Features of Using Blockchain Technology in Accounting

Nadiia Lobanchykova[1], Tetiana Vakaliuk[1, 2, 3], Dmytro Zakharov[1], Vitalii Levkivskyi[1], and Viacheslav Osadchyi[2, 4]

[1] *Zhytomyr Polytechnic State University, 103 Chudnivsyka str., Zhytomyr, 10005, Ukraine*
[2] *Institute for Digitalisation of Education of the NAES of Ukraine, 9 M. Berlynskoho str., Kyiv, 04060, Ukraine*
[3] *Kryvyi Rih State Pedagogical University, 54 Gagarin ave., Kryvyi Rih, 50086, Ukraine*
[4] *Borys Grinchenko Kyiv Metropolitan University, 18/2 Bulvarno-Kudriavska str, Kyiv, 04053, Ukraine*

Abstract
The article considers theoretical provisions and practical recommendations on the peculiarities of the application of blockchain technology in accounting, in particular, the concept of blockchain technology and possibilities of implementing blockchain technology in the accounting system are considered, practical solutions for the implementation of blockchain technology in accounting and audit are proposed; the impact of blockchain technology on the organization of accounting is determined. The advantages, disadvantages, and promising directions of research on the implementation of blockchain technology in accounting are identified.

Keywords
Blockchain, network, cryptocurrency, smart contract, accounting, distributed network.

1. Introduction

In recent years, blockchain technology has become one of the most researched and interesting areas of innovative development. However, the emergence of new technology and an attempt to apply it in the activities of enterprises require the modernization of the accounting system. The practical experience of implementing blockchain solutions for accounting and auditing demonstrates the complexity of regulatory regulation in this area. However, increased competition and global market dynamics are forcing companies to pay attention to new technologies and consider their application, which requires the formation of a clear regulatory position about such technologies [1, 2].

The relevance and prospects for the implementation of blockchain technology in accounting and auditing in the modern world are discussed both in scientific research and in the corporate environment. A blockchain, or chain of blocks, creates an extremely reliable system of records that can change the way accounting and auditing are conducted. Blockchain solutions can improve collaboration between stakeholders and reduce the cost of transactions, as well as allow for the creation of complex financial instruments based on smart contracts. From a stakeholder perspective, blockchain can enable more reliable auditing of financial statements, detection of fraud, and greater confidence in the accuracy of information [3, 4].

The prospects for implementing blockchain in accounting and auditing are broad. They include automation of accounting processes, in particular through smart contracts, simplification of internal and external control, increased information availability, and the ability to verify data in real-time. Therefore, research on the peculiarities of using blockchain technologies in accounting is relevant.

The purpose of the study is to substantiate the theoretical provisions and develop practical recommendations on the specifics of using blockchain technology in accounting.

2. Theoretical Background

The current state, prospects, and possibilities of applying blockchain technology in accounting are disclosed in the works of many scientists. The basic concepts of blockchain were introduced by Satoshi Nakamoto in Bitcoin [5]. He proposed a distributed ledger technology that tracks and maintains a tamper-proof record of transactions in a decentralized network. Essentially, it is a unique database system that is created, replicated, synchronized, and maintained by all participants in a decentralized network. Blockchain operates in a decentralized peer-to-peer network to verify and store all transactions in a consensus agreed by all nodes in the network, without any central authority to verify the transaction (as in the case of an intermediary). All completed and confirmed transactions are recorded on the distributed ledger in a verifiable, secure, and transparent manner, along with a timestamp and other details. In this way, the exchange of tangible and intangible data and assets between participants can be digitally recorded. Each stakeholder maintains a copy of the synchronized ledger, preventing a single point of system failure or data loss. When changes are made, such as the addition of a new block, all copies on the network are updated simultaneously and entries are recorded in all ledgers at all times. These changes are saved into blocks that create a chain where the block is linked to the previous one by storing its hash (unique data displayed from a given block). Fig. 1 shows the fundamental chain architecture of the blockchain network.

Except for the first block (genesis block), each block has its hash as a unique identifier that includes the previous block's hash. This creates a chronological chain. In addition, the hashing mechanism provides increased data security. Typically, a block stores a set of transactions with time stamps that stakeholders in the network confirm. Once a consensus is reached, the block is accepted and stored by all parties in the blockchain and cannot be changed. Thus, the trust and transparency of transactions between companies have significantly improved.

