

BLOCKCHAIN: DIGITALIZATION OF ACCOUNTANCY RECORDS

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ABSTRACT

Blockchain is a shared database technology that has the potential to transform the accounting and the audit profession. This paper attempts to study various aspects of blockchain technology ranging from its meaning, features, types, and application in various industries. It takes into consideration secondary data available from research papers and articles downloaded from SSRN, JSTOR, and Research Gate to analyze possible impacts of blockchain on accounting and audit in specific terms and on various other industries in broader terms. The core features of decentralized record keeping, transparency, permanence, and cryptographic security will make the traditional skills of accountants and auditors redundant. This will make them work hard to garnish their value-driven skills to compete in the transformed industry. This paper also focuses on understanding the concept of Distributed Ledger technology, the process of the blockchain, differences between centralized and decentralized ledger, and various areas of finance in which blockchain can be applied. It also throws lights on ways in which CPA firms need to transform themselves, various industries where blockchain technology can be applied, and how accountants and auditors need to prepare for the future of blockchain technology.

KEYWORDS: *Blockchain, Distributed Ledger, Accounting, Audit, Financial Sector.*

Introduction

Blockchain is an emerging accounting technology. It is concerned with maintaining a common ledger of accurate financial information and thus it directly has a major influence on the practices of accounting. The accounting profession is concerned with the measurement, communication, and analysis of financial information. It is majorly concerned with the ascertainment or measurement of rights and obligations over property, or planning methods of allocating financial resources in the best possible manner. Blockchain refers to the shared databases that are maintained and verified by the participants of a network ensuring transparency and permanence. Blockchain has the potential of enhancing the accounting profession in a big way by reducing the costs of maintaining and reconciling ledgers, providing operational simplification, absolute certainty over the ownership and recording of assets. It can also free up resources for accountants by eliminating reconciliations and providing certainty over transaction history to concentrate on planning and valuation, rather than just recordkeeping.

Blockchain will allow a very large scale of transactional-level accounting but not by the traditional accountants. So, the criteria for judging accountants as successful will change. Those accountants will be taken as successful who work on assessing the real economic interpretation of blockchain records. The need of the hour will be to reconcile the accounting record to economic reality and valuation. For example, an asset's ownership might be verifiable by blockchain records, but its condition, location, and true worth will still need to be assured by the human minds only. In short, blockchain could allow for increases in the scope of accounting, bringing such areas into consideration that are deemed too be too difficult or simply unreliable to measure.

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Objectives of the Study

- To understand the concept of blockchain and Distributed Ledger technology.
- To understand the features and process of blockchain.
- To understand the difference between centralized and decentralized ledger.
- To identify the various areas of finance in which blockchain can be applied.
- To understand the impact of blockchain technology on accountants and accounting methods.
- To identify the possible impact of blockchain on auditors.
- To understand the ways in which CPA firms need to transform themselves.
- To identify various industries where blockchain technology can be applied.
- To understand how accountants and auditors need to prepare for the future of blockchain technology.

Organization of the Paper

This paper is structured in a number of sections. Section 1 introduces the concept of blockchain technology, the potential impact of blockchain on the profession of accountants and auditors and the objectives of the study. Section 2 provides a review of recent literature on various aspects of blockchain. Section 3 describes the scope and methodology of the paper. Section 4 presents the subject matter of the study. Finally, it has been concluded by summarizing the study and discussing the outlook for further studies.

Literature Review

Mark Pilkington (2015) discusses the decentralized ledger technology and its possible applications in banks, voting system, digital identity provider, sports, tourism, art, and social inclusion. The study also throws light on potential risks of public distributed ledgers which call for the need of some hybrid solutions. Decentralized ledger technology is the core concept of the blockchain. Blockchain is expected to reshape the banking industry by providing many enhanced services to the current unbanked population.

Deloitte Deutschland (2016) in its annual white paper establishes that in future, blockchain can be adopted in all stages of accounting from the integration of records to fully automated audits. It lays down the benefit of blockchain and how it shall help to overcome the current challenges of traditional accounting and auditing. Blockchain can allow conclusive verification of transactions without the need of any intermediary whereas traditional accountants may file themselves struggling for detection of any frauds. Transactions can be written directly in joint registers whereas accountants need to maintain records manually. Currently, manipulations are easy to make but under blockchain, it is impossible to falsify records because of being cryptographically sealed.

