

The Role of Blockchain Technology In the Digital Transformation of Traditional Banking Industry

Chuanli Chen

University Of Sanya, Sanya, Hainan, 572000, China

Abstract: *As a new application technology in recent years, blockchain technology itself has high security and sharing, and it will develop to the direction of intelligence. For the traditional banking sector, non-performing loans and credit check is one of the main concerns. The application of blockchain technology to traditional banking can effectively reduce the occurrence of non-performing loans. At the same time, the application of blockchain technology in credit investigation business can also greatly improve the efficiency and comprehensiveness of credit investigation audit, which is of great significance to ensure low-risk operation of banks.*

Keywords: *Blockchain Technology; Traditional Banks; Role*

1. Introduction

Currency transactions between persons or companies are often centralized and controlled by a third party organization [1]. Making a digital payment or currency transfer requires a bank or credit card provider as a middleman to complete the transaction. In addition, a transaction causes a fee from a bank or a credit card company. The same process applies also in several other domains, such as games, music, software etc. The transaction system is typically centralized, and all data and information are controlled and managed by a third party organization, rather than the two principal entities involved in the transaction. Blockchain technology has been developed to solve this issue. The goal of Blockchain technology is to create a decentralized environment where no third party is in control of the transactions and data [2].

Blockchain is a distributed database solution that maintains a continuously growing list of data records that are confirmed by the nodes participating in it. The data is recorded in a public ledger, including information of every transaction ever completed. Blockchain is a decentralized solution which does not require any third party organization in the middle. The information about every transaction ever completed in Blockchain is shared and available to all nodes.

This attribute makes the system more transparent than centralized transactions involving a third party. In addition, the nodes in Blockchain are all anonymous, which makes it more secure for other nodes to confirm the transactions. Bitcoin was the first application that introduced Blockchain technology. Bitcoin created a decentralized environment for cryptocurrency, where the participants can buy and exchange goods with digital money [3].

However, even though Blockchain seems to be a suitable solution for conducting transactions by using cryptocurrencies, it has still some technical challenges and limitations that need to be studied and addressed. High integrity of transactions and security, as well as privacy of nodes are needed to prevent attacks and attempts to disturb transactions in Blockchain. In addition, confirming transactions in the Blockchain requires a computational power. It is important to identify what topics have been already studied and addressed in Blockchain and what are currently the biggest challenges and limitations that need further studies.

To address these questions, we decided to use a systematic mapping study process to identify relevant papers related to Blockchain. In the systematic mapping study, we applied a well-designed research protocol to search for material in scientific databases. The produced map of current research on Blockchain will help other researchers and practitioners in identifying possible research areas and questions for future research.

Although cryptocurrencies are also a business and management topic, we decided to narrow down the research topic to the technical perspective of Blockchain. Our objective was to find and map all papers

with technical viewpoints on Blockchain. We were interested in finding Blockchain research topics related to various technical areas, such as security, performance, data integrity, privacy, and scalability.

2. Blockchain and Blockchain technology

Blockchain is the technology behind the birth of bitcoin and cryptocurrency. Just a few years ago, majority of the people in the world used to know that it is the only application of BCT. However, today the world knows the disruption this technology has brought everywhere [4]. This technology is revolutionizing almost every industry. A study conducted by IBM, in which they have surveyed more than three thousand executives worldwide, shows that around 80% of them are actively implementing or planning to implement one or the other aspect of BCT in their day-to-day business. There may be the possibility that the transformation through this technology is not immediately realised, but in the coming course of time, it will prove to be a necessity to adapt to this technology for the business sectors. This technology helps businesses improve efficiency, provides security to data and information, reduces costs by eliminating unnecessary middlemen. Blockchain is a public ledger which maintains records of all the transactions held on a blockchain network while working in distributed manner. This blockchain network is a peer-to-peer network which does not need any central authority to authenticate/settle/control the transactions in the underlying network and thereby removes middlemen and brings transparency and improved security. In the era of digitalization, hacking and data breaching are the common problems all businesses are facing. The development of this technology has changed the way business transactions were done in the past. It has not only given birth to the digital currency but also transforming the businesses and societies.

