

# The Innovative Path of Digital Economy Business Models Based on Blockchain Technology: Taking Cross-border Payment as an Example

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**Abstract.** In recent years, with the continuous development of digital technology, new business models of the digital economy have emerged. Cross-border payment relying on blockchain technology has also become a major project under this business model, which promotes global trade and capital flows and effectively solves the problems of high cost, low efficiency and low trust existing in the traditional model. This report explores the characteristics of blockchain technology, such as distributed ledger, asymmetric encryption and identity security, and smart contract. Based on these characteristics, it is analyzed that cross-border payment based on blockchain technology has the advantages of low cost, high efficiency, high transparency and high user trust. And it was found that the innovative path of this new business model can be divided into two aspects: value innovation and profit model innovation. Create value by leveraging digital features rather than relying on traditional manual models. In addition, this report also points out that this innovative path will face challenges such as a shortage of professional and technical personnel, cybersecurity, different standards in various countries, and a lack of relevant markets. In this regard, relevant institutions should implement regular maintenance of the technology and regulatory coordination among countries. The government can increase its investment in the talent market to strengthen basic technical support and consumer trust.

**Keywords:** Digital economy business models, blockchain technology, cross-border payment.

## 1. Introduction

In recent years, the digital economy has developed rapidly worldwide, and e-commerce has also become a popular trend [1]. The emergence of cross-border payments has connected the economies of various countries, making transactions more international and promoting global economic development. However, cross-border payments under the traditional model are at a relatively low level in terms of cost, efficiency and trust. With the development of emerging technologies, cross-border payments based on blockchain have emerged, which has driven the transformation of the digital economy and the global payment system. Its features such as higher efficiency, lower cost and higher trustworthiness deserve attention. However, the existing research lacks the expansion of innovative paths under the electronic business model. This article will first describe the characteristics of blockchain, then present innovative paths, and finally analyze the challenges and provide strategies.

## 2. Characteristics of Blockchain Technology

### 2.1. Distributed Ledger

Distributed ledgers represent one of the most distinctive features of blockchain technology. This demonstrates that transaction data is collectively safeguarded and stored by different nodes rather than centralized in a single database. The characteristic of multiple nodes jointly storing data ensures transparency and security throughout the entire transaction process [2]. Within this decentralized model, data synchronization across multiple nodes makes tampering extremely difficult. Data security forms the foundation for implementing shared ledgers in cross-border payments within the digital economy [3]. Furthermore, the distributed nature relies on consensus mechanisms such as Proof of Work (PoW) and Proof of Stake (PoS). These mechanisms aim to ensure data synchronization and

consistency among cross-border nodes. This characteristic brings significant benefits to cross-border payments. It enables real-time sharing of transaction data across nodes in multiple countries and further prevents data fraud. Moreover, the transaction process can be tracked, enhancing credibility. In addition, distributed ledger has also enhanced the efficiency of banks, avoiding excessive time spent on reconciliation and settlement.

## **2.2. Asymmetric Encryption and Identity Security**

Asymmetric encryption enhances transaction security and identity verification through public and private keys. It ensures that only users with the private key can operate on their funds, thereby improving the security of the account. Moreover, in cross-border payments, the feature of encryption also protects users' privacy [4]. In blockchain transactions, personal information does not need to be disclosed because the transactions are identified by specific encrypted addresses, which to a certain extent enhances anonymity and transaction integrity. The feature of encryption effectively avoids account security issues caused by information leakage by intermediaries and other institutions in traditional transaction models, providing a significant security guarantee for cross-border payments.

## **2.3. Smart Contracts**

Smart contracts refer to automated contract codes, and these codes can be programmed. The most prominent feature of smart contracts is that they can operate without human intervention, when necessary, conditions are met. Contracts set on different nodes can automatically complete the required operations, such as exchange rate conversion, fee settlement and fund transfer. In cross-border payments, this feature helps to automate the processing of core links. For instance, in terms of exchange rate conversion and settlement, enhancing the operational efficiency and reducing the reliance on manual labor has significantly cut down on labor costs and instability [5]. On the basis of automation, cross-border payment has certain technical, and efficiency guarantees, which can achieve more efficient expansion. In addition, its business flexibility will also be greatly enhanced, and it will no longer need to rely on manual decision making.