Dr. Saifedean Ammous (2016) discusses the background of blockchain technology being used in the field of digital currency since around 2008. Potential applications of blockchain using the principle of decentralized currency are possible in areas like digital payments, smart contracts, and database and record management. The study also throws light on the challenges in the way of adoption of blockchain for the mentioned areas. Redundancy, scaling, regulatory compliance, irreversibility, and security-related concerns are some of the economic drawbacks in the way of wider adoption of blockchain. Redundancy related to the sharing of every transaction with every member of the network. Scaling refers to the huge network size which increases the storage and computational burden.

Hossein Kakavand, et al. (2016) discusses the regulatory issues and security-related risks in the field of blockchain technology. It also throws light on how EU and USA are framing regulations for this emerging technology. In EU, European Securities Market Authority and UK Treasury are framing blockchain related regulations. In the USA, Commodity Future Trading Commission, SEC, FinCEN and Internal Revenue Service review rules and regulations related to blockchain. Some of the operational risks stem from possible bugs in the software, vulnerability to attack, ever-changing software and difficult understanding for large masses. Effective governance is also highlighted as important for the successful implementation of blockchain technology.

Lawrence J. Tractman (2016) discusses the history of virtual currencies and the impact of bitcoins on the financial industry. It establishes that it is drop in the cost of data storage and processing that shall increase the chances of possible expansion of blockchain technology. It can be possibly applied in areas like transaction processing, government cash management, commercial bank ledger

administration and clearing and settlement of financial assets. A potential blockchain adoption path has been established which says that its full-fledged adoption may take more than ten years because of the regulatory challenges still in existence.

CPAs of Canada, and the American Institute of CPAs (2017) highlight some possible uses of blockchain technology in the financial sector as well as other industries. The study says that the technology can be applied in various areas of financial services but also in fields like life sciences, public sector, energy and resources, and consumer and industrial products. Blockchain can help to maintain the integrity of records, claims, billings, registries etc.

Deloitte Access Economics, et al. (2017) highlights the meaning of blockchain technology and distributed ledger technology. It also throws light on the possible applications of blockchain. The study discusses the benefits of blockchain to both businesses and regulators. It clearly brings out the differences between the centralized ledger and decentralized ledger based on intermediation cost, transparency, security, and privacy. It says that record-keeping and transaction-settling are the two core functions of blockchain based on which it can be applied to various areas. Operational simplification, reduction in frauds, greater transparency, and a single source of people's credentials are some benefits accruing to the businesses. Timely and transparent access to data and more informed decision-making are some benefits to the regulators accruing from the wide-spread use of blockchain technology.

Nadine Ruckeshner (2017) discusses how management, board, and internal control system can team up to give rise to accounting frauds. With the help of case studies, a generalization of fraud pattern and relationship between internal and external control system is established. The study says that blockchain application in accounting leads to maintenance of permanent, decentralized and transparent records of financial transactions and thus the possibility of detection of any fraudulent or misleading transaction is very high. Blockchain through decentralized consensus leads to organizational transformation in many ways.

Scope and Methodology

The study looks into the various aspects of the blockchain technology and its possible impact on a number of industries. It discusses in detail the possible impact on the accounting and auditing profession. This study is primarily based on secondary data. A number of industry journals, recent Deloitte reports, newspaper articles, and online articles have been used for analysis.

Analysis of Study

- **Meaning of Blockchain**

Blockchain can be defined as a shared database that is maintained and verified by all the participants of a network. It ensures the maintenance of permanent and timely records of financial transactions. It also ensures transparency and no ex-post alteration. Its biggest advantage is the high probability of detection of any fraud.

Types of Blockchains

Blockchains can be broadly characterized into the following types.

