

Blockchain Technology:
Applications, Limitations, and Implications of Adoption within Accounting

by

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Abstract

Blockchain technology is arguably one of the most significant technological innovations in recent memory. As a sophisticated digital record-keeping system, blockchain technology has the potential to revolutionize the way we conduct transactions and store data. In a world that demands greater transparency, effectiveness, efficiency, simplicity, and security, it is not surprising that technology is continuously evolving to meet these demands. From this, concepts such as artificial intelligence, virtual reality, cyber security, and cryptocurrency have emerged. Many of us in our respective fields may know of concepts such as cryptocurrency via the media. However, some may not know the deeper details concerning cryptocurrency, especially the fact that blockchain technology serves as the basis for digital currencies like Bitcoin and the reason for their existence. Since blockchain's inception in 2009, an immense appeal has been observed, and businesses are attempting to employ blockchain technology for a number of benefits. The primary purpose of this study is to investigate blockchain technology and its historical context, as well as provide a comprehensive analysis of its applications and limitations. This study will explore the potential of this transformative technology to bring benefits in a range of applications, as well as the challenges that need to be addressed in order to maximize its potential. Additionally, a brief overview of the possible implications of blockchain technology, if adopted within the accounting field, will be illustrated to outline what this means for the future and the business world.

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Chapter 1: Introduction

Accounting, a sophisticated system of checks and balances, plays an extremely vital role in the transformation and growth of a business and helps companies in setting and achieving their weekly, monthly, and annual milestones, all while maintaining a credible reputation of the company and inspiring confidence among stakeholders and investors. Accounting technology has since evolved from its inception and helps organizations in making wise financial decisions. However, accountants are constantly looking at ways to improve efficiency whilst maintaining simplicity. Accounting is always changing and, as such, has recently encountered the emergence of digital currency, most recently Bitcoin, which revolutionized conventional perceptions surrounding wealth and possessions.

a. Cryptocurrency

Cryptocurrency, often known as crypto, is a type of digital currency that operates as a method of trade via a computer network. The control of cryptocurrency rests with the users themselves rather than with any certain organization. Blockchain, the basis of crypto, is supported and maintained independently from both the government and banks. Because it offers a very safe and private platform, cryptocurrency is utilized in the issuance of security tokens, investments, insurance, lending of money, and fundraising.

By leveraging blockchain technology, cryptocurrencies are made possible. Bitcoin, the most well-known cryptocurrency, was the first decentralized cryptocurrency and, as a result, the first to use blockchain technology. Several variations of blockchain systems are available and accessible, each bringing forth a distinct set of properties and features fit for particular use cases. Some platforms, like the 2013-founded cryptocurrency Ethereum, have built upon the

blockchain's initial idea by including new capabilities like the ability to carry out smart contracts. In Ethereum, record-breaking and greater-than-ever transactions occurred in 2021. According to Etherscan, a blockchain explorer providing real-time data on the Ethereum network, the daily transaction volume on Ethereum was roughly 1.2 million and reached a new all-time high of 1.7 million transactions in May 2021, marking a 42% increase from the start of the year. It is safe to say that Ethereum is the most widely used blockchain network around the globe because it serves as the foundation network for many cryptocurrencies and most Non-Fungible Tokens(NFTs), which was one of the primary drivers for the peak transactions in 2021. Steve Davies, a partner of PricewaterhouseCoopers(PwC), notes that “Blockchain technology has long been associated with cryptocurrencies..., but there is so much more that it has to offer...”(“Blockchain Technologies Could Boost the Global Economy”).

Chapter 2: Introduction to Blockchain Technology

The groundbreaking technology offering a fast, efficient, decentralized, highly automated, secure, transparent, and instantly traceable record-keeping mechanism is referred to as Blockchain Technology. Blockchain can be defined simply as a digital record divided into "blocks," as the term blockchain implies, which are kept in various locations. This advanced technology has the potential to become the bedrock for modern-era business transactions.

This digitalization of assets, diligent record-keeping of transactions, and transparency among a decentralized network of users was realized with the aid of blockchain technology and has enabled the successful creation of decentralized digital currency networks(Coyne and Mcmickle).

a. Defining Blockchain Technology

More specifically, blockchain is a digitalized public ledger that allows transactions to be recorded and distributed across multiple computers within the decentralized network. It offers enhanced security as the records cannot be altered individually, and without the consensus of the network, it becomes extremely challenging to change, cheat, or hack the system(Sarmah).

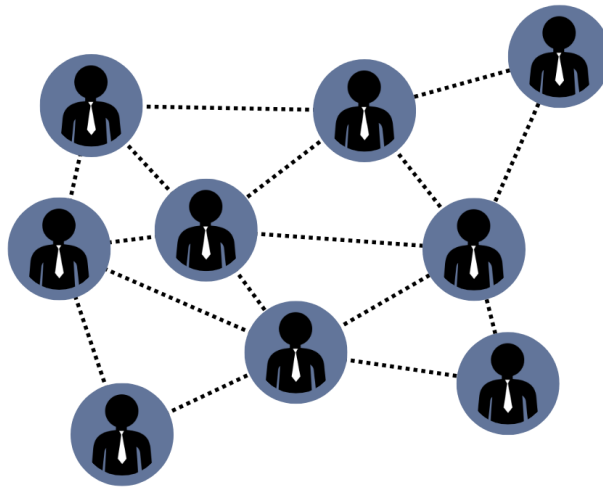


Figure 1: Decentralized Network Schematic

In a decentralized blockchain system, the power or control of the network is not in the hands of any single user, but it is distributed among all the participants(“Blockchain Technology Explained”). The blockchain is accessed by each user, who then registers as a node, and the shared ledger stores all of the transactions. If one of the participant’s nodes is corrupted, the blockchain has the ability to repair itself. There are five main components of a blockchain technology setup as given in the figure below:

