

Promoting the Digital Transformation of The Payment Industry Based on Blockchain Technology

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Abstract: In the era of digital economy, the digital transformation of the payment industry has become a general trend. However, digital transformation can bring development opportunities to the payment industry, but it also faces some challenges. Blockchain technology is regarded as the key core technology to support the future development and application of the Internet. The development of blockchain has become the focus of financial technology. Its decentralization, simple process, openness, transparency, and non-tampering characteristics can effectively solve traditional payment problems. problems existing in. It is precisely because of the characteristics of decentralization that the payment method is more information symmetric and transparent, which greatly improves the security of the transaction process. Commercial banks use the blockchain consensus mechanism to ensure that the data of the platform, upstream and downstream, and other participants reach a consensus across the entire network to ensure information symmetry and transparency; the secure interaction of information is achieved through encryption algorithms, which solves the possibility of information being tampered with; blocks The timestamp feature of the chain ensures the integrity of historical data. This topic is based on the research on the role of blockchain technology in the digital transformation of the payment industry. It is mainly used in the following three aspects: 1.This technology has the intelligent features of payment settlement and fund management. Ensure the safe interaction of transaction information by improving payment efficiency and the security of fund transactions. 2.This technology has the characteristics of high efficiency and low cost. It efficiently and low-costly obtains true and reliable data in the system, optimizes the credit creation mechanism, forms a new trade financing model, and effectively reduces financing risks. 3.This technology has safe and low-risk characteristics. Improve the level of data governance, improve the intelligence level of KYC, risk control strategies, and anti-money laundering, and reduce the risks of both banks and the industrial Internet.

Keywords: Blockchain, Payment industry, Digital transformation.

1. Research Background

1.1. Research significance

From the perspective of theoretical significance, in the digital economy era, with the innovative application of financial technology, the domestic economy and finance have gradually entered the digital era. Blockchain technology is regarded as the key core technology to support the future development and application of the Internet. The development of blockchain has become the focus of financial technology. Its decentralization, simple process, openness, transparency, and non-tamperability can effectively solve the traditional problems of financial technology. Problems in payment. The use of blockchain technology has promoted the continued digital upgrading of the payment industry. The country attaches great importance to the development of the digital economy and will incorporate the acceleration of the development of the digital economy into the "14th Five-Year Plan" and the long-term goals of 2035. The People's Bank of China has proposed to accelerate the promotion of financial services. Digital transformation and deployment arrangements were made. Digitalization first brings challenges to the understanding of industrial changes. Digitalization promotes changes in the environment and business models of the payment market. How to promote the digital transformation of the payment industry is the key.

1.2. Research status and development trends at home and abroad

In the era of digital economy, the integration of digital economy and real economy is accelerating, and the waves of digital industrialization and industrial digitization are intertwined. Against this background, the application of blockchain technology in the field of payment technology will play an immeasurable role.

Abroad: The United States has a relatively mild attitude towards blockchain supervision and actively encourages blockchain innovation on the premise of ensuring the safety of financial transactions. Even if a security risk event occurs in blockchain finance, extreme regulatory measures are rarely taken. Instead, we start from the causes of security risks and issue corresponding bills to regulate. This is why American blockchain technology can produce many firsts in the world. One of the important reasons.

Domestic: According to statistical data from the "China Blockchain Development Report 2021", my country's blockchain industry achieved large-scale growth in 2020. The annual blockchain industry investment and financing scale reached 3.20236 billion yuan, a year-on-year increase of 854 %; the number of investment and financing in the blockchain industry totaled 76, a year-on-year increase of 300%; the number of blockchain financing projects reached 68, a year-on-year increase of 300%. In terms of blockchain technology applications, my country is mainly concentrated in the financial field.

1.3. Literature review

(1) Professor Tang Jun mentioned in "Application of Blockchain Technology in the Field of Bank Payment and Clearing—The Value and Construction of a Credit Fund Monitoring Platform": As blockchain technology becomes increasingly mature, blockchain is the underlying technology. A series of financial technology applications emerged at the historic moment, and are gradually and effectively empowered in various scenarios and fields.

(2) Professor Zheng Sheng mentioned in "Research on Security Issues of Mobile Payment Technology in the Blockchain Era": Overall, blockchain technology is technologically advanced in the field of financial mobile payments, and is effective in protecting payment privacy information and tracing fund flows. , reduce currency issuance costs, reduce cross-border settlement costs, etc., create a win-win ecosystem for mobile payment Internet, and promote the upgrading of the mobile payment industry in the financial field.

2. Research Content

2.1. Essential characteristics of blockchain technology in the payment field

The unique functions and characteristics of blockchain technology are determined by its core technology. In essence, the blockchain is a distributed ledger that cannot be tampered with or forged. It is also a collection of technologies including network protocols, consensus technology, encryption technology, and smart contracts. The blockchain uses the P2P network protocol to network nodes. After each distributed running node in the system generates new data, it encrypts the data and encapsulates it into a new data block (Block), and puts a time stamp on the block header. (timestamp). This topic does not discuss too much about blockchain technology issues. In order to facilitate the subsequent discussion of the application of blockchain technology in payment platform scenarios, the four main functional characteristics of blockchain are summarized below: decentralization, node trust, high Transparency and high security.

