

BLOCKCHAIN TECHNOLOGY IN ACCOUNTING: PROSPECTS AND CHALLENGES

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Learning Outcomes:

At the end of the presentation, participants will be able to:

- (1) Discuss the new paradigm of BT;
- (2) Identify emerging business trajectories associated with BT;
- (3) Explain the key grand infrastructure of BT;
- (4) Illustrate how BT works and the link between BT and emerging digital currencies;
- (5) Analyse the opportunities and threats of using BT;
- (6) Assess prospects of BT and the knowledge base for the accountants.

1.0 INTRODUCTION

Blockchain is one of the “buzz” word on everyone lips nowadays and it represents one of the “hottest” technologies nowadays, with an important potential disruptive effect on our lives. Therefore, is a subject of great interest, both for industry and academia. Blockchain’s potential to radically change the accounting, audit and control activities raises therefore a huge interest for professionals in these fields (Pugna & Dutescu, 2020).

2.0 BLOCKCHAIN- DEFINITION AND DESCRIPTION

Blockchain is a decentralized, distributed ledger that focuses on the ownership and transfer of assets. Blockchain is described as a type of distributed ledger technology (DLT) (Christie, 2018; Ølnes et al., 2017) or a type of financial technology (FinTech) (FRC, 2018; Chen et al., 2019; Goldstein et al., 2019; Gomber et al., 2018). Others view blockchain as a sequential database or a giant spreadsheet that surpasses the classical financial ledger by recording transactional information, secured by cryptography, and governed by a consensus mechanism (Hinings et al., 2018; Yermack, 2017). In other words, blockchain technology is simply blocks of transactional data connected in chronological order that records transactional data in such a way that' makes it almost impossible to manipulation. **The chain of blocks gives the technology its name- Blockchain.**

The origin of Blockchain technology

It all started in 1991, when Haber and Stornetta discussed in their article titled “*How to stamp a digital document*” a technological solution for the problem of time-stamping easily modifiable digital assets to track their origin and any attempt to modify them. In that article, they proposed that computationally practical procedures for digital time-stamping of easily modifiable documents, is by creating cryptographically secured chain of blocks that makes impossible to back-date or to forward-date a document. These procedures aimed to maintain complete privacy of the documents and, therefore, no record-keeping by a third party will be required. **Therefore, the concept of cryptographically secured chain of blocks is considered to be the foundation of blockchain.**

Effectively, however, Blockchain began with a man named Satoshi Nakamoto, who invented Bitcoin and brought blockchain technology to the world back in 2009. The concept of blockchain itself appeared in 2008, when Satoshi Nakamoto used it to describe the public transaction ledger for the first digital cryptocurrency (Bitcoin). In his research paper entitled “*A Peer-To-Peer*

Electronic Cash System” he described a peer-to-peer system in which people could make instant online transactions directly from sender to receiver without any involvement of any third party like government or financial institutions (Nakamoto, 2008). Since then, blockchain technology, also referred to as “Distributed Ledger Technology” (DLT) evolved and has been used in different other platforms. Blockchain technology is emerging as a ground-breaking innovation, and it has the potential to disrupt various industries. It is a decentralized, transparent and immutable digital ledger that enables secure and efficient transactions, that does not need any kind of intermediaries.

Blockchain technology has witnessed a tremendous rise in popularity and adoption over the years. As of 2023, there are over 1,000 blockchains in circulation, catering to a wide range of industries and applications.

BLOCKCHAIN- CONCEPTUAL CLARIFICATIONS

Different authors defined blockchain in different ways as follows:

According to Furlonger and Uzureau, (2020), blockchain is a digital mechanism to create a distributed digital ledger on which two or more participants in a peer-to-peer network can exchange information and assets directly without the need for a trusted intermediary.

Similarly, Erbguth and Morin, (2016) viewed it as a distributed data ledger, in which transactions are recorded in append-only mode and verified through consensus algorithms. For others, it is a technological protocol that enables data to be exchanged directly between more participants within a network without the need for intermediaries. Each transaction is coded and added to an unalterable transaction chain, which is distributed to all ledgers (nodes), and thus preventing the alteration of the chain itself. The information relating to each transaction is recorded on a digital ledger, and copies are kept independently by each participant in the network. All the records in the network are unchangeable, time-stamped, encrypted and linked to each other.

Furthermore, the ICAEW (2018) referred to blockchain as an accounting technology for transferring the ownership of assets and maintaining a ledger of accurate financial information, where the constancy of a ledger is derived from trust in the system that drives the record-keeping.

Blockchain technology is a decentralized and transparent digital system which allows multiple parties to securely, record, track and verify transactions or data. Instead of being controlled by a single authority, it operates on a network of computers that collaborate to validate and store information. This technology ensures increased security, trust, and accuracy in various areas such as finance, supply chain management, and digital currencies, like bitcoin.

3.0 BLOCKCHAIN COMPONENTS AS AN INTEGRATED WHOLE

Components of blockchain technology are namely:

- **Nodes/ Peer Network:** Nodes are generally computer systems that contain a copy of a blockchain’s primary protocol and its entire transaction history. Due to decentralization, any individual can run a node anywhere in the world as long as they are connected to a decentralized blockchain network and have the required resources.
- **Wallet:** A blockchain wallet is an electronically generated purse that can store keys, which helps someone exchange funds easily. Transactions are secured, as they are cryptographically signed. The wallet is accessible from web devices, including mobile ones, and the privacy and identity of the user is maintained. All wallets can store keys, but only hot wallets can access the blockchain, so it’s important to keep your keys off your hot wallet until you need them.
- **Ledger:** A ledger in blockchain is a database or a list of every transaction that has ever taken place on the network. This decentralized ledger, known as a blockchain, is maintained by a network of

computers, or nodes, who work together to verify and record transactions. For example, the Bitcoin blockchain records all transactions involving bitcoins using blocks secured by cryptography

- **Hash:** A hash is a function that meets the encrypted demands needed to secure information. Hashed are of a fixed length, making it nearly impossible to guess the hash if someone is trying to crack a blockchain. The same data will always produce the same hashed value.
- **Smart Contract:** Smart contracts are lines of code that are stored on the ledgers on the blockchain and automatically execute when predetermined terms and conditions are met
- **System integration:** System integration is the act of taking many disparate systems and workflows and bringing them together into a single system that operates more effectively. For example, a system integration might combine software, workflows, networks, and even hardware to improve efficiency and effectiveness throughout an organization.
- **Systems Management:** Blockchain is a special type of database management system that has more features than a regular database. Blockchains decentralize control without damaging trust in the existing data.
- **Events:** Once the transaction has been committed on all the ledgers of the blockchain then, an event can be generated. Then, this event can be used anywhere for additional processing in the internal of the organization where an organization wants to use and perform it.
- **Membership:** It is a global blockchain business membership that provides your business with resources and opportunities to advance understanding and adoption of blockchain.

4.0 ELEMENTS OF A BLOCKCHAIN

Blockchain technology combines existing technologies into an innovative architecture defined by five elements (Furlonger, 2020). Therefore, true blockchain has five elements as follows:

Distribution: Participants are connected on a network, each of them operating a full node and maintaining a complete copy of the ledger, which updates with new transactions as they happen. Each node (the machines used by participants) is set to run the consensus algorithm. Although any participant can review any part of the ledger, it cannot change it in the absence of given circumstances.

