

A graphic illustration of a blockchain network. It features several interconnected, glowing cubes or rectangular frames. The frames are rendered in a 3D perspective, with some appearing closer and larger than others. The frames are primarily blue and cyan, with some glowing orange and yellow. The background is a dark blue gradient with scattered small, glowing yellow and orange particles, suggesting a digital or data environment.

**BLOCKCHAIN, CRYPTOCURRENCY,
AND MANAGEMENT ACCOUNTING:
ADOPTING THE TECHNOLOGY
WHILE MITIGATING ETHICAL AND
GOVERNANCE RISKS**

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ABOUT THE AUTHORS

Lamont Black, Ph.D., is an associate professor of finance in the Driehaus College of Business at DePaul University. He is a recognized expert on blockchain and cryptocurrency who is a regularly invited speaker for conferences, board presentations, and the media. Prior to joining DePaul, Lamont was an economist at the Federal Reserve in Washington, D.C. He can be reached at lblack6@depaul.edu.

Kelly Richmond Pope, Ph.D., CPA, is the Dr. Barry Jay Epstein Endowed Professor of Accounting in the School of Accounting and Management Information Systems in the Driehaus College of Business at DePaul University. She is the author of *Fool Me Once: Scam, Stories, and Secrets from the Trillion-Dollar Fraud Industry*. She can be reached at kpope2@depaul.edu.



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EXECUTIVE SUMMARY

Blockchain is a term that has become widely recognized as an emerging technology. Yet many people are still unsure of what blockchain is or how it works, and there are a wide range of opinions about the potential for blockchain to replace existing, legacy technologies. Some people believe it will become a ubiquitous platform for many applications, while others think it is an overhyped buzzword that has not delivered. Adding to this mix is the controversial role of cryptocurrency as the leading and most prominent application of blockchain. It is no wonder that accounting and financial professionals are unsure of what to make of this trend.

This report focuses on some of the basics of how blockchain works and the growing range of its applications. Blockchain is a distributed ledger technology that is closely related to the concepts of accounting and recordkeeping, so

every accountant should be trying to assess its implications. We have included cryptocurrency as an application of blockchain because “crypto” has gained widespread attention as a form of digital money and as a system for owning digital assets. Regardless of your current views on these subjects, this report introduces several important concepts that will likely have lasting impacts on the way in which information is recorded in a digital economy. Blockchain is a shared immutable ledger for recording transactions, tracking assets, and sharing information. Blockchain technology is particularly well-suited for accounting applications and could become a bedrock of global recordkeeping systems.

Blockchain technology is still relatively young, just around 15 years old. Even so, the blockchain economy is already massive—in the trillions and rapidly growing. In a 2015 survey, the



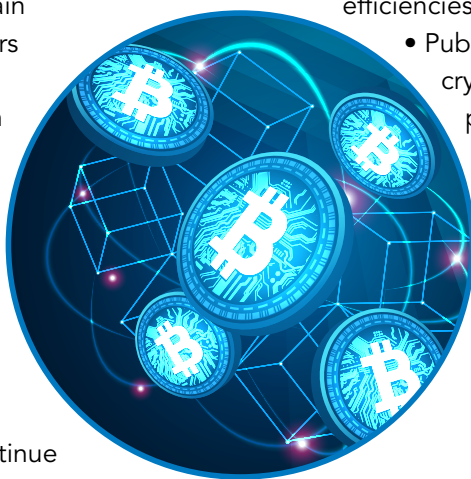
World Economic Forum estimated that 10% of the global gross domestic product (GDP) will be stored on blockchain technology by 2027.¹ Interest in blockchain and distributed ledger technologies continues to surge worldwide as organizations adopt the technology. *Deloitte's 2020 Global Blockchain Survey* revealed that 55% of executives identified blockchain technology as a critical priority for their organizations.² In 2021, Deloitte's global survey reported a "seismic shift" in acceptance of blockchain technology, with financial leaders increasingly envisioning digital assets as the future.³ Blockchain analysts predict increasing investments in blockchain technology in 2023 and beyond. For example, the use of blockchain in the financial sector will likely reach a value of \$22.5 billion by 2026.⁴ Beyond finance, blockchain investments will continue to expand into other areas. For example, in the healthcare space, spending on blockchain technology is expected to rise to \$5.61 billion by 2025.⁵

This is only the tip of the iceberg. Cryptocurrency put blockchain on the map, but it is also the most controversial of the blockchain applications. Given the ongoing headlines regarding the volatile cryptocurrency market, including the collapse of the cryptocurrency exchange giant FTX and the indictment of its founder and CEO Sam Bankman-Fried, it is not surprising that many are skeptical about the cryptocurrency space. Despite these alarming headlines, we know one fact: Cryptocurrency may be relatively new and slightly unstable, but it is built on blockchain, and blockchain is likely here to stay. A December 2022 Nasdaq article noted, "While the cryptocurrency fallout from the collapse of digital currency exchange FTX might be roiling the markets, financial firms are moving on undeterred, continuing to explore ways to use blockchain technology."⁶ Therefore, it is critical that management accountants and finance professionals

continue to understand how blockchain technology can impact daily business operations and improve organizational efficiencies.