Blockchain technology has many unique features that allow for the creation of a verifiable, secure, transparent, and immutable distributed ledger, the main characteristics of which are summarised as follows:

1. Universal exchange of values: Blockchain provides a secure and efficient platform for recording transactions regarding intellectual property rights, provenance of services and goods, ownership of assets, cryptocurrency exchange, etc.
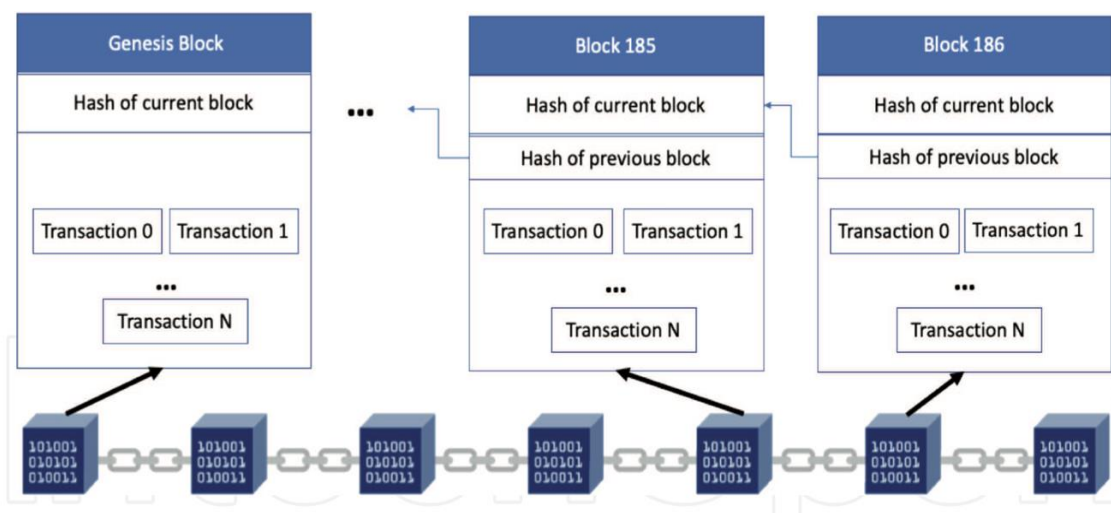
Figure 1: Blockchain network architecture [6]

2. Distributed governance: the blockchain network is not controlled by any authorized body, organization, or person, and the need for trusted intermediaries to verify transactions is eliminated. It is a distributed database that simultaneously provides secure and verified data for all network participants. Thus, the entire flow of transactions is fully transparent, and assets and data can be transferred between multiple companies quickly and efficiently.

3. Decentralized architecture: the ledger is decentralized and stored in all nodes (i.e. in separate stakeholder databases) of the network, and its failure at a central point of the infrastructure is impossible. Thus, it contributes to a reliable network that improves the quality, reliability, and availability of services and information.

4. Logically centralized: A blockchain network behaves as a logically centralized system with only one transaction record that all participants share.

5. Data transparency: blockchain technology allows you to create a highly transparent network that all stakeholders can see anytime. This significantly reduces the likelihood of illegal transactions.

6. Immutable data: once a block with a set of transactions has been verified by consensus and saved in the chain, the recorded data cannot be changed.

7. Improved data security: blockchain technology uses asymmetric cryptography and digital signature algorithms to ensure data security and individual identification.

A typical permissioned blockchain follows a similar data flow as shown in Fig. 2, where a signature is attached to the transaction, which is then sent or broadcast to the network and added to the block. Once the block is verified, the transaction is permanently stored in the chain. A permission blockchain differs from a permissionless blockchain in how blocks and transactions are verified. To improve performance and reduce latency, most permissioned blockchain networks deploy efficient consensus protocols that nodes use for verification.
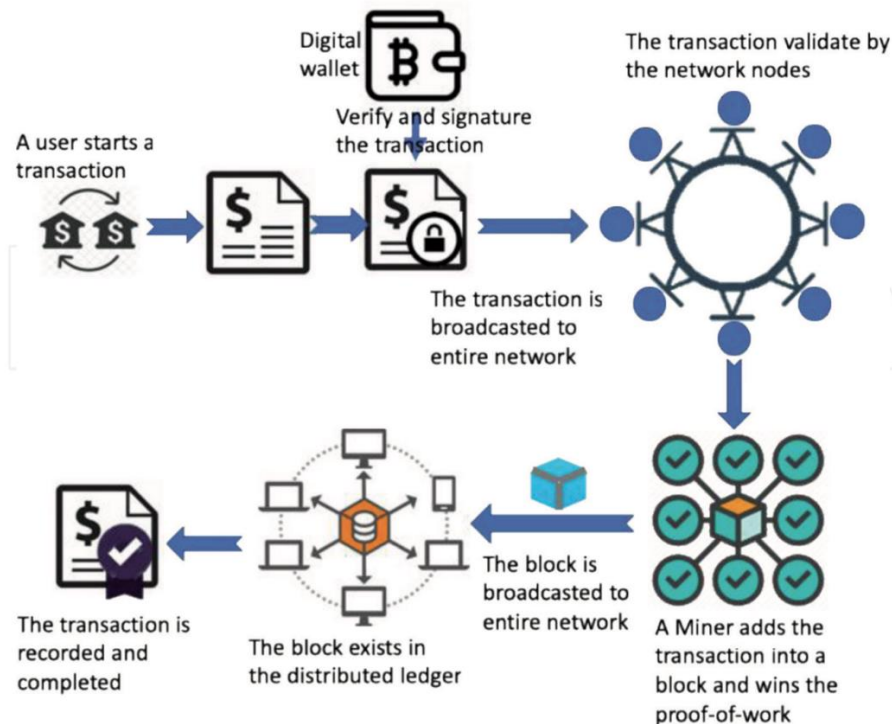
Figure 2: Data movement in the blockchain network [7]

