

# Research on Chinese Rural Digital Inclusive Finance Innovation Based on Blockchain Technology

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## ABSTRACT

With the continuous development of digital technology in recent years, the potential productivity brought by new technology has gradually become a powerful engine for the development of inclusive finance. The integration of fintech and inclusive finance has reached an unprecedented height, where digital inclusive finance comes into being. Among all the new technologies such as big data, cloud computing, and artificial intelligence, blockchain stands out and becomes a hot topic due to its features of decentralization, detrusting and tamper-proof. Currently, the inclusive finance in rural areas is faced with a serious island effect; the credit mechanism system is not perfect and the construction of inclusive finance service infrastructure is insufficient. The defects of rural inclusive finance can be made up to the greatest extent by a combination with the blockchain technology, thus building a more efficient and perfect rural inclusive finance ecology.

This paper will take rural inclusive finance as the research object, and elaborate the mechanism of innovative development of rural inclusive finance after the embedding of the blockchain technology. It is found that the equipment, technology and relevant laws are not perfect yet, which may bring risks to the development of rural inclusive finance. Finally, relevant policy suggestions are put forward, including a universal education for digital financial knowledge, the improvements in the infrastructure, etc.

**Keywords:** *Blockchain technology, Rural inclusive finance, Digital technology, Digital Universal finance.*

## 1. INTRODUCTION

With the gradual development of rural revitalization in China, financial products and services in rural areas are increasingly enriched, and their quality is also improving. At present, the development of inclusive finance in China's rural areas has achieved phased results, but there are still some difficulties, which greatly restrict the further development of inclusive finance in rural areas. The difficulty of financing and the problem of expensive financing cost for vulnerable groups cannot be solved by only relying on the traditional financial service model. The emergence of blockchain provides more new ideas and new ways for the development of rural inclusive finance. In 2019, China raised blockchain technology to the national strategic level for the first time, hoping to use blockchain technology to solve the problem of the lack of financial services in rural areas and in small, medium and micro enterprises (SMMEs). Therefore, how to make good use of blockchain technology to promote the development of rural inclusive finance has become an urgent issue to be solved.

This paper first introduces the concepts related to blockchain technology and rural inclusive finance; then it studies the development status and difficulties of inclusive finance in rural areas, followed by the explanations on the profound changes that blockchain technology will bring to rural inclusive finance, as well as the inconvenience and difficulties that may be caused to the implementation of blockchain technology based on the current situation of rural development; finally the paper puts forward a few policy suggestions.

By combining blockchain technology and rural digital inclusive finance, this paper provides a useful guideline for the innovative development of rural inclusive finance in the post-epidemic era, and also provides scientific suggestions for the regulatory authorities to improve relevant policies.

## **2. THE CONNOTATION OF BLOCKCHAIN TECHNOLOGY**

### **2.1. Overview of blockchain**

The blockchain consists of a string of data blocks generated using cryptography. As the underlying technology of Bitcoin, the blockchain was first introduced in 2008 in Satoshi Nakamoto's paper "Bitcoin: A Peer-to-peer Cash Payment System". It is essentially a decentralized ledger database. Then, in "The white Paper on China's Blockchain Technology and Application Development (2016)" issued by the Ministry of Industry and Information Technology of China, the blockchain is defined as a distributed ledger that connects data blocks in chronological order, and ensures that the data cannot be tampered with or forged by means of cryptography.

However, the blockchain technology hotly discussed in various fields is no longer a single technology completely based on innovation, but a combination of existing technologies. It includes encryption algorithms, P2P (peer-to-peer) file transfer, and transaction confirmation topology, etc.. By combining these technologies with databases, it is possible to form a seemingly new way of presenting data recording, delivery and storage. In short, the blockchain technology, which is decentralized and contained in a distributed structure, is an approach for data storage, transmission, and proof. It is the application of this technology in finance and other fields that has changed and innovated economic models and even the way people live.

