology having the potential to dramatically reduce the cost of transactions and reshape the economy. Harvard Business Review stated that Blockchain Technology will do to financial institutions what the internet did to media. Blockchain was initially developed as the backbone for Bitcoin, which is the most popular decentralized digital currency. Blockchain is particularly beneficial for financial transactions and banks, and has the potential to solve a lot of problems, when it comes to exchanging data, information, and media.

Financial institutions and banks can handle sensitive information with Blockchain and provide secure services with minimum risk that can be decentralized and transparent at a low cost Forrest (2016). The importance of Blockchain in the financial settlements, and in enhancing the reliability of financial statements. Similarly, Blockchain as a technology can

revolutionize economic sectors resulting in lower transaction costs, and highlighted numerous advantages of this technology. Nowadays, the leading platforms for Blockchain development in the financial industry are Hyper Ledgers, an open-source industry consortium formed by the Linux Foundation, and Ethereum, a custom-built platform that was introduced in 2013. As of February 2018, more than 1,500 cryptocurrencies have a market capitalization in excess of $ 400 billion, with Bitcoin accounting for more than $ 150 billion. In closing, financial institutions have realized the potential of Blockchain Technology compared to the existing infrastructure and legacy systems. Blockchain will resolve a lot of problems for the financial industry and boost their business performance dramatically such as Trade Finance, Smart Assets, Payments, and Smart Contracts.

4. Blockchain Technology and Real Time Accounting

Digitalization of the accounting system is still in its infancy compared to other industries, some of which have been massively disrupted by the advances of Blockchain Technology. Using Blockchain will improve audit efficiency as auditors will increase the potential of the accounting profession by reducing the cost of maintaining, providing a highly secured environment and reconciling ledgers. Blockchain will ensure traceable audit trails, automated accounting and reconciliations, tracking of ownership of assets and authenticating transactions. Specifically, Blockchain Technology can assist accounting by writing the firm's transactions directly into a joint register, creating an interlocking system of enduring accounting records. Since all entries are distributed and cryptographically sealed, changing or destroying them to conceal activity is practically impossible. This is similar to transactions that are being verified by notary, since all entries are distributed electronically and cryptographically stamp.Moreover, using Blockchain technology all accounting data could be

recorded permanently with a time stamp, preventing it from being altered. The firm's entire joint register would then be visible to customers, suppliers, shareholders, bank creditors, or any other interested party. Thus, accounting transactions, balance sheets or income statements could be available at any time, and would no longer need for someone to rely on a company's quarterly financial statements, enhancing business performance in the organization. Concerning security issues, all accounting transactions will be digitally time-stamped with a cryptographic hash code, which is a unique 64-digit alpha-numeric signature that is recorded to every single transaction. Hash code will make the transaction immutable and transparent while establishing greater security. Therefore, blockchain will ensure greater data security and authenticity of recording to a degree that not even the system administrator would be able to alter the data written to a Blockchain . Thus, Blockchain Technology has the potential to reshape the nature of today's accounting and auditing.

5. Blockchain Technology and Business Process Management

The traditional Business Process Management (BPM) is concerned with the design, execution, monitoring, and improvement. Business processes consist of two categories, intra and inter-organizational processes. Intra-organizational processes are those processes within an organization, whereas inter-organizational processes are those processes that go beyond the boundaries of an organization. However, business processes such as interoperability, flexibility to adapt to changes, lack of trust and security are not fully addressed in inter-organizational collaborations between mutually untrusted parties. Blockchain Technology has the potential to provide a suitable platform to execute inter-organizational processes in a trustworthy manner. Blockchain technology has the potential to significantly transform business processes. The difference, however, is that traditional BMP services tend to handle internal workflows within a

single organization only. In contrast, Blockchain technology allows the creation of a peer-to-peer BPM system that has no central authority.it provides a tamper-proof mechanism for decentralized execution of collaborative business processes and allows multiple corporations to exchange information directly with counterparties while guaranteeing the integrity of the procedure.