This report explores the role of management accountants in advising their organizations regarding blockchain adoption for financial reporting and business operations. Key takeaways include:

- Blockchain adoption is growing across a wide range of applications.
- Adopting blockchain technology has improved efficiencies within organizations.
- Public blockchains and cryptocurrency are an important part of the blockchain ecosystem.
- Concerns about potential ethical and governance risks associated with blockchain adoption can be mitigated.
- Management accountants should be assessing the future role of this rapidly emerging technology.



Having access to the real-time, highly reliable data that blockchain provides is a game changer for management accountants. A blockchain's distributed ledger is updated in minutes or even seconds with each subsequent block of transactions. With this data, management accountants can increasingly monitor financial performance and provide invaluable strategic insights in real time. The current environment around blockchain technology presents opportunities for management accountants to get in on the ground floor and lead their organizations' blockchain-related strategies.

The potential ethical and governance risks associated with blockchain adoption are manageable. Indeed, many aspects of corporate governance and internal controls improve with blockchain. For example, continuous financial monitoring on the blockchain can improve enterprise-wide risk mitigation initiatives such as fraud prevention and error tracking. As such, corporate executives are making blockchain a top strategic priority. •

Overview of Blockchain

Blockchain is a distributed ledger technology that records and shares every transaction in the user network. Once recorded, historical information cannot be edited. In this way, blockchain is the foundation for immutable ledgers (records of transactions) that cannot be altered, deleted, or destroyed. For those new to this technology, this section provides an overview of how blockchain works.

The process of updating a blockchain begins with a proposed transaction, which could be the transfer of any form of data from one participant to another. Cryptocurrency is a straightforward application of blockchain because it is a peer-to-peer transfer of data (0s and 1s) as “money.” Other transactions could be more complex, like the transfer of a property title from a seller to a buyer. The proposed transaction has a unique sender and receiver, which are represented by two addresses on the blockchain. The transaction also has a unique time stamp and other characteristics that establish the details of the transaction. The transaction is only “proposed” until it has progressed through the full process of blockchain validation.

The second step is to establish consensus on the blockchain network about the validity of a block (group) of proposed transactions. A consensus mechanism is how nodes on a blockchain reach agreement just like a group of people can reach a decision by consensus. Every blockchain requires a consensus mechanism to validate the proposed transactions. In most consensus mechanisms, a majority of participants on the distributed blockchain network must agree that the recorded transaction is valid. Consensus mechanisms can vary widely across different types of blockchain, but they all have a set of rules for reaching consensus. The consensus mechanism is the decentralized process of validating proposed transactions for addition to the ledger. Later in this report, we discuss how mining functions as the consensus mechanism for the bitcoin blockchain.

The third step is to “chain” the blocks together by connecting them into a blockchain. Once the participants in the network have reached a consensus, transactions on the blockchain are written into blocks equivalent to the pages of a ledger book. Each block (i.e., ledger page) is connected to the previous block using a reference identifier that establishes the sequence of the blocks. In the case of bitcoin, this is done with a “hash,” a unique identifier for the information contained inside a block. Each block references the hash in the previous block, which then creates an immutable chain of backward-referencing identifiers that is resistant to any tampering earlier in the chain. This unique sequence of cryptographic hashes creates the historical recordkeeping system that establishes the legitimacy of the current state of the ledger.

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Finally, the updated ledger is published to the network. This is why blockchain is a distributed ledger technology: The system distributes the latest version of the ledger to all participants. The network is comprised of nodes, which are basically computers running the blockchain software, and every node has a copy of the latest version of the ledger. Blockchain is secure because there is no single point of failure, meaning that a compromised node has no

influence on the full network of nodes. Blockchain is also transparent because every node has a copy of the same information. This makes the agreed-upon ledger a single source of truth. As a distributed ledger technology, blockchain is a system of shared accounting.



Public vs. Private Blockchains

There is not just one blockchain or even one type of blockchain. Blockchain technology can come in many different varieties. One of the key distinctions to understand is the difference between public blockchains and private blockchains.

Whether blockchains are public or private may

impact certain governance risks. There is no right answer, but rather trade-offs. Thus, the distinction is important for management accountants and financial professionals to understand when assessing the adoption of public or private blockchain applications.

Public blockchains are “permissionless,” meaning that anyone can participate in the network. The two largest public blockchains are bitcoin and Ethereum. Public blockchains are public in the sense that anyone can participate and that the distributed ledger is transparent and viewable to the public. For instance, the Ethereum blockchain is viewable to anyone on the internet (e.g., etherscan.io). Blockchain “explorers” make all the data on the distributed ledger of a public blockchain easily accessible. The data reported on a blockchain explorer can be collected, summarized, and analyzed to produce a form of accounting.

Private blockchains are “permissioned.” Only those with permission can participate in the network or view transactions on the network. Private blockchains are a form of “walled garden.” One can think of private blockchains as a form of “intranet” in contrast to the open and accessible form of the internet. Most attempts at enterprise applications of blockchain, including accounting, have been with private blockchains.