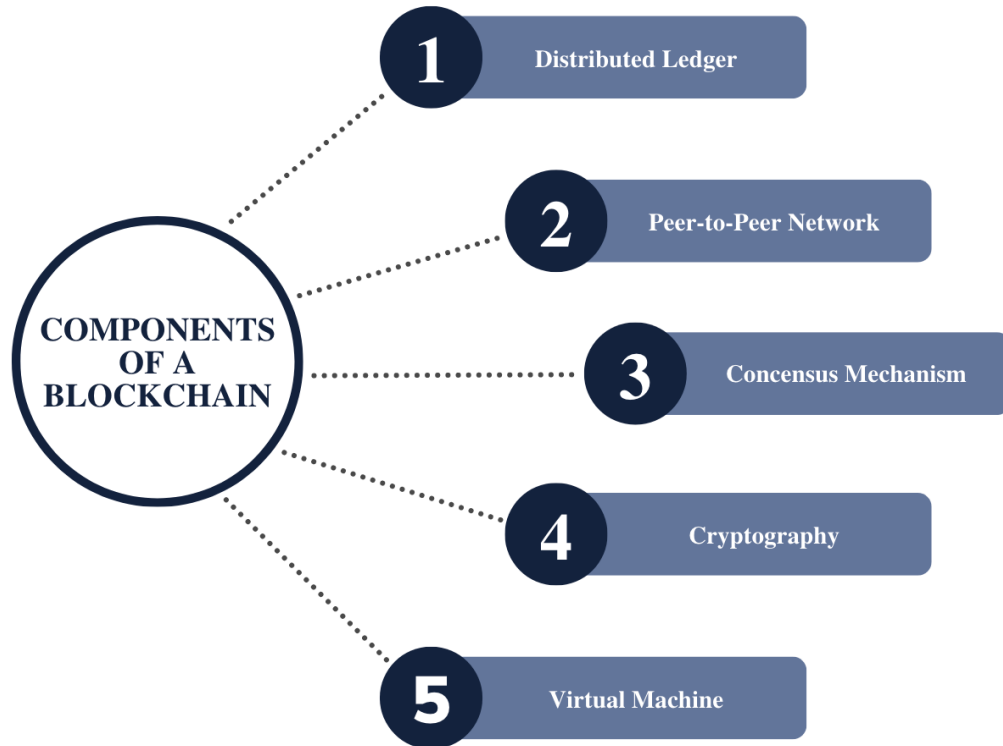


Figure 2: Components of a Blockchain System

Blockchain technology is accessible via applications that are aimed to share information between all the users, which are commonly referred to as nodes(Popovski, et al). Though, the ability to access the ledger depends on the type of blockchain, i.e., whether they are permissionless distributed ledgers, have restricted networks, or a combination of both(Bible, et al).

Blockchain is heading to become the trusted, unfilterable, and uncensored repository of data and information for the coming generations. According to a World Economic Forum estimate, by 2025, blockchain technology will account for almost 10% of the global Gross Domestic Product(GDP)("Blockchain Technology Explained"). In 2020 an analysis by PwC

demonstrated that blockchain technology has the potential to increase GDP by \$1.76 trillion over the next decade(“Blockchain Technologies Could Boost the Global Economy”).

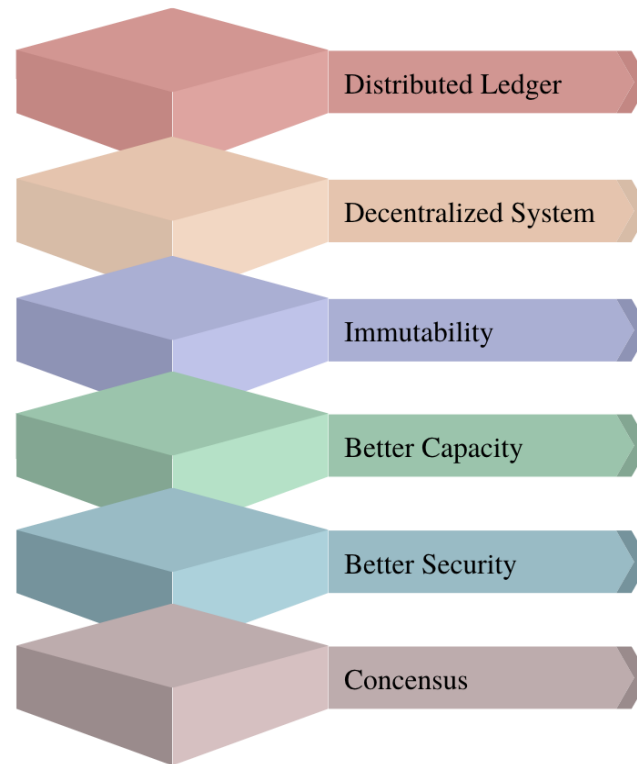


Figure 3: Features of a Blockchain Technology

Chapter 3: History Behind Blockchain Technology

The discovery of blockchain technology dates back to 1982 when a cryptographer named David Chaum coined the idea of having a private protocol in his dissertation work called “Computer Systems Established, Maintained, and Trusted by Mutually Suspicious Groups”. Later in 1991, two mathematicians and researchers named Stuart Haber and W. Scott Stornetta took forward the idea and started creating a framework to actualize the proposed concept known as decentralized digital currency(Sarmah). The researchers thought that a decentralized digital

currency might assist in alleviating worries about the security and privacy of internet transactions at the time. Wei Dai, a researcher, advocated the use of a decentralized ledger to record transactions in a paper on the idea of a "b-money" system in 1998(Sarmah). Another researcher, Nick Szabo, later elaborated on this concept. He suggested utilizing a blockchain to secure the bit gold digital payment system in the late 1990s, but sadly, this proposal was never put into practice. Szabo also suggested using a "smart contract" mechanism to enforce a contract's terms automatically.

It took years of research until a group of unidentified individuals working under the alias "Satoshi Nakamoto" created the "Block and Chain" technology, which was renamed to "Blockchain" technology in 2016(Popovski, et al). Blockchain was a decent candidate for a digital currency since it was a decentralized and distributed digital ledger. It offered a high degree of privacy and protection while enabling the rapid and secure recording of transactions. This technology came in pursuit of inventing the cryptocurrency known as Bitcoin. In a paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System," Nakamoto postulated a direct online payment between two parties without the use of a middleman(Popovski, et al). Satoshi Nakamoto created an easily accessible Bitcoin ledger as a decentralized network and Bitcoin emerged as an alternative to the pre-existing financial ecosystem.

Chapter 4: Unlocking the Potential of Blockchain Technology

Blockchain technology has recently started being utilized for projects that are unrelated to cryptocurrency. A number of industries, including real estate, healthcare, food safety, supply chain management, and governance, have already performed preliminary studies and testing on the application of blockchain. It is also being studied, notably for usage in the financial sector,

where it might speed up and simplify financial processes. Additionally, as per the report of Markets and Markets, “the global Blockchain market size in terms of revenue was reasonably estimated at \$4.9 billion in 2021 and is anticipated to rise to \$67.4 billion by 2026” at 68.4% in the compound annual growth rate(CAGR), which is used to calculate the rate of return on an investment over time(“Blockchain Market Size, Trends - Growth Drivers, Opportunities & Global Industry Forecast”).