There are plenty of applications and use cases where BCT can be implemented, and businesses can be benefited through distributed ledger technology (DLT). This technology has been implemented in various business areas such as Financial Services Sector, Healthcare, Insurance, Real Estate, Music, Logistics and Supply Chain, and so on. This technology with the help of smart contracts able to provide financial services without intermediary and can manage securities, claims, and settlement in an efficient manner. This technology is redefining healthcare sector by not only improving direct healthcare systems but also healthcare insurance systems. Transformation in insurance sector is also visible through this technology by bringing transparency and security for all the parties involved. Real estate sector reshaping has been started, as this technology is managing property title, ownership records, and other important data and records in a secured and immutable manner. By restructuring the musicians ownership rights and providing fair payments has brought transformation in music industry. This technology is not only redesigning the supply chain management but also logistics industry, trucking, shipping, freights, and all other modes of transports for transporting the goods. Not only all these areas are getting it implemented, but also it has reached to Government and public sector for various services such as better delivery of services, Government to Public payments, elimination of bureaucracy, prevention of frauds, and many more. Due to digitalization, identity management has always been a matter of concern for all public as well as private organizations. The BCT application is providing solutions to all such problems as well [5].

With the increasing popularity of 5G business applications, the traditional centralized application service architecture is facing an increasingly intense crisis of trust. In a centralized architecture, the reliability, security and integrity of all network agents, network behaviors, and network data are provided by application service data centers or third-party certification bodies controlled by a single agent. Therefore, when centrally deployed application service data centers and third-party certification bodies are attacked or unilaterally maliciously tampered by the controlling subject, the trust mechanism of the entire network becomes meaningless.

Blockchain opens up new possibilities for dealing with the crisis of trust in centralized network architectures by providing trust mechanisms for machine code. Using asymmetric encryption and security algorithms to register corresponding addresses, blockchain technology can ensure the uniqueness of identity; the tamper-proof characteristics of blockchain technology can increase the authenticity of network transaction data; using blockchain smart contract can improve the efficiency of multi-party transaction settlement. Network co-construction and sharing is an important trend of 5G network and future mobile communication network construction. Network credit provided by blockchain will replace authoritative subject and third party endorsement, avoiding the collapse of credible system caused by single point of failure and moral hazard. 5G networks and industrial applications powered by blockchain will form a fairer, open, credible, mutually beneficial, efficient and secure multi-party cooperation and open and win-win development ecology."

3. Application of Blockchain Technology to the Digital Transformation of Traditional Banking Industry

3.1 Application in the Payment System of the Central Bank

Under the background of increasing supervision of digital currency, issuing legal digital currency based on central bank has become the main form of promoting the development of digital currency in various countries. Based on the application of blockchain technology in the payment system of the central bank, there are two main forms of digital bills and cross-border payment. However, in practical application, there are also practical problems such as inadequate system efficiency, increased transaction risk and difficult supervision. To reform the existing payment system of the Central Bank based on blockchain technology, we need to do the following work: First, innovate blockchain and related technologies to improve the throughput of the payment system. By combining with traditional banks, the binary payment system can be constructed, and through the efficient connection between the main chain and side chain of the database, the data throughput and transaction speed can be greatly improved, and the issuance level of legal digital currency can be improved. Second, it is necessary to improve the management system of relevant aspects, clarify the scope of responsibility of service providers and users, improve blockchain security standards from the technical level and management level, and reduce operational risks caused by the existence of loopholes. Third, stick to the bottom line of risk prevention and build a systematic risk supervision system from the aspects of application hierarchical monitoring, blockchain intermediary monitoring and end user monitoring to ensure the safe operation of digital currency [6].

3.2 Application in Traditional Bank Payment

The combination of central bank and traditional banks to construct binary payment system is an important form of legal currency issuance and promotion in China. Under the influence of traditional payment environment and technological factors, there are still the following problems in the current payment management of traditional banks: First, the payment and settlement account supervision is lagging behind, the audit management system is not perfect, mainly by manual audit, and there are obvious management loopholes; Second, the way of checking accounts and payment and settlement tools are relatively backward, and there will be deviation in the statement information between grassroots branches and enterprises, or even illegal appropriation of funds. Third, on the whole, China's traditional bank payment management mechanism is not perfect, there are big loopholes in enterprise settlement management, and affect the bank's own management. The construction of legal digital currency system based on blockchain technology can effectively avoid the deficiencies existing in the traditional payment mode, effectively improve the efficiency of payment, eliminate the potential risks existing in the payment and settlement process, improve the reconciliation method and payment management mechanism, so as to better provide diversified payment services for enterprises. However, the application of digital currency mode also requires traditional banks to strengthen their own ideas and technical innovation, and comprehensively improve the professional quality of employees, so as to truly reflect the application effect of digital currency.

