

Blokchain technology as a management tool to increase the quality of the accounting and financial information

La technologie Blokchain comme outil de gestion pour l'amélioration de la qualité de l'information comptable et financière

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Abstract:

Business runs on reliable information. The faster it's treated and the more accurate it is, the better. Nowadays, it is necessary for a firm to be able to record each transaction by identifying the who, where, what, how much and even the conditions of the operation. The used data system must analyze the movement of the assets and deliver the information immediately to all the concerned users by recording all the supporting documentation. Blockchain technology is transforming industries. This technology stores information in digital forms and guarantees the transparency of data. It has fundamentally altered how information are created, tracked, transferred and approved in accounting. The aim of this paper is to discuss the implications of Blockchain for accounting and financial controls practices. We argue that in the short term the technology could be used as a platform to disclose and treat the information flows. Also, in the long term, we demonstrate that it reduces errors in disclosure statements and increase the quality of accounting information and the asymmetry of the data in financial statements. Finally, we illustrate the innovative aspects of Blockchain and its eventual influence on the performance of the firm in the years to come after using it.

Keywords : Accounting ; Blockchain ; Financial information ; Management tool ; Information flow

Résumé :

Toute entreprise fonctionne sur la base d'informations fiables et valides. Une information, traitée de manière instantanée et avec précision, sera considérée comme une donnée viable et précise. De nos jours, il est indispensable pour une entreprise d'être apte, lors de l'enregistrement d'une transaction économique effectuée, à retracer les acteurs impliqués, les lieux, les flux concernés ainsi que leurs valeurs et conditions d'exécutions. Le système de données utilisé doit permettre d'analyser les mouvements des actifs de l'entreprise et mettre à disposition des acteurs concernés, les informations nécessaires en temps réel avec l'ensemble des pièces probantes qui justifient l'opération effectuée. Dans ce sens, la technologie Blockchain a transformé les industries. Elle a fondamentalement modifié la manière à travers laquelle l'information est créée, suivie, transférée et approuvée en comptabilité. L'objectif de cet article est de traiter des implications de la Blockchain pour les pratiques de contrôle des informations financières et comptables. Nous supposons dans un premier temps, que sur le court terme, cette technologie doit être considérée comme une plateforme qui permet de révéler et traiter les flux d'informations avec précision. Tandis que sur le long terme, elle permettra de réduire les erreurs dans les états de synthèses de l'entreprise, et améliorer en conséquent la qualité de l'information comptable et l'asymétrie des données contenus dans les états financiers. Finalement, nous démontrons l'aspect innovant de la Blockchain et son éventuel impact sur la performance de l'entreprise.

Mots clés : Comptabilité ; Blockchain ; Informations financières ; Outil de gestion ; flux d'information

INTRODUCTION

The Blockchain technology appeared in 2008 with the emergence of the cryptographic currency and the peer-to-peer crypto exchange BITCOIN. It was the first implementation widespread of the Blockchain that consists of a set of protected information blocks chained chronologically to one-another. The purpose was to share information amongst all users that are concerned by the operation and access to it via an application. The shared information is protected against modification so as any alteration would be detectable. However, the use of Blockchain technology has expanded to other fields since cryptographic currency inception. It has broadened its technical foundation to assist and control other various businesses such as industries, banks, government services ... They started investing on this application programs to secure a competitive advantage that will become, in the future years a necessary management tool. Industrial companies use Blockchain to trace and track all the physical and financial flows as they move through the supply chain. For inter-organizational structures it allows to track all the components of the processes starting from purchasing raw materials, going through its transformation, and finally to the deliverance of the final product to the costumer. In fact, Blockchain is considered as a solution to securely track and share DATA between various business.