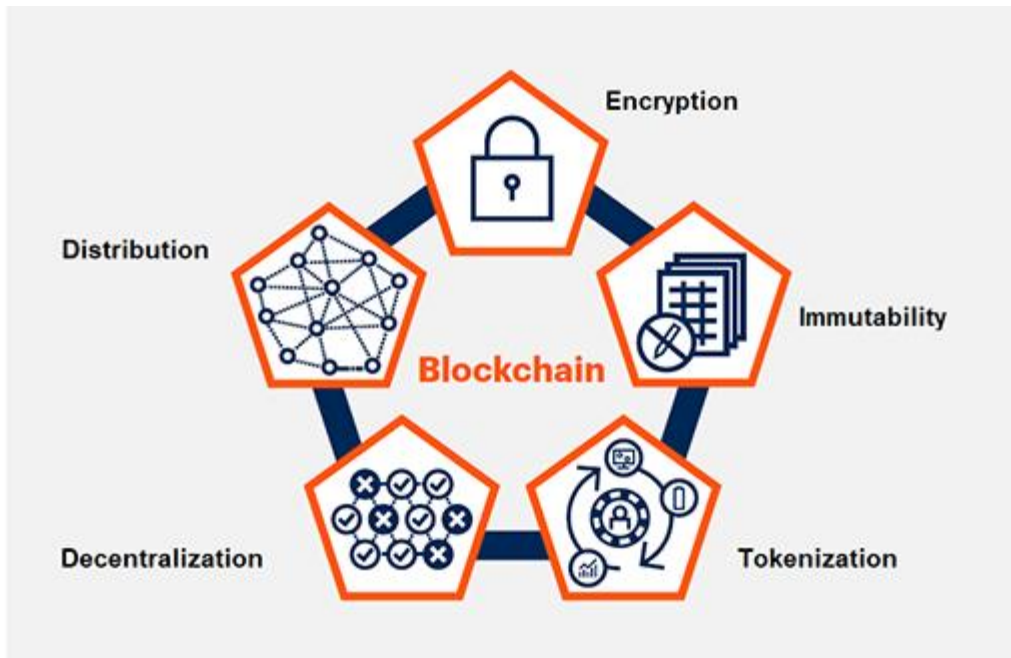
Encryption: Special technologies, such as public and private keys, are used to record data securely and privately in the network, so the participants can control the information shared (including their personal identity) in a transaction. It is however important to note that, even the participants are semi - anonymous (they have pseudonyms) and the blockchain authenticates each participant and validates the ownership of the assets to be transacted.

Immutability: Once completed, transactions are cryptographically signed, time-stamped and sequentially added to the ledger. Once recorded, transactions can be changed only with the agreement of all the participants.

Tokenization: The value exchanged in the blockchain comes in the form of tokens, as a way to secure this process in a digital environment. Tokens might function as digital representations of physical assets, as a reward mechanism to incentivize network participants, or to enable the creation and exchange of new forms of value.

Decentralization: As both the information in the network and the operating rules of the network are kept by multiple nodes, there is no single entity that has a central control over it. Transactions are verified and approved through a consensus mechanism operated on each node. This consensus-driven structure removes the need of a central authority to establish trust, identity and payment and acts like a shield against fraud and corrupted transactions.

Fig 1: Elements of a Blockchain Technology



Source: Gartner, 2019

It is extremely important to note that only together all these elements create a transparent and trusted environment used to create and share value. However, most of the developed or currently developing blockchain solutions use only some of these elements.

Nanda et al., (2023) stated that as Blockchain continues to evolve, it is very much crucial for all the businesses and also for the organizations to explore the applications and adapt to this transformative technology by understanding blockchain first. According to their study, it is crucial for businesses and organizations to understand that Blockchain is a distributed ledger which records the transactions across multiple computers which is known as nodes in a specific network. Each and every transaction or block contains a timestamp, which is eventually an identifier and also a cryptogenic hash of the previous block, which creates a chronological chain of blocks. This kind of interconnected structure ensures the immutability and the integrity of the data which is stored on the block chain. Also, blockchain employs an advance kind of cryptographic techniques which secures every transaction. Each and every transaction is verified and validated by the network participants and consensus mechanisms which is also a very significant part of the block chain. For example, proof of work or proof of stake ensures that only the legitimate transactions are added to the block chain.

FUTURE BLOCKCHAIN

Despite its potential to create new value and unlock existing value flows, blockchain remains still an experimental technology, with current applications addressing only some elements of small-scale projects. The attitudes towards blockchain followed the common pattern faced by young and evolving technologies - they moved from a “hype” characterized by unrealistic expectations to real disappointments brought by the cryptocurrency crash in 2018. Currently, blockchain crosses a period of “evolving maturity”, focused on enabling technologies for two of its defining components: distribution and encryption.

According to Gartner(2019), blockchain will evolve through three phases in the next ten years, with a first step focused on **operational improvement** followed by a second one dedicated to the *“real business of blockchain”* – reengineer business relationships and redistribute existing data and value flows in ways that could reinvent how business engage in a digital world (Panetta, 2019). The first phase started after 2012 and is expected to last through the early 2020’s. This is the phase of **Blockchain-inspired solutions**, in which only three of the five elements of blockchain are used namely: distribution, encryption and immutability (Zheng et. al, 2017).

In this period of evolving maturity, blockchain is confronted with both technical and organizational challenges. One of the core elements of a fully developed blockchain solution is decentralization, which means that business leaders must accept full transparency and be comfortable with automated business decisions outside their full control. This is very difficult. Moreover, the main intermediaries of the existing centralized infrastructure (market intermediaries, technology infrastructure providers) are constantly pouring more suspicions in their clients’ ears (Furlonger & Uzureau, 2020). Since all the blockchain-inspired solutions are designed in a centralized environment, they don’t allow unmediated trade of digital assets.

The second phase is expected to start in early 2025 and to last until 2030. In this phase, called **Blockchain complete**, all the 5 elements (distribution, encryption, immutability, tokenization and decentralization), blockchain components as an integrated whole are used. The major difference between blockchain complete phase and that of blockchain inspired solution phase is the presence of tokens operating in a decentralized environment using smart contracts.

The third phase, expected to start after 2030, is characterized by the integration of complementary technologies within blockchain networks. Technologies like Internet of Things (IoT), Artificial Intelligence (AI), Self-Sovereign Identity (SSI) will expand the value that can be monetized and exchanged in the network, allowing smaller transactions supported by smart contracts to take place. This *Enhanced Blockchain* has the potential to generate new business models based on decentralized operational structure, with completely autonomous transactions. Every category of human endeavors, be it in education, economy, politics, healthcare or science could be re-invented. Blockchain is proving to be the fifth disruptive computing paradigm shift (Mutambaie, 2018).

The Prospect of Blockchain for Accounting

Blockchain creates an innovative method to catalogue and account for data. Shared record keeping, a distinctive feature of the blockchain, allows the “trust” element in various relationships to be determined by consensus versus promise. (McComb & Smalt, 2018).

Blockchain offers transparency and certainty over ownership and history of assets and existence of obligations. This will free much of the accountants’ time and reduce the costs of maintaining and reconciling registers, which will greatly improve efficiency.

Moreover, with record keeping transferred to the blockchain, more resources will be available for planning and valuation for accountants in an organisations.

New types of assets, which are very difficult to measure in a traditional accounting system, can be managed by blockchain accounting. With the technology evolving to enhanced blockchain solutions, transactions of digital or digitalized assets will be automatically recorded in cryptographically protected blocks.

