

# ***Innovation Scheme Design of Personal Income Tax Collection and Administration Based on Blockchain Technology***

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**Abstract:** This paper sorts out the application status and technical characteristics of blockchain, and aiming at the problems of long and complicated tax payment process, lack of sufficient verification mechanism and serious loss of personal income tax in China's personal income tax collection and management, puts forward the idea of personal income tax collection and management combined with blockchain technology. Then, this paper designs a personal income tax collection and administration scheme based on alliance chain and intelligent contract to assist the tax authorities to conduct efficient, safe and automated tax collection.

**Keywords:** Blockchain, Personal Income Tax Collection and Administration, Internet plus, Smart Contract.

## **1. Introduction**

### **1.1. Blockchain**

In 2008, the publication of "Bitcoin: A Peer-to-Peer Electronic Cash System" marked the origin of blockchain technology. Taking Bitcoin as a representative, this paper designs a set of digital encryption currency systems, whose core supporting technology is blockchain technology. As it can be widely used in government affairs, finance, education, games, identity authentication, intellectual property and other fields, blockchain technology has rapidly emerged as a new hot spot for innovation and entrepreneurship and has gradually attracted more and more attention from all walks of life.

In China, blockchain technology has also received great attention. In October 2016, the Ministry of Industry and Information Technology and a number of units jointly prepared the "*China Blockchain Technology and Application Development White Paper (2016)*", which introduced the development status and typical application scenarios of blockchain technology at home and abroad, and formulated a roadmap for the development and standardization of blockchain technology in China. In April 2017, the Wuzhen think tank released the "White Paper on the Development of China's Blockchain Industry" at the Global Blockchain Finance Summit, pointing out that China is generally relatively ahead in the current global competition for blockchain technology. In 2021, the 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Long-term Objectives for 2035 (the "14th Five-Year Plan") incorporated

the blockchain into one of the digital industries and made important arrangements for its development. In June of the same year, the Ministry of Industry and Information Technology and the Central Network Information Office issued the "Guidance on Speeding up the Application of Blockchain Technology and Industrial Development", which pointed out that efforts should be made to solve the key problems that restrict the application of technology and industrial development, to further consolidate the foundation for the development of China's blockchain, to speed up the scale of technology application, to build a blockchain industrial ecosystem with world-class advanced level, and to realize leapfrog development.

At present, Beijing, Hunan, Guizhou, Hebei and other administrative regions have issued relevant policies on blockchains, and many of them have listed short-term targets for the development of blockchains. For example, Hebei, Hunan and Beijing have issued "action plans" for a period of three years. At the same time, many provinces and cities have proposed a number of "landing" application areas and scenarios, involving finance, manufacturing, people's livelihood, government affairs and communications. Compared with other fields, e-government has attracted much attention and is also covered in various plans. For example, both Beijing and Hunan plan to promote open sharing of government data. Jiangsu plans to build a coalition chain of various government departments, a public chain for the government to face the public and a private chain of secret-related systems such as public security, politics and law. Hainan has proposed to give priority to e-government projects applying blockchain technology in its annual construction plan.

At home and abroad, some attempts have been made on the application of blockchain technology in the field of taxation, trying to use blockchain technology to build a universal personal identity authentication system between government departments, including the tax authorities, to improve the convenience of tax payment and the efficiency of government work. However, these attempts are still in the initial stage, lack of systematicness, and have limited effect on improving the ability of tax collection and administration.

## **1.2. China's Personal Income Tax Collection and Administration Problems**

### **1.2.1. The Tax Payment Process is Lengthy and Complicated, Lacking Sufficient Verification and Verification Mechanism, and There is a Large Space for Optimization**

According to the latest personal income tax law of 2022, the whole tax payment process is still lengthy and complicated. Even after the introduction of the personal income tax app, the process is still complicated and people cannot easily pay taxes.