Blokchain is obtaining an increased attention from financial, accounting and audit professionals. This innovative technology is meant to decrease trading costs, reduce fraud risks, improve the accuracy and the completeness of the information registered in the financial statements of the firm (Fanning & Centers, 2016). The most of the current literature commonly discuss about the Blockchain technology application; its challenges, opportunities for auditors and accountants. While it is necessary to appreciate the innovative aspects of this technology to increase the quality of the financial and accounting information used to monitor the business strategy. Blockchain's benefits of instant sharing information and protecting data, could develop a new accounting ecosystem. In this ecosystem, The Blokchain technology will be considered as the accounting information system that supports all the Data and distributes the ability of transaction storage and control to a defined group of users in order to prevent any unauthorized modifications. This mechanism will provide a real time reporting of financial and accounting information to all the concerned parties at various aggregation levels based on their hierarchical level and their demands.

Blokchain is also presented as a management tool that considers all the procedures and all the internal instructions to monitor all the operational processes of the organization.

The purpose of this article is to identify what are the impacts to be expected from the use of this technology in the fields of accounting? To what extent could Blockchain technology be considered as a management tool to afford secure financial information and real-time Data. Specifically, we seek to illustrate the role of Blockchain in the identification, and the control of the financial and accounting information within the firm. First, we present the Blockchain and its application. Therefore, we analyze the benefits of the Blockchain system to serve the financial and accounting information. Finally, we provide an illustration of the Blockchain-based accounting ecosystem.

1. BLOCKCHAIN : DEFINITION AND APPLICATION

This first part will define the concept of Blockchain: its characteristics and background. We will also explore the application and potential utilization of this technology in the accounting

1.1. Literature Review

According to Delahaye (2014), Blockchain can be considered as a large “virtual” notebook that everyone can read freely, where anyone can write, but which is impossible to erase and destroy. The architecture of this technology is designed to be a decentralized open access Database. Blockchain technology becomes popular by being commercially adopted and influencing word currency markets. It is becoming one of the most promising data systems for the next generations of interaction systems. This technology, initiated by Nakamoto in 2008, consisted on a chain of blocks to create a secure digital currency system that is decentralized and publicly available. This blocks are arranged in a chronological order and shared to a large network (Yermack, 2017). As confirmed by Lee Kuo Chuen,(2015), Blockchain is a sequence of blocks which holds a list of transactions that are recorded in a conventional public ledger. Each Block points a previous block via a reference . It can be considered as a new accounting database that register all the transactions of the digital currency into blocks. Therefore, it means that all the nodes of the system have access to the entire information about the transactions.

Blockchain technology is being applied beyond financial transactions to all economics transactions of a firm. (Christidis & all, 2016). All the transactions must be authenticated and diffused in real time with all the concerned actors and participants in the network.

The system is also able to examine the identity of each payer and payee involved in the transaction based on a key cryptography system. It also verifies whether the payer dispose of enough money for the next transactions to occur. All those design features aims to ensure the

integrity, security and completeness of published transactions. It's almost impossible for a user or malicious actor to tamper with the existing Blockchain records.

Actually, this innovative system overcomes in terms of maturity; its classic functioning. International organizations invest in Blockchain technology in order to track orders, accounts, payments, goods and much more. It allows to be informed of all the information related to a transaction from the input to the end. Blockchain system provides immediate, shared and transparent information stored on an immutable ledger. All the members of the network have a public access to the ledger but the transactions can be recorded only once without any possibility of duplication and that is the main difference with the other traditional business network. No member can tamper with a transaction after registering it on the shared ledger. If there is an error, a new transaction must be added so as to reverse the error and then both transactions are visible.

1.2. Types of Blockchain :

Blockchain platforms can be public, private or permissioned¹.

A public Blockchain is the system where any node in the network can participate and create transaction. The disadvantage might be the no privacy of some relevant transactions that impacts the strategy and the expertise of the organization.

In some cases, where the use of Blockchain is operated within a group of firms, the permission to write, read and verify in the system could be limited to certain companies. Such system is defined as Private Blockchain (Pilkington, 2016). Only one entity governs the network, controls who is allowed to participate and control the shared ledger. It usually involves a limited number of participant and the information is only accessible to those predestined participants. They can only need to share certain accounting records among predetermined departments within the organization or with some of their suppliers and final clients. This architecture allows to protect the confidentiality of significant business Data and insures the privacy of the transactions.