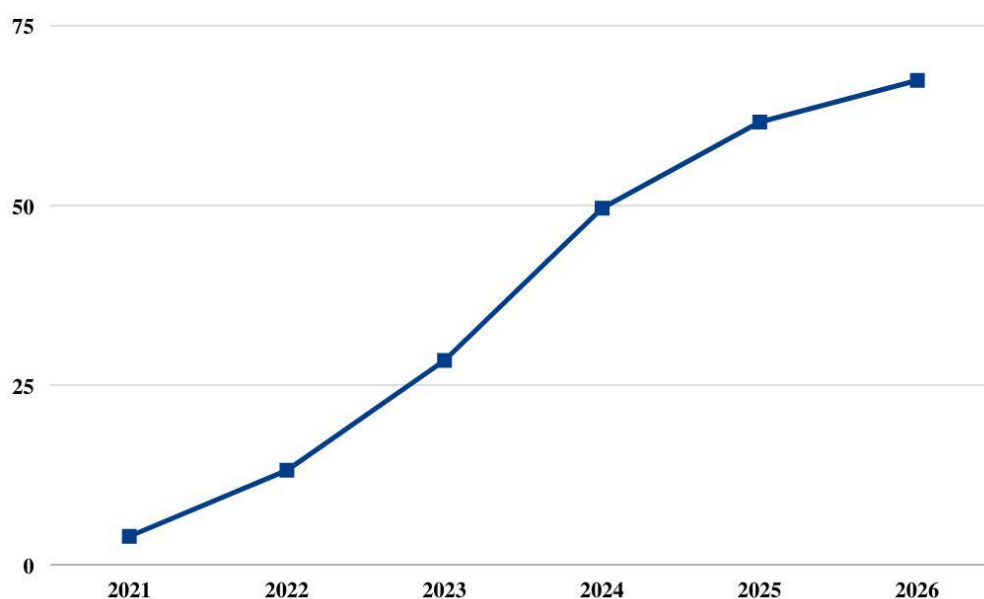


Figure 4: Blockchain Market Size (USD Billions)

Markets and Markets further highlight the several important variables which are responsible for the blockchain market's remarkable growth. The extensive use of blockchain solutions in banking and cybersecurity, the strong uptake of blockchain solutions for payment, smart contracts, and digital identities, and the growing acceptance from government efforts are a few of these trends(“Blockchain Market Size, Trends - Growth Drivers, Opportunities & Global Industry Forecast”).

Chapter 5: Applications of Blockchain Technology within the Field of Accounting

Blockchain technology is fundamentally compatible with accounting. The field of accounting is primarily concerned with the transactions of financial assets, analyzing the economic status of an organization, conducting financial communications within companies, and allocating financial resources wisely (“Blockchain and the Future of Accountancy”). Blockchain and accounting both aim to guarantee validity when transferring ownership of assets and to keep an accurate record of financial data and information.

Blockchain will be a more trustworthy technology than the existing ones; thus, its usage is increasing day by day. Deloitte, KPMG, PwC, and Ernst & Young(EY), also known as “the big four” of the accounting sector, have initiated some of the recognition of blockchain technology by using digital assets and cryptocurrencies as payment options.

Furthermore, it should be noted that blockchain offers effective accounting that aids in building good customer service and relationships as the efficient blockchain-based accounting procedures allow accountants to have spare time to concentrate on the value-adding human-to-human interactions. The following are several examples of blockchain technology applications in finance and accounting:

a. Security

Blockchain technology has gained significant traction due to its inherent security features. With the data structure at its core, blockchain provides a secure platform for transactions and data storage. However, it is extremely important to implement strong security protocols based on consensus, cryptography, and decentralization in order to ensure maximum protection against things such as hacking and fraud. By doing so, the integrity and reliability of

the blockchain network can be maintained, providing users with peace of mind and confidence in the technology.

i. Securing Monetary Transactions

Using a blockchain, one can securely transfer money to another person without going through a bank or other money regulating agency. The blockchain ledger is updated in real-time when each transaction is completed. Moreover, due to the immutability of the blockchain, a completed transaction cannot be undone. Also, any node may view these transactions since the Bitcoin ledger is transparent. No matter how long a transaction lasts, its blockchain can be used to track it all the way back to its beginning. Moreover, blockchain technology will increase the difficulty for managers to manipulate accounting data(Han, et al).

ii. Detecting Money Laundering

Blockchain has the ability to provide a tamper-proof and transparent ledger of transactions. This means that every transaction is recorded and can be easily traced and tracked, making it difficult for criminals to hide their activities and furthermore, detect any suspicious activity such as money laundering. In the case of money laundering, artificially intelligent software with machine learning can scan through the strings of data and detect any fraudulent transaction(Han, et al). This technology makes it nearly impossible to bypass the network and commit heinous activities.

iii. Securing Assets from Cyber Attacks

Finance and auditing departments can secure information about transactions from foreign attacks with the aid of blockchain as it functions in a peer-to-peer nature, and in case any nodes

are under a cyber-attack, the network would be functional, and the users can cater to the attacks. Even more, the network also works if any of the nodes are offline or unavailable; thus, the system becomes resilient to cyber-attacks and malfunctioning with the help of blockchain(Bible, et al).

b. Evolving Auditing

Auditors are vital for maintaining the financial trustworthiness and integrity that are necessary for any company or organization to operate. Auditors evaluate financial records and statements to guarantee their accuracy and compliance with laws and regulations. Essentially, their job is to check if the numbers add up and if everything is above board. Auditors can work for accounting firms or be independent contractors and may conduct audits for businesses, government agencies, or nonprofit organizations. Auditors examine records, interview employees, and verify the accuracy of financial data when auditing financials. The ultimate objective of an auditor is to offer an unbiased evaluation of a company's financial health and to contribute to the assurance that its financial statements are reliable.

Auditors have been given the opportunity to re-engineer the processes involved in examining multiple transactions and verifying the authenticity of digital assets via blockchain technology. It has helped in creating a consistency of information between the real world and on a blockchain. The immutability of all recorded data is a substantial attribute of blockchain technology mentioned time and time again, which allows a real-time audit trail to be provided via blockchain because the information is stored there permanently. With the aid of this function, its possible for auditing to be more effective, and human error can be reduced.