Many blockchain platforms have different consensus algorithms, development tools, and programming languages.

Accountancy professional bodies, namely the ICAEW, the Association of Chartered Certified Accountants (ACCA), the Chartered Institute of Management Accountants (CIMA), the Chartered Institute of Public Finance and Accountancy (CIPFA), and the International Federation of Accountants (IFAC), all published reports on their websites relating to blockchain technology. For example, Deloitte, EY, KPMG, and PwC have led the initiative to integrate blockchain into their business to meet clients' changing needs for blockchain transactions [8]. Accordingly, Deloitte created its Rubix division and launched a plug-and-play blockchain product [9]; EY introduced a blockchain analyzer platform to support audit team data reconciliation; PwC released cryptocurrency audit software and updated its Halo audit tool; and KPMG is partnering with

Guardtime, Microsoft, R3, and Tomia to create blockchain-based services [10].

The blockchain economy is closely related to such concepts as tokenization, ICO (Initial Coin Offering), and smart contracts. The use of these elements will drive changes in the existing economic system. Tokenization is the conversion of a physical asset into a digital format. This allows the owner to manage the asset directly rather than resorting to intermediaries or third parties. Technically, tokenization is available for any asset or intellectual property and knowledge of an individual. Using tokens aims to provide most business processes with transparency, speed, accessibility, and cost reduction.

Many people believe that cryptocurrency and tokens are identical concepts. They are similar but not equivalent. Tokens differ from cryptocurrencies in the following key ways:

- Are issued by a private company or organization.
- Are not used for payment on other platforms.
- Do not replace fiat money.
- Cannot be obtained through mining.

Tokenization is the basis of an ICO or initial coin offering. To obtain investment for a project, tokens that give investors rights to a service or product are sold. ICOs are an excellent way for startups to get funding without venture capital. In return for the investment, founders do not need to transfer any of their shares in the company to third parties. At the same time, investors can be professionals and ordinary people. Without an ICO, they would likely be unable to invest in the project.

The ICO process is similar to crowdfunding. However, while fans receive products or just pleasant bonuses in exchange for their investments in the latter, the value of tokens purchased at an ICO can increase tenfold over time. That is why these coins are often bought for further speculation rather than to use the rights to the product.

Singapore hosted the fourth largest ICO, Huobi, which raised $300 million. Elsewhere, Switzerland hosted six investment projects in the top 15 campaigns. HDAC (No. 5) raised $258 million, Tezos (No. 7) brought in $232 million, Sirin Labs (No. 8) received $158 million, Bancor (No. 9) brought in $153 million,

Polkadot (No. 11) received $145 million in investment, and DAO received $143 million from sponsors.

Table 1 shows the structure of ICO projects by application area; as you can see, most of them were related to blockchain infrastructure development.

Table 1
Types of the largest ISO projects [11]

№	Name of the ISO	Amount of investment	Project type
1	EOS	$4.1 billion	Smart Contracts
2	Telegram	$1.7 billion	Encrypted Messaging & Blockchain Ecosystem
3	Dragon	$320 million	Decentralized Currency for Casinos
4	Huobi	$300 million	Cryptocurrency Exchange
5	Hdac	$258 million	IoT Contract & Payment Platform
6	Filecoin	$257 million	Decentralized Cloud Storage
7	Tezos	$232 million	Self-Amending Distributed Ledger
8	Sirin Labs	$158 million	Open-Source Blockchain Smartphone
9	Bancor	$153 million	Prediction Markets
10	The DAO	$152 million	Decentralized VC

Another element related to blockchain technologies is smart contracts, which are essentially algorithms that perform conditional actions: if action x occurs, then action y is performed. Smart contracts allow you to automate processes and ensure the fulfillment of previously established agreements. The terms and conditions set out in a smart contract must be changed or enforced. Such contracts have various uses, such as elections, trade, and taxation.

