

# Research on the Innovation of Financing Mode and Path of Private Enterprises in the Context of Blockchain Finance

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## Abstract

The difficulty and high cost of financing are the important factors that restrict the development of small and medium-sized private enterprises in our country. In the information age, new technologies represented by "Big Smart Cloud" have been widely used in various industries. This paper takes small and medium-sized private enterprises of our country as the research object, through summarizing the financing problems and factors it faces, puts forward the methods to improve the financing mode of enterprises from the macro, meso, micro and realization levels, and discusses the optimization path, so as to innovate the financing mode of small and medium-sized private enterprises of our country from the financial perspective.

## Keywords

**Blockchain; Small and Medium-sized Private Enterprises; Financing Model; System Design.**

## 1. Introduction

Under the background of "supply-side reform" and "industrial upgrading", small and medium-sized private enterprises play an important role in China's whole industrial chain system, and have significant practical significance and representativeness. However, the financing problem caused by opaque financial information, namely "lemon dilemma," has become an important factor hindering its further expansion. In recent years, many scholars have explored and innovated the financing mode and path of small and medium-sized private enterprises under the background of blockchain finance.

Wang Dan [1] systematically analyzed the influence channels of credit policies on the credit decisions of small and medium-sized private enterprises based on the subdivision of credit policies and credit decisions. Jin Shuying et al. [2] further explored the feasibility of optimizing the accounting information generation path by constructing the accounting information generation path model based on blockchain. Deng Honghong [3] compared the financing mode of small and medium-sized private enterprises in China with that of developed countries, and combined with China's national conditions, put forward some suggestions suitable for China's small and medium-sized private enterprises to improve their financing ability and build a good financing mode. Lazanis[4] believes that blockchain can ensure the authenticity of accounting information and simplify the transaction process of the financial department. Mc Geer and Bonnie[5] believed that blockchain technology could be widely used in multiple organizations and platforms, providing broad application scenarios for innovation and reform in the financial field. Jun Dai and Miklos A. Vasarhelyi[6] made A preliminary comparison between blockchain technology and existing ERP technology, proposed a three-type bookkeeping system, and explored and analyzed the realization of a new application mode of bookkeeping audit under blockchain in the accounting industry.

From the above research, it can be seen that the research on blockchain mainly focuses on the construction of conceptual models, case analysis and future development prospects. However, in terms of using blockchain technology to promote the development of small and medium-sized private enterprises in China, scholars have only made preliminary exploration, and there is little research on combining blockchain with the financing mode of small and medium-sized private enterprises. Therefore, based on the perspective of blockchain finance, this paper analyzes the financing mode of small and medium-sized private enterprises in China, aiming to provide new ideas for the research of innovative financing path of small and medium-sized private enterprises.

## **2. Financing Problems Existing in Small and Medium-sized Private Enterprises**

### **2.1. Single Financing Channels**

At present the capital source of small and medium-sized private enterprises in our country is divided into endogenous financing and external financing. Endogenous financing means that enterprises use their own funds to accumulate initial capital, but with the expansion and transformation and upgrading of enterprises, the demand for external funds gradually increases. Exogenous financing means that enterprises raise funds from other subjects, such as bank loans and other ways to obtain funds. However, banks are more inclined to provide loans to large enterprises with strong strength and less risk, and do not pay enough attention to small and medium-sized private enterprises. Although China's financing system has gradually diversified, such as public listing, debt financing, venture capital and other ways, small and medium-sized private enterprises still mainly rely on bank loans as a relatively single financing channel, failing to make full use of other financing opportunities.

### **2.2. The Financing Cost is Too High**

The financing cost of an enterprise includes interest expense and related financing expenses. Compared with medium and large enterprises, smes are not only unable to enjoy preferential interest rates in terms of borrowing, but also pay higher floating interest rates than medium and large enterprises borrowing. At the same time, because banks mostly adopt mortgage or guarantee for loans of small and medium-sized enterprises, not only the procedures are complicated, but also in order to seek guarantee or mortgage, small and medium-sized enterprises have to pay such as guarantee premium, mortgage asset evaluation and other related expenses, which further increases the financing cost of enterprises.

### **2.3. Incomplete Guarantee System**

Compared with large private enterprises, it is difficult for small and medium-sized private enterprises in our country to provide high quality collateral because of their limited operation scale. However, the third-party institutions that provide guarantee for small and medium-sized enterprises are mainly funded by government departments, which cannot fully meet the financing needs of enterprises due to the pressure of local finance. In addition, the guarantor of small and medium-sized private enterprises often needs to bear 100% of the guarantee risk, and the guarantee system lacks a strong supervisor, which exacerbates the financing difficulty of small and medium-sized private enterprises.