The third type of Blockchain is the Permissioned Blockchain (Peters & Panay, 2016). The design of this type of network requires a central authority that have the role of selecting the participant and approving the access. These participants need to obtain a permission to join the shared ledger. It's a closed network where can be regrouped participant from different businesses but who are concerned conjointly about some transactions or instructions related to a transaction.

¹ See Table n°1: The comparison between the three types of a Blockchain network

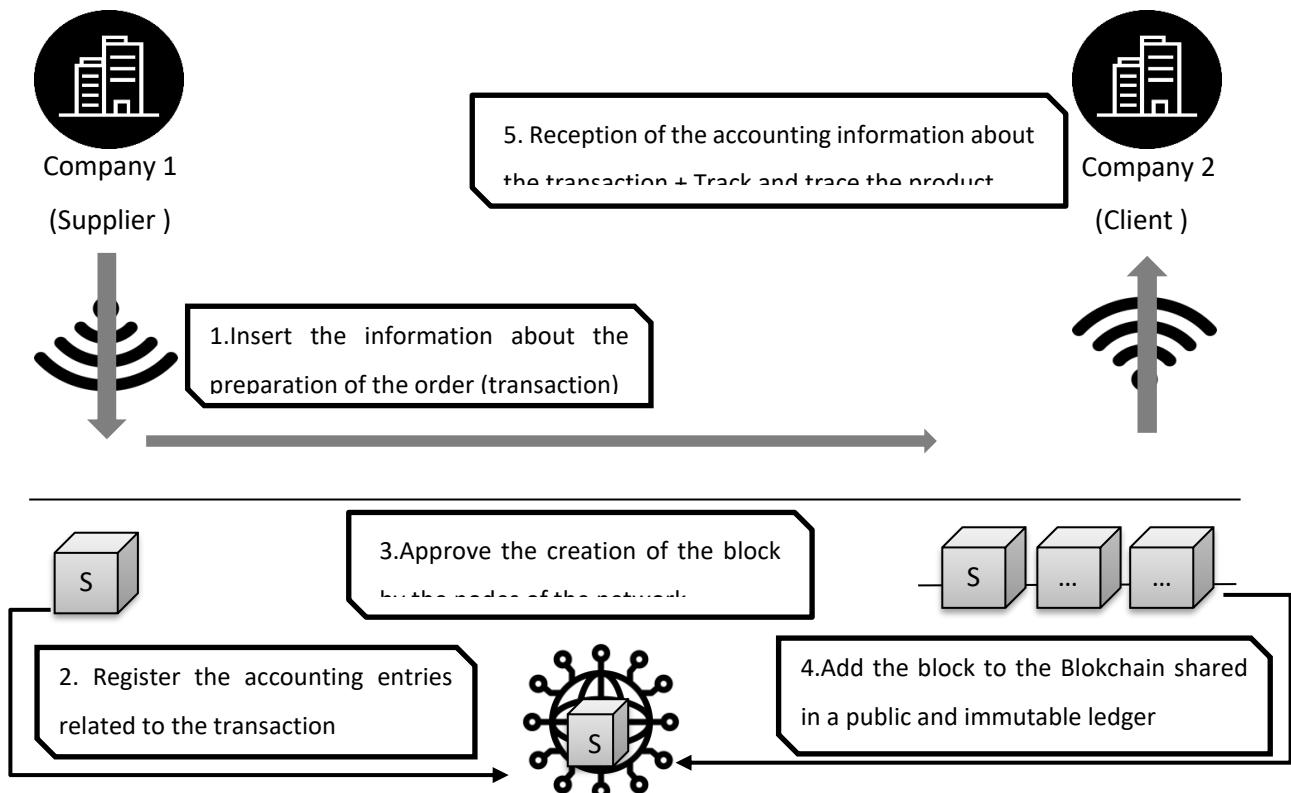
Table 1. The comparison between the three types of a Blockchain network

