The rise of blockchain technology and its potential for improving the quality of accounting information

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ABSTRACT

The recent rapid growth of blockchain technology is currently revolutionizing crypto currencies, monetary transfers, asset tracking, contract execution, and trust relationships. This paper attempts to discuss the origin of blockchain technology, current uses, and potential applications that can possibly strengthen the timeliness, quality, and accuracy of accounting information. The paper will also examine the efficacy of several practical accounting applications.

Keywords: blockchain technology, accounting, shared ledger, smart contracts

INTRODUCTON

Blockchain technology is providing the foundation for a new form of monetary settlements that has the potential to challenge the global fiat monetary structure. Bitcoin, a recently developed cryptocurrency that has garnered both widespread acceptance and speculation, is based on the operational functionality of a blockchain. Blockchain technology distributes a ledger over a system of connected computer networks rather than a centralized system. A blockchain is a computing data structure that contains all transactions since the origination of the blockchain. This structure is copied and shared among all participating computers connected to the network. When a new transaction is submitted, the transaction is batched along with other transactions as a "block" and is periodically added onto the front of the blockchain as the latest "block" of transactions. Once the "block" is recognized by a majority of machines, the network of participating computers update their blockchain to reflect the accepted blockchain (Pilkington, 2015).

The emergence of a ledger maintained on a blockchain is of special interest to accountants. The backbone of modern accounting and reporting is based on double-entry bookkeeping that is maintained in some form of ledger. Additional ledgers and sub-ledgers are pervasive in the accumulation and maintenance of financial records. The organization of these various ledgers comprise what constitutes U.S. Generally Accepted Accounting Principles or GAAP based financial statements. GAAP serves as the foundation for the Financial Accounting Standards Board's or FASB's objectives, usefulness, and limitations of general purpose financial reporting. Effective implementation of blockchain technology into the accounting ecosystem has the potential to improve the quality of information that is incorporated into the financial reporting process.

The objective of this research paper is to discuss the origins of blockchain technology, current uses of this technology, and potential applications in accounting and reporting.

THE BASICS OF BLOCKCHAIN

Blockchain is a technology that is based on distributed ledgers. The ledgers consist of "blocks" of information that are tied together cryptographically. This allows multiple parties to view the contents inside the block while what is inside the block remains protected. Common characteristics of blockchain include real-time distribution, authentication of each block by consensus (use of cryptography), and validation of each block. It is difficult to alter the historical records as each transaction and addition is time stamped. The blockchain also includes programmability to execute certain transactions without further action by users (U.S. House). The blockchain is further described as "a digital ledger of economic transactions that is fully public, continually updated by countless users, and considered impossible to corrupt. It is a list of continuous records in blocks" (Carzolo 2017). To clarify this definition, a specific blockchain can be customized to make it not fully available to the public but only viewable to authorized users.

"Blockchain has several advantages. First, it currently exists as a peer-to-peer network that has no single point of failure. If there is a failure in any node, the other nodes will continue to operate, maintaining the system's availability and viability. Second, almost the entire documentation is digital and can be easily applied to many different applications. Third, all transactions on the Blockchain are visible to all its participants, with the corresponding

increase in auditability and trust. Fourth, changes to the Blockchain are extremely difficult and if such a change occurred, it would be visible to the other users and if not validated, it would not be included in the block. These advantages of Blockchain technology will eliminate third parties, lower transaction costs, and cause transformation in many industries" (Fanning and Centers 2016).

The concept of the blockchain was developed by an unknown person using the pseudonym Satoshi Nakamoto (Nakamoto 2008). Nakamoto's creation of Bitcoin as a peer-to-peer payment system is based on blockchain technology. What is unique about the blockchain is that it creates an innovative method to catalogue and account for data. Shared recordkeeping, a unique feature of the blockchain, allows the "trust" element in various relationships to be determined by consensus versus promise.

CURRENT USES

Cryptocurrencies such as Bitcoin, Ethereum, and Litecoin have garnered significant attention and are based on blockchain technology. Although nascent in development, a variety of entities are developing other uses of blockchain technology to create business opportunities or solve problems. The banking and finance arena is developing applications for international payments, capital markets, and trade finance. Insurance companies are developing smart contracts to use in claims settlement. Business uses include supply chain management, healthcare data records management, and real estate transaction history. Governmental uses include record management, identity management, and voting.

