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# Problems and Countermeasures in the Development of Central Bank Digital Currency (CBDC): A Case of China

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**Abstract:**

Against the backdrop of the global digital currency revolution, China's central bank digital currency has had a profound impact globally and has shown great momentum in participating in international competition. However, there are still unresolved challenges which this article discusses. The article first outlines the simple development of central bank digital currency and presents three major issues: information technology risks, user proficiency and acceptance, and competition from mainstream payment systems. It further proposes countermeasures and analyses to provide a clear direction for the identified problems. Research shows that technological bottlenecks, user acceptance, and obstacles from payment systems are indeed the most urgent issues facing the digital yuan, and the proposed countermeasures facilitate the resolution of these core problems. This article provides ideas for optimizing and improving the development path of central bank digital currency, helping both domestic and international efforts to enhance the stability and popularity of digital currencies. It also offers insights and references for other scholars studying central bank digital currency, contributing to the healthy development of global digital currencies.

**Keywords:** Finance; central bank digital currency; massage security.

## 1. Introduction

In today's society, information technology has become an inseparable part of daily life, especially in the aspect of monetary reform. The original traditional currency, under the influence of the digital wave, has deeply integrated with digital technology, giving birth to central bank digital currency (CBDC). Guided by national policies and the financial system, CBDC will reshape the global financial landscape, unleash its potential, and enhance the inclusiveness of financial services.

China has been deeply exploring and practicing CBDC. Since 2014, the People's Bank of China has established a statutory research group dedicated to studying CBDC. In the following years, a Digital Currency Research Institute was established, mark-

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ing the substantial progress of research and development work. From initial theoretical research to technological innovation and pilot testing, years of development have gradually brought digital currency into the lives of people. The transaction scale of CBDC is gradually expanding, and usage scenarios are diversifying, showcasing excellent development potential in China‘s economic growth.

Although China’s CBDC has achieved many significant accomplishments, there are still shortcomings, such as issues related to technical security, as well as the limited familiarity and usage scope among users. This article will provide a comprehensive review based on the current state of CBDC development in China, deeply analyze the problems faced, and propose targeted strategies, aiming to contribute to the future development of digital currency in China.

## 2. Problems

### 2.1 Technology Problem

As a new type of digital currency released in recent years, people‘s doubts about the maturity of the technology remain. There are still unresolved concerns regarding the insecurity of funds, the ease of privacy leaks, and legal issues [1]. As financial service institutions that manage vast amounts of user data, the comprehensive promotion of central bank digital currency could lead to violations of personal information and security issues. When the number of users online is too high, it can easily cause network congestion, leading to unsafe transactions [2]. There are evident efficiency problems in the actual application of digital currency. As a system for rapid transactions, it takes a significant amount of time in the process of information verification and transaction settlement. Taking the Bitcoin system as an example, about 16% of transactions have a delay time exceeding 1 hour, and even 1% of transactions may take a day to enter the blockchain, which is far beyond the normal delay time. The average transaction delay time is 68.12 minutes [3]. This is due to the vast scope of information spreading across the entire network, requiring verification through transmission among various nodes. If the central bank digital currency is also built on such a decentralized distributed technology, then when facing large amounts of transactions and high-frequency transaction waves, there will be technical issues that are difficult to sustain for transaction security, affecting the circulation speed and transaction speed of the currency. In terms of network communication, the transaction data of central bank digital currency faces enormous challenges. If there are external factors of network instability in online transactions, how will the digital currency system resolve issues of network faults and jitter? Once such problems occur, transaction data may be hindered, leading to transaction delays or even failures. A large amount of sensitive information may leak in such abnormal network conditions, which not only harms the users‘ own interests but may also pose a catastrophic threat to the entire digital currency system.

### 2.2 Acceptance and Familiarity of Users

Unlike traditional cash transactions, electronic currency transactions have become widely used in today‘s Chinese society. However, new storage methods and a lack of understanding regarding central bank digital currencies still hinder wider adoption of digital currencies. Data investigations show that age influences the use of digital currencies; older groups are less accepting of new things, while younger groups are more open and have stronger learning abilities [4]. Therefore, for the aging population, established payment habits create significant barriers to change. Long-standing cash payments and mobile payments have deeply embedded themselves in people‘s lives, but new payment systems and tools require people to relearn. The procedures before actual usage are too complicated, such as downloading applications, real-name verification, and learning how to use them, which leads people to give up on proceeding. Additionally, some users still worry about tracking of transaction data and other privacy concerns, even though digital currencies emphasize privacy protection. People remain cautious and concerned about this new payment method due to unfamiliarity with virtual digital transactions and a lack of security [5]. Finally, users exhibit a significant discrepancy in their understanding of central bank digital currencies and information gaps; most users have a misguided understanding of the core attributes of digital currencies and often confuse them with private digital currencies. They know very little about the functions and advantages of digital currencies, resulting in a lack of motivation to actively try using them.

### 2.3 Different in the Current Mainstream Payment Methods

The mainstream online payment methods in current Chinese society are mainly payment methods from applications such as ‚WeChat‘ and ‚Alipay,‘ which are third-party payment applications that have accumulated a large number of users over the years, creating significant user stickiness and dependency. The non-bank payment service market in our country is developing rapidly, but the market concentration is too high, leading to some market issues. As consumers, the limited payment options affect the innovation of payment institutions themselves and disrupt market order, suppressing the development of the payment industry [6]. This puts immense pressure on the promotion of central bank digital currency, making it difficult to quickly attract users to change their inherent

payment habits. Secondly, there are compatibility issues between different payment systems; the central bank digital currency uses a completely new distributed ledger and encryption algorithms as its underlying data, which differs significantly from traditional third-party payment systems, seriously affecting users‘ freedom to switch between different payment methods and obstructing the entry of the central bank digital currency into the existing payment ecosystem. In the context of cross-border payments, international mainstream payment systems like Visa dominate the global network, and these powerful systems have established stable and unified business models after long-term stable development, connecting with many existing international payment systems and establishing their mature payment business models with standardized processes and clearing systems. If central bank digital currency aims to expand its business to international network cooperation, it must not only compete with these huge payment systems but also solve many payment compatibility issues. In integration projects, the policies and technical standards of each system vary, which presents many challenges for the expansion plans of the central bank digital currency system.