The fulfillment of a smart contract depends on compliance with the terms and conditions specified in it. For example, the rights to the sold property are transferred automatically only after the owner receives the amount specified in the contract. The security of such contracts is ensured by storing them in a decentralized registry in an encrypted form, but only if no errors are made in creating smart contracts.

Blockchain technologies may become the backbone of the economy in the future. Creating a decentralized financial system that intermediaries, commissions, the state, and corruption cannot influence is possible. However, in practice, building such a system

will be a challenge. Banks and corporations are now developing solutions based on blockchain technologies themselves. For example, Google is working on a blockchain to improve the security and reliability of user data. The Alibaba Group conglomerate is actively working in blockchain technologies, and two subsidiaries have even been set up to develop software and study blockchain in supply chains [12]. Banks are also implementing blockchain solutions to organize and conduct their business. For example, the British Barclays has joined the blockchain consortium founded by CLS Group, where participants are working to create a decentralized competitor to the global SWIFT payment system for fast and secure transfers [13]. In 2017, 12 Chinese banks, including state-owned ones, integrated blockchain solutions. In 2018, the Spanish bank Banco Bilbao Vizcaya Argentaria (BBVA) issued the world's first loan using a private blockchain [1].

3. Results

The analysis suggests that if states and banks continue to create and integrate solutions based on blockchain technologies, the current system will change but will not become decentralized and independent.

Ideally, the formation of a blockchain economy will lead to:
- Reduction of corruption and bureaucracy.
- Development and implementation of innovative management methods.
- Ensuring transparency of transactions.
- Simplifying and reducing the cost of financial transactions at the international and local levels.
- Creation of a global independent cryptocurrency.
- Creating opportunities for business investment for everyone.
- Liberation from the control of the centralized banking system.
- Introduction of a secure transaction system based on smart contracts.

The factors that hinder the development of the blockchain economy may include:
- Lack of a well-developed regulatory system—the industry, even in developed countries, suffers from legislative uncertainty.
- High volatility of cryptocurrencies, attracts speculators to the industry and causes dissatisfaction among regulators.
- Lack of understanding or interest in technology, and development is possible only with the participation of all stakeholders.
- Impossibility of implementing the tasks set in a short time without the help of states and banks.
- High level of fraud in the ICO sector, which may lead to a ban on the use of this method of attracting investments.
- The use of cryptocurrencies as a savings or speculative asset should become the new money of the blockchain economy.

For systemic economic processes, blockchain technology is a way to switch to a decentralized, transparent system and reduce the bureaucracy associated with control regulations. Blockchain technologies can be used to build a new financial system and eliminate transaction intermediaries.

The use of blockchain technologies can be considered not only at the macro and mega levels. Blockchain technologies will help optimize and improve many processes at the micro level. For example, a company can build a motivation system based on blockchain. To do this, develop a DApp solution (Decentralised application) and add a token with the necessary functions and characteristics. Tokens are not a currency because they have value only within the company.

Nevertheless, the management system allows the company to set the rate. The token has an actual monetary basis, allowing managers to control employee distribution easily. The rate depends on the business's success, so tokens cross between money and shares. When an employee receives such a token, he or she has a different attitude to implementing the plan. If successful, both he or she and the company will benefit as the token's value increases. The versatility of blockchain technologies allows you to attach any object to a token—glasses, goods, services, or a voice. This principle is a form of non-financial staff motivation, which implies a specific list of benefits that employees demand.

The use of such a system offers significant advantages. First of all, blockchain technologies have advantages over banking systems: the continuity of the system ensures

that any transaction is completed in the shortest possible time, without failures, breaks, or days off. Employees can freely dispose of their earned tokens. However, the main advantage of a blockchain-based incentive system is a significant increase in KPIs (key performance indicators). Everyone will want to test the new system with their hands, and getting the coveted tokens directly depends on the quality of work. To prove themselves positively, employees will start generating new ideas and increasing their productivity in the workplace. The bonuses and benefits program should consider their different needs and be flexible to ensure that employees are properly motivated. Within an individually set limit, each employee chooses the benefits they like from a general list. A distinctive feature of the solution is the decentralized setting of limits: specific categories of employees do not automatically receive the same limits; they are set individually for each employee, according to their performance. More flourishing and efficient work gives the employee more tokens in the virtual wallet and, accordingly, access to more rewards. It is important to note that the company's position or length of service does not play a role, as every employee can prove themselves in their work. The coefficient of token accrual depends on the quality of the work performed, and the evaluation criteria are prescribed in advance in a publicly available document.