Essentially, the blockchain allows for a new method to organize, record, and validate transactional recordkeeping. Most recordkeeping today requires a centralized trust authority. Corporations and governmental entities use a variety of systems and access authority levels in order to maintain control of relevant data and information. Using a centralized ecosystem limits the amount of resources that are used to maintain the integrity of the data increasing the likelihood that human or system corruption can occur without adequate internal controls. By contrast, the blockchain eliminates the need for a centralized authority by tasking the trust element of the relationship to a consensus-based format.

A supply chain management example might best illustrate the revolutionary potential of blockchain technology. The vice president of Walmart's food safety program walked into a local Walmart and purchased a package of sliced mangos. Back at his office, it took his team 6 days, 18 hours, and 26 minutes to trace the mangos back to their source. He then partnered with a technology firm to test the use of a blockchain to trace mangos from the farm to the stores. The mangos were tagged with a numeric identifier and were scanned and tagged every step of the process. Upon entering the unique identifier into a web portal, the manager was able to instantaneously get a record of the exact date, time and location or the movement of the mangos. Besides the efficiency of information retrieved, the use of this technology can eventually protect lives as in this case quickly identifying the source of a foodborne illness (Hacket 2017).

Although implementation is in its early stages, it is not difficult to conceptualize a plethora of applications. The blockchain can provide an unalterable permanent record of changes in ownership history of an asset. As knowledge is deemed to be the basis of

competition, (Civi 2000), the effective implementation of blockchain technology will allow adopters to establish a competitive advantage in the marketplace.

Additional uses that are beginning to transform business interactions are the development of "smart contracts." Using the blockchain, rules are established that automatically execute a contract when certain criteria are met. For certain types of transactions, this eliminates middlemen and redundant paperwork. These types of smart contracts work like an "IF" function in Microsoft Excel; however, the function is shared between the parties involved in the contract. An example would be a standby letter of credit. Instead of assembling all necessary paperwork that would be presented to a third-party bank by an importer / exporter, all steps along the way could be recorded, validated, time-stamped, and marked as complete to give a real-time release of funds once all preset conditions are met.

There exist many roadblocks which limit immediate and unquestioned implementation of blockchain technology. It addition to allocating significant resources for technological readiness, Deloitte has created blockchain proof of concept teams and developed a blockchain readiness framework. Within this framework they propose twenty questions that must be asked (and answered) that will be key in driving the success (or failure) of blockchain proof of concept projects (Deloitte 2017). The implementation of blockchain will require substantial efforts in planning and implementing processes and procedures and will most likely not be considered a standard technological upgrade process.

POTENTIAL ACCOUNTNG APPLICATIONS

The greatest opportunity for accounting also contains significant risk. Although efficiencies and validation accuracy can increase with the use of a blockchain, a user also must accept the risk of broadcasting potentially proprietary or trade secret information. Instead of keeping information with a central authority (i.e. controlled company data base and or ledger), the blockchain allows transactions to be broadcast on a distributed ledger. This technique solves two important issues in the accounting ecosystem: one, it increases the accuracy of information by having multiple parties validate and question the inputs. Second, if used in conjunction with an audit it provides audit evidence that can be used as part of an attestation engagement. Auditors working with clients would be able to integrate substantive testing by having access to a client's relevant blockchain that form the basis of financial assertions. Validation via the blockchain is a substantive procedure with external confirmation, a higher level of evidence than client supplied data. The chairwoman of the AICPA recently noted that the use of the blockchain would allow auditors to verify large amounts of routine data automatically allowing them to focus time on more complex transactions and controls (Tysiac 2017).

One way to illustrate the use of a blockchain (Table 1) would be to analyze its use for the recording and maintenance of an Accounts Receivable for one company and an Accounts Payable ledger for another. Assume company A sends product frequently to a major customer company B and outsources part of the process to a third-party fulfillment center. A private blockchain could be established so that companies A&B maintain a shared ledger to authenticate and record Accounts Receivable for company A and Accounts Payable for Company B. Authorized parties from each company and the third-party fulfillment center would validate the existence, valuation, and completeness of each transaction through agreed

upon criteria. Upon validation of a sale and purchase under GAAP criteria, the "smart contract" feature would initiate the recording of journal entries to reflect the financial statement impact of the transaction. This review process by consensus creates a form of notarization that provides greater transparency and accuracy for each transaction. If the company undergoes a financial statement audit, the blockchain could be accessed by the external auditor and form the basis for substantive testing for certain financial assertions e.g., completeness and accuracy.

