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ijircce@gmail.com



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A Review of Blockchain Technology and Its Applications in the Business

Tapash Kumar Saha, Sharad Nigma

M.Tech, Department of CSE, SHEAT Group of Institutions, Babatpur, Varanasi (U.P), India

Department of CSE, SHEAT Group of Institutions, Babatpur, Varanasi (U.P), India

ABSTRACT: Blockchain is the innovation that can prompt massive changes in our business climate and will extraordinarily affect the following couple of many years. It can meaningfully impact the manner in which we see business processes, and can change our economy. Blockchain is a decentralized and circulated record innovation that expects to guarantee straightforwardness, information security and trustworthiness, since it can't be altered or fashioned.

The vast majority of the ebb and flow research connected with Blockchain Innovation is zeroing in on its application for digital currencies, for example, Bitcoin and just a set number of examination is focused on at investigating the use of Blockchain Innovation in different conditions or areas. Blockchain Innovation is something beyond digital currency, and it can have a few applications in government, money and banking industry, bookkeeping and Business Cycle The board. Hence, this study endeavors to examine and investigate its chances and difficulties for the current or future uses of Blockchain Innovation. Thus, a large number of published studies were carefully reviewed and analyzed based on their contributions to the Blockchain's body of knowledge.

KEYWORDS: Blockchain Technology, Ledger, Applications, Business

I. INTRODUCTION

Blockchain technology is a revolutionary computer protocol used for digital recording and storing information on multiple computers or multiple nodes. One of the main components of Blockchain is the purported "Record", which is like a social information base Walport (2016). A Blockchain is a list of encrypted digital record or transaction, called a block. Each block is then, at that point "tied" to the following block, in a straight, sequential request, utilizing a cryptographic mark (Bogart and Rice 2015). The blocks contain a duplicate of the last exchanges since the last block was added (Bogart and Rice 2015). Subsequently, the common block, or record, is connected to all members who utilize their PCs in an organization to approve or affirm exchanges, eliminating the requirement for an outsider, (Christidis, & Devetsikiotis, 2016; Porru, et. al., 2017).

Blockchain is utilized to get and convey information in a new and extraordinary manner. The end of a focal example in the conveyed network suggests an extreme shift to coordinate exchanges between non-go-betweens or delegate administrations (Tapscott and Tapscott 2016). In this manner, Blockchain must be refreshed by agreement between members in the framework and an exchange can never be modified or erased, (Fanning and Focuses 2016). Its distributed database cannot be hacked, manipulated or disrupted in the same way as a traditional, centralized database with a user-controlled access system.

At the end of the day, the information is unchanging and whenever it has been kept in touch with a Blockchain, no one, not so much as a framework director, can change or erase it from the record. Since, every information block is time stepped and connected in a sequential request by means of a cryptographic mark Walport (2016). Blockchain Innovation can be applied practically in an exchange, including esteem, like cash, merchandise, land possession, clinical records or even votes.

Blockchain does not require data migration in a project; all relevant transaction data will be stored on the ledger and status will be then derived from it. Since, Blockchain is a circulated framework without a focal control point or authority (Glaser & Bezenberger 2015; Tapscott and Tapscott 2016) and it isn't directed by a solitary control place as there may accompany a framework organization, there's no weak link. Thus, in an endeavor, hypothetically, there would be no requirement for an IT expert to screen security on a blockchain data set.

Despite these possibilities, it's important to emphasize that Blockchain is a very new technology. As a result, there are

only a small number of instances in which the technology has been applied Aru (2017). A demonstrated model, could be the Bitcoins which is the best execution of the Blockchain Innovation, and has affirmed to be a reasonable arrangement in making trust in a trust-less ecosystem without central authority.

The strategies for this paper were mostly: information assortment and grounded hypothesis. Information assortment and ground hypothesis was finished in various ways. For instance, the paper thoroughly searched all published works found in the exiting writing, books, scholastic diaries, introductions, gatherings, specialized reports, looking through a few information bases utilizing watchwords.