Although private blockchains may appear “safer” to most professionals due to the closed network, private blockchains have not lived up to much of the hype generated over the last five to 10 years. This is likely because private blockchains are similar to traditional systems of accounting. Although they use different technology, the governance of the technology is still largely centralized, which undermines many of the benefits of blockchain as decentralized. With public blockchains, on the other hand, there is no “trusted third party” to verify transactions. This is typically thought of as removing the need for a government or bank, but it also could apply to accounting firms. There is no external auditor to serve as the ultimate source of truth. The blockchain is the single source of truth. •

Blockchain Early Adopters

The adoption of blockchain by large corporations began almost a decade ago. Global companies such as PayPal and The Walt Disney Company were among the first to adopt the widespread use of blockchain technology to transform their business processes.⁷

In 2014, PayPal, a global e-commerce payments platform, made it possible for online vendors to accept bitcoin payments by creating partnerships with Coinbase, BitPay, and GoCoin.⁸ That was PayPal's first foray into incorporating blockchain technology into its operations.

Today, PayPal employs blockchain technology to allow more than 400 million customers to:⁹

- Hold cryptocurrencies in their electronic wallets,
- Convert their digital assets held on the platform into fiat (regular cash), and
- Use that cash to buy goods from more than 29 million merchants.

In 2016, The Walt Disney Company started blazing a trail for the mass adoption of blockchain technology. Disney began to build its blockchain (named Dragonchain) to support accepting bitcoin payments for hotel rooms, park passes, and other goods and services.¹⁰

According to a 2021 survey by research firm Blockdata, blockchain adoption has grown exponentially since PayPal and Disney embraced the technology in 2014. Currently, at least 81 of the world's top 100 public companies by market capitalization employ blockchain technology, with at least 27 having a fully functioning live product.¹¹

In an October 6, 2022, update, Blockdata noted growing institutional adoption across six major sectors. The Tech, Media, and Telecom sector had the most companies participating, including global household names such as Meta, Salesforce, Adobe, and Verizon. The Consumer & Retail sector came in second place and includes companies such as Walmart.¹²

Leading public companies from all sectors

are incorporating and leveraging blockchain technology in various ways. For example, energy companies utilize blockchain technology to create peer-to-peer energy trading platforms and streamline access to renewable energy.¹³ In one case, homeowners with solar panels use an energy trading platform to sell excess solar energy.

In the finance sector, banks and stock exchanges utilize blockchain technology to manage online payments, accounts, and market trading. Singapore Exchange Limited—an investment holding company that provides financial trading



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services throughout Asia—utilized blockchain technology to build a more efficient system for batch processing and manual reconciliation of thousands of financial transactions.¹⁴

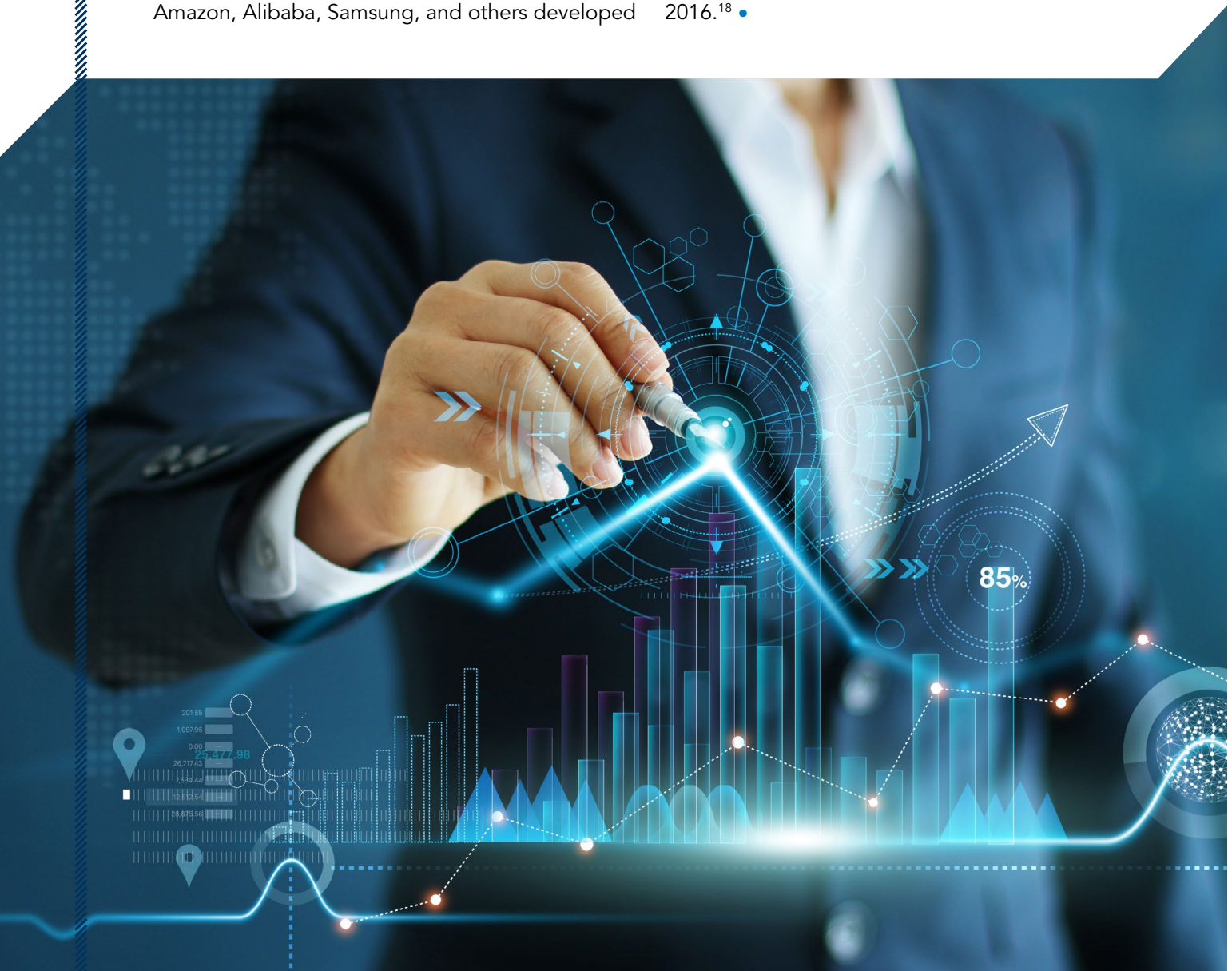
And in the United States, Nasdaq recently reported the introduction of a bitcoin futures ETF.¹⁵ Boston Security Token Exchange (BSTX) created the first regulated blockchain-enabled securities exchange to help bring initial public offerings to the market. BSTX offers a “faster settlement, proprietary and transparent blockchain data feeds, and improved market quality” for start-ups.¹⁶

