

Implementation of a Blockchain System to an Internal Management System for Small Organizations

Xuanzhen Hu

Saint John's High School, Shrewsbury, MA 01545, US.

Abstract

Safety, simplicity and reliability are few sought parameters in an ideal transaction and data systems. Blockchain technology with its decentralization and cryptographic networks provides shielding from tampering and ensures safety and reliability with simplicity. The success of blockchain technology hinges on the strategy employed in the implementation process. The paper provides a stepwise framework for implementing a blockchain system to the internal management of small organizations. The process of identifying the problems to be solved by blockchain by addressing the solving questions is elaborated in the paper. The use of blockchain in providing solutions to issues pertaining to internal management processes are discussed. The methodology for optimum choice and design of blockchain system with respect to the business case is conferred. The advantages of using an increased number of stakeholders to enhance effective blockchain performance are argued with the help of existing literature. The paper concludes with the merits of blockchain technology such as enhanced security, greater transparency and increased efficiency over conventional systems.

Keywords

Blockchain technology, Decentralization, Cryptographic network, Tampering, internal management processes.

1. Introduction

Ever since the publication of an invention known as bitcoin, blockchain technology has had its ups and downs. Recently, however, many organizations are looking beyond the technology's controversies by focusing on the endless solutions it presents to the business arena. According to Beck et al. [1], blockchain refers to a massive, decentralized ledger of transactions governed by several decentralized sources. Thus, it eliminates the need for a single, central authority such as a bank to confirm the already made transactions. Blockchain offers a secure system characterized by the irreversibility of transactions once approved. Several sources assert that blockchain-powered cryptocurrencies such as bitcoin can be used in everything ranging from data management to regulatory compliance. Many organizations are also eyeing blockchain as the potential solution to several issues related to financial transactions. However, the success of blockchain technology depends on the strategy employed in the implementation process. This paper outlines the stepwise approach of implementing a blockchain system to the internal management of small organizations and its merits, such as the promotion of efficiency, transparency, and security.

2. Understanding Blockchain

It is imperative to understand that a well-designed blockchain stores records in blocks, which are linked to one another using a cryptographic technique, resulting in a digital distributed ledger. The ledger can be shared and authorized by anyone who has access; hence, getting rid of costly third-party verification. The cryptographic “signature” on each block links to the previous block shielding the

blockchain from tampering after the creation of the blocks. Therefore, in the field of finance, blockchain has the potential to cut costs and improve efficiency [1]. It eliminates the need for reconciliation of inter-organizational data and transaction records since all the individuals to the blockchain have access to the same digital record. For this reason, blockchain systems find application in internal control operations such as accounting and auditing. According to Bible et al. [2], small organizations should begin by understanding that a blockchain can be decentralized. It is distributed across machines with no single stakeholder controlling the block. It can also be centralized like regular databases with a single stakeholder controlling the entire blockchain. Other blockchains are either permission less or permissioned, allowing any stakeholder to view and edit the blockchain or restricting changes executed by other stakeholders.

2.1 Developing a Business Case

After learning the core concepts of blockchain, the organizations should begin by figuring out the problems at hand, which needs a solution from a blockchain perspective. The issue here can either be bottlenecks in the internal management processes or improvement of an existing system. By so doing, the blockchain system comes in as the best alternative. Internal management systems involve procedures, policies, and rules an organization implements to provide a roadmap direction, increase efficiency, and boost its adherence to its policies. It includes several elements such as environment control comprising attitude, alertness, and work-zeal of managers and shareholders [3]. Secondly, the accounting system involves procedures of business transactions and analysis. Lastly, its control procedure unit comprises all the policies that need to gear the organization towards its specific goals. Some of the policies include proper delegation of power, division of labor, preparation, and use of documents. Therefore, the organization identifies the problem to be solved by blockchain by addressing the solving questions; do multiple parties either share or update data? Is verification a requirement? Do transactions interact? By answering those questions, organizations can identify the right type of blockchain platform.

2.2 Choosing and Designing Blockchain System

There is a wide variety of types of blockchain and blockchain solutions in existence today. Business organizations should choose the right type of blockchain to fit internal management. Small organizations should evade falling victim to the hype and end up choosing the wrong system without ascertaining its core merits. The management should evaluate whether they need a permissioned or permission-less system. Should it also be decentralized or centralized? This implies that the type of blockchain depends on the business case. For instance, an internal management system involving financial regulations and a high level of security requires a permissioned and centralized blockchain. In this case, Ethereum and Quorum serve best in an internal management system. For instance, Quorum helps eliminate the tampering of financial data hence guaranteeing top security and privacy of transaction statements [4]. After choosing the type of blockchain, its design should not only solve the organizational issues but also fit with the existing processes. If it does not merge with the current system, the initial processes should be revised to lay a fitting foundation for blockchain.