The blockchain could also make settlements on maturity of different assets based on smart contracts possible and also record them. This *real time blockchain accounting* is considered in the present as being the future of accounting systems in blockchain technology.

BLOCKCHAIN ACCOUNTING

With its main objective of transferring the ownership of assets while assuring a ledger of accurate financial information in a secure and trusted environment, blockchain is, undoubtedly, an accounting technology. Therefore, blockchain is expected to change the present accounting system in different ways.

Demonstration of How Blockchain Technology Works

You might be familiar with spreadsheets or databases. A blockchain is somewhat similar because it is a database where information is entered and stored. But the key difference between a traditional database or spreadsheet and a blockchain is how the data is structured and accessed.

A blockchain consists of programmes called **scripts** that conduct the tasks you usually would do in a database: Entering and accessing information and saving and storing it somewhere. A blockchain is distributed, which means multiple copies are saved on many machines, and they must all match for it to be valid.

The blockchain collects transaction information and enters it into a block, like a cell in a spreadsheet containing information. Once it is full, the information is run through an encryption algorithm, which creates a hexadecimal number called **the hash**. The hash is then entered into the following block header and encrypted with the other information in the block. This creates a series of blocks that are chained together.

Transaction Process:

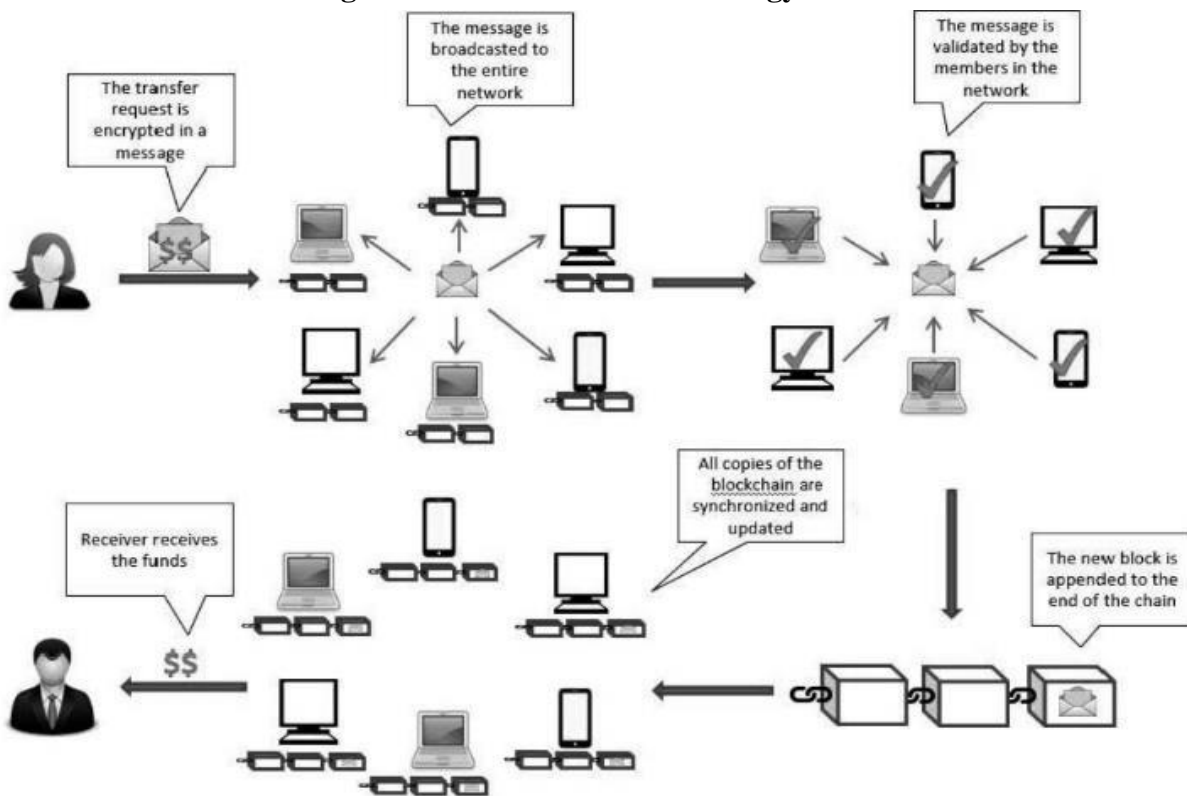
Transactions follow a specific process; depending on the blockchain they are taking place on it. For example, on Bitcoin's blockchain, if you initiate a transaction using your cryptocurrency wallet- the application that provides an interface for the blockchain- it starts a sequence of events.

In Bitcoin, your transaction is sent to a memory pool, where it is stored and queued until a miner or validator picks it up. Once it is entered into a block and the block fills up with transactions, it is closed and encrypted using an encryption algorithm. Then, the mining begins.

In blockchain, the entire network works simultaneously, trying to "solve" the hash. Each one generates a random hash except for the "nonce", short for number used once. Every miner starts with nonce of zero, which is appended to their randomly generated hash. If that number isn't equal to or less than the target hash, a value of one is added to the nonce, and a new block hash is generated. This continues until a miner generates a valid hash, winning the race and receiving the reward.

Using another example, there are many transactions that are related to one single purchase from a shop such as the salary of the employees that are working there, the maintenance cost, and the transactions done. Using figure 2 below to demonstrate how a blockchain technology works when there is a fund transfer request (see fig.2 below).

Fig 2: How Blockchain Technology Works



Source: Denter et al., (2023).

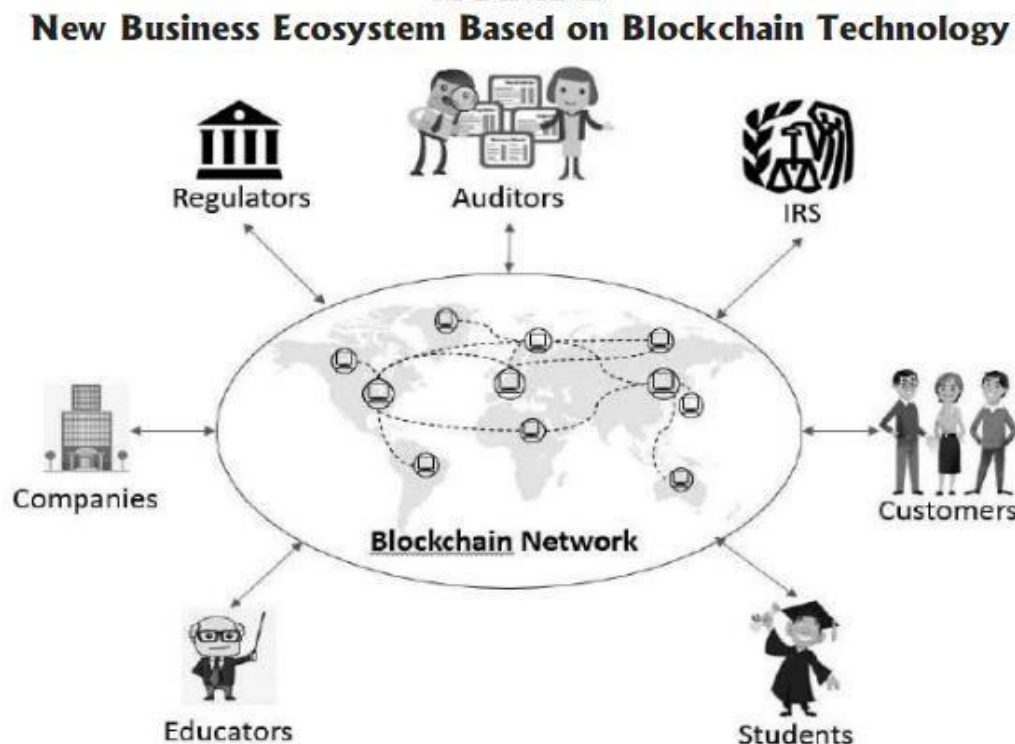
A blockchain is “a distributed database that maintains a continuously growing list of ordered records, called blocks.” These blocks “are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data.