There is also Blockchain as a Service (BaaS). Amazon, Alibaba, Samsung, and others developed

BaaS to help other companies build their own blockchain applications using preexisting infrastructure. According to Blockdata, Samsung, a South Korean multinational, offers services such as:¹⁷

- An enterprise blockchain platform (Nexledger),
- A supply chain traceability platform (Cello Trust), and
- The Samsung blockchain wallet, a noncustodial wallet for its Galaxy phone users.

In the U.S., IBM and Microsoft led the way in offering BaaS to other organizations beginning in 2016.¹⁸ •



Overview of Blockchain Applications

Blockchain applications include cryptocurrency and a wide range of other applications. Although cryptocurrency is controversial, we cannot discuss blockchain adoption without acknowledging the role of cryptocurrency. Other applications are growing every day and sometimes surprise people with their diversity of use cases.

The most well-known blockchain in the world is the public blockchain behind the cryptocurrency bitcoin. By any measure, bitcoin has enjoyed broad adoption. As of September 2022, more than 15,000 businesses accept bitcoin for payment of goods and services, including more than 2,000 in the U.S.¹⁹ Microsoft is the largest U.S. company that accepts bitcoin, and, as of June 2022, the top five industries that accept bitcoin are gambling,

tourism, banking, food, and retail.²⁰

While it was the application to cryptocurrencies that put blockchain technology on the global map, that represents only one application of blockchain. The technology lends itself to dozens of other potential applications across many industries including:

- Online voting
- Insurance policies
- Property and real estate records
- Forecasting
- Medical records
- Cloud storage
- Private transportation and ride sharing
- Copyrights and licenses
- Supply chain tracking.

TABLE 1: COMPANIES USING BLOCKCHAIN SUPPLY CHAIN TRACKING

De Beers Group	Uses blockchain to track high-value diamonds along its supply chain from mine to retail, avoiding conflict diamonds and offering trust in provenance.
Abu Dhabi National Oil Company (ADNOC)	Uses an IBM-based blockchain pilot program to track oil from the well to customers.
Maersk	Uses blockchain technology to track cargo ships and containers.
John West Foods	Uses blockchain to track codes on tuna cans that allow customers to trace the product back to the fishermen.
Ford Motor Company	Uses blockchain technology to trace cobalt supplies used in electric car batteries to ensure quality control and authenticity.

Source: Archana Sristy, "[Blockchain in the food supply chain - What does the future look like?](#)" Walmart Global Tech India, November 25, 2021.

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“Management accountants should absolutely understand blockchain technology because it is being used in their companies or their industries,” said Russ Porter, CFO and senior vice president of strategy, technology, and analytics at IMA® (Institute of Management Accountants). “It’s a potential technology that could be foundational to the profession.” Since accounting reports are a summary of financial transactions over a specified period that provide a concise report of a company’s operations and financial position, utilizing blockchain as the

ledger is ideal. Blockchain creates numerous efficiencies for management accountants and finance professionals to provide strategic direction to their organizations while ensuring corporate compliance.

The Business Case for Blockchain Adoption Is Only Getting Stronger

Increased institutional adoption likely indicates the continued growth of blockchain technology.

