

A Review of Financial Services Research Based on Blockchain Technology

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Abstract: Blockchain technology is an emerging technology, which has received much attention since its inception due to its data immutability and decentralization. Due to the special characteristics of blockchain, it can solve the financial services puzzle in terms of transactions and trust and can even help the financial services industry upgrade. In this review paper, we are gathering previous research papers focused on exploring the functionality of blockchain technology within the financial services sector and dividing them into two categories. One of the papers is about how blockchain works in financial services, and the other is about the impacts of blockchain in finance services. Then, we divided the article into three introductory directions according to the causal logic: the role, challenges, and development suggestions of blockchain technology in financial services. We also put forward suggestions for developing blockchain technology combined with the financial services industry.

Keywords: Blockchain technology, Finance service, Financial blockchain challenge

1. Introduction

The financial service sector has been reformed several times, however, there are still some flaws. Over 45% of financial businesses, like money transfer services, stock trade, and so on, are influenced by economic crime members each year [1]. And due to the intervention of the third party, people should pay on trust, and it can cost a lot and financial inclusion is uneven in many parts of the world. So, to deal with the problem, Satoshi Nakamoto stated the concept of blockchain in his book, which named bitcoin white paper, on 18 August 2008 [2]. Blockchain technology is an emerging technology. Here are a few scholars' definitions of blockchain. blockchain is a way to order transactions in a distributed ledger [3]. Blockchain is a decentralized and unchangeable set of data of accounts [4]. The key attributes of blockchains encompass decentralization, disintermediation, transaction sharing, and tamper-proofness [5].

With the continuous development of blockchain, it is widely used in various fields. There's a study to map the influence of blockchain technology across different industries. The researchers surveyed

1140 startups that adopted the technology to understand their industry categories, technology applications, and financing. According to statistics, 42.2% of enterprises are in the financial and insurance industries. This shows that blockchain technology has great potential value in the financial industry [6].

This paper collates and summarizes the previous research results on the application of blockchain technology in the field of financial services, and classifies them. One article discusses the role of blockchain in financial services, while another discusses the role of blockchain in financial services. Secondly, this paper summarizes the application of blockchain technology in the field of financial services, points out its existing problems, and puts forward some opinions on the growth of the company in the financial services industry. At the same time, the project will also provide relevant solutions to the problems related to the financial industry.

There is a literature review by Trivedi et al. which reviews and summarizes 59 articles on the application of blockchain technology in finance and e-finance. It was divided into three dimensions: blockchain development, challenges, and applications in the financial sector and it gave an in-depth introduction to the dimensions it reviewed [7]. In contrast, although our article does not have many related articles, there is one more research direction than this article: Suggestions for advancing blockchain technology in the realm of financial services. On the other hand, our article still has some flaws. This article is partial to theory and does not analyze the combination of blockchain and financial services based on specific practical cases, which may conflict with reality.

The academic contribution of this article is as follows:

(1) This article has combed the role of blockchain technology in financial services applications and its impact on the financial services industry and divided the article into three introductory directions according to the causal logic: the role, challenges, and development suggestions of blockchain technology in financial services.

(2) This article compared the advantages and disadvantages of text analysis and helped researchers to understand text analysis comprehensively.

(3) This article points out the need for more practical case studies in this field and research directions for improving financial blockchain regulatory policies.

2. Application Analysis of Blockchain Technology in Financial Services

2.1. Blockchain in Financial Services

Since the emergence of Blockchain, the use of Blockchain in the financial field has been regarded as a typical example of Block technology [7]. The term "blockchain" is a comprehensive phrase used to encompass a range of distributed ledger implementations that incorporate various technologies. The advantage of blockchain lies in its ability to ensure secure transmission and access of information, achieve data consistency, and provide tamper-resistant properties, thereby preventing denial in the financial system. In the financial services industry, blockchain plays several pivotal roles, such as identifying product opportunities, addressing regulatory concerns, assessing risks, and implementing corresponding controls.

2.1.1. About Blockchain

Blockchain technology continues to upgrade, and the industry divides its evolution into three stages. The three stages are shown in Table 1.

Table 1: Three Stages of Blockchain [8].

Three Stages of Blockchain	Features of Blockchain.
Blockchain 1.0	Use Bitcoin as a typical use to complete the issuance and circulation of a digital currency.
Blockchain 2.0	It is characterized by the use of smart contracts to promote collaboration between multiple commercial systems, thus expanding the scope of the use of blockchains.
Blockchain 3.0	On this basis, through the in-depth study of the Internet of Things, cloud computing, and other technologies, to further improve the operation and efficiency of enterprises.