When a transaction request is made in a system that is using blockchain technology, that transfer request is first received and encrypted in a message by the node, using cryptographic keys. The message is then broadcasted to the entire networks that are connected to the system, which in turn is validated by the members in the network and once a transaction is validated, a new block will be formed. This new block is then appended to the end of the chain. After which, all copies of the blockchain are then synchronized and updated immediately and the receiver receives the funds at the receiver’s end.

So, an authorized participant inputs a transaction, which must be authenticated by the technology. That action creates a block that represents that specific transaction or data. The block is sent to every computer node in the network. Authorized nodes validate transactions and add the block to the existing blockchain.

The blockchain provides a common platform by which anyone can access the overall transaction system and can save time. The blockchain has been connected to the business and the transactions are recorded as well and the mode of transaction can be money or even crypto currency. The technology modernized the industry and the accounts are recorded safely. The customers, suppliers, and all the related persons are connected through this technology, and for that auditing can become easy as well

Figure 3: Steps of blockchain technology



Source: Liu *et al.* (2023)

There are some steps by which blockchain technology is working and the steps are illustrated in the section. The blockchain is actually the combination of some leading technologies that are very common nowadays such as cryptographic keys, a peer-to-peer network, and some more. **Cryptographic keys are basically two types, private and public keys.** Successful transactions can be done between parties using those keys. A secure digital reference can be produced using the keys as everyone has access to both keys. The reference is actually the identity of the transaction that is used for every case. The unique identity is providing the security that is the main concern of the system. The digital signature is used to maintain the authorization for the control of the transaction in the world of cryptocurrencies.

The overall process is then connected to the peer-to-peer network and the authenticity has been provided after that (Guru *et al.* 2023). The digital signature secures each transaction and that is recorded as a certificate that cannot be modified or changed at any cost, so the security can be maintained. The audit can be done on the system very easily as they are connected through chains.

KINDS OF BLOCKCHAINS TECHNOLOGY ARCHITECTURE

There are four (4) main kinds of blockchain architectures that can be used by companies, organizations, and government namely:

- (1) **Private Blockchain Architecture:** A private blockchain architecture is blockchain network operates in a private context, such as a restricted network, or is controlled by a single identity. It is a type of blockchain in which only specific users have access and abilities to participate in the transactions, and is generally used only by the entity it belongs to. Instead of just anyone being able to join and provide computing power, private blockchain architecture is typically

operated on a small network inside a company or organization and it restricts access to permitted individuals only. They're also known as permissioned blockchains or enterprise blockchains. The **permission blockchain network** is used for the person who has permission access for the translation and the control of the structure.

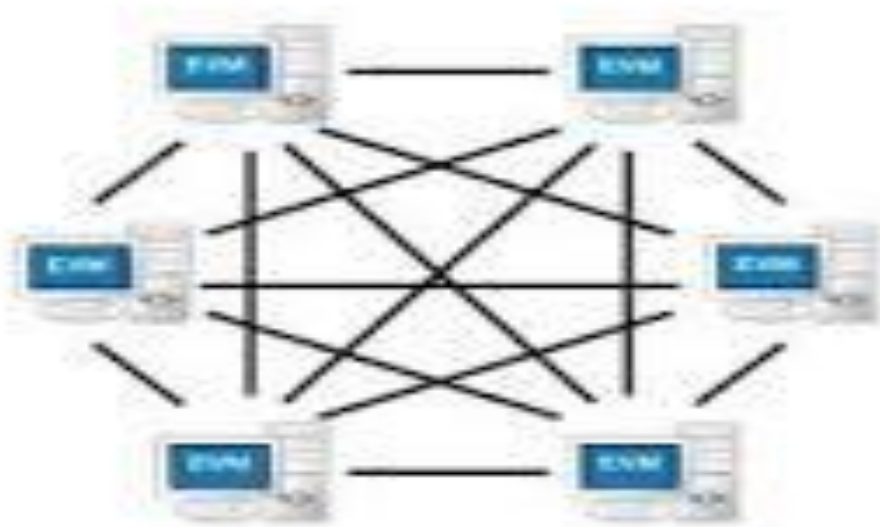
Examples of private blockchains include Hyperledger and Corda. Only selected users may maintain the shared ledger while the owner can override, edit, or delete entries on the blockchain as they see fit. It is used to operate the closed network that is used for confidential transactions and used in many small companies and businesses.

Fig4a: Diagram of a Private Blockchain Architecture



Source: Muthu, 2023

Fig4b: Diagram of a Private Blockchain Network

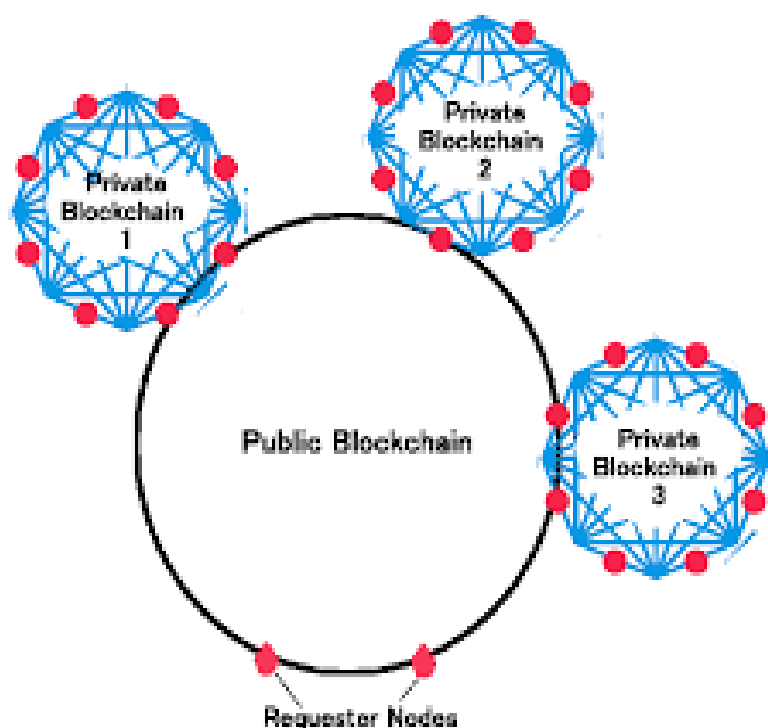


Source: Muthu, 2023

- (2) **Public Blockchain Architecture:** It is a permission less distributed ledger on which anybody can join and conduct transactions without restrictions. A public blockchain is one where anyone is free to join and participate in the core activities of the blockchain network. Anyone can read, write, and audit the ongoing activities on a public blockchain network, which helps achieve the self-governed, decentralized nature often touted when blockchain is discussed. Public blockchain operates in an open and permission less access. It allows anyone to join and participate without the need for permission from governing bodies. This openness fosters a high degree of decentralization and democratization of data.