For example, when taxes are levied on income from wages and salaries, withholding tax payers are required to withhold the tax in advance on a monthly or monthly basis. As there is a certain gap between the pre-payment tax stipulated in the tax law and the actual tax payable, considering the possibility that the tax withholding agent may obtain wages/salaries from multiple sources (for example, from two different enterprises), it is added that the tax withholding agent is required to make final settlement every year, and the final payable amount is calculated through complicated formulas. At the same time, there are many special additional deductions for the determination of taxable income, which are applicable to taxpayers in different situations, such as special additional deductions for education of children, support for the elderly, housing loans, etc. Completing the whole tax payment process through a complex tax payment process and multiple tax payment time nodes, which wastes administrative costs for the government; Personally, the cost of learning is too high.

At the same time, although many countries or regions will impose criminal or civil sanctions on tax evasion and tax evasion acts that provide false information, there are two major difficulties in verifying tax information: First, random review requires a large amount of labor costs; Second, in many cases, it is difficult to distinguish between unintentional mistakes and intentional mistakes [1].

### 1.2.2. There is a Serious Loss of Personal Income Tax

Since the implementation of the new personal income tax system in 1994, scholars have been measuring the scale of the loss of personal income tax in China. Due to the difficulties in personal income tax supervision, loose audit, and weak legal awareness of the public, there is objectively room for tax evasion. Therefore, although different scholars use different methods, the same conclusion is reached that the loss of personal income tax is serious.

Pan Xiaozhen calculated the theoretical personal income tax based on the income of the residents in the National Statistical Yearbook, and compared it with the actual personal income tax levy, thus calculating the personal income tax turnover rate. It was found that the personal income tax turnover rate was serious, reaching 57.14% in 2009 [2].

Yan Hua et al. used the data of 97,916 people in 29 provinces covered by the China Household Financial Survey Center (CHFS) in 2013, and obtained the personal income tax turnover rate of 55.48% after analysis [3]. This conclusion is similar to that of Li Jianjun and Li Wei et al. who also calculated the personal income tax turnover rate based on the CHFS data [4,5].

Guo Hongyu calculated the amount of personal income tax payable according to international standards, and the loss of personal income tax showed an upward trend as a whole. The loss rate of personal income tax in 2019 was 56.16%. [6]

At the end of 2021, Viya, an anchor in online celebrity, China, evaded taxes of RMB643 million from 2019 to 2020. At the beginning of 2022, star Allen evaded personal income tax of RMB47,658,200. Once such an incident became a public outcry, the issue of tax collection and administration once again entered the public eye.

From this, we can see that there is still a serious loss of personal income tax in China. Therefore, the efficiency of collection and administration of personal income tax needs to be further improved and the supervision of collection and administration needs to be strengthened.

### 1.3. Research Methods and Research Contents

This paper uses the combination of document analysis method and scheme design method to understand the current research situation in China through the analysis of important relevant documents at home and abroad. It synthesizes the views of various experts in the academic community and puts forward opinions based on personal thinking. At the same time, the framework design of the individual income tax+blockchain collection and administration model is carried out to complete identity verification, carry out information storage, design intelligent contracts and realize the intelligent integration of individual income tax collection.

Next, this article will introduce the characteristics, working principle, application status and advantages of blockchain technology in combination with tax collection and administration. Then, the paper puts forward the scheme design of individual income tax collection and administration based on blockchain technology. Finally, the paper summarizes the content of the article and looks forward to the future.

## 2. Blockchain Technology

The core of blockchain technology is to use a series of algorithms to continuously generate a data set that can verify the validity of the transactions between each node, namely "blocks". Each block is stored synchronously in each node in a chain shape, thus forming a "blockchain". The blockchain replaces the central server with "blocks" to realize the generation, update and sharing of the decentralized database. Therefore, it is also referred to as a Distributed Ledger, which is a database of public transaction information that is added by each checking node of the ledger (which may be different sites, countries or institutions) in chronological order in the network.