Indeed, it would be wrong to infer that institutional blockchain adoption and growth will



AIU 1,822 (-35)	HJI 20,369 (+580)	WWE 890 (-20)	PLQ 6,350 (-200)	EER 10,985 (+580)	QRT 665 (-15)	OPY 6,800 (-115)
MBC 3,605 (+210)	LJH 9,542 (-128)	MJB 2,609 (+35)	PON 7,654 (+169)	NFR 6,522 (+122)	UGH 1,632 (-54)	OMJ 3,652 (+182)
YBV 3,204 (-33)	QMN 5,211 (+156)	MMJ 7,100 (-60)	IIT 7,150 (-150)	KLM 782 (+74)	CCX 1,901 (+101)	EMH 3,280 (-120)
MPB 3,320 (-120)	WFF 712 (+12)	HJM 134 (+5)	QLC 2,022 (-18)	LSD 631 (+40)	SDH 6,287 (-57)	GHS 12,630 (+330)

diminish based on the collapse of cryptocurrency prices in 2022 or the FTX fiasco.²¹ Regardless of specific bad actors and cryptocurrencies' plummeting valuations, the advantages that blockchain technology provide are too revolutionary to ignore. For this reason, financial services firms and many others continue to roll out blockchain-based products that solve real-life business challenges.²²

Governments are also betting on blockchain growth. The European Union (EU), for instance, announced plans in 2021 for a multibillion-euro investment into blockchain infrastructure that provides grants and prizes to fund blockchain research and innovation.

To implement these efforts, the European Blockchain Partnership (EBP) was formed to develop an EU strategy on blockchain and build a blockchain infrastructure for public services. EBP seeks to foster close collaboration among EU nations with respect to blockchain development. As the European Commission states, EBP "supports interoperability and the broad deployment of blockchain-based services. It offers a regulatory-compliant environment in full compliance with EU laws and with clear governance structures and models to help blockchain grow and flourish all across Europe."²³ The EU's ongoing commitment to support blockchain technology could not be clearer.

Evidently, private companies and government agencies worldwide are betting that blockchain adoption will continue to flourish given blockchain's proven advantages.²⁴

What are the pros and cons of blockchain? Blockchain has several key benefits:

- Blockchain creates a decentralized environment that does not need third parties to verify or

transfer ownership.

- It updates and provides users access to data in real time.
- In many applications, blockchain offers multisignature protection or distributed data records, enhancing data security and privacy.
- It confirms provenance.

Cryptocurrency put blockchain on the map, but it is also the most controversial of the blockchain applications.

Efficiency, security, and lack of intermediaries make blockchain ideal for safely storing a broad range of data.

On the flip side, these benefits require certain trade-offs. These could be considered the "cons" of blockchain. For example, blockchain does not allow easy modification of data once recorded. Changes would require rewriting the codes in all blocks in the chain, which is time-consuming and expensive.²⁵ Correcting a mistake or making any necessary adjustments is difficult at best.

Another trade-off, particular to consumer-facing applications such as bitcoin, is that—without a centralized third party governing the database—users cannot recover assets if they lose their private key.²⁶ For these reasons, decentralization is a mixed bag. Still, most observers agree that blockchain's overall benefits far outweigh these trade-offs.

TABLE 2: BLOCKCHAIN PROS AND CONS²⁷

Pros	Cons
Immutability: impossible to erase or replace recorded data; prevents data tampering; enhanced security.	High implementation cost: costlier than a traditional database; organizations need proper planning and execution to integrate blockchain into their processes.
Transparency: decentralized, any network member can verify data recorded into the blockchain; the public can trust the network.	Data modification: difficult to correct a mistake or make necessary adjustments; once data is recorded, modifying that data requires rewriting the codes in all of the blocks, which is time-consuming and expensive.
Censorship resistant: No single authority (including governments) can interrupt the operation of the network.	Speed and performance: slower because it carries out more operations per transaction, including signature verification, consensus, and redundancy.
Traceability: creates an irreversible audit trail; confirms provenance.	Adoption: Since blockchains connect a network of users, they are only useful when the users adopt the platform.
Lower operational cost: no need for centralized servers; lower overhead costs; no banking or payment processing costs.	Data encryption: use of private access keys in consumer-facing applications.
No single point of failure: As a distributed network, with each node sharing the database, blockchain is secure and tamper-proof.	Scalability: fewer transactions processed per second; every transaction must be validated by the majority of the nodes ²⁸ ; network congestion issues; high transaction costs.
Reduced fraud: every transaction validated and its provenance checked via a consensus.	Costs: Some public blockchains continue to use mining or “proof of work”; mining uses a lot of energy for consensus protocol. (That said, most public blockchains now use “proof of stake” (staking) rather than mining, which is much more energy-efficient.)
Enhanced security: encrypts transactions in a digital database, and the transaction history itself is immutable.	Speed: Blockchains need miners ²⁹ ; transactions take longer to complete.

Origins of Blockchain Technology in Bitcoin

To further enhance the management accountant's understanding of this emerging technology, it is helpful to appreciate the origins of blockchain in bitcoin and how the cryptocurrency ecosystem has evolved.

Blockchain technology's history traces back to 1991 when research scientists Stuart Haber and W. Scott Stornetta first proposed digital time-stamping documents in sequence to authenticate authorship of intellectual property.³⁰ At the outset, Haber and Stornetta sought to develop a computationally practical solution for time-stamping digital documents so no one could backdate or tamper with them.