	Public	Private	Permissioned
Type of network	Open Network	Closed Network	Closed Network
Key attributes	- Full transparency of the transaction - No central authority - Privacy of data depends on the technological limitation of the system	- Controlled transparency of the transaction - Private group authorizes participation - Privacy of data depends on the technological innovation of the system and its application	- Controlled transparency of the transaction - Central authority - Privacy of data depends on the central governance decisions.
Advantages	- Decentralization of the information - High transparency - Accessibility across locations and nationalities - Accurate and timely Data - Greater security - Time-wasting record reconciliation is eliminated - Resilient system	- Stronger information privacy - Greater security - Time-wasting record reconciliation is eliminated - Faster Network - Resilient system	- Stronger information privacy - Greater trust of the shared information - Greater security - Time-wasting record reconciliation is eliminated - Scalable Network - Resilient system
Drawbacks	- Limited user privacy - Uncontrolled information - Slow network-wide transactions verifications	- Limited transparency - Limited decentralization : Risk of collusion	- Limited transparency - Limited decentralization to fewer participants : Risk of corruption

1.3.The functioning of Blokchain technology:

Blockchain application consists to follow four main steps that transform the information within the data system and record the information flows according to their nature. The following figure illustrate the process of recording information for an executed transaction.

Figure n°1: The design of Blockchain application



Source : Author

The first step (1) consists to insert all the information about the transaction for the concerned parties in the public shared ledger of Blokchain (e.g. the financial transactions, contracts, accounting entries, technical and commercial specificities...). The company (1) submit his request via a software interface (Internet) connected to the network.

For the second step (2), it is about to register the request related to the creation of the transaction by adding a Block that contains all the information gathered and predefined by the users of the network. The block will be disposed in “the queuing system”.

Therefore, the block must be approved by the nodes of the network (Step 3). The block will be added in a chronological order in the immutable public ledger.

The fourth step (4) is the key step of the Blokchain system. Each Block must be joined to the Blockchain by verifying the integrity and viability of the contained information and documents.

When the users of Blockchain technology validate conjointly the exactitude of the transactions, the Block is added to the Blockchain (e.g. in Figure n°1: Users (1) and (2) will have access to the same information and document registered in the Blockchain).

Finally, in step (5) the users can consult and control at different intervals all the information related to a transaction.

2. BLOKCHAIN TO SERVE THE FINANCIAL AND ACCOUNTING INFORMATION

2.1. Benefits of Blockchain to store reliable accounting and financial data

As mentioned in the first section, the accounting professionals must benefit from Blockchain and its implications. The system must operate to securely store accounting Data by sharing them with the interested parties in real time. In fact, it will increase the viability and the exactitude of business data. Thanks to Blockchain technology, organizations will be able to create new accounting information systems that includes not only financial exchanges between two parties, such as cash deposits and the recovery of money... but also the accounting data flow within all the departments of the firm. Moreover, it would enable a real time reporting by broadcasting accounting information to the predestinated parties such as the top management, managers, stakeholders and auditors. In this system, those parties will actively collaborate in the authentication of the transactions and provide reliable evidence for an instantly cross-validation.

Nowadays, accounting information in modern business world is automate. The accounting standards are integrated automatically into the software system of the firm that execute and support the recording processes (Krahel, 2012). Through Blockchain technology, accounting processes will be automated by encoding instructions and agreements related to business functioning on “smart contract”.

A “Smart contract” is a type of application that was used to expand the trading from a digital currency to a large variety of products (Swan, 2015). It is a computer program that autonomously verify and execute the instructions in contracts (Kiviat 2015). Also, the smart contracts execute pre-determined tasks and settle contracts by controlling autonomously changing conditions in conjunctions with the contract’s terms.