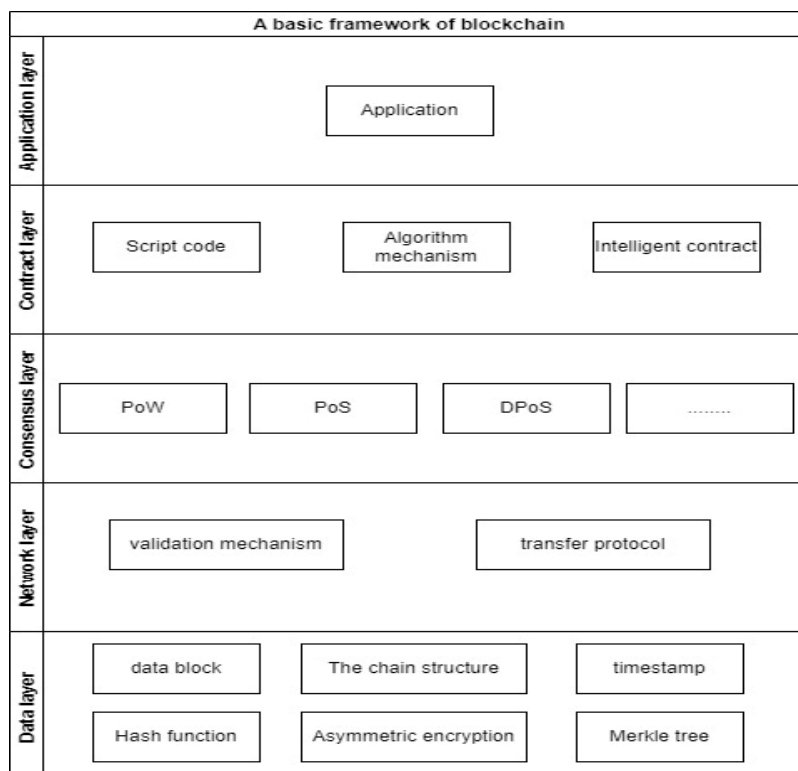


Figure 1: Basic architecture of blockchain.

The main features of the blockchain are decentralization, data verifiability, traceability and non-tampering, automation of contract execution and security and trustworthiness. It is an integrated innovation based on a series of technologies such as asymmetric encryption, consensus algorithm, peer-to-peer network (P2P) and intelligent contract.

### 2.1. Basic Structure and Working Principle of Blockchain

The blockchain system consists of data layer, network layer, consensus layer, contract layer and application layer.

The data layer encapsulates the underlying data blocks and related technologies such as data encryption, chain structure and hash function. Each node is uniformly linked through hash pointers, thus forming a complete chain structure. Each distributed node encapsulates the transaction data and code received for a period of time into a time-stamped data block, which is linked to the current longest main blockchain.

The network layer encapsulates the data verification mechanism and data transmission protocol of the blockchain. According to the design objectives and application requirements, a specific

transmission protocol and data verification mechanism are designed so that all nodes in the system can participate in the data block verification and accounting process. Data blocks can only be recorded in the blockchain after they have successfully passed most of the nodes in the network.

The consensus layer encapsulates various consensus algorithms and their related components, is the core of the blockchain system, and is also an application of long-term research results of distributed systems. Early bitcoin blockchains used a Proof of work (PoW) mechanism that highly relied on node computing power to ensure the consistency of distributed bookkeeping in bitcoin networks. With the development of blockchain technology and the emergence of various competing currencies, researchers proposed various mechanisms that could reach consensus without relying on computing power, such as proof of work (PoS) consensus and authorized share certificate (DPOS) consensus mechanism, etc. The blockchain consensus layer encapsulates these consensus mechanisms.

The contract layer mainly encapsulates various scripts, algorithms and intelligent contracts and is the foundation of programmable features of the blockchain. Digital encrypted currencies, including bitcoin, mostly use non-Turing complete simple script code to program and control the transaction process, which is also the prototype of intelligent contracts. A smart contract is a digitally formed commitment that includes the agreements used by the parties to the contract to implement those commitments.