As stated before, a blockchain network consists of multiple nodes that maintain a copy of the ledger and validate transactions. When a new transaction is added to the network, it is broadcasted to all nodes, verifying the transaction and adding it to their copy of the ledger. Once a block of transactions is verified, it is added to the blockchain and can no longer be altered(Sarmah). A date, a cryptographic hash of the block before it, and details about a particular transaction are also included in each block in the network. The timestamp shows the precise time that a blockchain network was mined and approved; therefore, it becomes easier to find the transaction details and bring proof of a transaction with minimal error handling and reconciliation, which is very ideal in the case of auditing(Han, et al.).

Furthermore, with the distribution and decentralization feature, the information within the blockchain is shielded against tampering or misuse, hence, providing increased security and safety while conducting auditing and other financing procedures.

c. Transparency

Transparency is crucial in accounting because it promotes accountability, credibility, and trustworthiness. When financial information is transparent, it enables stakeholders to understand how a company is performing and make informed decisions based on accurate information. This is essential for investors, lenders, regulators, and other stakeholders who need to evaluate the financial health of an organization. In the same breath, transparent accounting practices help to deter fraudulent activities and unethical behavior, as it is more difficult to conceal financial improprieties when all transactions are open and available for scrutiny(“Blockchain Technology Explained: What Is Blockchain and How Does It Work?”). Blockchain encourages this

transparency and trust since users are able to access their data largely unrestricted. It is a true peer-to-peer system, as it also eliminates the need for intermediaries(Popovski, et al).

i. End-to-End Encryption of Transactions

A business can secure its sensitive information regarding the number of assets, monetary transactions, and financial deals by using blockchain technology with end-to-end encryption(Sarmah). End-to-end encryption in regard to blockchain technology refers to the use of cryptographic techniques to protect the confidentiality and integrity of data transmitted between blockchain nodes. This means that data is encrypted on the sender's node, transmitted through the network in an encrypted form, and only decrypted by the intended recipient's node. Blockchain technology registers every transaction occurring such that it can be traced back whenever needed. This feature allows safe and secured backup for any business, providing peace of mind knowing that critical data and information are protected against potential data loss, cyberattacks, and other unforeseen disasters.

ii. Multiple Registrations of Transactions

Moreover, with the help of a blockchain, confidential information can be registered multiple times. The application of this feature helps users keep copies of sensitive data rather than hiding all of the information in a single place, and therefore once again, acts as a backup when any of these copies get infected or corrupted, assisting in keeping information transparent within accounting processes. Additionally, the ability of blockchain technology to register confidential information multiple times makes it easier to track and verify the authenticity of financial transactions.

d. Clarity and Accuracy in Business Communications

Using a shared, immutable record only authorized members can access, blockchain can be used for business transactions. Professional accountants work to accurately measure, analyze, and explain financial information exchanged within a business. Using blockchain gives accountants clarity over who owns what, how to measure rights and obligations over things like property, and provides an accurate road map for deciding how to distribute financial resources (“Blockchain and the Future of Accountancy”).

Consequently, blockchain technology is already fundamentally reshaping the global financial system and economies. Furthermore, the time, expenses, and other resources required for maintaining conventional ledgers are significantly reduced as blockchain provides complete assurance of customers’ assets and the remainder of financial information.

e. Smart Contracts

For all forward-thinking accounting experts, smart contracts are a powerful addition to the capabilities of leading digital solutions. The purpose of smart contracts is to enable the selling and buying of products and assets without the involvement of a middleman or external parties. The use of blockchain technology and smart contracts will revolutionize the areas of accounting that deal with transactional guarantees and transferring property ownership.

Smart contracts allow accountants, bankers, and their clients to accelerate the execution of contractual terms since these contracts are executed automatically when certain pre-defined conditions are met (Bible, et al). Due to the blockchain's decentralized structure, smart contracts' effectiveness is drastically supported. These paperless contracts provide accounting businesses with a precise, open, safe, and quick means of exchanging data and information.

Smart contracts are increasingly being utilized in global business. The World Food Programme has used smart contracts for digital reputation management platforms, safe and transparent ledgers, cryptocurrency organizations, and sending aid directly to the refugees, which has helped gain their patrons' trust (“Blockchain Against Hunger: Harnessing Technology in Support of Syrian Refugees”).

Chapter 6: Limitations of Blockchain Technology

Although blockchain technology continues to be one of the most cutting-edge developments in the field of digitalization, there are still numerous challenges to overcome before it is completely adopted by the business industry. The blockchain network's scalability, affordability, exploitable vulnerabilities, energy consumption, and compliance with regulations are among the numerous issues that need to be resolved. A few of the limitations of blockchain technology in the accounting field are as follows:

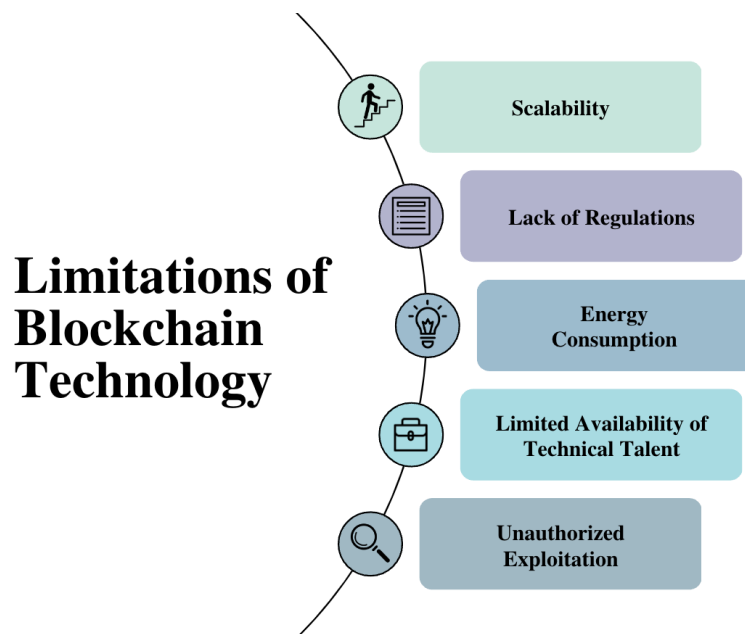


Figure 5: General Limitations of Blockchain Technology

a. Limited Affordability and Resources

Blockchains are price and resource-intensive because each node in a blockchain repeats a process in order to establish a consensus(Sarmah). When encountering a blockchain within the business, the user must be aware of the two capital costs coming with the technology, i.e., the cost of verification and the cost of the network. For online transactions, banks may not require a broker to verify the transaction has been successfully completed, but they can verify the history and evolution of the digital asset. Though companies can save the cost of verification, it is still expensive to set up and maintain the first mapping between offline events and their digital representations, i.e., the cost of networking. The third cost arrives when a company is not an IT company and thereby will require developers to establish a secure blockchain network for the company. The architecture and security of a typical commercial blockchain solution are designed by core blockchain developers. Using the architecture and foundation established by the core blockchain developer, decentralized applications and smart contracts are built. This can cost between \$5000 to \$100,000 to develop a unique blockchain for any business.