### **3. The Main Reason of Financing Difficulty of Small and Medium-sized Private Enterprises**

#### **3.1. Financial Institutions Did Not Pay Attention**

In the process of enterprise financing, financial institutions, as the providers of funds, play a key role in reversing the financing difficulties of small and medium-sized enterprises. However, financial institutions do not pay enough attention to financing loans for small and medium-sized enterprises, which is reflected in the following aspects: First, financial institutions are more willing to provide funds to powerful large enterprises or public facilities projects with greater development prospects, while they do not pay enough attention to the financing of small and medium-sized enterprises with high reputation and risk; Secondly, in order to reduce their own risk losses, financial institutions limit the amount of financing for small and medium-sized enterprises, resulting in too small financing scale, which can not really meet the development needs of enterprises. Finally, financial institutions take a long time to review the financing of small and medium-sized enterprises. However, it is difficult to solve the problem of urgent need for funds for small and medium-sized enterprises facing the shortage of capital turnover and the risk of bankruptcy.

#### **3.2. Weak Government Support**

If small and medium-sized private enterprises in the growth stage want to stand firm in the fierce market competition, they must rely on the macro policy support of the government. However, at present, the Chinese government's support to improve the financing plight of small and medium-sized enterprises is obviously insufficient, which leads to the lack of vitality of the whole SME market due to the financing plight.

#### **3.3. The Company's Own Creditworthiness is Not High**

Small and medium-sized private enterprises generally have small production and operation scale, old production equipment, backward technology, poor innovation ability, weak strength, weak ability to resist market risks, poor debt paying ability, and widespread shortage of production capital and lack of assets for low bets. Due to the existence of these internal problems, the credit of small and medium-sized enterprises is generally not high, which is one of the important reasons for the formation of financing difficulties of small and medium-sized enterprises.

### **4. Research on Innovation of Financing Model based on Blockchain Technology**

#### **4.1. Functional Needs of Innovative Financing Models**

##### **4.1.1. Stability and Freedom**

The platform based on blockchain technology should have strong storage, computing and transmission capabilities, so as to store a large amount of enterprise information, calculate and verify, and put the data on the chain at a near real-time speed.

##### **4.1.2. Platform Security**

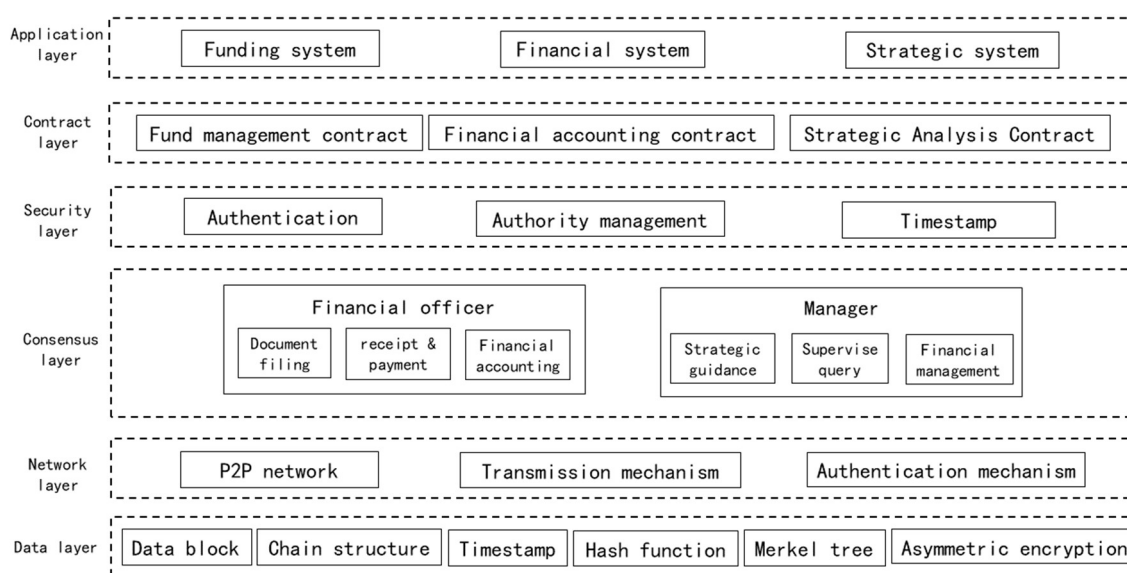
The data on the chain cannot be viewed by unauthorized third parties, and the hash value cannot be captured and tampered with by third parties. At the same time, 51% attacks must be prevented to fully ensure the security of enterprise financial data in the platform. In addition, any entity holding the correct hash value can verify the authenticity of the information on the chain.