2.3 Building an Ecosystem Preparedness for Uncertainty

Blockchain performs effectively by engaging a larger number of stakeholders. The organization should consider creating a community that understands the technology and its capability to improve trust among other companies. In this case, the organization acts as a blockchain role model for emerging firms [3]. Stakeholders play a vital role in a blockchain system since they decide: the rules for participation, the fair sharing of costs and benefits, risks and control framework for addressing the shared architecture, and the governance measures in place. Besides, blockchain is a new technology with minimal regulations [4]. However, the anticipation of changes in the future implies that organizations should not only monitor the regulatory frameworks but also participate in molding it.

3. Advantages of Blockchain Systems over Traditional Internal Management Systems

Most of the blockchain systems operate as decentralized databases in which the records and data are stored in blocks in an organized manner and are linked to each other through cryptographic networks. The emergence of blockchain technology accrues several advantages to various industries by providing increased security, enhancing transparency, and efficiency.

3.1 Better security

In most traditional systems, transactions mainly depend on intermediaries such as banks, credit card firms, and other payment providers. Unlike using blockchain since such intermediaries are unnecessary because distributed ledger requires verification of transactions through a process known as mining. In this case, the internal management system based on the blockchain becomes a trustless system. Trustless systems eliminate the risk of trusting a single organization and reduce the overall cost of transactions channeled to intermediaries and third parties. Therefore, blockchain systems become far more secure than conventional record-keeping systems due to encryption and linking of the new transaction to the previous block—the security feature of the blockchain system enhanced by its ability to resist tampering. Zhang et al. [5] argue that tamper-resistance involves shielding any type of intentional tampering by a user or adversary to the system. This feature protects any transaction information stored in the blockchain from tampering during and after the generation of a block.

According to Zhang et al. [5], transaction information is prone to two types of tampering, either due to miners attempting to alter the information of the received transaction or due to adversaries trying to tamper the information on the blockchain maliciously. For the former type of tamper, miners cannot succeed since each transaction is encrypted using a strong elliptic curve cryptographic encryption algorithm and Hash function such as SHA-256 [6]. The information is also signed by the payer using a secure signature such as ECDSA and finally distributed to the entire blockchain network for verification and approval through mining [5]. Secondly, the attempt by the hackers is deterred by the two protection techniques applied in the distributed system; the hash pointer and the network-wide capability of storing and verifying a transaction. Therefore, if the hackers attempt to alter using a block, they face the challenge due to the mismatch of blocks characterized by the inconsistent hash value. In other words, the blockchain internal management system requires the signing and distribution of every transaction over all nodes of the network, thus rendering it impossible to alter any data without being noticed across the network.

3.2 Greater Transparency

Another positive side of the blockchain-powered system is that they are more transparent than traditional record-keeping methods. Since blockchain is a distributed ledger, all participants in the network share the same documentation as opposed to conventional records, which provides a single copy [7]. Therefore, the shared information can only be updated or altered through consensus. Consensus implies that all the parties must agree to the changes. Changing a single transaction requires alteration of all other records and collusion of the entire system; hence, thus enhancing the accuracy, transparency, and consistency of the blockchain data.

Ibrahim notes that the deficiency in transparency has adversely affected the financial systems since most of these institutions have the advantage of accessing their customers' financial status behind their back, and it may not always be in the sincerest way. Ibrahim argues that the financial crisis of 2008 stemmed from a lack of transparency since Lehman brothers run two parallel ledgers internal and public records. The internal ledger hid their debts while the public record deceived the regulations through the overstatement of value. Although similar things can happen with blockchain, Ibrahim, however, claims that the existence of blockchain technology in 2008 would have helped maintain records in a timestamped order hence eliminating the scalability limitations of the bookkeeping systems of those days. Therefore, since blockchain technology is still new, exploiting its transparent capability guarantees preventing the next great depression from happening. [8]

3.3 Increased Efficiency

Blockchain, internal management systems, eliminates the paper-heavy processes which are time-consuming, prone to human error, and often require third-party participation. Automation of processes through blockchain facilitates faster and more efficient processing of transactions. Besides, using a single record shared among the participants gets rid of multiple reconciliations of the ledger; hence, less clutter. Decentralization of the system allows all the members to access the information; thus, becoming easier to build trust without several intermediaries. The blockchain system facilitates quicker clearing and settlement of transactions.

4. Conclusion

Blockchain systems involve a digital ledger of records that is shared among all the participants. The information is stored in blocks linked to each other through a cryptographic signature, a vital security feature of blockchain. Before implementing a blockchain system in an organization, it is imperative to develop a business case. This involves the identification of the problem whose solution can only be provided by blockchain technology. For instance, in an internal management system, financial transactions may require high security and a transparent environment that can be accrued by blockchain technology. After identifying the problem, the management should choose the right type of blockchain technology, which not only solves the problem but also easily integrates with the existing systems. The process can be smoothed by integrating the stakeholders. Implementation of a blockchain system guarantees various benefits such as increased security due to decentralization and secure encryption of data, higher efficiency due to the elimination of intermediaries and automation, and improved transparency.

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