Public blockchain network is basically used by the Public Sector. Governments and public sector organizations leverage blockchain technology to move away from soloed and inefficient centralized systems. Current systems are inherently insecure and costly, while blockchain networks offer more secure, agile, and cost-effective structures. In a public blockchain, users validate transactions that are then time stamped and shared publicly through consensus mechanisms. Being public, it means that anyone can join and participate in the network. The transaction data on the blockchain is immutable – the history cannot be tampered with, modified, or altered. Bitcoin, Ethereum, and Litecoin are some examples of public blockchains. On these networks, any user can volunteer to operate as a node. These nodes are responsible for verifying transactions and maintaining a copy of the distributed ledger.

Fig 5: Diagram of a Public Blockchain Architecture

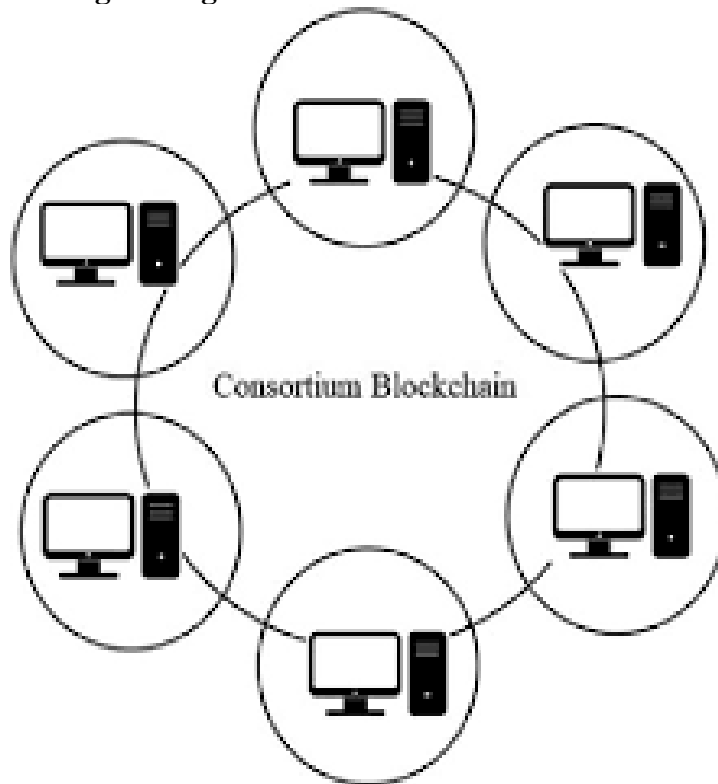


Source: Ali et.al.,2018

- (3) **Consortium Blockchain Architecture:** Consortium blockchain architectures are the union of a public and private blockchain architecture that is partly decentralized. **Consortium blockchain architectures** are most commonly used in a network where all members have total authority. They aren't entirely centralised, making it suitable for use cases that involve groups comprising of multiple organisations. In consortium blockchain network,

there are some controlling nodes to verify and validate transactions or blocks. The miner blocks are valid only when approved and signed by these controlling nodes.

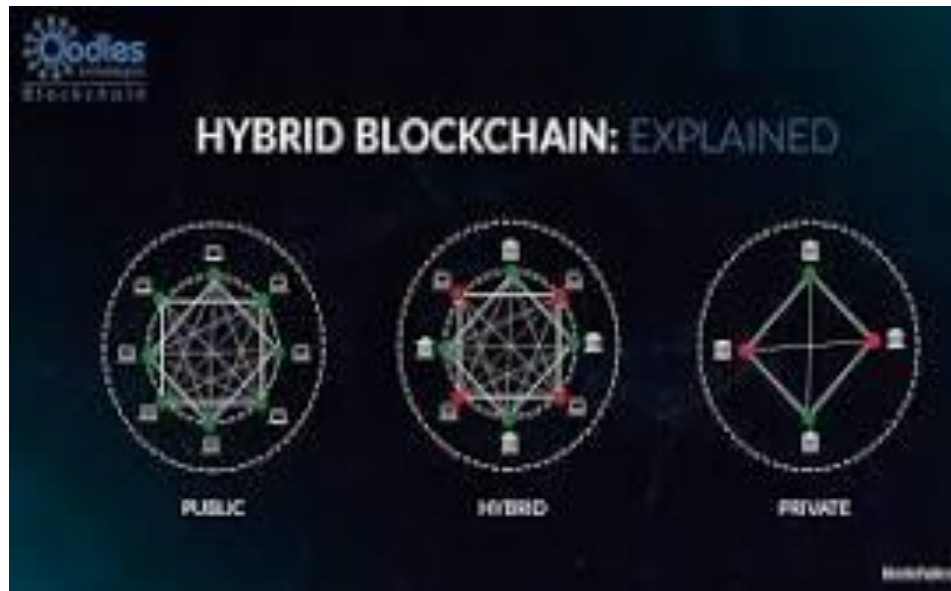
Fig.5: Diagram of a Consortium Blockchain Architecture



Source: Mukherjee and Pradhan,2021

- (4) The **Hybrid Blockchain Architecture**: is the type used to modify the network for both publicly and privately owned organizations and the centralization and error detection were done using the technology. A hybrid blockchain essentially has two interfaces: a private blockchain with its own ledgers and a public blockchain that aids in data verification between the private blockchain's ledgers. Once a user is granted access to the hybrid blockchain platform, the user can fully participate in the blockchain's activities. The devices can be put on a private network with a hybrid blockchain, and only those who require them can access them. Depending on the data to be shared, certain network features might be made public. A number of security challenges may be resolved with a hybrid strategy. Hybrid blockchain are basically used by Governments. Governments can use a hybrid blockchain solution to securely manage sensitive information, such as voting records, while also providing transparency in their decision-making processes. An example of a hybrid token, more specifically an investment-utility hybrid, is **Crypterium**, which is used to pay transaction fees when using the services provided by the issuer, gives the right to discounts for future services, and gives a right to revenues collection to those with access permission.

Fig 6a: Diagram of a Hybrid Blockchain Architecture

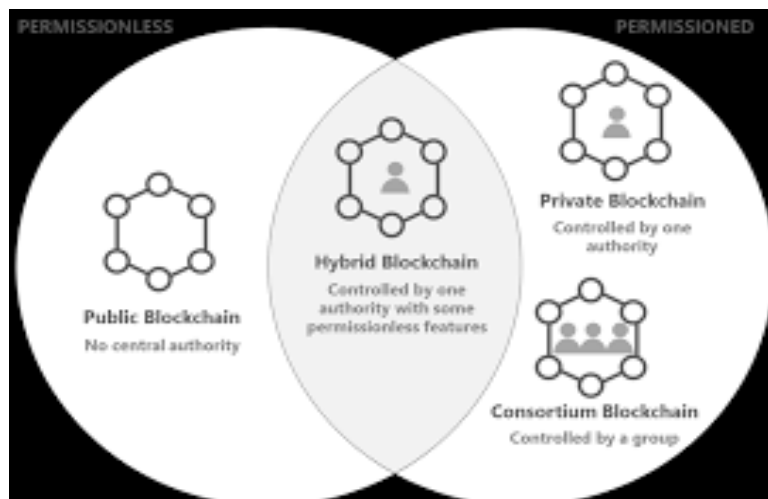


Source: Oodles blockchain, 2024

In every blockchain technology, there are layers of blocks that are working in parallel and the network is known as the **slide chain network**. There are also some layers that are connected and used in the transactions called the **blockchain layers**.