Blockchain's first major application and public debut was in the cryptocurrency bitcoin. The bitcoin whitepaper by Satoshi Nakamoto, titled *Bitcoin: A Peer-to-Peer Electronic Cash System*, was published in fall 2008 at the heart of the financial crisis, and the bitcoin blockchain was

launched in early 2009.³¹ The bitcoin white paper appears to be the first reference to a "chain of blocks" as a system for recording transactions, which is why bitcoin is an application of a public blockchain for recording transactions in digital cash. When it was launched, bitcoin was considered a digital currency experiment. Blockchain makes bitcoin possible because blockchain is the distributed ledger that records all bitcoin transactions. Blockchain prevents the double spend problem, the duplication of currency like counterfeiting, by keeping a record of all the currency and where it is stored. Bitcoin is efficient as a form of digital cash on the internet because the public ledger is jointly updated by numerous participants in an open-source network.³² The ledger recording bitcoin transactions is distributed and decentralized. Every node on the bitcoin blockchain has a copy of the bitcoin ledger (it is distributed), and transactions are verified

by the entire network (it is decentralized). The bitcoin blockchain is what makes bitcoin as a cryptocurrency so secure.

Bitcoin mining is the consensus mechanism for the bitcoin blockchain.³³ Mining is the process of running an algorithm to verify whether proposed transactions are legitimate based on comparing those transactions to the distributed ledger. Transactions involve sending funds from one address to another address. If the miners verify that the funds are present in the sending address, then the transaction is legitimate, and the miners will update the distributed ledger to incorporate the new transaction. Mining is based on a consensus mechanism called proof of work, which is very energy-intensive by design. This is why many people have concerns about the environmental impact of mining. Most newer blockchains use a different consensus mechanism

called proof of stake that uses a tiny fraction of the energy used in bitcoin mining.

Although most people today view it as a form of digital asset for investing, bitcoin is the original cryptocurrency for sending digital cash. Today, millions of people use bitcoin for payments at more than 15,000 businesses worldwide.³⁴ Bitcoin may not be the future of buying pizza and coffee, but it launched a crypto ecosystem that now includes other innovations like stablecoins, which are cryptocurrency pegged to fiat currency (like the U.S. dollar) for the purpose of removing price volatility. Therefore, the crypto ecosystem is continuing to evolve as a form of digital currency. A more recent first was the adoption of bitcoin as a legal tender. As of 2022, bitcoin functions as a legal currency in two countries: El Salvador and the Central African Republic. Reportedly, several other countries are considering taking similar steps.³⁵ •



Smart Contracts, Ethereum, and NFTs

The next major blockchain technology innovation was the smart contract. In the early 1990s, Nick Szabo coined the term “smart contracts” to refer to “a set of promises, specified in digital form, including protocols, within which the parties perform on these promises.”³⁶ Smart contracts are simple computer programs written directly onto the blockchain. They are an innovation because they provide a way to automate transactions on a blockchain.

Smart contracts had their public debut with the launch of the public blockchain Ethereum on July 30, 2015. The original Ethereum white paper was written by Vitalik Buterin several years earlier, and the project was launched by a small group of cofounders. Ethereum is different than bitcoin because it supports smart contracts. The native cryptocurrency of Ethereum is ether (ETH), which is the coin used to pay for transactions on the Ethereum blockchain. The first version of Ethereum, called Frontier, had two basic functions: to enable users to mine ether and run smart contracts. Smart contracts are relevant for business use cases because they allow the use of financial instruments, like loans or bonds, rather than only the cash-like tokens of bitcoin.³⁷

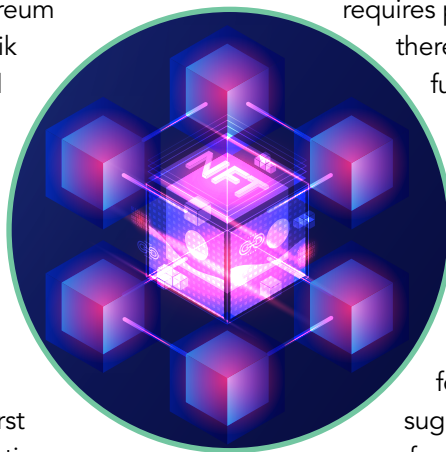
To the extent that businesses begin using smart contracts, public blockchains like Ethereum could become an ideal platform for building these decentralized applications. Bitcoin simply records transactions in the form of payment from one party to another. With smart contracts, Ethereum can record transactions in the form of services provided. This could become an ideal way of categorizing and reporting business services for accounting purposes.

The applications of blockchain range from fungible use cases to non-fungible use cases. Money is fungible, meaning that one unit is the same as another and can be exchanged easily (for example, one \$20 bill for another \$20 bill). Cryptocurrency is a fungible application of blockchain because it is designed to transfer value easily across a network of users. Bitcoin functions as money because one bitcoin is the same as another. This makes cryptocurrency the fundamental payment mechanism on a public blockchain. Executing a transaction on a public blockchain requires payment in a cryptocurrency; therefore, public blockchains do not function without cryptocurrency.

Although most people are now familiar with cryptocurrency as an application of blockchain, there are also non-fungible applications.