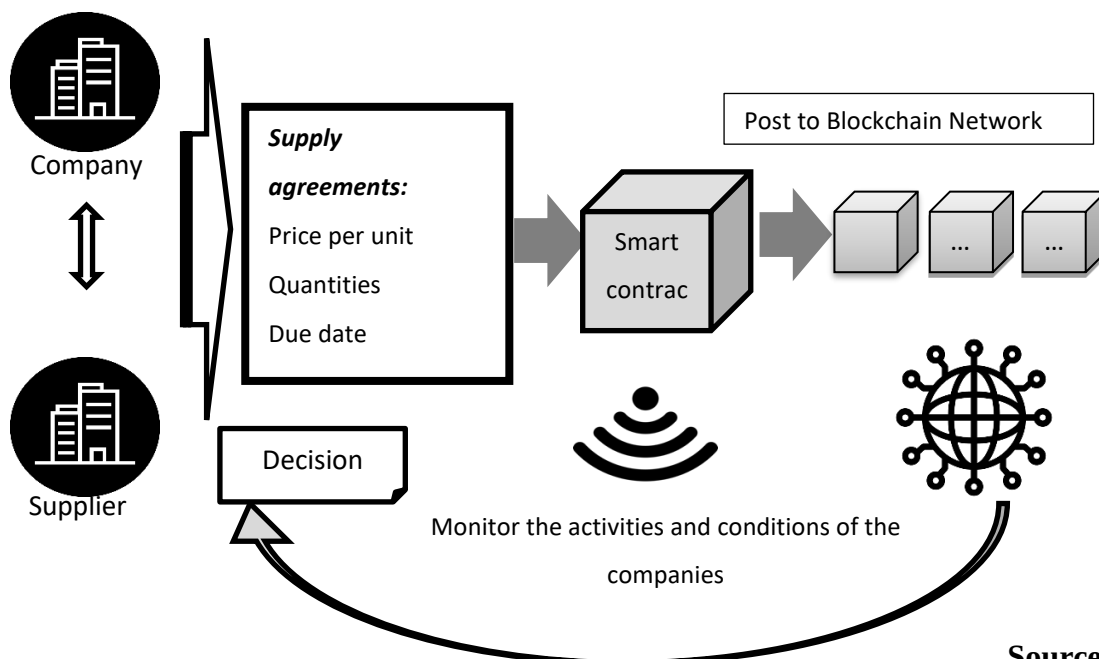
This function of Blockchain will help to considerably reduce the risks within any transaction. For example, when a company agrees upon a covenant with his supplier, the conditional terms are encoded into “Smart contracts” that will be deployed into a Blockchain. Then, the nodes in

the Blockchain, as presented in the first section, will control the activities and conditions of the company against the requirements predefined in the smart contract. If a violation of the covenant is detected, the Blockchain system will instantly activate the portion of the smart contract related to that violation. This could result an issuance of a warning, a credit memo or a contract cancellation.

In fact, a company that relies on Blockchain network will be able to self-organize and operate its own business: All the decision- making processes, management programs and their orientations will be stored in smart contract. The accounting information will be then more verifiable and the risks eliminated.

The design of smart contracts can involve a several range of participants such as auditors, lawyer, business partners, management, bank...

Figure n°2: Design of the functioning of Smart contract in Blockchain



Source: Author

The dematerialization practices will have a significant consequence for organizations in terms of costs and organization. The inception of Blockchain technology will mark the end of accounting and contractual records by reducing the paper consumption and helping the concerned parties to read and verify the supporting document in real time on the network.

Ideally, it will transform accounting into a conjointly certified information system that is shared to all the concerned parties. The accounting and financial information will be no longer compartmentalized. The majority of accounting operations reflect an economic transaction

between the company and an external entity which can lead to think about a joint accounting system where an accounting operation is validate by the seller and the purchaser. This will reduce the number of accounting entries to verify, and the possibility to execute an audit instantly.

In sum, the benefits of Blokchain and its potential effects in accounting are threefold:

The first benefit is the dematerialization of the information processing. The supporting documents related to an accounting entry are conserved in the public ledger, over time, and immutable. This, will increase the viability of the accounting Data and provides an instantly self-control of their compliance to accounting standards. Also, the non-use of paper will decrease the costs related to the consumption of paper.