When a bank utilizes blockchain for finance and accounting processes, the cost of owning and operating a blockchain and maintaining its ecosystem can be higher than the average cost of accountants managing transactions conventionally. It may take several months to develop, apply and take advantage of the implemented technology. However, if the institutions involved in owning and maintaining the blockchain split the total expense, there are significant savings. Therefore, even if the capital cost is high for blockchain, which may discourage its usage, the overall returns are higher when it is utilized.

In 2018, the Bank of Canada tried out a new payment system with R3, a company that makes blockchain software, and Payments Canada, the national payment system. They used a platform called Corda to make payments between the bank and its partners faster and cheaper. According to a report conducted by the Bank of Canada, the new payment system settled payments in just a few minutes, which is a lot faster than the previous way, which took days(Chapman, et al). It also handled more payments without needing more equipment, which in turn saved money and lowered costs. Although The Bank of Canada has not implemented blockchain technology at a larger scale, it is still considering using blockchain technology to make payments even better and safer.

Clearly, there are benefits to splitting the costs; however, it is important to keep in mind there is a tedious and time-consuming but necessary step for settling the payments, i.e., verifying the transactions. When considering resource management, only after the transaction has been successfully verified by each and every node in the blockchain is a transaction considered complete. This is a tiresome process and could take a long time because every node needs to confirm the authenticity of the inserted block so that the transaction can be marked as legitimate. Time is a valuable resource for any company, and this limitation may hinder the use of blockchain if not remedied as soon as possible.

b. Scalability

Another shortcoming of blockchain technology is its inability to scale. The size of every block is fixed and restricted to only 1 Megabyte(MB) in a blockchain network, and this can limit its usage in banks and other sectors working with huge amounts of data. Every time a block is added, the size of the blockchain increases, thus, the higher the number of transactions, the

greater the size of the blockchain. The size of a blockchain expands over time as every individual node keeps the history of every transaction saved such that the transactions can be validated(Atanasovski, et al).

As the health of a blockchain is dependent on the number of nodes it has, the exponential growth of the blockchain, in turn, affects its health. In that same vein, if the growth of blockchain involves huge blocks, the health of the blockchain will be jeopardized(Sarmah). Blockchain technology is physically constrained, such that it can only grow up to a finite size before it loses its decentralized distributed structure. The trade-off is that the increase in the network's size increases the blockchain's security, saving it from various attacks. As more computers and other devices join the network, the performance of the blockchain can degrade. Additionally, how quickly transactions are executed is directly impacted by network congestion.

c. High Energy Input

Arguably, one of the most important problems facing blockchain miners is the escalating cost of electricity. Blockchains are energy guzzlers. Keeping the network active at all times requires a high input of energy, which in turn has a significant environmental impact. In 2020, approximately between 120 and 240 billion kilowatt-hours of electricity is used annually to power blockchains and cryptocurrency assets(OSTP).

Mining is lucrative as more and more people are leaning towards using blockchain technology; therefore, miners and their energy utilization are increasing. Bitcoin's blockchain operates on nearly 204.5 terawatt hours(TWh) of electricity annually, which is greater than over 20 different countries("Electricity Domestic Consumption").

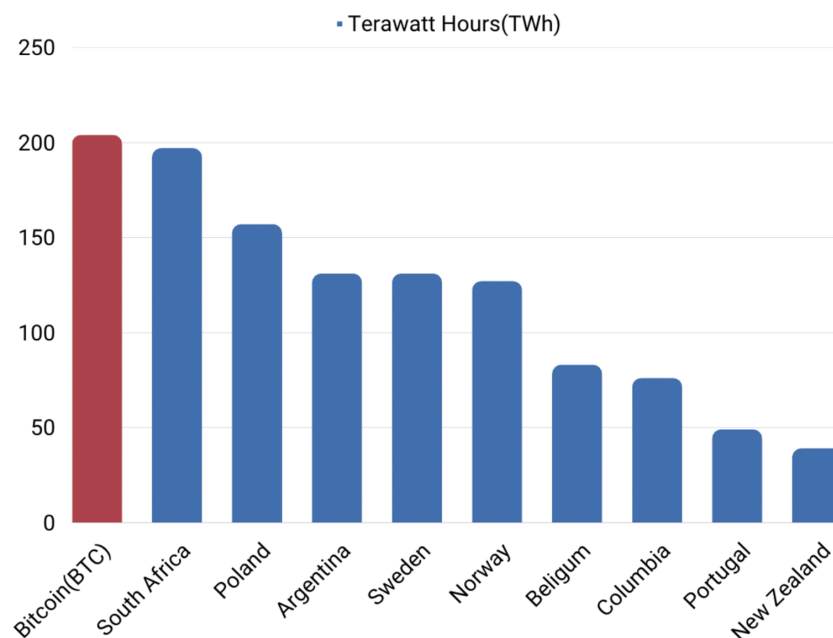


Figure 6: Electricity Consumption of Bitcoin in Comparison to Other Countries in 2021

In 2022, Bitcoin was “estimated to account for 60% to 77% of total global crypto-asset electricity usage”, and Ethereum was “estimated to account for 20% to 39%”(OSTP). The energy supplied is mostly used to maintain constant functionality. Keeping this in view, if several other tech companies are introducing blockchains, a high amount of energy will be required to operate and maintain them. Businesses must prepare to have the money upfront to bear the computational power costs. In order to “ensure the responsible development of digital assets”, the Office of Science and Technology Policy(OSTP) recommends to “minimize GHG[Green House Gas] emissions, environmental justice impacts, and other local impacts from crypto-assets; ensure energy reliability; obtain data to understand, monitor, and mitigate impact; advance energy efficiency standards; encourage transparency and improvements in environmental performance; and further research to improve understanding and innovation.”