Non-fungible tokens (NFTs) are an application of blockchain in the form of unique assets. As the name suggests, NFTs are designed to be non-fungible. They are unique and scarce, recording ownership of a specific asset. Although many NFTs are in the form of digital art and people question the value of NFTs, they are important as a digital record of ownership. Ultimately, blockchain is a technology for recording ownership and the transfer of ownership. The assets whose ownership is recorded on a blockchain could be either digital or physical. NFTs could be used to record the ownership of digital assets like digital art and music, or they could be used to record the ownership of tangible assets like real estate and equipment. NFTs will likely emerge as a system for establishing property rights on the internet.

Cryptocurrency and NFTs are important as it relates to public blockchains because they function as money and assets in the blockchain ecosystem. •



Blockchain and Management Accountants

Blockchain is not simply software for analyzing or visualizing data: It is a foundational technology for recording data. This could have a much more transformative impact than many of the other incremental technologies being explored in accounting.

In “Blockchain Disruption on Management Accountant’s Role: Systematic Literature Review,” Vecco Saputro, Hamzah Ritchi, and Sofik Handoyo acknowledged the foundational nature of blockchain and attempted to identify many areas where blockchain implementation could impact the management accountant’s work.³⁸

For management accountants, blockchain can potentially disrupt (in a good way) certain aspects of such tasks as:

- Accessing performance data in real time,
- Facilitating continuous financial monitoring,
- Leveraging decreasing operations costs, e.g., data transmission costs,
- Leveraging the ability to better track error information,
- Leveraging the increasing accuracy and reliability of a company’s underlying transaction and operational data,
- Implementing more efficient and effective accounting practices throughout the organization, and
- Improving corporate compliance and internal controls.

Accessing performance data in real time.

Blockchain enables management accountants to access accounting-related data (and other data) on demand, in real time due to the transparency and accessibility of the distributed ledger. Such access accelerates decision making and risk management. In particular, the ability to analyze their organizations’ performance data should enhance their ability to recommend immediate corrective actions when needed.

Facilitating continuous financial monitoring.

Blockchain’s distributed record database allows financial professionals to continuously monitor the flow of assets or transactions. Consequently, organizations can use continuity to curtail potential harmful activity, such as fraud or unlawful earnings management activities. Also, with blockchain technology, the underlying foundations of auditing and internal control can be embedded into each transaction, facilitating real-time audits and monitoring instead of retroactive examinations.³⁹

Leveraging decreasing operations costs.

Reducing unnecessary data transmission and other costs is a natural result of blockchain technology implementation. (This is different from rollout costs, which can be high.) In addition, an organization will achieve improved data integrity, which would be expected to reduce overall administrative and other costs.

Leveraging the ability to better track error information.

The time and effort required to discover errors or distortions across a company’s operations readily improves with blockchain tracking technology. Supply chain tracking is one significant example of how blockchain facilitates tracking issues.

Leveraging the increasing accuracy and reliability of a company’s underlying transaction and operational data.

As previously noted, blockchain-recorded information is irreversible and stored data cannot be tampered with. Once a transaction record is in the network, it is hard to manipulate or change the data, rendering transaction-level information and overall accounting information increasingly reliable. Information updates in real time also increase accuracy and reliability.

Implementing more efficient and effective accounting practices throughout the organization.

By creating irreversible records and transaction data for all authorized users, blockchain accounting

systems contribute to higher information integrity, increased speed of transaction settlement, and enhanced fraud prevention. Accounting and processing costs decrease, and the company's practice is more efficient overall.

Improving corporate compliance and internal controls. The availability of blockchain technology helps improve a company's internal controls, risk mitigation practices, and fraud prevention because the management team has real-time access to relevant data.

For example, blockchain can vastly improve a company's ability to efficiently comply with know-your-customer (KYC) and anti-money laundering (AML) regulations globally. KYC rules require vetting customers to establish their identity and risk profile on an ongoing basis. In financial services companies, KYC systems are notoriously

"clunky" and stand to be improved.⁴⁰ KYC compliance is designed to help prevent identity theft, money laundering, financial fraud, terrorism financing, and other financial crimes. Failure to comply poses threats of significant monetary fines and penalties and can result in authorities shutting down business operations.

In the financial technology (fintech) industry, participants are betting that blockchain technology can provide excellent solutions to their KYC implementation processes. With blockchain, companies can simplify client onboarding and improve access to client data, which improves monitoring of activity and reduces administrative time and costs dedicated to data maintenance. Therefore, blockchain adoption can lead to better compliance outcomes. •



The Ethical and Governance Risks of Blockchain Adoption Are Manageable

In general, adopting new technology introduces new ethical and governance risks, and blockchain technology is no different. Management accountants can assist the rest of the management team and the board of directors in analyzing and overcoming these risks.

From a corporate governance standpoint, there are several overarching issues to consider before assessing ethical and governance risks. First, management accountants can help the rest of the management team and the board of directors determine:⁴¹

- Appropriate potential uses of blockchain technology for their industry and organizations,
- Their organization's commitment and ability to deploy the necessary internal controls to maintain security,
- The necessary tools needed to monitor the governance and health of each blockchain platform their organization partners with, and
- Their organization's personnel/skill sets to maintain appropriate blockchain applications on an ongoing basis.