The second major advantage of Blokchain is the increase auditability of the accounting information. The system provides a true and fair view of the financial statements in real-time. For the accountant, he can at any time generate the final statement and refer to them because all the smart contract on the Blokchain system were validated by relevant professional concerned by the transactions such as lawyer, auditors, suppliers and regulators... For the stakeholders, they will have access close to real-time to the reliable accounting information and consequently verify if they reflect the strategy and policies of the organization.

Finally, the third benefit is the securement and coordination. Blokchain guarantee the authenticity of the supporting documents of the accounting information and make the flows more secure thanks to smart contracts. Furthermore, it allows a joint validation of the operations and accounting entries. This benefits are important to reduce risks and unknown factors, both internal and external.

2.3. The illustration of the accounting ecosystem transformed by Blockchain

As mentioned above, Blokchain involves all the concerned parties such as managers, investors, accountants, auditors... to actively collaborate. The purpose is to verify the viability and the exactitude of the transactions in order to provide reliable documentation for cross-validation. Those component should together provide a real-time and transparent accounting eco-system called "Blokchain-based Triple Entry accounting".

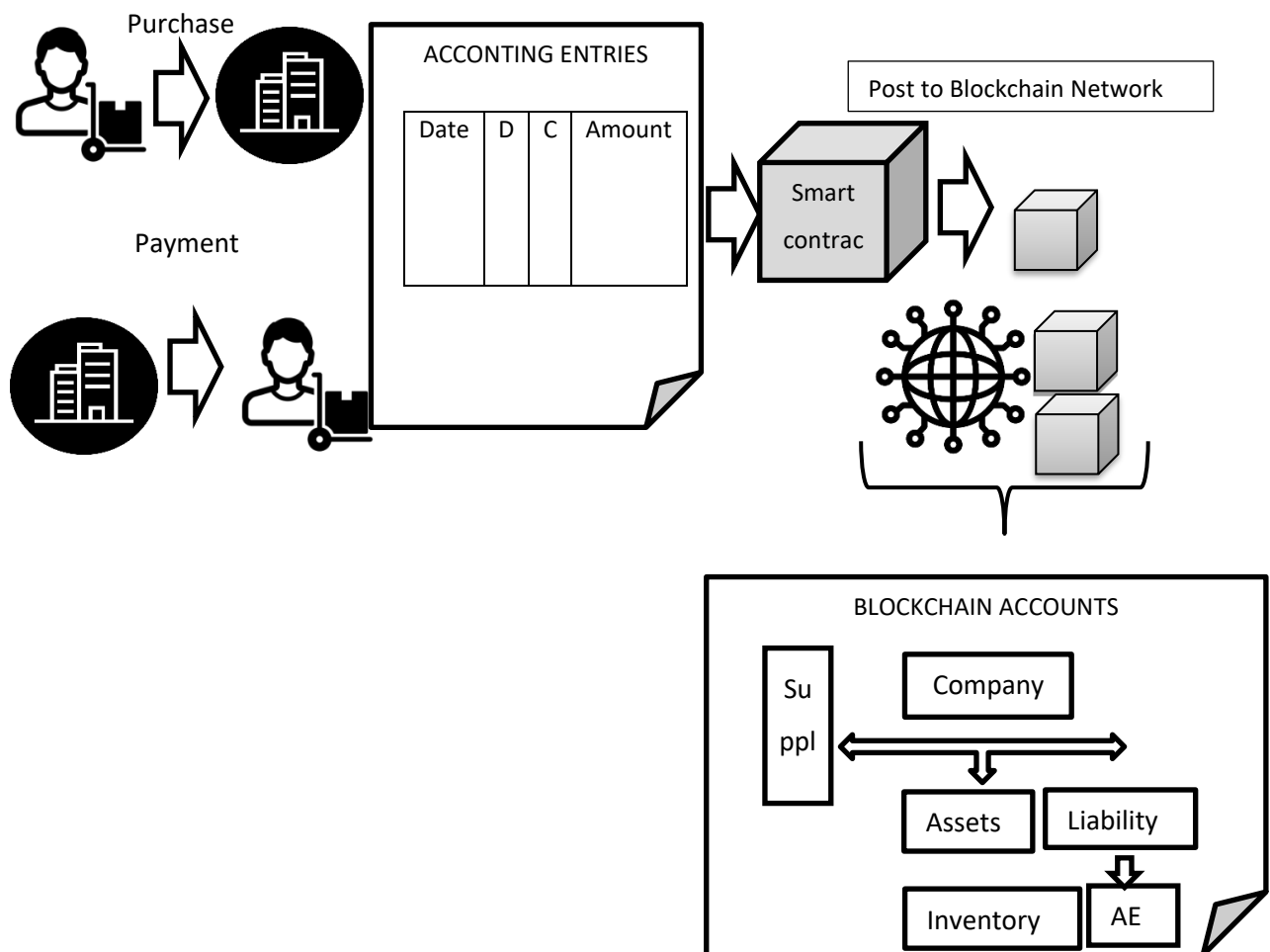
The triple entry system was recently discussed by both professionals and researches (Tyra 2014; Lazanis 2015; Sangster 2016). The traditional mechanism of transactions recording is double-entry system in which each operation is only registered in one account but the validation is operated by a second actor. This system reduces the risk related to human documentation error

