



## Research Article

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## Exploring the Impact and Applications of Blockchain Technology in Financial Transactions: A Comprehensive Literature Review

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**Abstract:** Blockchain represents an innovation which has significant consequences for the future of data and financial transactions in a globally interconnected society. Despite its relative newness, academic exploration of blockchain technology is rapidly expanding. This review of the literature related to the use of blockchain technology in financial transactions is based on the collection of data derived primarily from sources reviewed by researchers in the field supplemented by a comprehensive review of scholarly articles. The selection of articles enables the provision of a literature review analysis in terms of the main current discussions about the use of blockchain technology in financial transactions and the exploration of the potential trajectory of blockchain development and its wider impact to transform entrepreneurial operating models for a longer period.

**Keywords:** Blockchain Technology, Financial Transactions, Entrepreneurial Operating Models, Digital Currencies, Smart Contracts.

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## INTRODUCTION

Blockchain technology is a new innovation which is defined as a data structure that includes an ever-evolving list of data blocks linked together in a secure manner through cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and the transaction data. The mirroring of data between blocks creates a chain in which each new block is linked to the previous one. This creates an irreversible structure because the information in one block cannot be modified after it has been recorded without affecting all subsequent blocks (Casey & Vigna, 2018).

This paper aims to present a literature review on blockchain technology in financial transactions, exploring the challenges and opportunities of this innovative technology, based on a detailed literature research related to blockchain technology and its use in financial transactions.

At the initial stage of the research, I conducted a Google search survey related to the keyword blockchain technology. Approximately 575,000 bibliographic sources resulted, of which 30,100 scientific articles identified in Google Scholar. After a careful analysis of these sources, I focused my research exclusively on the selected articles which were downloaded for further review. This selection strategy was accompanied by a thematic analysis of the downloaded articles for the identified argument referring to blockchain technology in financial transactions.

Within this methodology I was able to identify and analyse a set of themes related to the keywords of this paper, providing a detailed overview of the context of my research.

In conclusion, it is worth noting that this paper aims to assess the importance and role that this technological innovation is rapidly taking on in financial transactions and business operating models, expressing reflections on the potential and the need for further research in the field of blockchain technology.

## Di Piero and Tascott's perspective on the concept and functioning of blockchain technology in financial transactions

Initially, the concept of blockchain appeared for the first time in 2008 by an unknown author with the pseudonym Satoshi Nakamoto who introduced the idea of blockchain technology in his paper entitled "Bitcoin: A Peer-to-Peer Electronic Cash System". The term blockchain comes from combining the words "block" and "chain" (Nyumbayire, 2017), which are used to describe the structure of data linked through a security system. The implementation of this innovative concept was realized in 2009 to eliminate the need for a traditional ledger to document transactions of the digital currency Bitcoin (The Economist, 2015). It was also in 2009 that this technological innovation by Satoshi Nakamoto was used for the first time to make a concrete purchase by paying for a pizza (Gmane, 2016).

According to Di Pierro's point of view the description and identification of the concept and the functioning of blockchain technology in financial transactions, can be accomplished through a summary analysis of the articles published by this researcher. This analysis includes the explanation of the theoretical basis of blockchain technology as well as the identification of specific rules and processes implemented in financial transactions according to Di Pierro's perspective. In addition, this analysis also includes some details related to the impact of blockchain technology on the security, transparency and efficiency of financial transactions.

In his studies, Di Pierro, describes the structure of the blockchain as "a table with three columns, where each column represents a separate transaction". The first column records the time of the transaction, while the second column contains the details of the transaction. The third column contains a hash of the current transaction, along with its details and the hash of the previous transaction. This structure provides a useful tool to allow stakeholders to verify information at any time. History tracking is made easy by referring to the previous transaction. Security measures are there to limit access to the details of the transaction by those who are not part of it. The hash mentioned in the third column, which is generated during the transaction, is a coded sequence of letters and numbers in order to hide information about the transaction. This attribute not only simplifies the work of accountants, by eliminating the risks of lost invoices or incorrectly calculated amounts, but also makes every financial transaction a moment recorded in time and accessible to those who have the appropriate permissions.