## **2.4. Cross-Chain Technology**

Cross-chain technology refers to the technology that enables interaction and value exchange among different blockchain networks. Blockchain is often regarded as relatively independent and usually cannot directly exchange data and value. This feature of cross-chain enables blockchain to no longer be confined to relatively independent systems as it is traditionally. It has broken the concept of isolated islands between blockchains, enabling them to achieve interoperability. Cross-border payment involves multiple digital currencies and the financial systems of different countries. Cross-chain technology helps them achieve effective interconnection on a global scale and reduce barriers. Furthermore, this characteristic also reduces the operational links with intermediary institutions in transactions, thereby enhancing efficiency.

## **2.5. Matching Blockchain with Cross-Border Payment Needs**

The problem that needs to be solved in cross-border payment is a triangular dilemma formed by “trust - efficiency – cost”. The above-mentioned characteristics of blockchain technology have effectively narrowed down this difficult problem from multiple dimensions. In terms of trust, blockchain technology synchronizes its transaction data in a node-like manner through a distributed ledger and its consensus mechanism, reducing reliance on intermediaries and addressing the issue of lack of trust among unfamiliar participants in cross-border transactions. In terms of efficiency, through the point-to-point smart contract feature, real-time exchange rate calculation and real-time transaction settlement have been achieved, reducing complex processes that previously required human intervention, breaking geographical boundaries, eliminating time differences, and realizing automated and efficient operations. In terms of cost, by reducing the intermediaries in transactions

and achieving automated settlement, the additional fees in transactions have been significantly lowered.

### **3. Analysis of Blockchain-Driven Innovation in Cross-border Payment Business Models**

Under the traditional model, cross-border payments have problems such as insufficient trust, low efficiency and high cost. Applying blockchain technology to cross-border payments can enhance its technological foundation, serve as its underlying driving force, and provide new development paths for business model innovation.

#### **3.1. Value Innovation**

The traditional cross-border payment model has value limitations. Firstly, it must follow the principle of giving priority to safety and compliance. The operation is strictly carried out in accordance with the requirements of Know Your Customer (KYC), Anti-Money Laundering (AML), and Combating the Financing of Terrorism (CFT), which sacrifices transaction speed and user experience. Secondly, the traditional method is inefficient. Transactions are restricted by geographical time zones and bank business hours, and it usually takes 2 to 5 working days to complete the settlement. The next drawback is the high cost. There are many intermediaries involved, charging a handling fee of 3% to 7%, which is particularly detrimental to individual users and small and medium-sized enterprises. In addition, the traditional model lacks transparency, and the transaction routes are complex, which makes it impossible for users to track the transaction status and capital flow in real time.

In this case, blockchain-driven value innovation mainly lies in three aspects: trust, efficiency and cost. In terms of trust innovation, blockchain-driven cross-border payments no longer collect data in a centralized manner as in traditional models. The technology of distributed ledgers provides a very secure data environment for cross-border payments. Different nodes ensure that data is difficult to temper with, increasing transaction transparency. The value of the transaction data has also increased significantly. In terms of efficiency innovation, blockchain implements peer-to-peer transactions and achieves real-time settlement through the innovative characteristics of smart contracts. It has successfully broken through the time zone restrictions that are difficult to cross in traditional cross-border payments [5]. In terms of cost innovation, the blockchain-driven model reduces the participation of 3 to 5 layers of intermediaries compared to the traditional model, directly connecting the payer and the payee. This innovation has significantly reduced the handling fee, which can be lowered to one-fifth of the traditional cost or even lower. Moreover, this innovation reduces the human involvement in the transaction process, significantly enhancing the security of data and funds.

For example, Ripple's "trust line" mechanism. Ripple intends to use XRP as a bridge currency to achieve faster and cheaper transactions. Currently, Ripple regards different banks as nodes in its network and uses cryptographic algorithms for verification, concealing specific transaction information [6]. This ensures the privacy and security of the bank and enhances mutual trust. In addition, Stellar Network has achieved rapid fund arrival, completing confirmations within 3 to 5 seconds, significantly enhancing transaction efficiency [7].