There is always proof of every work that has been stored securely and the security of a blockchain is increased by mining which is related to bitcoins. There are many decisions that can be taken using the records which can be very helpful for the business. The security of each transaction is provided very carefully. Hacking, which is a process by which many data can be changed and manipulated but using blockchain technology the security is increased as no modification can be done on data once they are recorded without census agreement, thereby reducing ability to hack data in a blockchain network.

Fig 6b: Diagram Differentiating all the Blockchain Technology Architectures



Source: Mukherjee and Pradhan, 2021

BENEFITS OF BLOCKCHAIN ACCOUNTING

Blockchain promises to offer many benefits to the accounting system, by automating the process of recording and keeping transactions on digital assets in a secure and trustful environment. Some of the most appealing ones are (Sarkar, 2018; Zhiwei et al,2018; McComb & Smalt, 2018):

(1) Improved efficiency: Records are kept only once, in blocks and is accessible anytime by any authorized user. This will reduce the cost of maintaining physical or digital records. Also, with transactions recorded in real time and ledgers instantly updated, reconciliations will be removed from the recording process. The modern technologies, like Artificial Intelligence and Data Analytics will optimize many accounting processes in an enhanced blockchain system. All these will increase efficiency and value of the accounting function.

(2) Authenticity of information and reduction in fraud. Unlike physical or digital records, blocks in a blockchain are not susceptible to unauthorized alterations. This will ensure the accuracy of information stored in the blockchain and will dramatically reduce the chance of fraud. Within a real time blockchain accounting, the risk of any errors will be completely eliminated.

(3) Real time reporting: In a real time blockchain accounting, any user registered in the network or external regulator will be able to access information about an organization in real time.

(4) Focus on value-added activities: All the organizations' resources involved in the traditional record keeping will be available to other value adding activities of the organization in blockchain accounting.

(5) Financial reporting: According to Nanda et al., (2023), blockchain technology can significantly transform financial reporting by making sure that the transparency, accuracy and timeliness of financial information are insured. Through the usage of the smart contracts, which happens to be a feature of the Blockchain technology financial transactions can be recorded directly on the Blockchain technology, which eventually creates a tamper proof audit trail. This will eliminate any kind of need for intermediaries and thus will reduce any kind of errors and thus will enhance the reliability of financial statements (Liu et al., 2019). In addition, to the real time access to all the financial data that will allow for quicker and more informed decision making stakeholders.

(6) Audit: Blockchain technology has the potential to revolutionize the audit procedure by providing the auditors with direct access to the underlying transactional data. With the help of the Blockchain, auditors can easily verify the authenticity and the integrity of transactions without depending on any kind of third party documentation. This eventually will increase the efficiency of audit, and thus it will reduce the risk of any kind of fraud, and also will enhance the overall reliability of financial audits. Smart contracts can also automate audit procedure, ensuring the compliance with the previously determined rules and regulations.

(7) Fraud prevention: Blockchain has the inherent feature of immutability and transparency that makes it an effective tool in preventing and also in detecting any kind of fraudulent activities. By recording all the transactions on a distributed ledger, the Blockchain technology creates a transparent and tamper proof system, which reduces the risk of any kind of fraudulent manipulation of the financial records of any specific institution (Maffei et al., 2021). Moreover, the decentralized nature of Blockchain eliminates a single point of failure, thus making it extremely difficult for the hackers to even approach it or to breach the system.

(8) Cost reduction: By implementing the Blockchain technology in accounting processes, we can generate significant amount of cost reductions. By eliminating all the intermediaries, such as any kind of clearing houses and reconciliations or organizations can easily streamline their operations and thus reduce the transactional costs. Additionally, the automation of process through the smart

contracts reduces any kind of need for manual intervention, thus it also minimizes any kind of errors and thus it improves overall operational efficiency (Dyball, and Seethamraju, 2022). Blockchain technology also provides a secure platform for sharing any kind of financial data and thus it reduces the costs which are associated with the data reconciliation and sharing among different stakeholders of a specific company.

(9) Share of Accounting Information: The question of how to aggregate and share accounting information among various users have always challenged accounting professions (Sheldon, 2018). The excitement and interest in blockchain-based technologies have raised awareness about the lack of financial standards (Singh, 2020) on the emerging FinTech products such as crypto-assets as well as solving the challenge of sharing information among various users.

(10) Confidentiality: Blockchain provides extensive capabilities for ensuring a user's anonymity. User keys are the only link between the user and his data. However, these keys are also easy to anonymize. As a result, while being open and offering rich opportunities for transaction tracking, blockchain allows users to maintain an unprecedented level of anonymity.

(11). Data Integrity: Blockchains are designed a ledgers where every block is linked to nearby blocks using cryptographic hash functions. Therefore, once a transaction is recorded on the blockchain, it cannot be altered or deleted. Any changes made to the already recorded data are processed as new transactions.

(12) Availability: Having many nodes ensures blockchain resilience even when some nodes are unavailable. And as each node in the network has a copy of the distributed ledger, the correct blockchain remains accessible to other peers even in the case of a compromised node.

Accounting And Audit – Current Approaches To The Blockchain Technology

Blockchain Feats Accounting Perfectly, While It Can Be Considered Its Specific technology. According to Swan, blockchain is like a giant spreadsheet for registering all assets and an accounting system for transacting them on a global scale (Swan, 2015). Certainly, this technology will generate an important revolution in the way documents and ledgers will be generated, controlled, archived and updated. An “universal entry bookkeeping” system shall emerge. The key features of the blockchain are redesigning the accounting information system through (a) **universal propagation:** all participants have identical copies of the ledger, no one controls it and there is a rapid propagation of new entries within the system ; (b) **immutability:** no possibility to change it without consensus; (c) **programmability:** throughout smart contracts (ICAEW's IT Faculty, 2018).

In 2019 Deloitte conducted a survey to assess the perceptions of 1384 senior executives from countries worldwide about the impact of the blockchain technology (BT) in the future, in companies with more than US \$100mil in annual revenues. Another subsequent survey was then conducted on managers of 13 blockchain emerging disruptors and investment in the sector to search for the technology issues. The first important finding was that there is already a shift from “blockchain tourism” to a more material development, specifically in the fintech domain. 53% of respondents stated that blockchain becomes a critical milestone of their business, 10% higher than in 2018. Additionally, the attitude towards this subject was improved, 86% viewing the possibility of mainstream adoption, blockchain considered scalable. Barriers to greater investment in blockchain were perceived lower in 2019, as compared to 2018. One of the final conclusions

was that “...executives ...should ask (about) the role blockchain can play within their organizations” (Linda Pawczuk, Deloitte Consulting Leader for blockchain and cryptocurrency).

This survey is also providing a regional analysis, on China, Singapore, Israel, US. China established blockchain as top-five critical priority, emphasizing areas where blockchain could generate specific applications (i.e. product traceability, copyright protection). Singapore considers blockchain as fundamental to the economy and promotes cryptocurrency, the government being very supportive on free public blockchain platforms; additionally, favorable tax treatment and public funding for blockchain development were enforced. Israel is a leader of crypto revolution, in digital assets implementation, focused mainly on cryptography's R&D; Stock Exchange is developing blockchain applications and governmental agencies start adopting blockchain in their communications. The USA government becomes a blockchain user and regulator; regulations on the legal status of cryptocurrencies have evolved, data protection limits how the personal information may be handled, in some states laws to enforce blockchain transactions were proclaimed (Deloitte, 2019).