- **Public Blockchain**

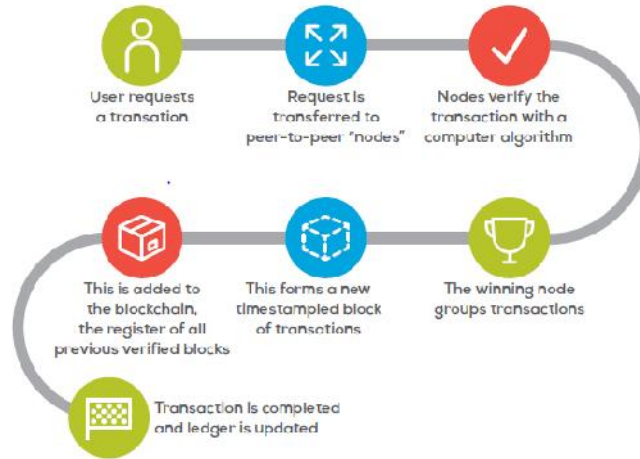
It refers to the decentralized blockchains. It is a system of blockchain where anyone can read the transactions; forward the transactions and expect that they are included in the string of blocks, and participate in the consensus process. These blockchains are secured by crypto-economics which literally means a combination of cryptographic checks and economic incentives. It is a general principle where the degree of influence of a participant in the process of consensus is proportional to the number of resources that they put into the system. Example: Bitcoins, and Ethereum.

- **Consortium Blockchain**

Under this, the consensus process is controlled by a set of pre-selected nodes. A node simply is just a copy of the blockchain that exists on any type of hardware device. People rely on nodes to keep track of cryptocurrency transactions that have occurred on the blockchain. For example, there can be a consortium of 15 financial institutions. Each institution will operate its own node, with the condition that at least 10 institutions need to digitally sign a block to make it valid. There can be different rights for the nodes according to policies established by the consortium. They are also a kind of completely decentralized blockchain. Example: R3, and Corda.

• **Blockchain Private**

It is a blockchain where permissions to write a transaction are kept centralized in one organization. The permissions of reading them can be made public or restricted, depending on application and analysis of the Manager. Example: Monax, and Multichain.



Blockchain Process

Source: Deloitte Access Economics 2017

Key Features of Blockchain

Blockchain is a platform for accounting and business and not an application or business model. The most important facets of blockchain technology are three key terms. These also how blockchain is different from the traditional or electronic ledgers of today, which are databases owned and run by a single party. The key features are discussed here.

- **Propagation:** One of the main features is that there are multiple copies of a blockchain ledger, and no 'master' copy. All participants have access to the full, identical and equivalent copy of the ledger. No central party controls the ledger. New transactions get posted quickly and propagated to all participants' copies. This also refers to the veracity feature.
- **Permanence:** Because each user has his or her own copy of the ledger, historical transactions cannot be edited without the consent of the majority which indicates that blockchain records are permanent. The entire ledger is always stored by each participant and can be inspected and verified by all. This creates transparency
- **Programmability:** Some blockchain allows program code to be stored on them along with the ledger entries. This can create automatic journal entries which automatically get executed when triggered. These are called 'smart contracts.' The contracts here are made self-executing.

Difference between the Centralized Ledger and Decentralized Ledger

The traditional accounting system is of a centralized ledger but the blockchain backed accounting will be entirely decentralized. Both have them can be compared on certain grounds. Decentralized ledgers have a higher maintenance cost as it needs cost for verification by all the participants of the system and then adding to the ledger. Intermediation cost, on the other hand, is higher for centralized ledger because of reliance and trust on an intermediary. There is much more transparency and security in the blockchain technology because it is impossible to alter transactions or add any fraudulent transactions in the record. Because of the use of cryptographic keys, the level of privacy is also higher in distributed ledger technology.

Applications of Blockchain

Blockchain is more than just a technology; instead, it is a protocol. It is a way of recording transactions. Blockchain enables ownership to be transferred from one party to another. It could remove the need to reconcile different ledgers. Because of being distributed between all users, it could remove the cost of paying a central authority to maintain the accuracy of the ledger. Any participant in the ledger

can trace all previous transactions paving a path for increased transparency and 'self-audit' of the blockchain. Whether blockchain should be applied in any particular business or sector shall depend on whether the qualities of distributed ledger technology are desirable alternatives to the present methods. Good blockchain applications would lead to cost and timing advantages by removing the central parties from the system and increased security and certainty by having a system of consensus.