The goal of this study is to introduce a survey of the Blockchain Innovation and its current or future functional applications. Subsequently, in the following segment we present a methodical writing survey to distinguish current Blockchain applications and examine future reasonable 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 Improvement is a persistently making once-over of records, called blocks, which are related and gotten utilizing cryptography. Each block normally contains a cryptographic hash code of the past block, a timestamp and exchange information (Bogart and Rice 2015), which as planned so these exchanges are unchanging.

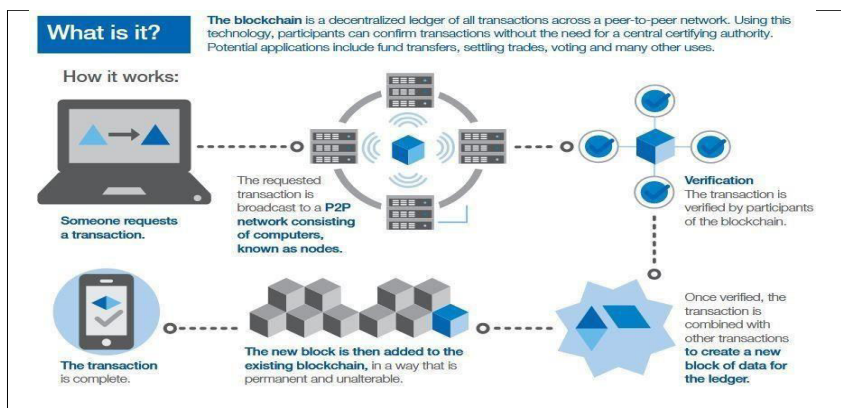


Figure 1: The Concept of Blockchain Technology

Source: World Economic Forum

The Blockchain idea was conceived by Nakamoto (2008) and is shown in Figure 2. Blockchain or Disseminated Record Innovation (DLT) is a circulated record recording innovation (Walport 2016), which contains data about exchanges or occasions. It can keep exchanges in a straightforward, secure, decentralized, proficient, and minimal expense way (Schatsky and Muraskin 2015; Bahga, A., Madiseti, V., 2016; Bahga, A. and Madiseti V., 2014).

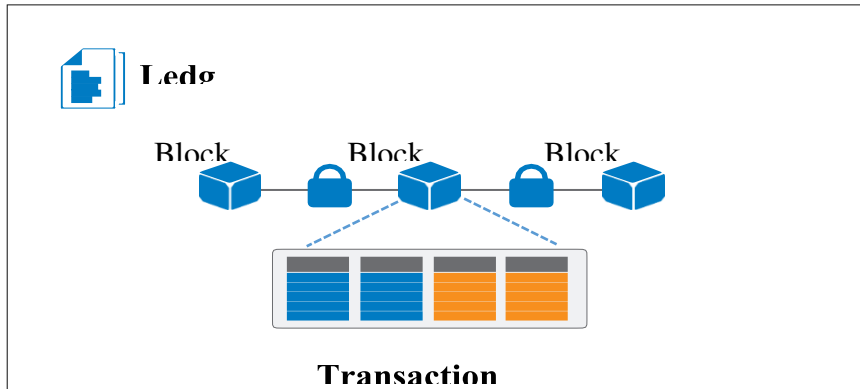


Figure 2: The Concept of Blockchain Technology:
 Source: representation in view of Bitcoin (2015) and Nakamoto (2008)

Subsequently, the Blockchain Innovation has the accompanying qualities: a disseminated record, decentralized information the board, information security, straightforwardness and honesty, hostile to altering and hostile to phony, high proficiency, minimal expense, programmable elements that increment flexibility and reliability and no risk of a centralized database failure (Glaser & Bezenberger 2015; Tapscott & Tapscott 2016; Swan 2015).

There are a few sorts of Blockchains, probably the most significant are: Public Blockchain, Confidential Blockchain and Consortium Blockchain (half and half Blockchain). Each type enjoys its benefits and impediments, permitting them to address the issues of different applications (He et al., 2016; Buterin (2015). Figure 3 delineates the Kinds of Blockchain Innovation.