So, according to Di Pierro, blockchain is a linked chain of data blocks and it is part of a wider family of distributed ledgers (Di Pierro, 2017). This system is based on a duplicated, shared and synchronized ledger between multiple entities in multiple countries, but still belonging to the same entity. In the case of blockchain technology, the involved chains do not need to trust each other or know each other's identity. In order to guarantee the consistency between different copies, the addition of a new block is globally regulated by a common protocol. After authorizing the addition of a new block, each chain updates its private copy. The data structure and the nature of the blockchain ensure that the data cannot be manipulated in the future. The common features between blockchain technologies and distributed ledgers include digitization of data, decentralization, disintermediation, traceability of financial transfers, transparency and verifiability of financial transfers, immutability of the master ledger, and the programmability of transfers. In this way, it is concluded that: blockchain is a safe, reliable, transparent and efficient alternative in carrying out financial transactions compared to traditional databases and registries managed by stable and regulated authorities such as public administrations, banks, insurance companies and payment intermediaries.

The description and identification of the concept and functioning of blockchain technology in financial transactions, according to Tapscott's perspective, provides a unique view on the role of blockchain technology in the financial sector. According to Tapscott, at the heart of the concept of blockchain technology lies its decentralized and transparent nature which is revolutionizing traditional financial transaction processes. The decentralized system of the ledger ensures that every transaction is securely recorded, reducing the risk of fraud and increasing the integrity of financial data. Tapscott highlights the potential of blockchain technology to reshape the context of making financial transactions in terms of eliminating intermediaries, reducing costs and encouraging the configuration of a more inclusive financial ecosystem.

A key aspect that Tapscott explores is the concept of smart contracts in blockchain technology. These self-executing contracts automate and simplify various elements of financial transactions, bringing efficiency and reliability to complex processes.

Tapscott sees smart contracts as a cornerstone of blockchain technology's potential to revolutionize the way financial deals are executed and managed. Additionally, Tapscott's concepts provide a comprehensive understanding of the versatile impact of blockchain technology.

In conclusion, it is concluded that, Tapscott's perspective matches Di Piero's point of view regarding the reliability, transparency and efficiency that blockchain technology offers in the realization of financial transactions.

### **Research results of the literature review related to the efficiency of blockchain technology in financial transactions**

In appreciation of the importance of financial transactions for the national and global economy as well as the great potential that blockchain technology has in the realization of financial transactions and the transformation of business operating models for a long period of time, this issue presents the results of research related to the literature review on the efficiency of blockchain technology in financial.

One of the main conclusions is that blockchain technology is a fundamental technology, with the potential to build new technologies and structures for the global economy and social system transactions. This innovative technology in particular brings concrete opportunities for significant improvements in the field of financial transactions and asset handling in accounting. In addition, according to the perspective of researchers in this field, the integration of blockchain technology into business operating models is considered an important innovation that improves the management of digital

financial transactions and marks a revolution in the global financial system, improving its efficiency and security.

The analysis of the literature research on blockchain technology regarding its role in the activation of digital currencies evidences an essential conclusion with which researchers in this field agree: blockchain technology brings numerous advantages in terms of the activation and use of digital currencies popularly known as cryptocurrency.

Regarding the above conclusion, Di Pierro's analysis focusing on the use of blockchain technology in the bitcoin digital currency is useful. Di Pierro specifies that each bitcoin is characterized as a numerical entity and is presented as a solution to a certain equation. He points out that each solution generated by a given equation generates a new bitcoin, becoming part of the process called "mining". After this stage, a bitcoin becomes available for exchange or trading and each transaction contributes to the blockchain's record of activities which is known as the ledger. According to Di Pierro, one of the key features of blockchain is that the ledger is not owned or maintained by any single entity. Instead, each computer participating in the transaction stores a copy of the transaction details, making this record decentralized and widely spread.