The core functions of blockchain technology are record-keeping and transaction-settling, the former deals with the fact of non-alteration and non-tampering of the previously recorded data, whereas the latter deals with the means of making and settling transactions without the need of any central authority. On the basis of these two functions, it can be applied to the digital payment system, real estate, healthcare, smart government, artificial intelligence, smart contracts, transaction processing, government cash management, commercial bank ledger administration, tourism, sports, social inclusion, digital identity provider, energy and resources.

Impact of Blockchain for Accountants and Auditors

With blockchain, all the participants of a given ecosystem can have shared ledgers of the details of the accounting entries. The shared ledgers can act as a single source of truth for every player. Blockchain will have a huge impact on the accounting and auditing professions. CPA firms, as well as internal accountants and auditors, now need to rethink how to manage the bookkeeping, accounting, and auditing processes in their organizations. Integration of blockchain, analytics, and artificial intelligence can uncover anomalies in real time. No participant will have to wait until the end of the accounting period and finalization of books to detect any anomaly. The traditional job of matching debits and credits by an accountant sitting in his cabin is already gone. Distributed Ledger Technology uses cryptographic tools and distributed consensus to innovate the traditional record-keeping. It eliminates the need to double check sample transactions to discover any fraudulent transaction. Material misstatements and financial irregularities could be uncovered and stopped on a real-time basis or may be entirely prevented.

But it in no case means the elimination of human accountants and auditors. Although the nature of jobs for human auditors and accountants will be very different. Business analytics will be applied to manage risks and also to identify opportunities. Accountants and auditors who shall understand, monitor, and improve analytical and cognitive systems and processes will be in demand and will be valued in the future of blockchain technology. The role of ex-post book-keeping will be highly automated. Accountants and auditors will be in demand to design, monitor and tune business analytics. They shall be responsible to oversee the automation of accounting and auditing processes. And in the process of developing and implementing new systems. And, they shall still continue to evaluate the underlying assumptions and estimates. The really smart and judgmental part of the work would become the most important part of the work. Hence it would not require as many people as it does in the traditional system, but the people that it would require will need to be much more skilled in their use of analytical tools. It is believed that the impact on accountants and auditors will be very positive. Blockchain will enable changes that shall improve auditor productivity and allow them to spend more time exercising their professional judgment into trends in customer behavior, operations, and other key business factors.

Impact of Blockchains on the Accounting Method

Blockchain is an accounting technology. It is traditionally concerned with the transfer of ownership of assets, maintenance ledger of financial information. It is broadly concerned with the measurement and communication of financial information, and the analysis of said information. Blockchain can enhance the accounting profession by reducing the operational costs, and providing absolute certainty over the transactions. It tends to enhance transparency and reduce the occurrence of frauds on account of manipulation of the transactions. Thus, blockchain will be able to work on assessing the real economic interpretation of blockchain records. By relieving accountants from more redundant nature of maintaining accounts, blockchain could allow for increases in the scope of accounting. Blockchain means a replacement for traditional bookkeeping and reconciliation work by the accountants. This could make those accountants strong who shall focus on providing value elsewhere. For example, in matters of mergers and acquisitions, in value-judgment areas and advice.

Impact of Blockchain on Auditors

Blockchain has abundant applications in the area of external audit. If all of the transactions that underlie an organization are visible on blockchains then performing confirmations of a company's financial status would be hardly necessary. This indicates toward a profound change in the way that

audits shall work. If blockchain solution can be combined with appropriate data analytics, it could help with the transactional level assertions involved in an audit and allow auditor's skills to be better spent on higher-level non-traditional questions. Read-only access can also be made available to authorized external entities like regulators and auditors who can instantly and automatically verify and validate those transactions. Audits will thus become much more analytical, at least semi-automated, and even continuous. For instance, auditing is not just checking the monetary amount and detail of different parties of a transaction, but also how it is recorded and classified. These judgmental elements require context that is not ordinarily available to the general public but require knowledge of the business. The auditor will have more time to focus on such judgmental questions with blockchain technology in its place.