Once a decision is made to adopt blockchain technology and the necessary personnel and infrastructure are in place, an organization can zero in on potential ethical and governance risks. In a May 2022 *Harvard Business Review* article, Reid Blackman identified four overarching ethical and governance concerns around blockchain adoption that management accountants should be cognizant of:⁴²

1. A lack of third-party protections
2. Privacy violations
3. The zero-state problem
4. Bad governance

Lack of Third-Party Protections

As Blackman noted, when transactions take place

without a third party, customers have no one to whom they can appeal for help. Management accountants must understand the related risks and be able to explain the implications to the management team and the board of directors, and ensure everyone is fully on board. Any external auditor should also be informed. Depending on the scenario, management accountants might consider proposing a non-blockchain workaround, as Blackman suggested.⁴³ In some cases, organizations should consider obtaining informed consent from anyone who may be impacted.

Privacy

As previously discussed, the most popular blockchains, bitcoin and Ethereum, are public. On public blockchains, all transactions can be seen by anyone. Given that management accountants are often dealing with internal, proprietary information, the use of a private blockchain may be preferred given the industry. Regulations around data privacy may also impact compliance considerations. Again, management accountants can help their organizations assess their ethical duty to balance transparency and privacy and then decide which option (either public or private, or a hybrid) is appropriate for their organizations. "There's a lot of potential applications management accountants would benefit from knowing because they may be able to help build those types of systems and help the trust equation work more efficiently for their companies," Porter says.

Zero-State Problem

Do you remember the saying "garbage in, garbage out"? Well, this almost describes the concept of the zero-state problem Blackman identified.⁴⁴ The zero-state problem occurs when the accuracy of the data contained in the first block, or "genesis block," of a

blockchain is in question.

According to an analysis published by Deloitte, the integrity of data recorded on the blockchain depends on:⁴⁵

1. The integrity of data input by everyone on the network, including, of course, the genesis block;
2. The effectiveness of the blockchain validation and consensus mechanisms;
3. The processes each participant implements to promote blockchain's effective operation; and
4. The controls implemented over outputs from the system.

Assuming all these safeguards over data input and output are met, blockchain data is highly reliable. But a problem on the genesis block—such as hacking, fraud, or bribery—would tarnish the integrity of the data.

To prevent the zero-state problem from happening, it is important that blockchain access is monitored and that those adding “blocks” are properly trained. Blockchain users must perform due diligence, and the management accountant can assist with this ongoing process.

When conducting due diligence, Blackman appropriately recommended specifically vetting how the genesis block was created and where the data was sourced from for a specific blockchain.⁴⁶ Find out if a reliable third party has audited the blockchain at issue. If the blockchain relates to items prone to fraud or bribery or other risky behavior, for example, special consideration must be given. Blackman recommended disclosing three things to those potentially affected:⁴⁷

- The zero-state problem,
- The due diligence conducted on the genesis block, and
- What, if any, protections are in place to prevent fraud or malfeasance.

Management accountants may recommend other disclosures depending on the specific circumstances of each case.

Governance

One of the common misconceptions about blockchain is that being “decentralized” or

“permissionless” equates to a lack of governance. This could not be further from the truth. In reality, blockchain governance is quite complex. A blockchain's creators have to set forth at the outset “who has power; how they acquire it; what, if any, oversight there is including; and how decisions will be made and operationalized.”⁴⁸ Making any changes to these significant items after the fact is not easy.

Given the ongoing headlines regarding the volatile cryptocurrency market, including the collapse of the cryptocurrency exchange giant FTX and the indictment of its founder and CEO Sam Bankman-Fried, it is not surprising that many are skeptical about the cryptocurrency space.

Many blockchains use a form of decentralized governance known as decentralized autonomous organizations (DAOs). A DAO is a community-led entity with no central authority. It is fully autonomous and transparent: Smart contracts lay the foundational rules and execute the agreed-upon decisions, and, at any point, proposals, voting, and even the code itself can be publicly audited.⁴⁹

As Blackman aptly noted, blockchain governance can raise various “significant ethical, reputational, legal, and financial ramifications” for anyone partnering with the blockchain.⁵⁰ To properly advise clients and mitigate risk, it is imperative that management accountants understand the governance structure of a particular blockchain, including with respect to how potential issues will be resolved. •

CONCLUSION

As blockchain technology expands into multiple industries, it will be important for management accountants and finance professionals to stay knowledgeable about how blockchain can be a value-add to their organizations. We must remember that blockchain adoption extends well beyond cryptocurrency and has been utilized to improve organizational efficiencies such as real-time access to financial reporting and other operations data. As blockchain technology becomes embedded throughout various industries and additional blockchain applications continue to surface, we can expect heightened regulatory scrutiny.

Key takeaways for finance professionals include the following:

- Blockchain adoption is growing across a wide range of applications beyond cryptocurrencies.
- Adopting blockchain technology has improved efficiencies within organizations.
- Public blockchains and cryptocurrency are an important part of the blockchain ecosystem.
- Concerns about potential ethical and governance risks associated with blockchain adoption can be mitigated.
- Management accountants should be assessing the future role of this rapidly emerging technology. •



ENDNOTES

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