#### **3.2. Value Creation Path**

The traditional business model's way of creating value mainly relies on intermediaries to achieve value creation. The traditional model, due to its diverse and complex transaction steps, relies on the participation of correspondent banks, clearing institutions and banks to achieve the ultimate goal. The transaction chain is very long. Moreover, the traditional path of value creation wastes resources. The traditional model requires repeated reconciliation and settlement to ensure the accuracy of its data and transaction results, which greatly increases the operational burden. This also leads to a waste of human resources and time. With traditional approaches, employees are under enormous pressure to

comply. For cross-border payments, financial institutions must strictly adhere to applicable compliance requirements. Most KYC and AML checks are performed manually, including the collection, comparison, and verification of customer information. Complex documentation and tedious procedures can easily lead to human error, further increasing the compliance burden. In addition, manual-based transactions carry significant risks related to money laundering and terrorist financing. In addition, the complex processes of document review and data verification may lead to transaction delays and reduce efficiency.

The value creation path of the digital economy business model reconstructed by blockchain has simplified the process, relying on distributed ledgers, smart contracts and other types of data, which greatly saves human resources and time costs. Compared with the traditional path, 3 to 5 intermediary agencies have been removed. Placing more emphasis on the transaction itself in terms of resource and value creation has enhanced customer experience. Moreover, through direct connections between nodes, the straightforwardness of transactions has been enhanced. It is also worth noting that the new value creation path adopts automated processing, making value creation faster and more accurate. The integration of smart contract technology also reduces human intervention, enhancing compliance and operational efficiency. This has laid a solid foundation for the development of business models in the future digital economy. In addition, cross-chain operations are also a new path for value creation. Institutions achieve the connection of financial systems among different countries through cross-chain protocols and transaction protocols, avoiding the emergence of "blockchain silos" and enhancing the value of cross-border payments in terms of global scalability [8].

For instance, Ripple Net has successfully achieved node interconnection among over 500 global financial institutions and simplified the clearing process, opening up a new path for value creation [7]. Antichain has utilized smart contract technology in cross-border remittances to automatically complete the collection and verification of KYC, and has also automated anti-money laundering verification, enabling the automation of value creation.

### **3.3. Profit Model Innovation**

In the traditional model, profits mainly rely on transaction fees. The revenue from cross-border payments almost entirely comes from various handling fees generated between users and institutions. And the profits from this source are largely influenced by trading volume and macroeconomic fluctuations. From the perspective of users, the traditional cross-border payment model imposes an excessive burden on them. Individuals or small and medium-sized enterprises have to pay high transaction fees, which reduces consumer satisfaction and transaction willingness, and hinders the development of inclusive finance.

The business model innovation of the digital economy based on blockchain technology is driven by scale effects, which can reduce the handling fee rate per transaction. The growth of transaction scale can effectively make up for the reduction of individual transaction income and achieve a steady increase in profits overall. Secondly, profits can rely on the token economy. Native tokens such as XRP are usually circulated in online markets. Relevant institutions can enhance the market value of the tokens and create value-added effects by taking advantage of network effects. Moreover, the impact brought by the network effect is huge and continuous within a certain period of time. Therefore, the token economy can provide a continuous and powerful impetus for business under the model of the digital economy. A significant portion of the profits based on blockchain also comes from technological output. Blockchain payment platforms provide technical support to banks and financial institutions, with the service fees and technology licensing fees they collect as their main sources of income. This innovative profit model enhances the stability of profits, reduces the impact of trading volume and economic fluctuations, and is conducive to long-term stable development.

## **4. Challenges and Strategies for Implementing Innovative Paths**

Although blockchain technology provides positive technical support for the development of new business models and can effectively reduce costs, improve efficiency, and increase trust. Under the rapidly developing business models of the digital economy, there are still many challenges.