### 4.1.3. Efficient and Easy to Use

The financial data information of the platform is jointly maintained by small and micro enterprises on each node of the chain. Even if the platform fails, the design based on blockchain technology can ensure the secure transmission of financial data. During the platform failure, new enterprises will only be temporarily affected, while the original financial data can still be transmitted efficiently and will not be lost. In addition, due to the distributed nature of blockchain, massive data will not have an impact on the processing speed of the platform.

## 4.2. Overall Design Framework

Based on the design of blockchain technology, this paper specifically constructs the financial system of small and medium-sized private enterprises, and uses hash encryption, smart contract and other technologies to ensure the authenticity of financial data, thus providing strong support for the financing of small and medium-sized private enterprises (see Figure 1).



**Figure 1.** The overall framework of the financial system of small and medium-sized private enterprises based on blockchain technology

General idea of research on financing mode and path innovation of small and medium-sized private enterprises under the background of blockchain finance:

In the first step, enterprises conduct transactions and generate financial data, which are published to each node of the alliance chain in the form of broadcast. After the node verifies and passes, the data is automatically uploaded and stored. The data information on the chain can be traced but not tampered with, and hash encryption technology is used to ensure information security.

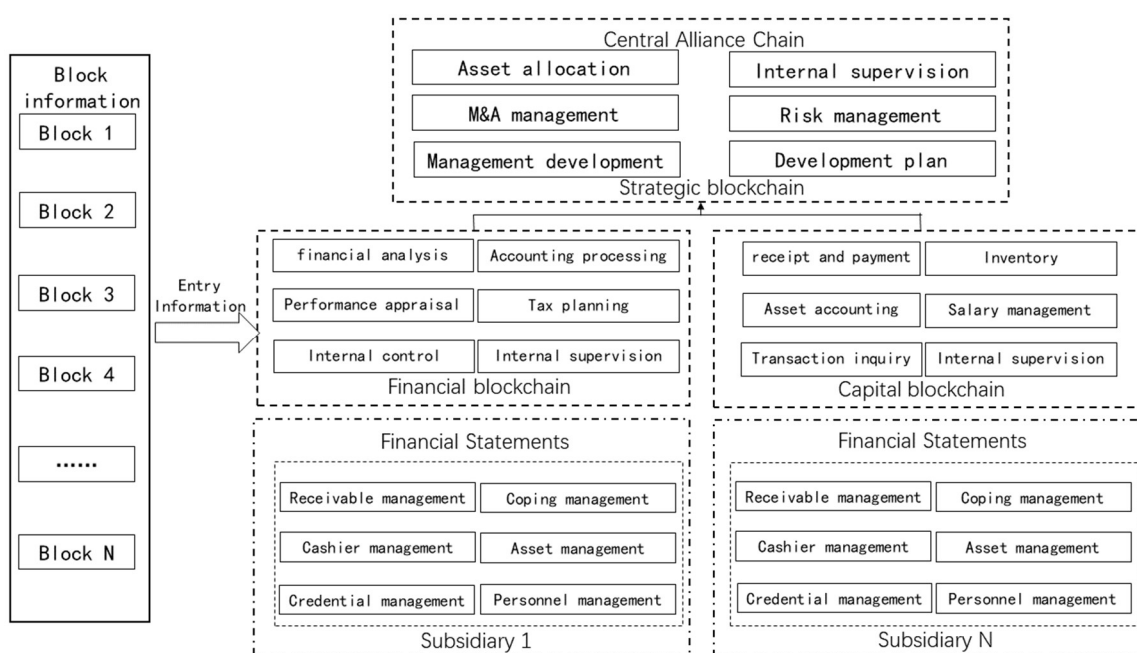
The second step is to establish the financial blockchain, capital blockchain and strategic blockchain on the basis of the enterprise financial system, capital system and strategic system, and the three form a shared center blockchain alliance. The financial blockchain and the capital blockchain support and feedback each other, while providing data decision-making for the strategic blockchain, while the strategic blockchain is the highest authority of the financial sharing center and supervises the implementation of both the financial blockchain and the capital blockchain.

The third step is to open the authority for financial institutions and third-party guarantee departments when the enterprise needs financing, so that they can enter the internal financial system of the enterprise, and then check the authenticity and integrity of the financial

information provided by the enterprise, so as to provide the basis for whether the enterprise provides funds.

### 4.3. Infrastructure Model

The financing mode and path innovation strategy of small and medium-sized private enterprises are constructed based on blockchain technology, which includes six parts: application layer, contract layer, incentive layer, consensus layer, network layer and data layer. Starting from the specific structure of the enterprise financial system, this paper combines the underlying structure of blockchain with the financing mode, and constructs an infrastructure model of "blockchain + financing mode" (see Figure 2).



**Figure 2.** Financial system infrastructure of small and medium-sized private enterprises based on blockchain technology

**Data layer:** It covers data algorithms and provides the feasibility of blockchain technology operations. The data layer is the basic layer of blockchain structure, including data block, chain structure, timestamp, hash function, Merkle tree and asymmetric encryption technology, etc.