In particular, utilizing a) Public Blockchain, anybody can execute on the organization exchanges which are straightforward and are unknown. A Public Blockchain, for example, bitcoin, is totally decentralized. The framework works in view of clients' agreement; there is no main issue of disappointment. Nonetheless, Public Blockchain is powerless against framework assaults. For example, an assailant could reproduce and appropriately chain every one of the blocks that had been adjusted, without being recognized by the members; b) Confidential Blockchain, the exchanges are confidential, the information isn't accessible for general visibility, however the individuals are known. In a confidential Blockchain organization, a member can't peruse or compose the Blockchain except if the member has a consent or a challenge to join the organization. Confidential Blockchain is typically utilized by huge organizations with authorizations characterized between different partners of the undertaking Blockchain. For example, a bank can have its own Blockchain network for its confidential use with limited access to its various stakeholders such as customers, employees and suppliers; c) *Consortium Blockchain* is a hybrid model of both Public and Private Blockchain. Picking this model, endeavors or foundations can have their own Confidential Blockchain organization to divide the information between the consortium members (like banks, establishments and different ventures or firms).

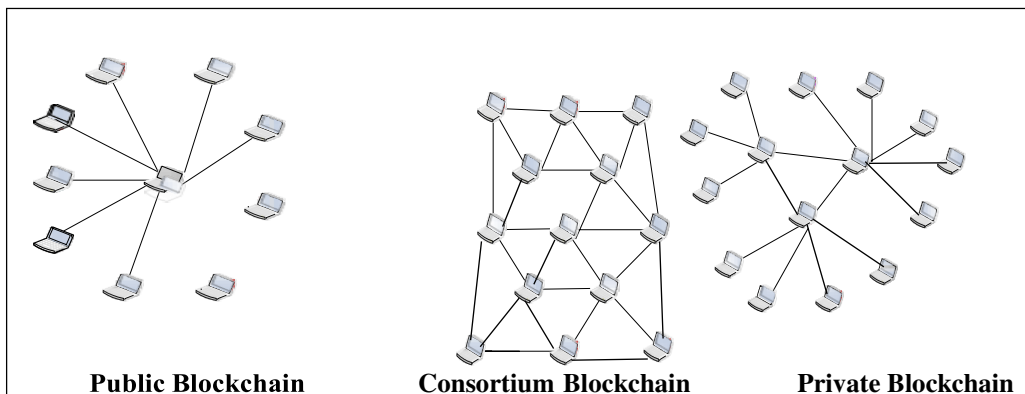


Figure 3: Illustrates the Types of Blockchain Technology

1. The Applications of Blockchain Technology in Business

The following section is presenting some of the practical applications of Blockchain Technology in different sectors. Applications have been sorted into the accompanying gatherings: Brilliant Agreements, Government, Monetary industry and Bookkeeping and Business Interaction The board.

2. Smart Contracts

As indicated by Szabo (1994), a Savvy Agreement is a modernized convention that executes the provisions of an agreement. Simply, Smart Contract is an ordinary contract, but it is written in computer code to be executed in the Blockchain environment Gates (2017). Thus, such agreements in the IT-environment are frequently referred to as Smart Contracts Savelyev (2017).

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 intermediary for transactions. Generally this outsider is answerable for keeping up with and executing the agreements and construct the trust between any elaborate gatherings (Porru, et. al., 2017). In this manner, Brilliant Agreements can conquer moral peril issues like vital default, and they can decisively diminish expenses of check and authorization.

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. Brilliant Agreements take into consideration programmed systems for rehash exchanges, or exchanges with a specific degree of significance.

Blockchain will naturally check, execute and uphold the agreement terms between concurred parties. These contracts are called Smart because they can be partially or fully self-executing and self-enforcing Gates (2017).