Moreover, blockchain cannot exist without the internet. If the internet is disabled, the blockchain will stop the synchronization, and the transaction processing will temporarily halt because the ledgers will stop logging any transactions. Only if the transactions are regulated will the network operate. However, it's very unlikely that this will be a significant problem for most firms in the accounting industry.

d. Lack of Established Standards and Regulations

Numerous government departments regulate blockchain and cryptocurrencies, but there is no overarching, cohesive regulatory framework to address the rising legal and ethical issues in blockchain technology. This legal flexibility allows businesses to experiment and expand swiftly; however, it also permits hazardous corporate practices that expose consumers to the risk of continuing the use of unregulated technology.

The government presents a few penalties regarding blockchain and cryptocurrencies. The Anti-Money Laundering Act of 2020 codifies existing Financial Crimes Enforcement Network(FinCEN) guidelines by requiring reporting requirements and money transmitter registration for all transactions involving "value that substitutes for currency," which covers digital currency(McKenna, et al). Malta, commonly referred to as Blockchain Island, is the first country in the world to fully adopt blockchain technology and develop progressive legislation to facilitate its use(Mohamad, et al).

Through a procedure known as forfeiture, the government can seize the possession of any cryptocurrency, which can also lead to the permanent loss of assets which can be very troublesome in the area of accounting. Additionally, the government has the authority to access the transactions taking place as they are stored on a public ledger. In the United States,

blockchain-based transactions are legal and pursuant to the Bank Secrecy Act's(BSA) regulatory requirements(McKenna, et al).

e. Hacking Blockchain

Despite being a safe and secure framework, blockchain technology is at risk of being hacked and other cybercrimes; hackers can still find vulnerabilities and exploit them to gain unauthorized access to the blockchain network, just like any software or digital interface. Specifically, blockchain technology is vulnerable to what is called a hash rate attack, where a group of attackers can hijack the blockchain by taking control of its computational power. In the case where the hash rate is approximately 50% in the hands of attackers, a 51% attack can take place where the blockchain can be manipulated and altered for malicious activities(Han, et al.). Since hackers can breach administrator networks or change the default configurations set by the owners of the blockchain, hence, in these blockchains, there is a higher risk of getting hacked and losing authority over the information secured within the blockchain.

Another way in which hacking can occur is through smart contract vulnerabilities. These self-executing contracts are encoded on the blockchain and are intended to automatically enforce the terms of an agreement. However, if there are errors or vulnerabilities in the code, they can be exploited by hackers to steal funds or compromise the system. It is worth mentioning that phishing attacks and other social engineering tactics can also be used to trick users into giving up their private keys or other sensitive information, which can then be used to access their accounts and steal things such as cryptocurrency.

f. Maintaining Information Confidentiality

Blockchain technology promotes transparency among its users; however, this may cause confidentiality problems as some companies may want to keep their private data hidden from the network users. With the occurrence of high transparency, it's likely that information will be leaked, compromising privacy(Mohamad, et al). When using distributed ledgers in sensitive settings, such as dealing with government data or simply a patient's medical data, the use of blockchain is limited when dealing with confidential information(Atanasovski, et al). Every individual node involved in the network has the information regarding the transaction as openly available to the public, and thus, it can become a liability to consider seriously. In such cases, access to the ledgers must be restricted to a few nodes only. The blockchains guarantee confidentiality by using a private-public key scheme, which uses cryptography to secure and authenticate communication between parties in a decentralized network.

In this scheme, each participant in the blockchain network generates a pair of cryptographic keys: a private key and a public key(Pugna, and Adriana). The private key is kept secret and known only to the owner, while the public key is shared with other network participants. When a participant wants to send a transaction, they use their private key to sign the transaction, which is then broadcast to the network. Other network participants can then use the sender's public key to verify the transaction's authenticity and ensure that it was indeed signed by the sender.

Chapter 7: Implications of Blockchain Technology

Despite the above-mentioned limitations, blockchain technology has the power to completely alter several industries. Blockchain technology has the potential to impact all

record-keeping processes, including the way transactions are initiated, processed, authorized, recorded, and reported(Bible, Raphael and Riviello).

There are countless opportunities for the accounting profession as we transition to a financial system with a strong and secure blockchain network. The adoption of blockchain technology has the potential to have a significant impact on financial statement auditing, provide potential new assurance services, and give Certified Public Accountants(CPAs) and auditors positions within the blockchain ecosystem.

When blockchain technology is used in conjunction with suitable data analytics, it would be able to assist accountants with transaction-level assertions, allowing their time to be better focused on higher-level issues. Though, the profession of accounting still has much research to do, even though accountants are already involved in early experimentation and investigation. Due to their combination of business and financial expertise, accountants can also serve as consultants for businesses thinking about utilizing blockchain technology, helping them analyze the benefits and drawbacks of the new technology. Leading accounting firms and authorities can contribute their experience to the development of regulations and standards to encompass blockchain. In the following ways, blockchain has the possibility to change accounting and business as we know it today:

a. Stagewise Implementing Blockchain

There is no rush to transform the conventional processes into blockchain systems all at once, rather, a sophisticated approach is required to revamp the processes. Blockchain needs to be developed to the highest level possible, standardized, and optimized in order to be a true flawless component of the financial system, especially in the world of accounting(“Blockchain

and the Future of Accountancy”). One by one, companies should adopt the usage of blockchain so that the progress is gradual and the change is adaptable for both the accountants and clients.

Key project steps for stagewise implementing blockchain technology are first to make a feasibility study, followed by the creation of a business case and the conceptualization of a blockchain. Then comes the project scoping and the development of a proof-of-concept(PoC), which leads to the design of a blockchain solution. After that, there is the selection of the tech stack, development of the network, deployment, and integration within existing systems. Lastly, it is required to establish an after-launch support program that measures the progress and evolution of the designed blockchain.

A balanced approach is often taken by the majority of institutions when adopting blockchain, such that they undertake both the centralization and decentralization features. When one organization, such as a business or a government, maintains all the authority, this is referred to as centralization. This may aid in keeping things organized; however, it also means that there is only one source of responsibility if an issue arises. It also may be simple for that organization to abuse its position or conceal information from the public. On the other side, decentralization refers to the distribution of authority. Because no single entity has absolute control, this can increase transparency and security. Companies that opt for a balanced approach usually take into account their specific business requirements, regulatory compliance, and overall goals.