This incentive system has several interesting aspects. Firstly, there is a currency exchange rate. Its direct dependence on net profit will stimulate better teamwork. For example, the quality of communication between departments will improve significantly, as the conclusion of a deal may depend on the timely receipt of the information. Secondly, the token accrual rate will significantly increase the quality of work performed. Thirdly, the use of smart contracts will make the whole process more transparent: no one will be able to doubt the fairness of the token accrual.

Despite legislative obstacles, blockchain technologies are gradually being introduced into production processes and social life, forcing the avoidance of outdated technologies. Their revolutionary and explosive nature and, at the same time, their adverse side are hidden in a distributed public register that belongs to no one and can be used by anyone.

Legislation requires mandatory publication of financial statements (for joint-stock companies, banks, insurance companies, and enterprises of public importance). Regular disclosure of financial statements is required, including balance sheets, income statements, cash flow statements, statements of equity, and notes to the financial statements. To maximize their interests, management may mislead users of information by manipulating accruals, structuring transactions, and disclosing false information. The reliability of the published financial statements and notes is, to a certain extent, guaranteed after the audit. However, third-party users of the information cannot get acquainted with the "real" transactions and accounting processes of the company. Users cannot obtain a complete, accurate, and timely understanding of a company's financial position, operating performance, and cash flows by reviewing the financial statements alone.

The blockchain records and verifies information in a decentralized way. The process does not require authoritative intermediaries, and blockchain technology ensures the information is transparent, secure, and protected from interference. As a result, blockchain has a great potential to increase trust between market participants [15], which, in turn, the use of blockchain technology in financial accounting has the potential to make the accounting process of firms transparent, improve the quality of external reporting information and effectively reduce information asymmetry between firms and external investors.

The application of blockchain technology in accounting includes two aspects. On the one hand, listed companies disclose accounting information on the blockchain. Companies publish source documents of transactions and events and add payment fees and accounting policies and methods embodied in smart contracts to the accounting blockchain. Once the smart contract is set up, if the firm chooses to change it, all changes will be tracked on the blockchain.

On the other hand, as blockchain nodes, various stakeholders will engage in competitive mining and promptly record and verify the information submitted by the enterprise in a new block and then transmit it

to the blockchain network. Institutional investors with technical and financial advantages are more likely to become blockchain nodes, as, in addition to the rewards of mining blocks, they are also motivated by an information advantage with early access to corporate information. In addition, counterparties such as auditors and lawyers are also likely to become nodes on the blockchain. Auditors can check source documents and intelligent contracts published by a firm and issue their audit opinion on the blockchain. Finally, regulators and stock exchanges will also become essential nodes in the accounting blockchain to perform their monitoring functions better.

While firms must apply accounting methods prescribed by accounting standards for recording, presenting, and disclosing information in traditional accounting, they still have discretion over accounting methods, such as accounting policies, estimates, and judgments. Listed companies only provide regular financial reports to the market but do not disclose the accounting procedures used to prepare the reports. While this institutional arrangement can protect firms' confidential information, there are also several negative consequences. First, the risk of falsification and corruption of transactions exists regardless of whether a company uses a paper or electronic ledger. Secondly, managers or controlling shareholders of listed companies may manipulate or create transactions to maximize their interests. Since the accounting process is not transparent, it is tough for external information users to detect problems. Finally, even if external auditing exists, auditors may not be able to detect all instances of fraud and error in the firm or may lack the independence to report problems to the market.

As noted above, the technical characteristics of the blockchain make the disclosed information very transparent, traceable, and protected from unauthorized access. Voluntary disclosure via blockchain is a beautiful way for companies that want to reduce information asymmetry with investors. In the short term, firms can disclose valuable but non-mandatory information via the blockchain, such as earnings forecasts and corporate social responsibility reports. In this way, self-disclosure helps investors better understand the business and make more informed decisions. In addition, even disclosing publicly available information via blockchain has many positive effects.

On the one hand, historical information has a specific reciprocal value. Especially in the case of significant uncertainty, investors will verify the available information by reviewing historical information. On the other hand, the disclosure of publicly available information through official channels can influence investors' decision-making.

In the long run, as firms and investors recognize that voluntary blockchain disclosure is a high-quality signaling mechanism to reduce transaction costs, more and more companies will choose to make voluntary blockchain disclosures after balancing the benefits and costs. However, as more information is disclosed on the blockchain, comparability of information will become an issue. Regulators may require a standardization of information to improve comparability.