## 3. Solution

### 3.1 Technical Structure and Protection System

Improve the risk control of the digital currency system and enhance the ability of risk control. Learn more about the risk control technology of digital currency in various countries to enhance the acumen of technical risks. It is necessary to make reasonable use of existing network resources, improve the technicality of the network platform, continuously maintain the technical maintenance of the payment system, and strengthen the support capacity of digital technology [2]. Adjust and update the existing bill, clarify the scope of digital RMB crimes in writing, and improve the supervision and control of „digital RMB“ at the legal level [7]. Adopt a hybrid architecture design, which is divided into peak hours and low peak hours. Different technical algorithms are used at different times, faster and more efficient algorithms are used at transaction peaks, and native algorithms with higher safety factors are used during low peak hours. Promote the upgrading and transformation of the underlying technology, set up the sub-module computing technology, reduce the computing pressure of each module, and accelerate the overall transaction speed. Insert risk control guarantee, monitor security risks in real time, and raise risk alert. Optimize the design of digital currency wallets and user protection, and add some authentications to protect user security from the technical level. For example, face recognition, fingerprint recognition, verification code, etc. Introduce multi-level protection, real-time networking and information interoperability with the public security system. Ensure that users‘ security information is not violated.

### 3.2 Users’ Credit

In order to enhance users‘ stickiness and familiarity with digital currency, the government can expand publicity. Due to the people‘s high trust in the government, digital currency can be promoted and developed. It not only expands the number of users, but also promotes the future development of digital currency [7]. Carry out different publicity for users of different ages, expand the public‘s familiarity with the central bank‘s digital currency, break down traditional knowledge barriers, and solve the problem of user trust. In the face of ordinary users, you can use video publicity, poster cartoons or open booths to promote, and use the attraction to popularize science to the public. In the face of merchants and enterprises, you can start a lecture to explain the advantages and security of digital currency, cross-border payment settlement, optimization of the capital chain and other advantages. Strengthen the motivation of active promotion. Learn from the usage methods of other apps, cater to the public‘s usage habits, and add similar payment methods such as scanning payment to enhance the affinity with users. A large number of paths to promote the central bank‘s digital currency will be added to the payment methods, and payment paths will be laid in physical stores with a large number of mass consumption, such as convenience stores and supermarkets. For example, it is recommended to use it when paying at the checkout of convenience stores and enjoy preferential policies. Clarify privacy and security issues, publicize the guarantee mechanism, release and interpret the basic principles of the central bank‘s digital currency through official channels, disclose security and technical guarantees, and eliminate users‘ doubts about security. Establish a perfect asset guarantee and customer service system to ensure that questions can be answered at any time. Improve users‘ sense of security for digital currency payment systems, and cooperate with insurance companies and other similar guarantee institutions to reduce risk concerns. As a digital subject, the lack of skills of the elderly is the main reason for the technical gap of the elderly. It is necessary to focus on optimizing the visual elements of the payment interface, enhance the accuracy and sense of confirmation of payment operations, and guide elderly users to complete payment smoothly in terms of hearing [8].

### 3.3 Cooperation and Clear Rules

The key to solving these difficulties is to deeply understand the specific sources of these differences. Communication and consensus between systems are the focus of

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the breakthrough, and the establishment of unified data vocabulary and data standards to ensure consistency in information transmission [7]. Sign a cooperation agreement to align the authority with the detailed transaction rules [9]. Promote cooperation, establish a cooperation model between the central bank and the third-party payment system, realize the complementarity of functions, and promote the strategic cooperation between the central payment system and the third-party payment system. Introduce relevant policies to encourage merchants and consumers to use new consumption models and promote the establishment of cooperation mechanisms. Formulate unified standard transaction rules, led by the central bank, and negotiate with other payment institutions to specify the data format. Clarify the data format of the central bank‘s digital currency system and the third-party payment system, avoid the docking problems caused by format differences, and invite third-party payment institutions to jointly design and optimize the payment system, so as to fundamentally reduce the problem of system compatibility. Build cross-border payment system rules and break through the cross-border payment barriers generated by the international payment system [10]. Led by the central bank organization, together with international organizations, jointly formulate policy details for cross-border payment of the central bank‘s digital currency. Promote the global use of this standard and improve the recognition of the central bank‘s digital currency on the international platform. Domestic regulatory authorities need to play a guiding role in promoting the digital transformation of financial institutions, encouraging and supporting the widespread use of digital currency, strengthening technological research and development, and improving the level of financial technology.

## 4. Conclusion

In summary, the digital currency of the People‘s Bank of China faces many challenges in its development process, with certain areas in information technology, user levels, and the overall payment system that could be improved. Addressing these underlying issues will help to promote the healthy development of China‘s central bank digital currency, enhance its international status, and fulfill its financial service functions. This will provide strong support for the development of the digital economy and elevate the financial sector in the international financial arena.

Due to technical limitations, this article cannot obtain in-depth professional data and relies only on publicly available data reports, resulting in a certain lack of persuasiveness in the conclusions. The research perspective in the article is relatively singular, lacking an international viewpoint, and the long-term adaptability of the strategies needs further supplementation.

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