### **2.2. Characteristics of blockchain**

#### **2.2.1. Decentralization**

The most important feature of blockchain technology is decentralization. This means that the status of any node within the whole blockchain is equal. Each node regulates the rules of transaction through a certain consensus mechanism, and the transaction is recorded in the blockchain. Together, these nodes manage the operation of the blockchain, enabling direct peer-to-peer transactions without the need for a third party to manage and maintain the ledger. No matter which node the data is recorded from, the data will be automatically synchronized to other nodes to achieve distributed recording and updating on the blockchain. Even if a node is attacked and fails, it will not affect the normal operation of the whole system. After repairing, it can automatically synchronize the information from other blocks to ensure the integrity of blockchain information to the greatest extent [1]. Thus, this feature can greatly improve work efficiency, avoid the whole system paralysis caused by the failure of the central node, and ensure the accuracy and reliability of the transaction data in the blockchain.

#### **2.2.2. Tamper-proofing**

This feature is guaranteed by cryptography. Blockchain utilizes hash functions and asymmetric encryption methods to ensure the one-way and irreversible push of data on the chain. The original content cannot be obtained according to the surface password. At the same time, the existence of the timestamp is to ensure that the information is arranged in chronological order, and cannot be tampered with. Tampering with one part of the information would require recalculating thousands of stages involved in the subsequent block, which has greatly increased the difficulty of decryption. What is more, the 51% attack of the consensus mechanism, referring to the agreement of more than 51% of the block nodes when modifying certain information in all blocks, also basically makes it impossible to tamper with data [2]. This has effectively ensured the real reliability of the distributed database.

#### **2.2.3. Open, transparent and traceable data**

The blockchain's distributed ledger means that all the ledger data is public, and all accounts have access to all historical transfers through a block browser. This information including the transfer address, transfer time, and transfer amount is all recorded one by one. Each node can obtain a complete account book, where the information is divided into two parts: public information and private information. The former is open to all nodes, and the latter is only open to the both sides of the transaction with private key decryption. Data information on the blockchain system can be reviewed, recorded, traced and restored by relevant nodes, thus ensuring the openness, transparency and traceability of the data on the chain to the greatest extent.

## **3. DEVELOPMENT STATUS AND PROBLEMS OF RURAL INCLUSIVE FINANCE**

### **3.1. Development Status**

The concept of financial inclusion was introduced when the United Nations was promoting "microfinance". Its main purpose is to offer business including savings, finance, and credit to all social groups that have capability to repay, especially to small and micro enterprises, the urban and rural low-income people, and some special groups such as the poor, the disabled, and the elderly, thus establishing a more efficient and more comprehensive financial system of point-to-point service.

In recent years, the Chinese government has clearly pointed out the measures to develop inclusive finance in the documents concerning agriculture, rural areas and farmers, and the subsequent increase of financial allocations has also continuously stimulated the potential

of inclusive finance. There is always a problem of unbalanced and inadequate economic development in the urban and rural areas of China. The universal concept brought by inclusive finance can introduce resources into rural underdeveloped areas, promote the development of local productivity, stimulate local economic vitality, and solve the current problem of unbalanced economic development perfectly [3].

With the strong support of the government for rural inclusive finance, The Bank of China and other Chinese financial institutions have joined the ranks of promoting the development of inclusive finance, helping improve the allocation and integration of rural resources, thus promoting the construction of rural financial system and the development of agricultural finance. As indicated in the Innovation and Development Report of Inclusive Finance in China (2019), the information system of inclusive finance in rural areas is increasingly complete. In rural areas, everyone has a bank settlement account, and ATM and POS machines are available in every village. These digital products have greatly improved the availability of financial services and effectively reduced the threshold and cost of financial services [3]. But at the same time, it should be clearly awarded that these are far from enough for many underdeveloped rural areas. In these areas, the loss of young people, the idle land resources and the lack of capital support will cause huge losses to the local economic development and have a negative impact on the social economy.

### **3.2. Difficulties in development**

#### **3.2.1. Serious isolated island effect in rural areas**

In electronic circuit design, the island effect refers to the fact that a certain area of the circuit is in principle with the current flow, but in fact, there is no sign of the current flow. The island effect can be extended to rural inclusive finance. In the rural environment, villages are self-sufficient and have a strong sense of collective belonging. There is almost no communication between villages. During the 12th Five-Year Plan period, nearly 900 towns and townships and 80,000 administrative villages built hardened roads and upgraded more than one million rural roads, thus basically connecting all towns and townships with roads. Over 99% and 93.2% of townships and administrative villages operated shuttle buses. However, these roads still fail to connect villages together, and the severe island effect greatly hinders the mutual assistance of rural resources and capital. There are a large number of individual scattered households, and it is difficult to form scale advantage in demand. On the contrary, it raises financing costs and seriously hinders the development of inclusive finance in rural areas.