4. Application effect of Blockchain Technology on Digital Transformation of Traditional Banking Industry

4.1 Positive Effects

Blockchain technology solves the information asymmetry problem of traditional banks and improves the efficiency of business handling. Blockchain technology can package each customer's information into a block, in which information can be added, but not reduced, and cannot be tampered with. For customers, information security is guaranteed. In the credit business, the banks need to conduct investigation and approval at various levels when making large loans, and the lack of information sharing between banks and departments leads to repeated efforts of all departments, resulting in low efficiency in business handling. After the integration of credit business and blockchain technology, timely access to information, reducing repetitive labor, but also conducive to traditional banks to grasp the overall credit status of customers, better risk management[7].

Reduce Business Transaction Costs. Traditional banks are always limited by the multi-center and multi-link situation when handling payment and settlement business. Blockchain can change this

situation. The main feature of blockchain is decentralization, which can reduce intermediate procedures for business handling, improve processing efficiency and reduce transaction costs. In credit business, the application of blockchain technology can also reduce the cost of credit investigation before lending and enhance the effect of risk management after lending.

Reduce the error rate of manual operation to ensure the safety of trading. Traditional banks may cause some business operation errors when they are manually operated. It verifies transaction information accurately through blockchain, which can ensure the authenticity and accuracy of information and data, and reduce the error rate of manual operation. Blockchain also uses some mechanisms of cryptography to create a cryptosystem, where customer information is stored in the cryptosystem. Only after the customer decrypts the cryptosystem can transactions be carried out, which can prevent malicious theft of transaction funds and ensure the security of transactions.

Blockchain technology can realize real-time information query. In the operation of traditional banks, batch transactions are processed at the end of daily business, and complicated manual reconciliation is required, which takes a long time and consumes a lot of resources. The addition of blockchain can realize automatic reconciliation, and is an uninterrupted service, customers can get account information at the first time or master the abnormal situation of transaction.

Reduce the cost of bank regulation. In the traditional banking system, strict audit is needed to control the occurrence of risks and do a good job in supervision. In the process of audit, it needs to consume a lot of manpower and material resources, which is a high cost for traditional banks. After the fusion of audit work and blockchain technology, the tamper-proof and highly transparent characteristics of blockchain can increase the supervision of traditional banks and reduce the supervision cost of traditional banks.

4.2 Negative effects

The capacity problem of blockchain has not been solved, and the transaction confirmation time has been prolonged. The block capacity in blockchain refers to the maximum number of bytes that can be stored in each block. Obviously, it is not infinite. As the transaction volume of traditional banks gradually increases, the pressure on the blockchain system will increase, the transaction speed will be slow, and it will consume huge resources, and the transaction confirmation time will be extended indefinitely [8].

Blockchain will hit profits of traditional banks. Due to the continuous development of interest rate liberalization, the interest margin between traditional bank deposit business and loan business keeps shrinking. Therefore, traditional banks turn to encourage the development of intermediary business, and the most important intermediary business is payment and settlement. The majority of profits of some mainstream banks come from payment and settlement business. In recent years, thanks to the addition of the emerging technology blockchain, its technological breakthrough in distributed accounts will have a huge impact on the profits obtained in payment and settlement business processes.

Blockchain technology is uncertain for the development of traditional banks. The development of blockchain technology is not yet mature. Although it has some features of convenience, security and transparency, the cost of establishing such a blockchain system cannot be measured. Therefore, the full penetration of blockchain technology into traditional banks on the basis of maintaining the three principles remains to be considered. Moreover, as blockchain technology is an emerging technology, laws and regulations on blockchain technology are not yet perfect, and the supervision is also lagging behind, which may increase the risks of traditional banks.

5. Application Suggestions

5.1 Improve the Docking Efficiency between Banks and Enterprises

A growing number of banks are seeing the benefits of fintech innovation as Internet companies push forward with fintech. Large traditional state-owned banks have strong financial strength, so they can independently research and develop blockchain technology, apply it to accounts receivable business in supply chain finance, and make use of their sufficient resource advantages to cooperate with enterprises to facilitate the financing interests of small and medium-sized enterprises. In addition, traditional banks and other financial institutions should also play a leading role in the innovation and development of blockchain technology, and make use of their advantages in the financial market to promote the coordinated development of blockchain technology and supply chain finance. The integrated

development of the financial industry is conducive to the effective linkage between traditional banks and other financial institutions and small and medium-sized enterprises with financing needs.