such as an erasure of transaction or an inexactitude, but it does not provide reliable accounting information about the compliance of the conditions of the transactions within the internal instructions and terms of agreements. A third-party is necessary to perform some test of compliance in order to examine the accounting information and provide an opinion on the accuracy of the financial statements of the company.

Tripe-entry accounting system requires an independent intermediary besides the two parties involved in the transaction. For this purpose, we propose Blockchain as the third-party who has the potential to distribute and automate the storage and verification processes by providing secure applications that prevents the inception of irregular accounting entries and tampering.

By encoding the transaction into the third-party (BLOKCHAIN), a cryptographically secure and self-verifiable accounting information will be generated thanks to the functioning of this system. In this regard, reliable information will be instantly shared between the concerned parties and a continuous transparent report will be available for managers and stakeholders.

Figure n°3: The illustration of the Blockchain-Based Accounting Ecosystem



Source: Author

Blokchain accounts are formed in a hierarchical structure that contains at the bottom the individual accounts that have a unique identifier, then the total assets and liabilities, and finally the company as a whole at the top. This architecture allows a real-time verification of the balance sheet equation using smart contract. If the balance in the assets account is less to the total balance of the liabilities, a smart contract will be created to monitor automatically the balance of the company. Other functionalities such as issuing discounts for late delivery, can be easily encoded into the smart contract. This possibility will allow automatic execution of predetermined instructions and terms based on future activities and conditions.

In sum, the accounting entry submitted to the Blokchain network involve the following procedures to monitor the transactions:

- The recording of the transaction within the company's ERP system.
- The posting of the transaction in the network
- The transfer of the concerned assets
- The verification of the exactitude of the used accounts and amounts
- Posting Blokchain accounts (The third-party validity

CONCLUSION

This paper proposes potential application of Blokchain and its utilization in accounting. We point out four important points. First, Blockchain is a system that provides decentralized and secured information. Second, the paper describes the benefits of Blockchain to produce reliable accounting information in close real-time. Third, we illustrate the functioning of Blockchain system and its application to the triple-accounting system. Finally, the paper proposes an illustration of Blockchain-based accounting ecosystem that integrate all the technical requirements of the two systems.

The technology is widely adopted in organization where data integrity is the main concern and the volume of data is not overwhelming such as e-commerce businesses. Recording volume of business data into Blockchain system will be extremely demanding and expensive, especially among small and medium organizations.

Blockchain's programs require a training and cooperation from IT professionals in order to use this technology and participate to design and implement correctly the smart contracts. They should also have a deep understanding of the impact of the technology on accounting procedures and provide appropriate supervision to prevent risks of inappropriate information.

This leads to future research opportunities such as identifying innovative Blockchain mechanisms for complex accounting operations and propose innovative Blockchain model that can be adjusted for real-time reporting purposes.

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