2.2. Combination of blockchain technology and payment industry

Blockchain technology will play an important role in the payment field in the future and promote the digital transformation of the payment industry. Most of the transaction parties in the financial field are public entities, and it is impossible to introduce third-party payment companies such as WeChat and Alipay for transaction supervision. The traditional online ordering and offline remittance model makes business risks uncontrollable. The platform and the account-opening banks of both parties to the transaction are connected to the platform's blockchain, which can ensure that both parties perform the transaction and complete the payment. The transaction agreement, delivery of subject matter, and order generation are all edited into smart contracts, and node trust is confirmed through the blockchain and payment terms are agreed upon. Once the payment conditions are triggered, the contract is automatically executed and payment instructions are sent to the bank without human control.

2.3. Problems and challenges faced by blockchain technology

(1) The blockchain system uses a transaction ledger that is open to the entire network to store all historical transaction data. All nodes in the blockchain system can see the plain text data on the chain and trace the transaction process, which can easily cause users to Privacy such as identity, transaction type and account balance.

(2) The blockchain system uses a multi-party consensus method to complete the confirmation of transactions. The nodes participating in the consensus must master more transaction information to verify the transaction rules. Once there is a problem with the consensus node, it will inevitably affect the correct verification of the transaction and cause Private data leakage poses a threat to the privacy protection of transaction content.

(3) The decentralized nature of privacy protection in traditional blockchains results in a lack of reasonable supervision of transactions on the chain. Transaction tracing and content supervision cannot be achieved for malicious and illegal transactions, which may bring systemic security risks at the application level.

2.4. Suggestions and conclusions on the supervision system of blockchain in the payment field

Through in-depth research on this topic, it is recommended to promote the development of blockchain industry associations, adopt the concept of collaborative supervision, and jointly promote the construction of the blockchain supervision system. Set necessary industry access thresholds, issue corresponding licenses to enterprises or platforms that meet the requirements, and realize the open development and transparent supervision of blockchain finance. With the assistance of Internet technology, we should innovate the supervision model, adopt the concept of collaborative supervision, and give full play to the supervisory functions of other social entities. Innovate the supervision model through self-regulation, joint supervision and other methods, and jointly create a diversified collaborative supervision model with government departments as the regulatory body and other regulatory bodies as supplements.

3. Project Innovation Points and Features

3.1. Project features

This project focuses on the application of my country's blockchain technology in the field of financial technology and explores how to promote the digital transformation of my country's payment industry through blockchain technology. In the context of the digital economy, blockchain technology, as an important network technology, has gradually been valued by various countries.

3.2. Project innovation

The project innovation points cover three aspects: technological innovation, structural innovation and application innovation.

(1) Technological innovation

At the technical level, this project will conduct in-depth research on the application of blockchain technology in the payment industry in the field of financial technology. In this

topic, the content of the blockchain transaction system will be explained through the PGC solution. This solution is designed for the blockchain transaction system based on the account model. It uses the Twisted-ElGamal homomorphic encryption algorithm to encrypt the transaction amount and account balance. This enables the confidential addition and subtraction of account balances during the transaction process.

(2) Structural innovation

Blockchain technology is structurally integrated from the data layer, network layer and industrial Internet infrastructure (IaaS) such as database, network protocol, multi-chain cross-chain interaction. In addition, blockchain can effectively provide payment platforms with cutting-edge technology application carriers such as cloud computing, the Internet of Things, artificial intelligence, and multi-party secure computing.

(3) Application innovation

At present, the integration of the digital economy and the real economy is accelerating, and the waves of digital industrialization and industrial digitization are intertwined. Against this background, the application of blockchain technology in the field of payment technology will play an immeasurable role.

4. Technical Route, Problems to Be Solved and Expected Results

4.1. Technical route

(1) Decentralization. Blockchain uses network protocols to form a network of participating nodes to achieve information interaction. Data is distributed and stored in each block, and it no longer relies on data management nodes (such as core enterprises, platform operating agencies or SaaS service providers and information management intermediaries (such as government data centers), banks, credit agencies, etc.) to achieve distributed storage, recording and updating of data.

(2) Node trust. Trust between nodes is established based on the same algorithm technology and decentralization.

(3) High security. The decentralized characteristics of the blockchain determine that data generation and modification are broadcast to all nodes, making the information highly transparent, shareable, traceable, and unable to be forged or tampered with.

4.2. Problem to be solved

The current decentralized nature of privacy protection in traditional blockchains results in a lack of reasonable supervision of transactions on the chain. Transaction tracing and content supervision cannot be achieved for malicious and illegal transactions, which may bring systemic security risks at the application level.

4.3. Solution

Zero-knowledge proof plays an important role in protecting

the privacy of blockchain transaction content. Represent any calculation condition with an arithmetic circuit C . After inputting data, 0 or 1 is returned as the verification result. The application of zk-SNARKs in the Zcash system mainly involves the following three steps:

(1) $\text{KeyGen}(1, C) \rightarrow (pk, vk)$ inputs a security parameter λ and F domain-arithmetic circuit C , and generates the proof key pk and verification key vk in the zero-knowledge proof.

(2) $\text{Prove}(pk, x, a) \rightarrow \pi$ inputs a proof key pk , public information x and the prover's secret information a , and outputs a non-interactive proof π to indicate that the prover does possess certain knowledge.

(3) $\text{Verify}(vk, x, \pi) \rightarrow b$ inputs a verification key vk and public information x , and a proof π . If the verifier is convinced, that is, he believes that the prover does possess certain knowledge, the verification output is $b = 1$.

4.4. Expected results

Publicly publish provincial and above journals related to the topic of "Promoting the Digital Transformation of the Payment Industry Based on Blockchain Technology"; write an innovative research report; form the preliminary entries for the 2023 Challenge Cup College Student Extracurricular Academic Works Competition.

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