#### **3.2.2. Imperfect rural credit system construction**

The credit system is the basis of financial transactions. The objects of the village inclusive finance service are farmers in remote and poor areas, but the population in remote areas is scattered and the natural village area is large, so it is difficult to collect personal credit information, and it is even more difficult to check and update information [4]. Moreover, the large proportion of migrant workers in rural areas and the large population mobility aggravate the difficulty of information collection and later-stage management. The resulting imperfect target data and the fraud and deception have greatly reduced the availability of inclusive financial services in rural areas. In addition, the popularization and education of inclusive financial knowledge in rural areas are not enough, and this has caused the feelings of strange, fear, and even resistance in rural residents. Such distrust also directly restricts the large-scale development of inclusive financial products and services in rural areas.

## **4. APPLICATION ADVANTAGES OF BLOCKCHAIN TECHNOLOGY IN RURAL INCLUSIVE FINANCE**

### **4.1. Effectively solving the problem of imperfect credit system**

Blockchain technology itself has the feature of trustworthiness, which can achieve information symmetry well. By using blockchain technology to build a decentralized management platform, and applying mutual trust account agreement to evenly distribute the rights and obligations of all nodes, each node will transact based on the transaction rules, and all the nodes themselves will judge whether the transaction is valid without the need of mutual trust. According to a computer program, the content of each transaction is encoded into a smart contract and published on a distributed network. Each transaction conducted on the blockchain will be broadcast to the whole network users. According to the 51% principle of the consensus mechanism, each node will consider the authenticity of each transaction to maximize its own interests. Once the transaction information is confirmed and stamped with the appropriate timestamp, the recorded information cannot be changed. Investors can easily track where their money is going, and the rules of operation are open and transparent. This is extremely important for the inclusive financial market in rural areas where personal credit investigation has not been fully popularized.

Moeda is the first international application to leverage blockchain technology to provide more confidence, efficiency, transparency, and financing for those who cannot access the capital through traditional systems. This enables traditional financial institutions to directly and effectively obtain customers' credit status without

any credit endorsement, which is an essential financial channel to empower rural areas and people who lack bank credit channels.

#### ***4.2. Effectively reducing transaction costs and controlling financing risks***

Despite the development of digital inclusion, it has not covered all long-tail markets. The traditional digital inclusion business is "one-to-many" model. In short, it takes commercial banks as the center to provide corresponding financial services for customers. However, the remote geographical location of rural areas, a large number of vulnerable groups, regional and economic development is relatively backward. To build a large-scale decentralized platform with the blockchain, there is no need to consider the cost of building and operating such as fixed asset expenditure, operation and maintenance cost, and labor cost of the physical platform. At the same time, the blockchain can simplify the process of financial services, reduce the cost of manual system maintenance and optimization, and realize the automatic operation of business. It not only reduces the cost of manual operation, but also greatly improves the efficiency of business. Both sides of the transaction can directly contact point to point without intermediary matching, and there is no need to pay intermediary fees. This has greatly reduced the center's operating costs and the customer transaction costs.

Bain, one of the world's leading management consulting firms, claimed in a study that if blockchain technology is properly used, companies can reduce their operating costs by more than a half, thus minimizing the cost of rural financial transactions. In particular, the public chain in the block chain can be open to all. Traders and financial regulators can monitor the information data in the block through the open interface, which can solve the problem of information asymmetry among customers and control certain financing risks [5].

### **5. POSSIBLE DIFFICULTIES OF BLOCKCHAIN TECHNOLOGY**

#### ***5.1. Lack of perfect supporting equipment***

In recent years, although the Chinese government has subsidized and supported the development of rural inclusive finance from various aspects including finance, taxation and insurance [6], the infrastructure construction of rural inclusive finance service network and the communication is still insufficient. According to the statistics of China Internet Network Information Center, as of December 2021, the number of Internet users in China's rural areas is 284 million, accounting for 27.6% of the total number of Internet users, and urban areas surpass rural areas by 44.8%. The gap between urban and rural areas is still large.