Impact of Blockchain on CPA Firms

- CPA (Certified Public Accountants) firms need to think about ways in which they can leverage on the emerging technologies to deliver more productive services and the ways to stay ahead in the competition to serve their clients with new technologies.
- Such firms should start by educating their members about blockchain and its impact on accounting and auditing with the help of experts.
- There is also a need to educate the clients. Clients should be made aware of the changes in accounting and auditing processes. They should be providing help to executives and senior managers about the strategic implications of blockchain and related emerging technologies for their business. They should guide and influence organizations about how blockchain will be embedded and used in the future, and to develop blockchain-led solutions and services.
- Such firms should change their mindset, organizational culture, business processes, business models, and business ecosystems.
- Leading accountancy firms and bodies can leverage their expertise to craft regulations and standards for the blockchain backed financial sector.
- They can work as advisers to companies which consider joining blockchains. They can provide advice on helping them weigh the costs and advantages of the new system.

Disruptions for the Accounting Industry

Blockchain distributed ledger technology will surely make certain accounting practices and some professional services obsolete.

- **Some Manual Task to Disappear**

As discussed in previous sections, corrections in blockchain will be transparent to all parties and hence data cannot be falsified or manipulated. This would make auditing easier and more reliable and reduces the possibility of error. Hence, some of the manual tasks of the auditing process may disappear, although, auditors will not be completely replaced because of their value judgment-based functions.

- **Triple-Entry system**

Transaction recorded in blockchain shall eliminate the need for both parties to enter the transaction into their own ledgers because it's a distributed ledger technology. However, it may lead to a triple-entry system where transactions will be entered into both parties' ledgers as well as into the blockchain.

- **Enhanced Security**

Blockchain technology is highly secured because it makes financial information impervious to hacks. This is on account of exceptionally strong blockchain encryption. Thus, blockchain tends to prevent anyone to make undetected, unauthorized changes into the records maintained.

Accountants Future Preparation for Blockchain Technology

Blockchain is still in its infancy. There are many questions which are still unanswered about blockchain and its adoption, so accountants and auditors should make themselves part of that conversation to find possible answers. It could help them to drive the industry's direction in their favor. Blockchain will make the audit process fast, and automated so the auditors or other transactional service providers should consider diversifying into areas that are more creative. Accountants should add more value by providing strategic advice to their clients and not just undertaking the basic bookkeeping functions. Firms should evolve with the latest technology and attempt to leverage on the upcoming force that shall alter the entire method of accounting and auditing.

Industries to be Affected

The accounting industry shall experience the most disruption because of the blockchain technology because it fundamentally changes the way of making and recording transactions. The three main features of veracity (creation of multiple copies of records), transparency (easy identification of any attempt of malicious nature), and disintermediation (no central control) make this technology suitable for many industries. Some of the industries likely to be disrupted are mentioned here:

- **Healthcare**

Providers will be able to maintain the integrity of medical records using a private or permission-restricted blockchain, medical billing, claims, and other records.

- **Politics**

Casting, tracking, and counting of votes using blockchain technology will eliminate voter fraud as every vote get recorded under a cryptographic hash. Since the records are open and people can verify the count themselves, any questions of legitimacy will be a thing of the past. Officials could be certain about no votes being changed, removed or being illegitimately added.

- **Human Resources**

Employers can check academic records stored in the blockchain to confirm the accreditations claimed by the people seeking work.

- **Entertainment**

Blockchain technology could be used to solve licensing issues. Users could listen to music stored on blockchain and pay artists directly. This could lead to the demise of already deteriorating record companies.

- **Real estate**

Purchasing and selling properties could become faster and better streamlined with the use of blockchain technology instead of manual, extensive paperwork.

- **Public sector**

Blockchain can be used for asset registries. It could make dealing in land and corporate shares simpler and efficient. It can also make the digital identity schemes decentralized and prevent any centralization-induced political or social use of the digital identity of masses.

- **Energy and resources**

Blockchain can allow for surplus energy to be traded as digital assets among consumers.

- **Financial Services**

It can help in speedy international transfers and execute real-time and cost-effective transactions. It can facilitate the payment and settlement mechanism.