Implications For The Accounting Profession

Certainly, blockchain will change the accounting profession itself – the accountant work will migrate from bookkeeping and reconciliation to other value-adding activities in judgmental area and advice. Although measuring rights and obligations from transactions might concern accountants in connection to blockchain, this technology may help the enhancement of the financial profession, by uplifting the main efforts from bookkeeping to more value-added subjects, such as: **planning and valuation, integrated analysis and complex interpretation of various outcomes, data systems assessment**. Accountants will need to **assess the real economic interpretation of blockchain records, by matching those to economic reality and valuation**.

Another important aspect is related to the role that accounting is authorized to play in the development and adoption of blockchain technology itself. **Accountants are experts in all the domains imbedded in blockchain model: standards setting, business logic, record keeping, application of complex rules (Smith, 2018)**. Therefore, they should be involved in the “business” design of different blockchain solutions, together with those who have technical knowledge of how blockchain works.

Accountants have the opportunity to act as **consultants to organizations** considering block solutions.

They should play the bridging role between technologists and business stakeholders in the process of blockchain adoption and also advise on the impact of blockchain on their businesses and clients.

The profession contribution should also be valuable not only in developing specific, effective regulations and standards but also in advising companies and other stakeholders when dealing with blockchain technology and cryptocurrency and optimizing their processes and systems.

New skills will be needed, specifically on technology, consulting and providing value-added to clients. Additionally, the ability to act as an arbitration party between technical people and business stakeholders could be considered an important new skill to be acquired by accountants.

Although measuring rights and obligations from transactions might concern accountants in connection to blockchain, this technology may help the enhancement of the financial profession, by uplifting the main efforts from bookkeeping to more value-added subjects, such as: planning and valuation, integrated analysis and complex interpretation of various outcomes, data systems

assessment. More transparency and timeliness information will become also attributes that professionals will have to integrate in their work.

Other important implications will concern the external auditors. Data, information and procedures confirmation won't be necessary anymore, the transaction level assertion will change, specific substantial procedures will evolve towards a more holistic, business integration approach. Most of the auditors' specific procedures were repetitive, involving a great amount of manual work on reframing and checking the information "true and fair" impact on financial statements, in other words to assess whether the bookkeeping system is free from material errors and biases. Samples were generated and material levels were assumed within these specific endeavors. Most of these procedures and techniques will disappear or radically change, replaced by blockchain and machine learning facilities, leaving more time and space for other value-added contributions to be done by external auditors in an organizations.

On the other hand, transactions within a blockchain system should still be assessed in terms of their authorization and "according to regulations" features, whether related parties had been involved, correct classification, measurement and disclosure to financial statements done. Blockchain technology will help to improve procedures on management's estimations and decisions, reduce possible processing of fraudulent transactions in the system. In other words, blockchain protocol in the nearest future should be performing most important part of the auditors' endeavor and duties of fraud detection and certification of opinion as to the "true and fair view" of financial statements. Also, the technology ability to automate on-going alerts real-time will help increase the efficiency of audit services and thereby provide more time to be devoted to more high-quality areas of audit.

SKILLS NEEDED BY AN ACCOUNTANT TO FUNCTION WELL IN A BLOCKCHAIN TECHNOLOGY ERA

1. Software Proficiency Skill: To perform accounting duties now, you must know how to use various software packages, such as spreadsheets, word-processing, Peachtree, sage etc. But to fit in well in a blockchain technology era, every accountant must possess a thorough knowledge of cloud based accounting **software such as Intuit's QuickBooks** online software and other cloud based softwares and applications in conjunction with Generally Accepted Accounting Principles are needed.
2. Accounting professionals who want to use blockchain will need to know how to set up information transfer for ledgers, contracts, and records and use essential software applications.
3. Five core skills, blockchain architecture, cryptography, programming languages, smart contracts and data structures are required to become blockchain developer. Acquiring these skills allow blockchain developers to create secure, decentralized networks that store transaction records and other information. Every professional accountants should also possess these skills too, though not as a developer but as an adviser and consultant that will enable him serve as a bridge between the technologists and the companies.
4. Additionally, the ability to act as an arbitration party between technical people and business stakeholders could be considered an important new skill to be acquired by accountants.

Furthermore, Deloitte have compiled a few of the essential skills as follows:

(1) Knowledge of Business Drivers from Blockchain Implementation

Before diving into the technical blockchain development skills, accounting professionals should first understand the fundamental business drivers of implementing blockchain solutions. Having knowledge of the business outcomes that stem from blockchain implementation is guaranteed to help accounting professionals identify the ideal routes for improving operational efficiency and transparency for their clients.

(2) Blockchain Architecture

Blockchain architecture is a fundamental concept that all professionals — accounting or not — should understand. While distributed ledgers form the DNA of all blockchain technologies, accountants may encounter distributed ledgers in a variety of contexts and therefore blockchain architecture is an important skill that every future accountant must possess.

(3) Cryptography

Cryptography is an integral element of the inner-workings of blockchain technology. Cryptographic puzzles are used to protect the identities of users in a network, deliver trustworthy and secure transactions, as well as protect valuable user data.

Behind the curtain of blockchain technology, cryptography can be credited as the tool that ensures all ‘on-chain’ information is accurate and secure. As such a fundamental part of blockchain technology, it’s crucial that accounting professionals are familiar with the mechanics associated with encryption and data privacy.

(4) Smart Contracts

Smart contracts have been designed to help conduct transactions of goods, services and assets without the need for an intermediary or third party. These paper-free contracts are an accurate, transparent, secure and speedy way for accounting firms to exchange data and information effectively.

The efficiency of smart contracts is largely supported as a result of the decentralised nature of blockchain. Smart contracts are a formidable entry among top blockchain development skills for all forward-thinking accounting professionals.

CHALLENGES NOW AND ENVISIONED IN BLOCKCHAIN TECHNOLOGY IN ACCOUNTING:

There are technical and organizational challenges envisioned in blockchain accounting. These include:

Transitional Complexities attached both to the process of transformation from traditional accounting systems to blockchain accounting systems and to blockchain hypo technology system. One of the main challenges is related to the infrastructure for blockchain (Zheng et al,2018). As blockchain is highly dependent on Internet, the risk of an improper infrastructure must be seriously considered when trying to migrate to it. In this context, a high level of cyber security is required.

Regulations: Another challenge is related to the fact that accounting is largely dependent on regulations. Although the blockchain technology can assure that these regulations are properly respected, it should be flexible enough to allow the adoption of any new regulation or the adjustment of existing ones on real time basis. Also according to Nandaet al., (2023), the implementation of Blockchain technology introduces new complexities related to data privacy, ownership and auditing standards. Regulatory bodies must develop appropriate frameworks to address these concerns and provide guidance for the usage of Blockchain in accounting practices.

Scalability: to which blockchain is adopted by organizations represents another challenge for the accounting blockchain. In order to be effective, blockchain accounting needs to be adopted by a sufficiently large number of organizations (Inghirami, 2018). Currently, enterprise blockchain solutions are still in their infancy and the number of organizations that attempted experimenting with blockchain in accounting is rather small. Also, Blockchain networks face scalability issues, resulting in slower transaction processing times as the network grows.

