Chapter 12
Application of Blockchain Technology for Distributed Management of Digital Research Library Holdings

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ABSTRACT

Technological advancement is gradually shifting the paradigm of how network records and transactions are processed and secured without third-party intervention. The importance of blockchain technology in performing these roles cannot be overstated. This technology has a wide application in the health, banking, insurance, real estate, media, and transportation sectors. Nevertheless, the role of blockchain technology in the distributed management of digital research library resources has received limited attention. This chapter discusses the distributed management of digital research library resources through blockchain technology. It explains the meaning, features, and components of blockchain technology. Concepts such as distributed library management and digital research library were clarified. The digital research library materials were highlighted along with how they can be managed. The chapter thus argues that blockchain technology can be used in the distributed management of digital research library resources.

INTRODUCTION

Blockchain technology emerged as an attempt to offer a solution to the long-lasting problem of third-party involvement in the management, exchange, and sharing of information and tenders among people

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involved in a transaction. Bitcoin has successfully applied this user-to-user data sharing or exchange model to allow free movement and exchange of digital currencies and information across different local and international locations. This end-to-end technological advancement can also be a feasible mechanism for fully implementing a distributed library management system. Although Cabello et al. (2017) proposed this model, it appears to be deficient in tackling issues of multiple library database registrations among library patrons in the global research community. Thus, this chapter was designed to explain how blockchain technology can be used to enhance the effective implementation of distributed management of research library resources and correct issues of multiple user identities in research libraries. The reader should be able to do the following after reading this chapter:

- explain the concept of blockchain technology
- state the uses of blockchain technology
- define a digital research library
- describe distributed management of research libraries
- discuss the application of blockchain in distributed management of digital research library resources

BLOCKCHAIN TECHNOLOGY

Blockchain is a highly secured and dependable transactional and information database that has received global recognition as a global record-keeping mechanism and has been found effective in managing big data (Muheidat et al., 2022). It is an integrative and decentralised database developed to record, validate, maintain, make public and distribute records of transactions among clients on the same network (Kondor et al., 2014; Sarmah, 2018; Yli-Huumo et al., 2016). It applies cryptography as a security mechanism in which every individual record, transaction, and message is cryptographically signed, thereby reducing the incidence of network hacking, data mutilation, and data compromise (Kawaguchi, 2019).

Blockchain technology is made up of blocks that allow everyone on the network to access the activities of other users in the same network. With this structure in place, it becomes more difficult for a single central block to exert influence over the network. Customers may see their transaction records without the participation of a third party, which is a vital goal of the system's architecture. The idea behind the concept of blockchain technology was to remove all barriers to the free flow of digital currency among clients in a block network across the globe through cryptography. Thus, the domain of this technological innovation originally was currency cryptography (Chen et al., 2018). Blockchain is tied to Satoshi Nakamoto, the man who formally applied the technology to operationalise the cryptocurrency called Bitcoin in 2008.

Blockchain technology is built so that no central database or block regulates, rules, or supervises it. Rawat et al. (2021) noted that to avoid the need for a trusted third party, the distributed ledger technology known as "blockchain" records all transactions and processes in an uninterrupted sequence of blocks. Every user in all the blocks in the network has adequate access to the activities of other users. Once information is verified and recorded in the blockchain, it cannot be manipulated, altered, or erased. It is sent to the network whenever a transaction is made, where automated systems verify its validity. Once transactions are validated, they are connected to the transaction log, creating what is known as a "blockchain" or "chain of transactions". The global acceptability of blockchain technology is hinged on