Some Blockchain Applications of Smart Contracts are the following:----

- **Contract The board - Blockchain Innovation in an Agreement** The executives gives an answer for organizations approving agreement data that could be profoundly useful for associations and endeavors, everything being equal, of businesses, such as in the technical industries and construction (Christidis & Devetsikiotis 2016). Thus, Contract Management via Blockchain Technology would allow organizations to optimize the performance of their supply chains, evaluating vendors and obtain higher value and shorter lead times Morrison (2016).
- **Diversification - Blockchain inside Brilliant Agreement** gives a straightforward transaction of eminences progressively disseminations to everybody engaged with both the music and entertainment worlds (Dair and Beaven 2017).
- **Healthcare -** The healthcare sector has already taken steps of the use of 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 Mettler (2016).
- **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 utilization of Blockchain Innovation has critical potential for the whole protection esteem chain. Certain insurance items can be computerized through Shrewd Policies. Blockchain has the potential to eliminate error, negligence and detect fraud and verify the authenticity of customers and their policies.
- **Blockchain Web of-Things -** Web of-Things (IoT) is an arrangement of interconnected registering gadgets to the web, mechanical and advanced machines, items, creatures or individuals that are given remarkable identifiers with the capacity to move information over an organization without expecting human-to-human or human-to-PC cooperation (Bahga and, Madiseti, 2016). It permits the assortment and trade of information with each other, (Chen, et al., 2015; Dorri, et al., 2017) utilizing sensors, inserted programming, and a typical language to convey.

Gartner (2017) predicts that there will be 20.4 billion IoT devices by the year of 2020. With this number of gadgets to join IoT centers from now on, the framework could show weakness, like organization security, speed, and reasonableness. Blockchain Innovation manages the issues referenced and reinforces the interconnectedness of IoT. Its organization will empower gadgets to perform without a hitch, safely, and independently by making Brilliant Agreements that are just executed upon the achievement of explicit necessities.

3. Blockchain Technology for Implementing e-Government

The capacity of Blockchain Innovation to record exchanges on dispersed records offers new open doors for states to further develop straightforwardness, forestall extortion, and lay out trust in the public area. Blockchain can possibly make government activities more effective by working on the conveyance of public administrations and expanding trust in open areas, Konashevych (2017). Comparative, Ølnes, et al., (2017), expressed that Blockchain Innovation presents a ton of advantages for legislatures like information honesty, further developing straightforwardness, improve security, forestalling misrepresentation, and lay out trust and protection by recording exchanges on dispersed records for the state the executives framework. Consequently, a disseminated record is a special instrument to improve straightforwardness of the monetary cycle and the decrease of debasement factors.

Utilizing Blockchain Innovation, digital money apparatuses and Shrewd Agreements, is feasible to construct 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 SmartContract. 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. Subsequently, state archives, e-casting a ballot, barbers, public obtainment and the enrollment of organizations could be conceivable through Blockchain Innovation, forestalling misrepresentation, laying out trust between the residents and the state, and improving business execution in the public area (Barnes et al., 2016). 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 (Barnes et al., 2016).

In the present, various nations, for example, the USA, China, Joined Realm, Sweden, Netherlands, Joined Middle Eastern Emirates and Estonia declared Blockchain drives to investigate its purposes in the public area and in government. Deloitte Insights (2017) indicated that some of the potential benefits such as trust and transparency can be especially beneficial for developing countries since they are more vulnerable to corruption, misrepresentation, and absence of trust than created nations.

All things considered, taking on Blockchain Innovation and Shrewd Agreements will be feasible to carry out 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.

a. Blockchain Technology for Financial industry

According to Iansiti & Lakhani (2017), 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 (Joichi, et al., 2017).

Blockchain was initially developed as the backbone for Bitcoin, which is the most popular decentralized digital currency Nakamoto (2008). 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 money (Tapscott & Tapscott 2016). 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). Broby & Paul (2017) discussed the importance of Blockchain in the financial settlements, and in enhancing the reliability of financial statements. Similarly, Brian (2017) stated that Blockchain as a technology can revolutionize economic sectors resulting in lower transaction costs, and highlighted numerous advantages of this technology.