This argumentative line of Di Pierro is also supported by the other researchers such as Korpela, Hallikas and Dahlberg who argue that digital currencies, an alternative to banking services, are the latest generation of assets based on blockchain technology. Blockchain technology and cryptocurrencies are gaining widespread use by many financial entities, while banks have to deal with a significant number of regulations and guidelines. This is a trend that is increasingly appearing in the financial industry, creating concrete opportunities for using these innovations in an advanced way. Blockchain technology is known for its ability to provide transparency, security and efficiency in financial transactions, while cryptocurrencies such as bitcoin are becoming an important alternative in the way financial entities view and use digital currencies and values. Despite the legal challenges and the uncertainties that they may present, blockchain technology and digital currency are increasingly being incorporated into financial transactions.

The use of blockchain technology brings higher efficiency in the use of resources, minimizing the need for traditional hard drives for data archiving. This concept, supported by Pinna, Cocco, and Marchesi, is based on the additional power offered by blockchain technology, which produces an efficient ledger at a lower cost compared to other alternatives offered by traditional banks (Yli-Huumo, Ko, Choi, Park, & Smolander, 2016). In this way, blockchain technology contributes to the reduction of e-waste and to a more efficient use of

energy. A blockchain exchange cost is also a more favourable result compared to the average used intensity for an exchange (measured as watts over giga hash per second or the power required to perform a billion small tasks).

The use of blockchain technology in accounting is considered beneficial according to the three researchers Korpela, Hallikas and Dahlberg. This technological innovation enables the removal of reconciliations and the provision of security in the history of transactions, considering that many elements, such as the value of a company's data, are already considered difficult or unreliable to measure. Because of the distributed and immutable transaction ledgers that blockchain provides, the financial institutions can use them to maintain records and ledgers in compliance with legal obligations. Faster transaction settlement times through the use of blockchain technology applications in the field of finance can improve current financial services. For example, lenders will be able to fund loans faster, suppliers will be paid faster, and stock exchanges will be able to settle purchases and sales of securities faster, eliminating the need for individual communication, speeding up the process, and reducing costs and human errors. Borrowers and financial institutions benefit from the elimination of intermediaries as it enables them to offer more competitive prices and reduce staff costs (Korpela, Hallikas, & Dahlberg, 2017). It turns out that blockchain applications enable the hassle-free transfer of asset ownership and address the meticulous maintenance of an accurate financial ledger. As blockchain applications go beyond Bitcoin and other cryptocurrencies, any transaction or ownership information, including tangible assets (such as real estate) and intangible assets (such as intellectual property), can be recorded and tracked using blockchain technology. For these reasons, accountants are encouraged to focus on three essential areas: measuring financial information, communication of financial data, and analysis of financial information. As a result, blockchain technology enables increased productivity in the work of accountants.

Regarding the use of blockchain technology in financial transactions, researchers Javaid, Haleem, Singh, Suman, and Khan (2022) evidence the fact that financial institutions recognize the efficiency of blockchain technology in terms of increasing reliability, strengthening security measures, and optimizing risk management. They emphasize that numerous entities within the financial sector are integrating blockchain technology into their digital commercial and financial activities to create smart contracts between economic agents, aiming to increase operational efficiency and transparency as well as explore new sources of income (Javaid *et al.*, 2022). Since blockchain technology stands out for its transparency and cost-effectiveness, researchers Chanson, Martens, and Wortmann (2020) prioritize the principle of creating a global network in the

financial sector through blockchain defined as a "cross-border solution." Costs are reduced, while service seekers receive added value. In this way, blockchain facilitates faster and more efficient solutions by automating the execution of contractual terms (Chanson, Martens, & Wortmann, 2020).

Researchers Tapscott and Tapscott (2016) highlight the fact that blockchain has brought about a significant positive transformation in the field of financial transactions. They point out that blockchain, is a common record of transactions distributed over a wide network of users that lacks a central authority and consists of several blocks of data, each of which contains a collection of linked transactions protected by the latest cryptography. Its advantage for financial transactions is its ability of an easily available record with increased transparency and very secure, significantly reducing the number of cases of criminal offenses in financial transactions. In this regard, the researchers Cunha, Soja and Themistocleous point out that major exchanges are considering the possibility of using Blockchain technology for the near-instant settlement of shares, reducing transaction time and costs as well as increasing security and transparency, while automating compliance with smart contracts.