Large banks with abundant funds can set up their own teams to develop blockchain technology, but some private banks, urban commercial banks, rural banks and other financial institutions do not have enough funds to "tailor" blockchain technology services for banks according to their own business status. Therefore, small and medium-sized banks with insufficient capital will choose to cooperate with large Internet companies and startups specializing in blockchain technology. In order to accelerate the rapid implementation of blockchain-based supply chain finance receivables business model, traditional banks and other financial institutions use blockchain technology to accelerate the digital transformation of business, and Internet giants and blockchain startups also rely on the support of financial institutions for technological innovation capital. Traditional banks and other financial institutions can choose to cooperate with blockchain technology enterprises to jointly build a blockchain supply chain financial business model. However, while cooperating with technological innovation companies, financial institutions should also pay attention to the comprehensive capabilities of the enterprises they cooperate with to reduce investment risks.

5.2 Strengthen Blockchain Technology Innovation

Currently, block chain in basic performance, security, reliability, standards, and security aspects of core algorithm also shortcomings, combined with block chain technology in different fields of application will face the risk of different, so you need to further promote the block chain technology innovation and development, and establish an effective and reliable block chain ecological system. First of all, improve the application effect of blockchain technology in the field of supply chain finance. For example, the consensus mechanism should be improved to balance the relationship between safety and efficiency, and a perfect reward and punishment system should be established on this basis to strengthen market competition. Continue to improve the functions of smart contracts, focus on strict analysis and review of code security and consequences, especially to establish a review system for the conversion between contract codes and legal provisions, so as to avoid unnecessary risks.

Second, intelligent contracts should be through the algorithm program design more function, make its have certain tolerance, even if the inevitable error, the system can also through the continuous operation of regulating mechanism to guarantee the data sharing and smooth, to minimize losses, both to ensure the security of data, can also block the healthy development of the chain.

Finally, the cultivation of blockchain technology talents is the top priority of blockchain technology innovation. The premise of ensuring technological innovation and service innovation is to have a corresponding team to carry out reasonable RESEARCH and innovation. Relevant business sectors can also consider setting up a separate blockchain technology team to continuously cultivate high-end professional and technical personnel. Senior managers should also encourage the introduction of innovative talents to provide talent supply for the development of blockchain-based supply chain finance business.

6. Conclusion

At present, the rapid development of Internet finance has spawned a variety of different Internet finance platforms, including Ant Finance and JINGdong Finance. Such financial platforms are generally based on large Internet companies, with stable customer resources and traffic and large scale. The scale of enterprises on this kind of financial platform is small. Due to the traditional supply chain finance mode, such enterprises are located at the end of the supply chain and will encounter many difficulties in the financing process. Therefore, taking the Internet financial platform as the core to create a new financial model can expand the coverage of financial services and provide corresponding financial services for different enterprises. Small and medium-sized enterprises will use the Internet platform to complete relevant transactions in their daily activities, generating a large amount of data, enabling financial platforms to obtain enterprise transaction information on the basis of reducing the cost of investment. The financial platform can control the information of each subject in the industrial chain and provide good service for the terminal enterprises based on the number of customers it has. When enterprises need financial support, they can use electronic sheet to complete the financing application. The system will automatically collect information related to the enterprise and complete the evaluation of the financing amount of the enterprise. If the enterprise provides the pledged goods in the application process, the ownership transfer will be completed in the form of smart assets, which can increase the financing

amount of the enterprise. After passing the risk control review of the platform, the financing funds will be automatically transferred to the account. When the enterprise makes repayment, the ownership of the pledge will also be transferred to the enterprise. Once there is a trust-breaking phenomenon of enterprises, according to the information of breach of contract, trade activities will be warned or business qualification will be suspended.

In the context of digital economy, the use of computer technology plays an important role in the development of supply chain finance, and blockchain-based computer technology has a strong promotion potential in the application and development of supply chain finance. Due to the imperfection of block chain technology, the application mode of "block chain + supply chain finance" is not perfect and comprehensive. With the development opportunity of digital economy, trying and improving the new development mode of supply chain finance is the new development path to solve the bottleneck problem of development funds for small, medium and micro enterprises in the development of supply chain finance.

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