Concluding, it seems that Blockchain Technology with Smart Contracts have the potential to significantly change the environment in which inter-organizational processes are able to operate. Blockchains Technology offers a way to execute processes in a trust manner, even in a network without any mutual trust among the counterparty. In addition, combining both BPM and Blockchain Technology can assist an organization in reaching the next level of integration and automation of business processes.

Challenges and Barriers of Blockchain Technology

In spite of the numerous potential benefits and application areas of Blockchain Technologies such as in e-Government, Accounting, Finance BPM and several others, the literature presents various challenges and barriers that need to be address

Advantages of Blockchain Technology

1) Data integrity and Immutability: Participants can reduce fraud while strengthening regulatory compliance. Once a record has been stored in the ledger, it can only be deleted after a consensus.
2) Security: All transactions will be digitally time-stamped with a cryptographic hash code, a unique 64-digit alpha-numeric signature is recorded corresponding to every single transaction
3) High availability and Accessibility: Due to decentralized networks, Blockchain Technology data would be complete, timely and accurate

4) Reliability: Blockchain Technology is not regulated by a single control center and there's no single point of failure.
5) Decentralization: Blockchain is a decentralized technology peer-to-peer transaction, removing the need for a third-party to intermediate, avoiding all the additional overhead cost and transaction fees.
6) Transparency and Consensus: All transactions conducted on the Blockchain Technology are transparent by any counterparty and allow for subsequent audits anytime. The shared ledger includes the details of the original source, destination, time and the date of the transactions
7) Processing Time: Using Blockchain technology one can reduce time for processing transactions or records, approximately from 3 days to minutes or seconds.

Disadvantage of Blockchain Technology

1) Cost issues: Blockchain Technology has initial costs and the use is not free of cost which is a drawback of decentralization. The users have to pay for the transactions and computational power
2) Data malleability issues: Data malleability is a potential issue in the Blockchain implementation. The signatures do not provide guarantee of the ownership. An attacker can modify and rebroadcast a transaction which can cause problems in transaction confirmation.
3) Latency issues: Time factor is one of the most critical issues in Blockchain implementations, since it is not appropriate for massive transactions, due to complex verification process
4) Wasted Resources: Requires large amounts of energy. The energy spend of mining in the Bitcoin network is approximately $15 million per day
5) Integration concerns: Blockchain Technology offer solutions that require significant changes of existing legacy systems in order to incorporate

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6) Immaturity of the Technology: Blockchain is a new technology, represents a complete shift to a decentralized network and might lead to organizational transformation, including changes in strategy, structure, process, and culture.

IV. CONCLUSION AND RECOMMENDATIONS

From a theoretical perspective, based on the literature review, Blockchain Technology has high value and good prospects in resolving problems of data integrity, improving transparency, enhancing security, preventing fraud, and establishing trust and privacy. Blockchain Technology can bring revolution in the areas of Finance, Accounting, e-Government, BPM, insurance, entertainment, trading platforms, healthcare, internet-of-things, as well as law firms and others.

Hence, Blockchain Technology has a huge potential in introducing innovative solutions, depending on the area or the sector of its implementation, since Economic efficiency and social benefits can be achieved through technical innovation and applications. However, implementing Blockchain Technology at organizations in different industries could prove to be very costly. Migrating or moving legacy systems require a significant amount of investment from organizations.

Therefore, Blockchain Technology may not replace legacy systems or old applications soon. However, Blockchain can certainly be a complementary application to legacy systems and may even lead to the development of new systems in the near future.

In conclusion, more intensive research in this area of Blockchain Technology is necessary to advance the maturity of this field, since it is still in the exploratory stage and there are many legal and technical issues to be resolved. Therefore, this review offers a useful starting point for future research themes for the development of Blockchain applications, and assists practitioners and researchers.

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