Anticipating that blockchain technology can increase the authenticity, accuracy, and comparability of disclosures and reduce corporate earnings management; regulators may even use blockchain as the primary platform for mandatory disclosure. The content of mandatory disclosure will be source documents of transactions and events, as well as accounting policies and methods embodied in smart contracts. Such information should be disclosed in real time based on current data. Other non-confidential information, such as earnings forecasts, corporate social responsibility reports, and business reviews, which are typical content companies would like to disclose voluntarily in the short term, should also be disclosed on the blockchain. However, the frequency of disclosure should be at the discretion of firms. If firms want to make a good impression in the market, they will be incentivized to disclose non-confidential information promptly.

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In summary, compared to traditional financial reporting methods, blockchain technology in financial accounting has advantages such as high transparency, traceability, timeliness, and protection against forgery. In addition, smart contracts can automate financial reporting, which can significantly reduce financial accounting costs and improve the timeliness, reliability, and comparability of information. In addition, it can also reduce errors in disclosures and earnings management so that financial statements can fairly and accurately reflect the firm's financial position and operating performance. Accordingly, the problem of asymmetric information can be mitigated. However, due to the existing shortcomings of blockchain technology, the above benefits will take time to become a reality. With the development of blockchain technology, blockchain accounting, and financial reporting will become a viable and attractive option in the long run.

In the long run, using blockchain technology in financial accounting has two main implications. On the one hand, the raw data published in the blockchain is tamper-proof. On the other hand, smart contracts allow for automated accounting and reporting, which helps to track business activities. These changes will make it more difficult for companies to manipulate accounting data, but this does not mean that using blockchain in financial reporting can eliminate fraud. While the potential benefits are large enough, firms still have incentives to cheat by falsifying source data.

As a result, one of the potential threats of blockchain adoption in financial accounting is that businesses may turn to creating transactions to obtain desired accounting metrics. In terms of auditing, this change means that the control risk in audit risk will decrease while internal risk may increase. In such circumstances, the focus of auditors will shift from preventing material misstatements to analyzing the reasonableness and reliability of the auditee's activities.

The accounting blockchain has other threats if applied in the long term. These include the shifting of accountants' responsibilities, the problem of information privacy for firms, and the growing complexity of regulation. Blockchain technology could automate the recognition, measurement, presentation, and disclosure of information, replacing the position of traditional financial accountants in the long run. This reduces the scope of traditional accounting tasks, such as recording and preparing financial statements, but creates more jobs to ensure the authenticity of source documents and the validity of smart contracts. This is a new challenge for accountants.

In addition, the issue of information privacy in the short term only affects the amount of information that firms voluntarily disclose on the blockchain. However, in the long term, radical changes in the automation of financial reporting will significantly increase companies' out-of-pocket costs, which will likely hinder the application.

There is also the problem of increasing regulatory complexity. Due to the diversity and anonymity of nodes, speculators can take advantage of the mining right to post "useful" information to make a one-time profit. Even false information can be detected quickly, and it is difficult to identify the speculator who posted the false information. In addition, the presence of the "51% attack" also makes regulation difficult. While it is difficult to have more than 51% of the blockchain's computing power, there is a possibility of collusion. Regulators cannot deter this action if it does occur. One possible solution is to use a permissioned blockchain instead of a public blockchain. The basic idea of a permissioned blockchain is that one central organization controls who has the right to read and write new information on the blockchain. This can partially solve the problem of information privacy and the growing complexity of regulation. However, it would weaken the fundamental characteristics of blockchain technology, which are decentralized and immutable.

Financial accountants' responsibilities will shift from recording transactions and preparing financial statements to ensuring the authenticity of source documents and the validity of smart contracts used in the accounting blockchain. Other threats, including the confidentiality of firms' information and the increasing complexity of regulation, could pose a barrier to the application. One possible solution to address these concerns is to use a consortium blockchain instead of a public blockchain, which would correspondingly weaken blockchain technology's fundamental characteristics. In general, blockchain in financial accounting has both opportunities and threats. Moreover, when the technology becomes sufficiently mature, it will likely bring fundamental changes to financial accounting and auditing, even to entire financial markets.

The practice of implementing blockchain technology in accounting and auditing. The digitization of companies' systems has allowed them to apply new technological tools to simplify business processes and transform business models to innovate in their operations, as they can access advanced computing power and large databases. Academics, social media, industries, and governments spend much time on digital technology: blockchain, Artificial Intelligence (AI), big data, the Internet of Things (IoT), and cloud computing. These innovations are significantly transforming businesses and individuals, with blockchain providing the foundation for a "value internet" that will fundamentally change society and its businesses. Since Nakamoto [5] laid the groundwork for what became blockchain technology in 2008, the banking, finance, insurance, education, and government sectors have used blockchain technology to the point where 10% of global GDP will be recorded and stored on blockchain by 2027 [16]. PricewaterhouseCoopers (PwC) estimates that blockchain could increase global GDP by USD 1.76 trillion by 2030 [10].