RISKS AND OPPORTUNITES

The potential opportunity for use of blockchain is clear. Goldman Sachs notes that "Blockchain has the potential to change the way we buy and sell, interact with government, and verify the authenticity of everything from property titles to organic vegetables. It combines the openness of the internet with the security of cryptography to give everyone a faster, safer way to verify key information and establish trust" (Goldman 2018). Large numbers of corporations have blockchain projects underway; however, it appears that full scale implementation is not yet taking place. This will most likely change as early adopters reveal success stories.

One undetermined aspect of implementation is whether the benefit will outweigh the cost of implementation. Full scale replacement of legacy systems and processes is currently not practical as the full benefit of blockchain technology cannot be realized unless there is participation from relevant outside parties. This presents a dilemma for implementers who want to move beyond the exploratory stage—can significant capital expenditures be justified for a technology that currently has limited usefulness? The most likely roll out will be specific and narrow scope projects that will allow clear and timely follow up and analysis. During a recent technology roundtable sponsored by the Journal of Accountancy, a participant predicted a likely path of implementation stating "I specifically think private blockchain implementations will surface first, in and around certain use cases—think high value transactions Then, once we get past the proof-of-concept stage, we'll see some trendsetters, companies we don't even know about today, coming up with some killer app, some killer approach, something imaginative and transformative" (Drew 2017). This likely scenario means that implementation of blockchain technology will be driven by entrepreneurial solutions versus corporate mandate.

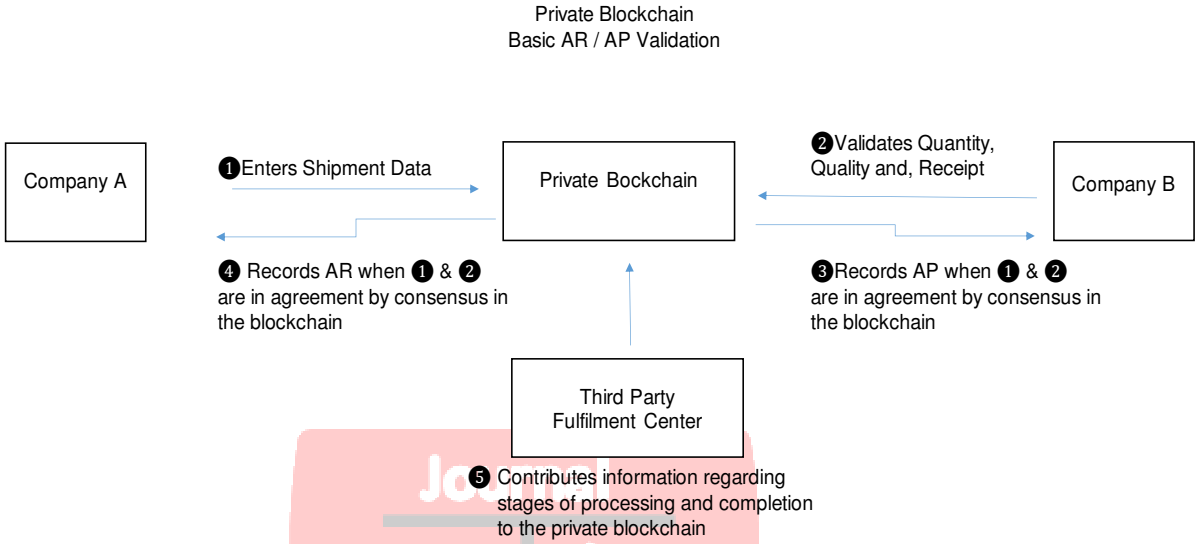
There are contrarian viewpoints that challenge the potential importance of blockchain technology. During a recent Journal of Accountancy annual technology roundtable, J.Carlton Collins likened the potential impact of blockchain technology on the accounting profession to the implementation of XML technology that was developed a couple of decades ago. He notes "There was much promise in those technologies and many people believed at the time that XML would transform accounting, and it did just that for SEC reporting companies. Still I think these technologies have been very underutilized" (Drew 2017)

CONCLUSION

The emergence of blockchain technology has the potential to disrupt the way information is recorded, organized, verified, and disseminated. Accounting applications using blockchain technology are being developed however full-scale adoption and implementation has yet to occur. Blockchain technology will certainly be a consideration for enterprises that seek to improve the timeliness, quality, and accuracy of accounting information. As theoretical

applications transition to successful proof of concept successes, the use of blockchain technology will become an integral part of the information technology ecosystem.

Table 1



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