Now days, the leading platforms for Blockchain development in financial industry are Hyperledgers, 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 comparing 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 (Tapscott & Tapscott 2016).

b. 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 the Blockchain Technology. Involving Blockchain will further develop review productivity as inspectors will expand the capability of bookkeeping calling by diminishing the expense of keeping up with, giving exceptionally gotten climate and accommodating records, Swan (2015). Blockchain will ensure traceable audit trails, automated accounting and reconciliations, tracking of ownership of assets and authenticating transactions.

In particular, Blockchain Innovation can help bookkeeping by composing the company's exchanges straightforwardly into a joint register, making an interlocking procedure for persevering through bookkeeping 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 a public accountant, since all passages are disseminated electronically and cryptographically stamp.

In addition, utilizing Blockchain innovation all bookkeeping information could be recorded forever with a period stamp, keeping it from being modified. The association's whole joint register would then be apparent to clients, providers, investor, bank loan bosses, or some other closely involved individual Swan (2015). Consequently, bookkeeping exchanges, monetary record or pay explanations could be accessible out of the blue, and would never again require for somebody to depend on organization's quarterly fiscal reports, expanding business execution in the association.

Concerning security issues, all accounting trades will be cautiously time-ventured with a cryptographic hash code, which is an exceptional 64-digit alpha-numeric imprint that is recorded to each and every exchange. Hash code will make the exchange changeless and straightforward while laying out grater security. Subsequently, blockchain will guarantee more prominent information security and validness of recording to some extent that not even the framework chairman would have the option to change the information kept in touch with a Blockchain (Fanning and Focuses 2016). Accordingly, Blockchain Innovation can possibly reshape the idea of the present bookkeeping and examining.

c. Blockchain Technology and Business Process Management

The traditional Business Process Management (BPM) is concerned with the design, execution, monitoring, and improvement of business processes. Business processes are the series of events executed by an organization to deliver a product or a service to customers (Dumas, et. al., 2013). Hence, BPM helps associations in further developing existing business processes, business rules, generally speaking proficiency and the board.

Business processes comprise of two classifications, intra and between hierarchical cycles. Intra-hierarchical cycles are those cycles inside an association, while between authoritative cycles are those cycles that go past the limits of an association (Dumas, et. al., 2013). 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 (Pourmirza, et. al., 2017).

Blockchain Technology has the potential to provide a suitable platform to execute inter-organizational processes in a trustworthy manner. (Hull, R., 2017). Comparative, Milani (2016) expressed that Blockchain innovation can possibly fundamentally change business processes. The distinction, notwithstanding, is that customary BMP administrations will more often than not handle inside work processes inside a solitary association as it were. In contrast, Blockchain technology allows the creation of a peer-to-peer BPM system that has no central authority Weber (2016), provides a tamper-proof mechanism for decentralized execution of collaborative business processes and permits numerous enterprises to trade data straightforwardly with counterparties while ensuring the trustworthiness of the interaction (Porru, et. al., 2017). This is vital while managing directed exchanges that require explicit rule consistence. Moreover, (Weber et. al., 2016) proposed that inter-organizational processes through Blockchain Technology and Smart Contracts can code guidelines and allow organizations to verify and enforce specific steps, ensuring the joint process performed correctly, by any counterparty on the network without any mutual trust between nodes. Additionally, Blockchain Technology allows participants and counterparties to maintain control of their own data, even though counterparties have enforced rules upon them by the network (Porru, et. al., 2017).

Finishing up, it appears to be that Blockchain Innovation with Savvy Agreements can possibly altogether change the climate in which between authoritative cycles can work. Blockchains Innovation offers a method for executing processes in a trust way, even in an organization with no common trust among the counterparty. Likewise, consolidating both BPM and Blockchain Innovation can help an association in arriving at a higher degree of joining and computerization of business processes.

v. Challenges and Barriers of Blockchain Technology

Disregarding the various likely advantages and application areas of Blockchain Advancements, for example, in e-Government, Bookkeeping, Money BPM and a few others, the writing presents different difficulties and obstructions that should be tended to. The accompanying table 1 sums up the principal benefits and inconveniences of Blockchain Innovation.

Table 1: summarizes the main advantages and disadvantages of Blockchain Technology.