Deloitte's 2020 Global Blockchain Survey shows that companies are more committed than ever to embedding blockchain in their business. As blockchain matures, innovators are discovering new opportunities to create value and increase trust and resilience to digital transformation by combining blockchain with other forms of technology, such as AI, IoT, or cloud computing. We look at blockchain technology as a factor in increasing transparency and trust in accounting and how professionals can improve decision-making by leveraging blockchain's ability to provide immutable and verifiable data. The main characteristics of blockchain technology are transparency, decentralization, immutability, tamper resistance, strong authentication, synchronized networks, and consensus. In other words, blockchain technology allows the transfer of anything of value, not only financial transactions but also assets such as intellectual property, health data, voices, and ideas.

Blockchain technology affects the database mechanism of an Accounting Information System (AIS) by digitizing current paper-based checks. The technology can securely store accounting data such as accounts payable and receivable and can improve the efficiency of transaction accounting. Deloitte identifies ways blockchain technology can solve current accounting problems[17]. It can simplify transactions, reduce settlement time and counterparty risk, minimize fraud, and improve regulation and capital liquidity [17].

The primary purpose of using blockchain technology for accounting is to create trust and a trust network, with or without a trusted party. Blockchain collects verified information about the transaction amount, to whom and by whom it was paid, then hashes and adds the block to the existing chain. Combining hash algorithms, private and public keys, and decentralized ledgers makes blockchain powerful in modern internet usage. Its immutability, traceability, and visibility allow participants to view fully encrypted, synchronized transactions. The distributed network [18], digital signatures, and consensus verification rules make blockchain safe and secure. According to the Financial Accounting Standards Board, the trust derived from blockchain comes from records being tamper-resistant and unalterable due to their distribution and hashing. Like fingerprints, hashes are unique because every change, no matter how minor, when information is added causes the hash to change from one unique identifier to another, as such changes mean that its block is no longer the same.

Blockchain is a cutting-edge technology that can transform invoicing, payment processing,

contracts, and documentation. While cash, receivables, payables, and inventory are already updated in ERP systems, such records are centralized and lack multi-party verification. Blockchain allows encrypted transactions that benefit from multi-party verification to be publicly displayed, thus enabling companies to provide real-time balance sheets, income statements, cash statements, inventory records, and capital investment information relating to individual counterparties, customers, auditors, and regulators along the value chain. Because blockchain allows for the instant exchange of critical information, it can create a transparent, real-time, verifiable accounting ecosystem where managers, accountants, counterparties, and investors can collaborate to verify transactions and provide reliable evidence for multi-party verification. Blockchain-enabled real-time accounting will significantly reduce opportunistic behavior by managers to engage in accounting tricks and disruptive activities to manipulate reported earnings. This is because such accounting can allow participants to instantly identify suspicious asset transfers and other transactions that may pose a conflict of interest.

There are some studies and proposals on using blockchain to publish and verify information in real time. Using real-time accounting data recorded in blockchains is proposed to inform real-time audit and reporting procedures [19]. J. Sogaard has implemented real-time Value-Added Tax (VAT) calculation using real-time accounting information recorded through blockchain technology [20]. Financial institutions can now provide real-time services to ensure that every calculation is reliable. For example, Ripple [21] offers more accessible and faster cross-border payments using blockchains on global networks. Blockchain will not replace the XBRL standard; it will be more effective if XBRL provides high-quality structured data. XBRL combined with blockchain can enable real-time reporting and accounting [22].

Some new initiatives that use blockchain are related to triple-entry bookkeeping. Triple-entry bookkeeping using blockchain technology creates a shared ledger (journal of records) that can be viewed across business networks. A blockchain public ledger can significantly increase transparency and trust through multi-party verifiable records [23]. A triple-entry accounting system is also available, which adds a third level of records called "credit" to explain additional income to current debit and credit records. The difference between triple-entry and double-entry accounting is that digitally signed receipts are added and shared by each agent to provide substantial evidence by sharing records where the digitally signed receipt is the third transaction, thus ensuring the credibility and transparency of the records. Triple-entry bookkeeping can also follow an independent and secure template to increase the reliability of financial reporting, thus increasingly enabling the exchange of financial information with blockchain participants. This shared ledger can automate data reconciliation to simplify the procedure and provide greater confidence in decision-making. The reliable presentation of financial statements can be improved with shared data from independent companies, a transparent system, and the immutable, open-access storage provided by blockchain. Of course, different businesses will have different needs for triple-entry systems. For example, banks have legal requirements to track individual transactions, while other businesses have more general requirements. The design of triple-entry systems should be aligned with the goal of a long-term business strategy.