The proportion of Internet users using mobile phones to surf the Internet reaches 99.7%, and the users using computer terminal devices are far fewer than that using mobile phones. This shows that even though the Internet penetration rate is increasing day by day, the popularity of internet-related infrastructure in rural areas is still relatively poor. The lack of computer terminals makes it difficult to operate the blockchain system, which is an urgent problem for the digital economy.

#### ***5.2. Lack of technical personnel***

Although the development and application prospect of blockchain technology has been recognized by the government and all sectors of society, in order to make use of the main force of blockchain technology in rural inclusive finance, a large number of interdisciplinary talents with financial knowledge, blockchain knowledge, legal knowledge and other relevant knowledge are needed [7]. However, the available talents are scarce. Especially in the backward areas of agricultural Bank of China village, the introduction of blockchain r&d (Research and Development) talents for inclusive finance is not enough, which is also a major obstacle to the application of blockchain technology in inclusive finance.

#### ***5.3. Legal challenges***

The distributed and detrusting characteristics of blockchain technology conflict with many basic legal principles. It desalinizes the traditional definition of region and regulation, and brings a great impact on the current economic system of market structure. Regulators' awareness and understanding of this new technology is not sufficient, and there are still gaps in the legal basis and institutional design of some components of blockchain technology [8]. Because of this, many financial institutions do not dare to use blockchain technology to carry out relevant economic activities, for fear of potentially increasing market risks.

### **6. POLICY RECOMMENDATIONS**

From the actual investigation and the above analysis, it can be seen that there are still difficulties in the development of blockchain technology in rural inclusive finance. Only innovation-driven development and breakthroughs in existing technologies can truly promote the development of rural digital inclusive finance through blockchain technology. In this regard, this paper puts forward the following suggestions:

(1) Popularize digital financial knowledge education of rural vulnerable groups on a large scale, improve financial literacy, basically identify fraud, identify beneficial financial services and actively participate in them [9];

(2) Strengthen the construction of infrastructure. For the serious shortage of network infrastructure hardware and software facilities in rural areas, measures should be taken to comprehensively cover the network communication systems and intelligent computer terminals to improve the penetration rate of the basic equipment in remote rural areas.

(3) Strengthen talent pool and technological innovation. It is necessary to set up a talent reserve plan as soon as possible, cooperate with colleges and universities to jointly cultivate professional talents [10], attract and retain senior talents by increasing research funds and guaranteeing living benefits, and accelerate the development and implementation of relevant applications.

(4) Accelerate the establishment of blockchain special law and improve the regulatory mechanism. In view of the future application of the blockchain, relevant access policies should be issued, and corresponding standards should be set for digital assets, personal credentials, transaction items and other information in the transaction process.

## 7. CONCLUSION

Theoretically, the active introduction of blockchain technology can effectively reduce the transaction cost of rural inclusive finance, solve the problem of imperfect trust system, and control financial transaction risks to a certain extent, putting forward new ideas for promoting the development of inclusive finance industry in rural areas. However, blockchain is still a new frontier technology for China, and its application and supervision are not perfect in China. Therefore, there are many technical and legal system problems in the implementation process, and how to solve these problems is also in an urgent need of thinking and solving today. This paper puts forward some relevant opinions, hoping to provide some help.

At present, China's rural inclusive finance is still in the initial stage of development, and the author's investigation on this also has immature aspects. In the process of this study, due to the epidemic situation, the real-time and latest data in rural areas were not collected. Instead, the author used the relevant data in 2021, which may be delayed and not accurate enough. The author hopes that future generations can supplement and modify this part of data to explore the true and accurate situation. In the future, blockchain technology will become more mature. Financial institutions and fintech companies will jointly develop rich financial software and put it into practical application. In the process of practice, more practical problems will be found, which is also a good experience material for the country and enterprises, which is worth careful discovery and consideration by future generations.

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