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.	(Swan 2015; Fanning & Centers 2016).
2.	Security: All transactions will be digitally time-stamped with a cryptographic hash code, an exceptional 64-digit alpha-numeric signature is recorded relating to each and every exchange.	Swan (2015).
3.	High availability and Accessibility: Due to decentralized networks, Blockchain Innovation information would be finished, opportune and exact.	(Bahga & Madiseti, 2016; Bahga & Madiseti 2014).
4.	Unwavering quality: Blockchain Innovation it isn't managed by a solitary control place and there's no weak link.	(Glaser & Bezenberger 2015; Tapscott & Tapscott 2016).
5.	Decentralization: Blockchain is a decentralized innovation shared exchange, eliminating the requirement for an outsider to transitional, keeping away from all the extra above cost and exchange expenses.	(Christidis & Devetsikiotis, 2016; Porru et. al., 2017).
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 incorporates the subtleties of the first source, objective, time and the date of the exchanges.	(Christidis Devetsikiotis 2016).
7.	Automation: Blockchain Technology uses Smart Contracts which are self-executed code commands that can be stored and executed on Blockchain.	(Christidis & Devetsikiotis, 2016; Porru et. al., 2017).
Disadvantages 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 clients need to pay for the exchanges and computational power.	(Beck et. al., 2016; (Marsal-Llacuna and Luïsa 2017; Angraal et al., 2017).

2.	Information pliability issues: Information flexibility is a likely issue in the Blockchain execution. The signatures do not provide a guarantee of the ownership. An assailant can change and rebroadcasts an exchange which can create some issues in exchange affirmation.	(Decker & Wattenhofer 2014; Yli-Huumo et al., 2016; Hou 2017).
3.	Idleness issues: Time factor is one of the most basic issues in Blockchain executions, since it is not appropriate for massive transactions, due to complex verification process	(Beck et. al., 2016; Yli-Huumo et al., 2016).
4.	Wasted Resources: Requires large amounts of energy. The energy spend of mining in the Bitcoin network is approximately \$15 million per day	Swan (2015).
5.	Integration concerns: Blockchain Technology offer solutions that require significant changes of existing legacy systems in order to incorporate.	(Yli-Huumo et al., 2016).

According to Yli-Huumo et al. (2016), the challenges and barriers are related to the technological aspects of Blockchain Technology, such as usability, interoperability, security, computational efficiency and storage size. Many investigations (Ahram et al., 2017; Angraal et al., 2017; Decker and Wattenhofer, 2014; Yli-Huumo et al., 2016), scrutinized the digital protection issues and dangers. Hou (2017) stated that the blind trust on the part of Blockchain developers, security and performance are serious issues and drawbacks of Blockchain Technology. Besides, Blockchain Innovation isn't limited by any global guidelines and guidelines. Additionally, with the rising requirement for interoperability among huge enterprises like banks, the innovation should be viable with various heritage frameworks (Yli-Huumo et al., 2016). The interconnection with the current frameworks is a major test today as the ongoing heritage frameworks and cycles can't be completely killed and require massive changes of existing inheritance frameworks to integrate (Yli-Huumo et al., 2016).

Additionally, Blockchain Technology is not appropriate for massive transactions, due to complex verification process, (Beck et. al., 2016). In Blockchain Innovation, to give security, all exchanges should be carefully time-stepped with a cryptographic hash code, a remarkable 64-digit alpha-numeric mark to record each single exchange, which consumes a great deal of registering power and time.

In closing, Blockchain adoption might lead to organizational transformation, including changes in strategy, structure, process, and culture. This transformation requires organizational members' cooperation and commitment in order to enable the organization to survive and to improve the level of performance and effectiveness.

III. 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, enhance security, preventing fraud, and establish 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.

All in all, more concentrated research around here of Blockchain Innovation is important to propel the development of this field, since it is still in the exploratory stage and there are numerous legitimate and specialized issues to be settled. Thusly, this survey offers a valuable beginning stage for future exploration topics for the improvement of Blockchain application, and help specialists and scientists.



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