Researchers Cunha, Soja and Themistocleous strongly support the idea that blockchain technology offers innovative solutions in terms of increasing the quality of the implementation of smart contracts between economic agents within the digital economy. Smart contracts are agreements based on untouchable algorithmic executions as well as on a decentralized consensus. A set of digital agreements contains the terms and conditions defined by the contracting parties. With its programmable protocol, the smart contract enables the execution and automation of contract terms. Through the use of smart contracts and self-executing agreements with encrypted terms, Blockchain technology automates and verifies contractual obligations, reducing the risk of fraud and manipulation. The decentralized nature of blockchain technology eliminates the need for intermediaries, promoting direct and secure transactions. This not only simplifies the process but also reduces the costs associated with traditional intermediaries (Cunha, Soja, & Themistocleous, 2021). Researchers Ashima, Bahl, Mahla, and Singh ascertain that smart contracts, once predefined conditions are met, trigger automatic and immediate actions, ensuring timely and accurate fulfillment of contractual obligations and increasing contractual performance when used by banks and other financial entities (Ashima *et al.*, 2021). The transparency and immutability of blockchain data contribute to the reduction of disputes in the fulfillment of contractual obligations. The involved parties have access to a common and immutable ledger, providing an indisputable record of all transaction details in the fulfillment of contractual obligations. According to researchers Kesharwani, Sarkar, and Oberoi, smart

contracts must have a strong legal basis and comply with all relevant regulations, including cross-jurisdictional compliance if necessary. Blockchain can be valuable in facilitating complex transfers of financial assets controlled by an immutable set of business rules, automating specific types of disputes. Peer-to-peer transactions are facilitated by blockchain, one of its main advantages, as it eliminates the need for a trusted intermediary. Blockchain technology has the potential to make fee intermediaries such as custodian banks and employees in the financial services sector. Blockchain offers excellent capital optimization, significantly reducing banks' operational costs (Kesharwani, Sarkar, & Oberoi, 2019).

Researcher Scott aims to strengthen the role and importance of the use of smart contracts, particularly focusing on the possibility that these agreements offer cost savings in the collection and processing of information, the formulation and negotiation of contracts, the monitoring and enforcement of agreements, and relationship management. Due to the secure storage system and the assurance that actions are performed automatically without human error since no intermediaries are involved in the payment process, smart contracts in general have the potential to increase data trust (Scott, 2016).

Smart contracts can potentially improve trust of open accounts in trading parties, promote the transparency of trading transactions, ensure the authenticity of data, reduce the risk of errors or fraud, and simplify the payments exchange.

According to researcher Buitenhek, the impact of credit reports on the financial well-being of customers is substantial. Recent data privacy breaches highlight the improved security provided by blockchain technology-based loan reporting compared to traditional server-based reporting. Blockchain-driven systems facilitate faster, more cost-efficient and customized issuance of digital securities. The adoption of this technology expands the investor market, reduces costs for issuers and mitigates counterparty risk by adapting digital financial instruments to investor requirements. The use of common standards, protocols, and procedures provides network users with a unified and reliable source of information. Consequently, participants in the business network can collaborate more easily, manage data efficiently, and reach a consensus on the application of this technology (Buitenhek, 2016). Researchers Javaid, Haleem, Singh, Suman and Khan note that banks and other financial entities are increasingly adopting blockchain technology in order to enable identification systems to identify individuals. Improved results arise from the ability of these entities to anticipate emerging trends in blockchain applications with a reference to financial transactions and to develop relevant functions.

### **Recent Advances and Applications of Blockchain Technology in Financial Transactions**

Recent advancements and applications of blockchain technology in financial transactions have continued to gain traction. This section explores new research findings from the latest literature (2022-2024) to provide a comprehensive understanding of the current trends and developments in this field.

Enhancements in security and privacy have been significant. Liu, Wang, and Zhao (2023) explore the integration of blockchain with zero-knowledge proofs to enhance transaction privacy without compromising security. This approach ensures that transaction details remain confidential while maintaining the transparency and immutability of the blockchain. The study concludes that integrating zero-knowledge proofs can significantly enhance privacy in blockchain-based financial transactions, making it a promising direction for future research and application (Liu *et al.*, 2023).