Blockchain is changing the approaches and tools for auditing. Traditional audit methods must be revised to meet businesses' current and future needs in the digital economy. Continuous auditing means using advanced technologies to automate audit activities continuously to test controls, analyze risks, identify exceptions or anomalies, analyze patterns, and view trends. It is likely to move towards integrating artificial intelligence and blockchain to form a coherent ecosystem to improve assurance. Deloitte, Ernst & Young, PwC, and KPMG report that they plan to use AI in audit planning, risk assessment, transaction testing, analytics, and audit work papers to reap the benefits of time savings, faster data analysis, increased accuracy, more profound knowledge, and better client service. "The Big Four are committed to using artificial intelligence systems, especially machine learning, which allow a system to learn from data to recognize/apply patterns and develop

a way to present new data. The introduction of machine learning has paved the way for advanced auditing, which can be enhanced with blockchain.

Ernst & Young, for example, has launched a "plug-in, always-on" approach to using real-time blockchain data to replace current practices. Blockchain can transform current auditing into a more accurate and timely automated assurance system and increase trust in artificial intelligence systems. Once records are approved, verified, and saved on the blockchain, they remain unchanged. The benefits of implementing blockchain in auditing are as follows: continuous auditing using blockchain reduces the task of manual data extraction and audit preparation; in companies engaged in service certification, good blockchain connectivity makes it easier for auditors to collect audit evidence and provide information quality assurance services; all records of business transactions in the blockchain chain remain confidential and secure.

While artificial intelligence and blockchain offer technological tools for auditors, they still need data standards to provide meaningful reporting. However, it is still being determined whether current XBRL reporting standards will be sufficient for artificial intelligence and blockchain use. Whether XBRL can provide the quality, unambiguous data needed to make better use of AI and blockchain applications remains to be seen.

In addition to the areas mentioned above, we also draw attention to the caveats that companies should consider when implementing this technology. Blockchain does not provide one-size-fits-all solutions, as they can be applied explicitly to different situations and are not the only possible answer or even the best one. However, blockchain can solve current accounting problems by moving to multi-party verification of transactions, thus increasing trust and promoting digital corporate reporting. While no technology is foolproof, the blockchain can only be altered to add false information or delete previous information if someone gains 51% of the computing power. However, their distribution networks make this difficult to do with public blockchains. The risk of hacking is even more significant in private blockchains managed by administrators, as a hacker can penetrate their networks or they can change the rules and content of private blockchains. Furthermore, it is unreasonable to assume that businesses will completely abandon their IT infrastructure and replace it with a blockchain. Instead, it will be one of the components of the IT infrastructure, and companies will start implementing blockchain in certain parts of their business to coexist with existing legacy systems, as not all data can be stored on the blockchain chain.

4. Discussions

Accordingly, the proposed solutions are analytical and conceptual, requiring additional research and a detailed analysis of the possibilities of physical implementation within Ukraine and Ukrainian legislation.

The following issues need to be investigated:
- Regulatory aspects and data privacy issues in the implementation of blockchain technology in accounting.
- Development of mechanisms to protect against a 51% attack.
- Regulation of the regulatory framework.
- Studying the technical features of the implementation of blockchain technologies for enterprises, institutions, and companies.
- Development of the concept of blockchain technology implementation, including its technical component.

5. Conclusions

The concept of blockchain technology, in particular its decentralized and distributed nature, has proven to be essential to ensuring high reliability and immutability of financial data. Blockchain technology allows data to be stored securely, making altering or falsifying data fraudulently complex.

Research on the use of blockchain technology in the economy shows its potential to revolutionize financial accounting by simplifying processes and increasing automation. This becomes especially relevant in today's economic environment, where speed and accuracy are crucial to the success of businesses. The prospects for introducing blockchain technology in accounting promise to provide greater transparency, reliability,

and efficiency in processing financial information. However, it is essential to consider regulatory and data privacy issues when implementing this technology.

Businesses, outsourcing, consulting, and audit firms are actively considering implementing blockchain technology to improve the quality of accounting and audit processes. This will increase the reliability and efficiency of financial reporting and reduce the risks of information asymmetry and inefficient management decisions.

Smart contracts are an essential blockchain-based technology solution that changes operational processes in accounting. Smart contracts built on the blockchain allow you to automate and regulate many accounting operations based on predefined conditions. This increases the accuracy and speed of information accounting.

In general, introducing blockchain technology improves the quality of financial information, ensuring its reliability and security. In turn, this helps to increase stakeholder confidence in financial statements.

Thus, this study emphasizes the importance and potential of using blockchain technology in accounting, auditing, and taxation. It demonstrates how blockchain technology can improve processes' reliability, efficiency, and transparency in various areas and emphasizes its advantages in modern accounting and auditing.

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