Expected Future

The areas of accounting related to transactional assurance, and carrying out of transfer of property rights will be transformed to a very great extent by blockchain and smart contract approaches. There will be a reduction in the need for reconciliation and dispute management, increase in certainty around rights and obligations. This will enable an expansion in the areas of accounting. Data analytics or machine learning will increase the efficiency and value of the accounting function. Because of the above potential changes, the set of skills represented in accounting will change. Work like reconciliations and provenance assurance will be reduced or entirely eliminated, while other areas such as technology, advisory, and other value-adding activities will see huge expansion.

There will be little need to confirm the accuracy or existence of blockchain transactions with external sources, but there will be more focus required in areas like how those transactions are recorded and recognized in the financial statements, and how judgmental-driven areas are decided. Auditors and regulators would be able to check transactions on a real-time basis and with certainty. Although accountants will not need to be equipped with detailed technical knowledge of how blockchain works. But they shall know how to advise their clients about blockchain adoption and impact on businesses. They will also need to act as the intermediary between both technologists and business stakeholders. In future, any activity that otherwise runs on a database can be run on a blockchain platform also. Blockchain might be an appropriate solution for problems that have the following three characteristics:

- A number of participants who don't have trust in one another;
- A desire to work without an intermediary, and
- A need for a complete log of transactions.

Conclusion

Blockchain refers to the specific distributed ledger solutions that facilitate functionality. It is backed by the technology of distributed ledgers that facilitate veracity, transparency, and disintermediation in financial records. The three broad types of blockchain on the basis of accessibility are public blockchain, consortium blockchain, and private blockchain. It is characterized by real-time entry of transactions, distributed consensus, and transparency. Because of the above features, it can be profitably applied to the digital payment system, real estate, healthcare, smart government, artificial intelligence, smart contracts, transaction processing, government cash management, commercial bank ledger administration, tourism, sports, social inclusion, digital identity provider, and energy and resources. It will transform the job of accountants and auditors because the work of book-keeping, matching debits with credits and spotting any attempted frauds will be done automatically on real-time basis in a complete transparent manner. Auditors and accountants should learn to diversify their skills to leverage on the capabilities of the new technology. It will make their job more efficient by making accounting and audits fast, transparent, and secure. This will let them devote more time to value-driven activities. Other industries to be affected by blockchain technology are healthcare, politics, human resources, entertainment, real estate, public sector, energy and resources, and financial services. The role of accountants and auditors will no longer be limited to book-keeping, and reconciliation of records. But with the spread of blockchain technology, they will have to act as the intermediary between the technical world and the business world. They would have to enhance their skills in value-driven judgmental areas.

References

- ✧ Ammous, Saifedean. (2016). Blockchain Technology: What is it Good for? Available at SSRN: <https://ssrn.com/abstract=2832751> or <http://dx.doi.org/10.2139/ssrn.2832751>
- ✧ Kakavand, Hossein and Kost De Sevres, Nicolette and Chilton, Bart. (2017). The Blockchain Revolution: An Analysis of Regulation and Technology Related to Distributed Ledger Technologies. Available at SSRN: <https://ssrn.com/abstract=2849251> or <http://dx.doi.org/10.2139/ssrn.2849251>
- ✧ Pilkington, Marc. (2015). Blockchain Technology: Principles and Applications. Research Handbook on Digital Transformations, edited by F. Xavier Olleros and MajlindaZhegu. Edward Elgar, 2016. Available at SSRN: <https://ssrn.com/abstract=2662660>
- ✧ Trautman, Lawrence J.(2016). Is Disruptive Blockchain Technology the Future of Financial Services? (May 28, 2016). 69 The Consumer Finance Law Quarterly Report 232 (2016).
- ✧ <file:///C:/Users/india%201/Downloads/01529-RG-Blockchain-Technology-Potential-Impact-Audit-Assurance-Profession-January-2018.pdf>
- ✧ file:///C:/Users/india%201/Downloads/1216-07_Future%20of%20Blockchain_web_FA.pdf
- ✧ <http://lup.lub.lu.se/luur/download?func=downloadFile&recordId=8953732&fileId=8953736>
- ✧ <https://umu.diva-portal.org/smash/get/diva2:1114333/FULLTEXT01.pdf>
- ✧ <https://wi2017.ch/images/wi2017-0112.pdf>
- ✧ https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Blockchain_A%20game-changer%20in%20accounting.pdf