### **4.1. Technical Challenges and Strategies**

The inherent challenge of blockchain technology is that it is difficult to achieve cross-chain compatibility among different countries. Because different countries may use different blockchain platforms, how to well unify cross-chain protocols and achieve mutual operation among systems is a challenge worth considering. Moreover, in the digital economy, information and data play a very important role. Cyber security has become a matter of concern in the digital economy [9]. Even though blockchain technology has characteristics such as distributed ledgers and smart contracts to ensure data security, there is still a possibility of vulnerabilities or hacker attacks during the transaction process. Furthermore, although distributed ledgers ensure that data cannot be tampered with, they also bring difficulties to data repair when errors occur.

In this case, it is necessary to promote further improvement at the technical level, such as the research and development of high-performance consensus mechanisms. Moreover, the technical department needs to enhance the security protection of the blockchain, regularly inspect relevant nodes and carry out vulnerability fixes.

### **4.2. Challenges and Strategies at the Regulatory and Compliance Levels**

In the context of the continuous development of the digital economy, communication and interaction among multiple countries are indispensable and will increase with the development of new business models. Therefore, the problems that may arise among different countries cannot be ignored. Regulatory and compliance standards in different countries may vary significantly, leading to inconsistent standards in transactions and causing unnecessary misunderstandings. In addition, cross-border transactions enhance data flow and may increase the risk of data leakage. And the data involves multiple countries, which might be a bit difficult to monitor. The development of the digital economy has also driven the rise of digital currencies. Among them, Bitcoin, a representative one, relies on the underlying technology of blockchain technology [10]. However, the price fluctuations of digital currencies are relatively sharp, making it difficult to serve as a long-term stable payment method.

In this situation, relevant institutions should enhance regulatory coordination and establish a multi-national regulatory sandbox mechanism to regulate the differences among multiple countries. The cross-border regulatory sandbox mechanism can attempt innovative payment models in a controlled environment. In addition, developing blockchain compliance tools is also an important strategy, such as on-chain identity verification and transaction traceability systems, which can enhance data security and increase customer trust.

### **4.3. Ecological and Market Challenges**

At present, the continuous development of blockchain technology lacks a sufficient number of experts. The personnel and experts required for its development stage are among the 20 fastest-growing vocational skills in the current market, with an increase of over 200% in 2018 [9]. However, the current commercial and talent markets lack understanding and training on blockchain technology, which leads to many potential technical personnel not having sufficient opportunities to learn and understand it, making it impossible for them to contribute to the development of blockchain technology. Moreover, this technology requires a relatively high capital cost. In the absence of a thorough understanding and sufficient confidence in the market, it is difficult to obtain adequate financial support. Furthermore, for consumers, the acceptance of blockchain technology among ordinary users has not yet been widely adopted. They lack the enthusiasm to break their original

payment habits and try new things. Moreover, blockchain is decentralized. The trust and authority of a decentralized platform may be difficult for many organizations and individuals to adapt to [9].

In this situation, the government can increase its investment in the talent market for blockchain technology, offer specific training courses, and relevant financial institutions can also provide short-term learning programs related to technology to discover potential technical talents and increase the proportion of experts in blockchain technology. In addition, financial institutions and the government can enhance the popularization and promotion among users, enabling more consumers to understand blockchain technology, increase their expectations for this technology, and make them more willing to try it. Enhance the usability and credibility of blockchain payment among consumers and in the market.

## 5. Conclusion

In conclusion, cross-border payment based on blockchain technology has the characteristics of distributed ledger, asymmetric encryption, smart contracts and cross-chain technology, which form the basis of cross-border payments in digital business models. These characteristics have effectively solved the triangular problems of low efficiency, high cost and lack of user trust in the traditional model. In addition, this new business model has enabled innovation in several areas, including value and profit models. This has improved transaction transparency, enhanced benefits, and secured the leading position of this technology. However, challenges remain in terms of technology, regulatory compliance, and environmental sustainability, which require the joint efforts of the government and relevant institutions for collaborative development. Cross-border payment based on blockchain technology has promoted the further development of the digital economy. In the future, it can be combined with multiple institutions to strengthen the infrastructure of globalization and its popularization among consumers.

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