One business that employs centralized and decentralized features is IBM, with its IBM Blockchain Platform. This platform helps businesses create and use blockchain applications quickly and with ease(“IBM Blockchain Platform”). The platform provides a single control hub where administrators may administer the network and set policies. Yet, because the network's

nodes are decentralized and each has a copy of the ledger, things are more transparent and secure. In contrast, if a bank implemented a blockchain network, it would serve as its central authority and maintain control over it. But, every user would also have a node of their own on the network that would save a copy of their transactions. Customers might also take part in decision-making, this way, everyone can ensure that all parties agree upon the ledger's contents.

b. Entrepreneurship and the Job Market

The early pioneers of the cryptocurrency industry, including Satoshi Nakamoto with Bitcoin and Vitalik Buterin with Ethereum, are the first crypto entrepreneurs. In the business world today, blockchain is of significant importance and has spawned several billion-dollar businesses that began as little local enterprises. The online bitcoin broker Coinbase is one of the most prosperous blockchain businesses that generated approximately \$7.8 billion in annual sales in 2021, a 550% increase from 2020(Curry). Blockchain fosters entrepreneurship by eliminating chances of corruption, dismantling typical bureaucratic barriers, and promoting common ownership of assets.

However, regarding economic implications, it is true that when automation occurs, employment decreases. Though blockchain technology may create new job opportunities due to managers hiring those who are conversant with blockchain technology, it is also important to consider the potential impact it could have on traditional accounting roles(Mohamad, et al). The requirement for human accountants and bookkeepers may decline as a result of blockchain's capacity to automate various accounting operations, including record-keeping, transaction processing, and auditing("Blockchain and the Future of Accounting"). A transparent and secure ledger created by blockchain, for instance, may make it unnecessary for auditors to manually

confirm financial transactions, which would reduce the number of auditing positions available. Similar to how automated smart contracts on the blockchain might perform many common accounting operations like account reconciliations, requiring less human involvement. This is extremely important to consider, especially since the accounting profession is expected to experience a continued decrease in supply as it is.

c. Accounting in Real-time

Blockchain has the potential to revolutionize contracting, paperwork, payment processing, and invoicing for worldwide accountants(Han, et al). Blockchain enables companies to provide real-time balance sheets, income statements, and cash statements. It allows companies to visualize, organize, and maintain their inventory. Blockchain also helps in highlighting the capital investments in the value chain; Furthermore, it can also benefit as a public displayer of the encrypted transactions that are under the validation of multiple groups(Han, et al.).

d. Aiding Accountants

With its decentralized, distributed, immutable, and transparent nature, the blockchain functions as an accounting technology that securely records, stores, and validates transactions and data without the need for a central authority, thereby enhancing efficiency, privacy, security, and trust in various industries and applications. In addition to keeping a ledger of correct financial data, accounting is involved with the transfer of asset ownership. The measurement, communication, and analysis of financial information fall under the purview of the accounting profession. Identifying or evaluating rights and obligations regarding property or strategizing the most efficient use of financial resources make up a large portion of the profession as well(“Blockchain and the Future of Accountancy”). By giving accountants clarity over who

owns something and whether there are obligations, blockchain technology has the potential to increase productivity significantly.

By lowering the expense of maintaining and reconciling ledgers and supplying complete clarity on the ownership and history of assets, blockchain has the potential to improve the accounting profession (“Blockchain and the Future of Accountancy”). By allowing resources to be focused on planning and valuation rather than recordkeeping, blockchain could also help accountants better understand the resources and obligations of their organizations.

Further down the road, with the help of AI and machine learning, blockchain will aid in turning laborious operations into simple and automated solutions. While blockchain technology has shown immense potential for revolutionizing various industries, including finance and accounting, it is unrealistic to think that businesses will get rid of accountants and replace their entire current IT infrastructures with a blockchain (Han, et al.). To determine what fair-value accounting is, analyze intangible assets, calculate depreciation, and differentiate between different forms of leases, accountants and auditors are required (Han, et al.). Instead of replacing accountants, blockchain will emerge as a part of an IT infrastructure. Businesses will implement blockchain in some of their operations such that it works alongside their present systems (“Blockchain and the Future of Accountancy”). Traditional accounting methods are tried and tested, are easy to implement, and can handle a large volume of transactions whilst maintaining human-to-human interactions. However, blockchain-based accounting methods can offer unique advantages, such as improved data integrity and reduced fraud risk (Pugna, and Adriana). By combining both methods, companies can take advantage of the benefits offered by each and achieve greater efficiency, security, and accuracy in their accounting practices.

Chapter 8: Conclusion

Blockchain has great potential to bring about significant changes in international businesses. Blockchain promotes security, transparency, efficiency, and possible cost savings. It offers solutions to the problems that many companies and businesses are experiencing. By increasing enterprises' productivity and profitability, it enhances international business and trade. Using this technology, the conventional tasks of an accountant are re-engineered as the transferring ownership of assets and keeping a record of precise financial data becomes secure and easy to manage. One of the distinguishing characteristics of blockchain technology is this common ownership and accountability, which gives blockchains a high level of security and immutability.

The financial services and banking industry has always been recognized for its 30 to 40 years old legacy systems; though, it is not unexpected that they have embraced Blockchain for the upgradation of their several obsolete procedures. This is anticipated to let the companies save a significant amount of money that is usually spent when following conventional practices. Furthermore, the implementation of blockchain technology in the field of accounting as a database system for organizing and maintaining the records of ongoing digital transactions within an institute is a secure and efficient strategy. Participants are able to witness completely encrypted yet synchronized transactions with a complete history saved alongside the transaction, instilling immutability, traceability, and visibility of a blockchain system.

Since blockchain technology is being adopted by many companies, accountants need to have proper skill sets that include knowledge of blockchain's key features and functions. The evolution of blockchain within accounting will cause the spectrum of skills represented in

accounting to change. Accountants may need to be able to offer advice on blockchain adoption and take into account how blockchain will affect their clients and their businesses. They must also have the communication skills to serve as a bridge between business stakeholders and technologists.

Using traceable and auditable blockchain data, audits can be made more successful with blockchain and machine-learning artificial intelligence tools. In light of the fact that blockchain provides advanced methods, blockchain-enabled accounting can prevent information asymmetry by involving all stakeholders. Due to the aforementioned details, technologically advanced accounting will now encompass a wider range of skills and knowledge. While some tasks like provenance assurance and reconciliations will be scaled back or abolished, other expertise like technology, consulting services, and other value-adding activities will be expanded. The difficulty for firms lies in the thought that blockchain has potential risks, and companies shall refrain from adopting blockchain in accounting since it is new and lesser known.