The decentralization. This is the most important feature of blockchain technology, which means that in this mode, for the decentralized management organization or hardware in the network, each node has the same rights and responsibilities. It refers to a decentralized mode of management and operation, therefore, in this mode, as long as a node is damaged or lost, it will not have a great impact on the overall operation.

2.2. The Role of Blockchain Technology in The Financial Services Industry

The decentralized and non-variable nature of blockchain technology can improve the security of financial systems, the efficiency of transactions, and the trust of customers. Research shows that blockchain can be widely used in banking, capital markets, Internet finance, and other financial industries [9]. The combination of blockchain technology and financial technology will be a promising development trend.

2.2.1. Digital Currency and Payments

Virtual currency. In the blockchain system, use the advantages of digital currency to create a new business model, including instant settlement, global interoperability, no transaction fees, and high security, to achieve a stable and risk-free universal measurement model.

In the international financial market, due to the joint action of various middlemen and currencies, we not only need to deal with tedious procedures but also have to face the impact of foreign exchange changes on cross-border trade.

The new virtual currency will bring a more convenient trading mode and trading platform to countries around the world; the cryptography technology based on blockchain will greatly improve the security of cross-border transactions; and the unified Internet currency will speed up the transaction speed [10].

2.2.2. Banking Business

With the development of blockchain technology and the improvement of the financial system, it is also an opportunity for the banking industry. Banks can also make derivatives like password asset swaps. In this case, the company may treat the bank as a trusted dealer and give consumers access to such password assets.

In addition to commercial banks being able to deal with decentralized cryptographic property, they can also deal with blockchain-based cryptographic property or financial instruments such as the digital currency of the central bank. And similar services, such as mainframe and paid services. The advantages of using passwords and blockchains in banks can increase transparency, reduce costs, and speed up payments, especially for export trade [11].

2.2.3. Accounting and Auditing

In theory, because of the transparency and persistence of data, the possibility and cost of data tampering are increased. As a result, companies tend to disclose credible and credible information on the blockchain, which in turn reduces investors' demand for stock returns because of the higher quality of the information they have [12].

This is a high-quality signal that can help companies deal with the problem of mutual trust with outside information users. In the long run, blockchain technology and smart contracts can help reduce errors in disclosure and earnings management, effectively improve the reliability, timeliness, and comparability of accounting information, and reduce information asymmetry [13].

2.3. Blockchain Benefits Financial Services

The potential of blockchain is huge and a lot of advantages will be played out if blockchain is adopted in programs like the "Belt and Road" The encryption and immutable features provided by blockchain technology enable mutual trust without the guarantee of a central authority, and form a reliable and mutually trusted financial system.

In the current financial system, the payment system is provided by the state or a third party, which is essentially a centralized model, while the decentralized model brought by blockchain has significant advantages, and the trust brought by centralization and authority only exists in a limited area and scope. The trust built by blockchain due to decentralization and security covers different countries and regions, which has great advantages for cross-border cooperation, cross-border transactions, and the construction of transnational financial systems.

In addition, through the intelligent contract technology of blockchain, the relationship between the two sides of the transaction becomes closer, so that the automatic and intelligent execution of financial transaction contracts can be completed, thus avoiding the risk of default without early warning. At the same time, it also improves the accountability of the system and reduces the trust risk and capital risk of the system. In traditional cross-border transactions, because of information asymmetry, it is often necessary to collect the credit information of the other party and set up a margin account secured by funds, but the approval and acquisition process is time-consuming, costly, and tedious. However, on this basis, the automation of mutual credit data can be realized by using a decentralized account book and a cooperative sharing mechanism. Strengthen the timeliness and confidentiality of financial information [10].

3. Challenge of Blockchain Technology in Financial Services Applications

There have been numerous instances of successful blockchain technology applications across various domains, notably in the financial sector, but there are also some challenges and limitations. The implementation of blockchain technology in the financial sector presents various challenges, including concerns regarding latency, privacy, security, and scalability [13]. White Paper on the development of blockchain financial applications pointed out that the challenges faced by blockchain financial applications are as follows: the technical standard system needs to be improved, the contradiction between privacy protection and data sharing is gradually highlighted, the performance efficiency is limited, and the cooperation inside and outside the chain is facing new challenges [8]. One of the most prominent is the lack of security. For example, in 2018, Coin Check, one of Japan's largest digital currency traders, said the hacking resulted in the loss of \$534 million in virtual assets. This is due to the lack of security of blockchain technology. When a single miner or mining pool commands more than 50% of the mining power, they possess the capability to manipulate the system to their advantage. If a 51% attack ensues, ownership of virtual assets can be transferred, thereby

distorting reality and manipulating the blockchain. The frequency of 51% of attacks brings into question the trustworthiness of the data stored within a blockchain [15].