**Network layer:** Information is mainly transmitted through P2P network. Compared with the traditional centralized structure, the network layer adopts distributed structure, which greatly reduces the degree of centralization.

**Consensus layer:** It is mainly represented by consensus mechanism, which ensures the synchronization and consistency of data records of all nodes on the blockchain to achieve information transparency and data sharing of the blockchain system.

**Security layer:** provides security guarantee for the whole model, and ensures information security supervision through authentication, permission management and timestamp functions.

**Contract layer:** The concept of smart contract in blockchain technology is introduced. With the assistance of the security layer, the contract layer can automatically complete data processing under the condition of inspection, helping the whole financial system to achieve intelligent management.

**Application layer:** Mainly reflected in the capital system, financial system and strategic system.



#### 4.4. Specific Optimization Path

The construction of financial system based on blockchain technology mainly includes three key parts: financial data registration contract, contract data audit and financial data storage. By building a financial system based on blockchain technology, this paper provides strong support for the financing of small and medium-sized private enterprises, and promotes the innovation of their financing mode and path.

##### 4.4.1. Financial Data Registration Contract

Financial data contracts are used for companies to record financial data. In the process of data uploading to the chain, by calling the fully deployed PRC, first check on the blockchain whether the user-initiated authentication message is a participant in the transaction. If the authentication fails, the company cannot be in the block. Register your own financial information on the Internet in real time; if confirmed, PRC will hash the digest according to the financial information content, and then write the information and the hash digest into a new block, and this hash digest will be returned to the client as the unique identifier of the piece of financial data. The contract is designed as follows:

Input: dataset, the object of transaction;

Output: HashAbstract;

```

procedure receiveDataset (dataset);
  if message.sender=writer then;
    dataset=new Transaction( ); #Initialize transaction information;
    dataset.name=dataset.name;
    dataset.time=this.time;
    dataset.content=dataset.content;
    HashAbstract=hash(dataset); #Generate a hash summary of the transaction data;
    WriteToBlock(dataset,HashAbstract); #data unique hash abstract on the chain;
    return HashAbstract;
  end if;
end procedure.

```

##### 4.4.2. Review of Contract Data

When verifying the authenticity of the financial information in the contract, you first need to enter: enterprise information P and its hash value H(P), transaction time T and its hash value H(T), transaction object S and its hash value H(S), the person in charge of each information signs Sn. Output: Audit information C and its hash value H(C). The review process is as follows:

```

Begin if check(Sn): #Verify the signature of the person in charge of the information;
Then if Hi == Hash(K): #After the signature is correct, verify the hash value;
Then D5.generate(C) #After the hash value is correct, generate audit information C;
else: pop(K) # The financial data is wrong notice(Di) #Do not allow warnings on the chain;
End if;
else: pop(Sn) # Incorrect signature notice(Di) #Notify related companies;
End if D5.send(K,C,H(C),Sc,D4) #Data and audit data are transmitted to the financial
department and platform;
End.

```

##### 4.4.3. Financial Data Storage

When storing the financial information of an enterprise on the chain, you first need to enter: enterprise information P, transaction time T, transaction object S, and audit information C. Output: new block of private chain. The stored procedure is as follows:

```
Begin D4.get(K, C) #The financial department obtains financial data and audit data;  
if check(H(C)) and check(Sc): Then New_tranction.Generate(P,T,S,C) #Generate new  
transaction data;  
H = Hash(New_traction) #Generate the hash value of the data;  
Si = Sign(H) #Signature of person in charge;  
End if #Generate new block;  
D4.Generate(new_block(H, pre_H, New_tranction, Si)) Link(new_block, Private_chain) #New  
block joins the private chain;  
End.
```

Through the above three basic processes, the company's financial data is verified and stored, so as to ensure that its financial data is complete and true, and to provide an innovative reference for its financing path.

## 5. Conclusion

Small and medium-sized private enterprises are the backbone of China's real economy, with strong momentum and significant impact in terms of employment and tax revenue. However, such enterprises are often constrained by the "lemon dilemma" when further expanding their scale. To solve this problem, blockchain technology can ensure the authenticity and integrity of financial data of small and medium-sized private enterprises and provide a reliable basis for them to obtain third-party investment. In addition, the application of blockchain technology can also solve the problems of poor credit and high financing cost faced by small and medium-sized private enterprises in the process of financing, and broaden their financing channels. Moreover, the application of blockchain technology can also help improve the enterprise financing guarantee system in China and prompt financial institutions to lower the threshold when providing loans. Based on blockchain technology, this paper provides an innovative path for financing small and medium-sized private enterprises, hoping to provide reference value for the research on the innovation of financing models and paths for small and medium-sized private enterprises.

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