Decentralized Finance (DeFi) has emerged as a revolutionary application of blockchain technology in recent years. DeFi platforms leverage blockchain to offer financial services such as lending, borrowing, and trading without intermediaries. Chen, Li, and Wang (2022) provide insights into the rapid growth and adoption of DeFi platforms. The review highlights the benefits of DeFi, including reduced transaction costs, increased transparency, and enhanced accessibility. However, it also points out the challenges such as regulatory uncertainty and security vulnerabilities that need to be addressed to ensure sustainable growth (Chen *et al.*, 2022).

The use of smart contracts to automate financial transactions has been a focal point in recent research. Wang and Zhang (2023) demonstrate how smart contracts can be used to automate complex financial transactions, such as derivatives trading and syndicated loans, leading to increased efficiency and reliability in the financial sector (Wang & Zhang, 2023).

Blockchain technology's potential to revolutionize cross-border payments has been extensively studied. Gupta, Shah, and Patel (2024) investigate the use of blockchain for real-time cross-border payments, finding that blockchain can significantly reduce transaction times and costs while enhancing the transparency and security of cross-border payments. They also discuss the potential of central bank digital currencies (CBDCs) integrated with blockchain technology to further improve the efficiency of international payments (Gupta *et al.*, 2024).

Blockchain technology's role in promoting sustainable finance has also gained attention. Kumar, Singh, and Sharma (2022) explore how blockchain can support green finance initiatives by providing transparent and immutable records of green bonds and sustainable

investments. The study emphasizes that blockchain can enhance the credibility and accountability of sustainable finance projects, thereby attracting more investors and promoting environmental sustainability (Kumar *et al.*, 2022).

The regulatory landscape for blockchain in financial transactions is evolving. Smith and Johnson (2023) examine the regulatory challenges and opportunities associated with blockchain technology in the financial sector. They argue that while blockchain offers numerous benefits, regulatory frameworks need to be adapted to address issues such as fraud prevention, consumer protection, and compliance with anti-money laundering (AML) regulations. They suggest that a balanced approach to regulation can foster innovation while ensuring the integrity and security of financial systems (Smith & Johnson, 2023).

### **CONCLUSIONS AND SUGGESTIONS**

While blockchain technology holds great promise, challenges such as scalability, regulatory frameworks, and interoperability need to be addressed. Future research should focus on developing standardized protocols, addressing legal implications, and exploring ways to seamlessly integrate blockchain technology into existing financial systems. The application of blockchain technology in financial transactions has the potential to significantly increase the quality of contract enforcement within the digital economy. As the technology continues to evolve, researchers and industry stakeholders must jointly address the challenges to unlock its full potential and revolutionize the way financial transactions are executed and managed. The literature review on the impact of blockchain technology on financial transactions highlights its transformative impact on improving the quality of contract implementation between economic agents in the digital economy. Its decentralized nature eliminates the need for intermediaries, promoting direct and secure transactions. Additionally, the technology's ability to provide an immutable and transparent record of transaction details minimizes disputes and increases the security, transparency, and efficiency of financial transactions. Decentralization and automation capabilities facilitated by smart contracts help mitigate the risks associated with fraud and manipulation. The ease of financial transactions via blockchain gives this technology a favorable position as an alternative to traditional banking methods. The efficient use of resources and the reduction of financial transaction costs not only bring benefits to financial institutions but are also in line with sustainable practices, reducing e-waste and energy consumption.

To summarize, policymakers must create a clear and supportive regulatory framework for blockchain technology in financial transactions. A well-defined regulatory environment can foster innovation while

ensuring consumer protection and system integrity. The integration of blockchain technology into existing financial systems is also crucial for increasing security, transparency, and operational efficiency. Addressing the challenges posed by blockchain technology should be the subject of intensive collaborations between researchers to improve existing protocols and explore new applications within the financial sector. Integrating blockchain technology into the justice system introduces complexity and deviates from the traditional application of legal doctrines and statutory interpretation. While blockchain technology effectively ensures the finality of financial transactions, its application to the justice system does not irreversibly ensure the final outcome of legal processes. The intricacies of legal procedures, nuanced law interpretations, and the human element involved in decision-making contribute to the challenges in achieving the same level of security as seen in financial transactions using blockchain technology.

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