In addition to the challenges caused by the lack of blockchain technology, some external factors can hinder the development of financial blockchain. The application of financial blockchain requires high funds. The adoption of blockchain technology can be a costly and time-consuming endeavor, especially considering the scarcity of proficient blockchain developers. This circumstance might particularly discourage smaller financial companies from investing in the upgrade of their current systems [16]. The knowledge hiding in Blockchain is also one of the obstacles to the development of financial blockchain. Adopting a qualitative method, Chang et al. interviewed sixteen experts and found that knowledge hiding in Blockchain was common[13].

4. Blockchain Technology Combined with Financial Services Application Development Proposal

Due to the nascent stage of blockchain technology's implementation in the financial industry, finding optimal strategies to address its challenges has emerged as a highly significant topic. Given that blockchain technology is still in its early stages of development, there is a need to strengthen the oversight of systems and technology to facilitate the adoption of the blockchain [7]. From a corporate perspective, Chang et al. suggested the key success factors for financial services incorporating blockchain. Cause the implementation of blockchain is expensive and electricity consumption is high. Companies need adequate funding, good financial management, and adequate energy supplies. At the same time, companies should resist the phenomenon of knowledge hiding between teams, allowing customers to execute simple blockchain requests and building credibility [13]. The above recommendations mainly include the national efforts to develop financial blockchain technology, pay attention to the supervision and legal norms of blockchain technology, cultivate financial blockchain technology talents, and have sufficient start-up capital.

Of course, at present, many countries have enacted policies for blockchain financial applications. There are some examples shown in Table 2.

Table 2: Some policy examples.

Nation	Policy examples
El Salvador	El Salvador has become a global pioneer in the adoption of blockchain technology. In June 2021, the government of El Salvador passed legislation acknowledging Bitcoin as a lawful means of payment for commodities and services.
US	The United States has always had a positive attitude toward blockchain technology. In 2016, the U.S. Office of the Comptroller of the Currency (OCC) released its Responsible Innovation Framework. “, aimed at regulating startups that are working on blockchain and other financial technologies. In 2018, the SEC stated the issuance and trading of digital asset securities.
Japan	Japan passed the Payment Services Act (PSA) recognizing cryptos as legal property while treating trading gains generated by cryptos as miscellaneous income and taxing investors accordingly.
China	To accelerate the application of blockchain technology in China, China has issued policy documents such as the National Blockchain Plan, the National Blockchain Technology Application Pilot Implementation Plan, and the Blockchain Industry Technology Self-discipline Convention, encouraging financial services institutions such as central bank securities commerce, private banks, insurance companies, and investment companies to explore the use of blockchain technology and benefits from it

As blockchain technology continues to advance, national policies regarding its adoption are progressively maturing. It is a growing trend that blockchain technology can fully leverage its benefits in the realm of financial services, facilitating the upgrade of financial offerings.

5. Conclusion

Blockchain, in simple terms, technology handles blocks and links transaction records in a chain, and they are publicly distributed ledgers. blockchain technology can be applied in multiple fields, especially in the financial market of information sharing and transmission are achieved, and this is based on the decentralized, tamper proof, anonymity, and other characteristics of blockchain technology. Blockchain technology makes a big change in financial efficiency and it helps a lot in the financial market. However, the application of blockchain technology in financial services still faces many new challenges. However, I firmly believe that as blockchain technology continues to evolve and receives strong support from governments, it has the potential to greatly bolster the development of the financial services industry, leading to a future marked by a transparent and highly efficient financial services market. Based on the collection situation of articles, we propose the following research directions.

(1) Case study based on specific financial service applications combined with blockchain technology. As far as the literature currently searched is concerned, most of it focuses on theoretical research. theories we quote from essays may not be effective in solving the financial crisis and we should look for more real examples at the same time.

(2) Improve laws related to blockchain technology and increase regulatory efforts. Recent thorough analyses of academic sources regarding cryptocurrency reveal that the existing literature, specifically in terms of regulatory aspects, is still lacking, inconclusive, and in its early stages of development [17]. So this is something we need to focus on.

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