Despite the advancements, blockchain technology is still in its infancy and a work in progress. Although it has several drawbacks as a result, blockchain nevertheless provides a lot of advantages. Also, it's critical to remember that issues with storage, excessive energy use, scalability, and other aspects of blockchain are expected to be temporary. A \$3 trillion net value is expected for the blockchain industry in the next five years thanks to significant investments from enterprises and global IT firms. The blockchain and cryptocurrency markets now have less competition since only a tiny percentage of consumers understand and trust this technology. Keeping in view of the steady expansion, blockchain can become the new norm for people in the future. By using blockchain and other cutting-edge technologies like data analytics or machine learning, companies can help optimize many present accounting department operations. With the

increase in technology usage, the accounting profession will become more effective and valuable than it already is.

The investigation into the applications and limitations of blockchain-enabled accounting has revealed promising results, but further study is needed to fully understand its potential. The technology is still evolving, and although the most astute way to have it be a part of the accounting ecosystem is in a partial capacity alongside traditional accounting conventions, it still remains unclear how it will be integrated into existing accounting practices for most places. The sentiments regarding blockchain shifted from a boom, driven by exaggerated hopes, to disappointments spurred by the bitcoin crash in 2018 and 2021. This is a typical trend for immature and emerging technology. Since Blockchain is still in its "evolving maturity" stage, it will be crucial to evaluate its effects on accounting and financial management as the technology develops and new use cases come to light (Pugna, and Adriana). With additional effort and study, we can realize the full potential of blockchain-enabled accounting and open the door to a more safe, dependable, and effective financial system.

Bibliography

Atanasovski, Atanasko, et al. "The Blockchain Technology and its Limitations for True Disruptiveness of Accounting and Assurance." *Journal of Applied Economic Sciences*, 2020.

Bible, William, et al. "Blockchain Technology and Its Potential Impact on the Audit and Assurance Profession." n.d.
 <<https://us.aicpa.org/content/dam/aicpa/interestareas/frc/assuranceadvisoryservices/downloadabledocuments/blockchain-technology-and-its-potential-impact-on-the-audit-and-assurance-profession.pdf>>.

Chapman, James, et al. Bank of Canada, 2017, *Project Jasper: Are Distributed Wholesale Payment Systems Feasible Yet?*

Coyne, Joshua G., and Peter L. McMickle. "Can Blockchains Serve an Accounting Purpose?" *Journal of Emerging Technologies in Accounting*, vol. 14, no. 2, 1 Sept. 2017, pp. 101–111., <https://doi.org/10.2308/jeta-51910>.

Curry, David. "Coinbase Revenue and Usage Statistics." *Business of Apps*, 9 Jan. 2023, <https://www.businessofapps.com/data/coinbase-statistics/#:~:text=Coinbase%20revenue%20skyrocketed%20in%202021,2021%2C%20a%20550%25%20increase>.

Han, Hongdan, et al. "Accounting and Auditing with Blockchain Technology and Artificial Intelligence: A Literature Review." *International Journal of Accounting Information Systems*, vol. 48, 2023, p. 100598., <https://doi.org/10.1016/j.accinf.2022.100598>.

McKenna, Patrick, et al. "State by State Cryptocurrency Laws and Regulations." *Bloomberg Law*, 27 Feb. 2023,

<https://pro.bloomberglaw.com/brief/cryptocurrency-laws-and-regulations-by-state/>. Han,

Hongdan, et al. "Accounting and Auditing with Blockchain Technology and Artificial Intelligence: A Literature Review." *International Journal of Accounting Information Systems*, vol. 48, 2023, p. 100598., <https://doi.org/10.1016/j.accinf.2022.100598>.

McKenna, Patrick, et al. "State by State Cryptocurrency Laws and Regulations." *Bloomberg Law*, 27 Feb. 2023,

<https://pro.bloomberglaw.com/brief/cryptocurrency-laws-and-regulations-by-state/>.

Mohamad, Shafi, et al. "Blockchain Technology: Implications for Accountants." *Journal of Management Analytics*, vol. 7, no. 2, 2020, pp. 189–208.

OSTP. Climate and Energy Implications of Crypto-Assets in the United States. White House Office of Science and Technology Policy, 8 Sept. 2022, Washington, D.C.

Popovski, Lewis, et al. "A Brief History of Blockchain." 14 May 2018. *pbwt.com*.

<<https://www.pbwt.com/content/uploads/2018/05/010051804-Patterson.pdf>>.

Pugna, Irina Bogdana, and Adriana Duțescu. "Blockchain – the Accounting Perspective." *Proceedings of the International Conference on Business Excellence*, vol. 14, no. 1, 2020, pp. 214–224., Doi: 10.2478/picbe-2020-0020.

Sarmah, Simanta Shekhar. "Understanding Blockchain Technology." *Computer Science and Engineering*, vol. 8, no. 2, 2018, pp. 23–29., Doi: 10.5923/j.computer.20180802.02

“Blockchain Against Hunger: Harnessing Technology in Support of Syrian Refugees.” *World Food Programme*, 30 May 2017,

<https://www.wfp.org/news/blockchain-against-hunger-harnessing-technology-support-syrian-refugees>.

“Blockchain and the Future of Accountancy.” *ICAEW*, Information Technology Faculty, Sept. 2018,

<https://www.icaew.com/technical/technology/blockchain-and-cryptoassets/blockchain-articles/blockchain-and-the-accounting-perspective#:~:text=Blockchain%20is%20an%20accounting%20technology,the%20analysis%20of%20said%20information>.

“Blockchain Market Size, Trends - Growth Drivers, Opportunities & Global Industry Forecast.”

MarketsandMarkets, Nov. 2021,

<https://www.marketsandmarkets.com/Market-Reports/blockchain-technology-market-9100890.html>.

“Blockchain Technologies Could Boost the Global Economy.” *PwC*, PwC, 13 Oct. 2020,

<https://www.pwc.com/gx/en/news-room/press-releases/2020/blockchain-boost-global-economy-track-trace-trust.html>.

“Blockchain Technology Explained: What Is Blockchain and How Does It Work?” *Freeman Law*, 26 Nov. 2022,

<https://freemanlaw.com/blockchain-technology-explained-what-is-blockchain-and-how-does-it-work-2/>.

“Electricity Domestic Consumption.” *Enerdata*,

<https://yearbook.enerdata.net/electricity/electricity-domestic-consumption-data.html>.

“Ethereum (ETH) Blockchain Explorer.” *Etherscan*, <https://etherscan.io/chart/tx>.

“IBM Blockchain Platform.” *IBM*, IBM Corp., Apr. 2022,

<https://www.ibm.com/downloads/cas/Q9DGBLV7>.