Redundant: Blockchain makes useless the service of a central authority. Being a peer-to-peer network, transactions are recorded securely in blocks and organizations will not have to keep backups in forms of physical and digital records, thereby pushing aside central control authority services and third party services such as banks. This requires a new framework and specific regulations, and countries and organizations are preparing for these challenges. In 2019 the regulation framework of blockchain and crypto currencies has been significantly changed all over the world.

Challenges of Blockchain Technology For An Accountant In Nigeria:

Below are some drawbacks of blockchain technology that you should know about as an accountant in Nigeria. They are:

- 1. Poor Electricity Supply:** Blockchain technology is highly dependent on constant supply of electricity to function well. So, in a country like Nigeria, where there is constant power outage, adopting blockchain technology will rather increase cost of production of goods and services tremendously, as well as being a big challenge an accountant in Nigeria will contend with.
- 2. Fluctuating Internet Network:** Blockchain technology needs a good and steady networks to deliver. Therefore, in a country like Nigeria where network is always fluctuating as well as high cost of data is another challenge an accountant in Nigeria must contend with.
- 3. Inability to Access Training Centres for Blockchain Technology Easily.** There may be problem of seeing where to get trained or acquire knowledge on this new technology easily.

4. **High Cost of Training:** Being a new technology in accounting, cost of acquiring the new knowledge is very high.
5. **Proficiency Skill in Accounting Software Packages:** Accountant in Nigeria must first of all be sound in the use of accounting software packages like Spreadsheets, QuickBooks, Sage 50, Peachtree, XBRL, etc before he/she can be able to transform into blockchain technology. XBRL enables data to be processed automatically by software because XBRL can provide a computer-readable tag for each item of business data based on taxonomies used (Gov.UK, 2020). Whereas blockchain is a distributed ledger system, XBRL is a data standard.
6. **Private keys:** The blockchain network maintains its high level of security through private keys. It comes in handy when you validate a blockchain address and it comes in a form of a password too. Moreover, unlike your social media or e-mail id password, changing a private key once generated is impossible. For example, when you open a crypto wallet, you get a private key. It is a password that allows you to withdraw funds from your wallet in a cryptocurrency operation. By chance, if you lose this key, you cannot withdraw funds from your account. So, you need to store multiple copies of it just so that if you lose the original one, you can rely on one of the copies. The downside is that your crypto wallet is compromised if anyone can access one of these copies. Moreover, unlike your social media or e-mail id password, changing a private key once generated is impossible.
7. **Possibility of disruption of network security:** Blockchain technology is known worldwide for its top-notch security. However, there is a chink in its armour that you should know of. The validation process in a blockchain is done through miners having a lot of computing power. If you are a miner with enough computing power to control more than 50% of a blockchain's mining hash rate, you can launch a 51% attack. You can prevent transactions from gaining confirmations and even pause payments between users. Also, you can reverse completed transactions leading to double spending on such transactions in the cryptocurrency. An attack like this is unlikely on bigger blockchains like Bitcoin or Ethereum. However, new blockchains or forked cryptos can suffer massive damage from this activity. So, accountants in Nigeria should be aware of this disruption of network security.
8. **Inefficient mining process:** Each block in a blockchain is mined through a mechanism called Proof-of-Work. Each miner needs a high-powered computer to compete in the mining process. Many miners may compete to mine a block; only one gets the block rewards. There is a massive waste of energy and resources in the mining process of blockchain technology. So, an accountant in Nigeria need to equip himself with a high powered computer as well as being well skilled in computer usage to fit in well in blockchain technology

4.0. SUGGESTIONS FOR IMPROVED BLOCKCHAIN DELIVERABILITY IN ACCOUNTING

- (1) Regulatory bodies in accounting must as quickly as possible, develop appropriate frameworks that will ensure that blockchain technology when adopted by organizations and companies are properly regulated to respects accounting standards and regulations at all levels and also

provide guidance for the usage of Blockchain in accounting practices.

- (2) With the advent of blockchain technology in accounting, Accountants should as a matter of urgency, learn new skills that will enable them retain their jobs, specifically on technical known how, consulting and providing value-added services to clients. Additionally, the ability to act as an arbitration party between technical people and business stakeholders could be considered an important new skill to be acquired by accountants too.
- (3) Regulatory bodies in accounting should work with blockchain technology solution developers at every stage to ensure that it is flexible enough to allow the adoption of any new regulation or the adjustment of existing ones on real time basis.
- (4) Organizations and companies considering the adoption of blockchain technology should ensure that they maintained high level of cyber security as the technology is highly dependent on internet services to operate.
- (5) Blockchain technology being a peer-to-peer network, transactions are recorded securely in blocks and organizations will not have to keep backups in forms of physical and digital records. This requires a new framework and specific regulations, and countries and organizations considering blockchain adoption should be prepared to handle this challenge.
- (6) Accountants are experts in all the domains imbedded in blockchain model, namely: standards setting, business logic, record keeping, application of complex rules et cetera . Therefore, they should be involved in the “business” design of different blockchain solutions, together with those who have technical knowledge of how blockchain works as this will give them the ample opportunity to feat into the new technology well without being rendered redundant by the disruptive nature of the technology.
- (7) Business partners and lenders prefer disaggregated data to help them better understand a business and to better guide their decisions. Financial advisory boards typically wish to receive raw data, not those manipulated by companies according to their flexible accounting standards (Cong et al., 2018: 7). Further, developing machine learning will provide better tools to improve the capabilities to make decisions using disaggregated data. For example, many jurisdictions around the world currently require public companies to produce financial reports using extensible business reporting language (XBRL). It is a de-facto standard for the digital exchange of financial information, allowing financial information to be aggregated, transmitted, and analyzed. XBRL enables data to be processed automatically by software because XBRL can provide a computer-readable tag for each item of business data based on taxonomies used (Gov.UK, 2020). Whereas blockchain is a distributed ledger system, XBRL is a data standard. Because blockchain will need data standards to work well, system designers, accounting practitioners and policy makers need to collaborate and identify whether existing standards like XBRL can be applied or new standards need to be developed as needed (Singh, 2020) as companies transform to blockchain technology.

5.0 CONCLUSION

In this paper, I have presented a comprehensive overview on blockchain in accounting and its prospects and challenges. Blockchain is one of the most revolutionary technologies available today but unlocking its true potential require more than technical improvements. Certainly, blockchain will change the accounting profession itself – the accountant work will migrate from bookkeeping and reconciliation to other value-adding activities in judgmental area and advice.

Looking ahead the Blockchain technology holds many promising potential for the transformation of the accounting and auditing practices in the businesses. As Blockchain technology continues to

be more and more mature, the scalability issues are likely to be addressed through advancements in technology, such as sharing and layer two solutions. Interoperability standards and the protocols will be developed gradually to enable the seamless integration with the existing systems.

Accountants being experts in all the domains imbedded in blockchain model should be involved in the “business” design of different blockchain solutions, together with those who have technical knowledge of how blockchain works as this will give them the ample opportunity to feat into the new technology well without being rendered redundant by the disruptive nature of the technology.

Finally, there is a strong need for the accounting professional bodies to quickly equip and educate their members on this new technological revolution in accounting and auditing practices so as to avoid their jobs been taken by the technology. Blockchain technology is undoubtedly the future. However, if you want to invest in or implement it, you must also know its disadvantages. This technology is still in its development stage and is constantly transforming.

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