With the development of technology, Turing's complete scripting language, such as Ethereum, which can realize more complex and flexible intelligent contracts, has emerged, enabling the blockchain to support many applications of macro financial and social systems.

The application layer encapsulates various application scenarios and cases of the blockchain as an interface for system development and application deployment.

## 2.2. Application of Blockchain in Tax Field

Scholars in finance and taxation circles have paid more and more attention to blockchain technology in recent years. Zhang Zhile wrote an article to explore the basic idea of using blockchain technology to reduce tax disputes and tax noncompliance [7]. Zhao Yichen, Lu Yang and Zhai Mingxue discussed the possibility, advantages and disadvantages of combining blockchain with taxation in the era of Web3.0 [8]. Hu Qilei constructed a tax sharing coupling system [9]. Xie Qinghua and Zhou Zhiyong used game theory to analyze the impact of blockchain enabling tax collection and administration on tax dynamic games [10]. Richard Thompson Ainsworth and Andrew Shact designed a VAT blockchain system with a consensus threshold of 75% to prevent VAT fraud [11]; On the other hand, Du Li and Zheng Yuwen designed a blockchain electronic invoice system adapted to China's national conditions, drawing on the ideas of Ainsworth et al. [11,12]. Jeffrey Owens thinks that the blockchain technology can not only realize the automatic withholding of payroll taxes, but also, more importantly, eliminate the fraud of payroll taxes at the source through the automatic execution function of the blockchain technology, which is to compile algorithms to calculate the tax payable, automatically deduct payroll taxes and pay them to relevant parties through in-depth analysis of the blockchain technology [1]. Under the background of summarizing relevant research, Jia Yizheng and Zhang Zhujin systematically expounded the application of blockchain technology in the process of tax administration. They believed that the blockchain technology realized the transparency and symmetry of the information of both parties through the form of distributed bookkeeping, in order to eliminate a series of tax collection and administration problems such as current tax evasion of Chinese enterprises and bottlenecks in the collection process of tax authorities [13]. However, these studies either only involve the tax theory, or the combination of blockchain and value-added tax, or they are not applicable to the tax situation in China, and there are still a large number of missing studies on landing scenarios.

## **2.3. Analysis on the Characteristics of Blockchain and its Applicability in Combination with Taxation**

### **2.3.1. De-centralization (Distributed Storage)**

The core advantage of blockchain technology is that it does not need centralized agents and can realize point-to-point direct interaction. When blockchain technology is applied, the processes of data block generation, verification, storage, maintenance and transmission are all based on the distributed system structure. Pure mathematical method is adopted instead of central organization to establish the trust relationship among the distributed nodes, thus forming a decentralized and trusted distributed system.

In the traditional method, it is difficult even to collect and store massive tax information. If blockchain technology is applied, the data capacity of a single data block is small and the nodes in the system can be designed as complete nodes, pruning nodes or lightweight nodes according to needs, while pruning nodes and lightweight nodes do not need to store complete blockchain data. Therefore, the blockchain can overcome the limitation of data storage space and realize the collection of massive tax-related transaction information.

At the same time, the decentralized nature of blockchain technology enables transaction data to be generated and disseminated in a peer-to-peer network and then stored in a decentralized manner. Therefore, the application of blockchain technology helps to realize the sharing of tax-related information and overcome the problem that tax-related information is difficult to check and check in a timely manner under the situation that tax-related transactions of value-added tax are cross-industry and cross-regional and the collection and administration authorities are scattered.

### **2.3.2. Verifiable, Traceable and Tamper-proof**

The blockchain uses the chain block structure with a time stamp to store the data, which adds a time dimension to the data. Through mathematical methods, only real transaction data can be included in the block through verification, and once the transaction data enters the block, it is traceable and cannot be tampered with. Therefore, the use of blockchain technology is helpful to automatically realize the automatic verification of the authenticity of information required for individual income tax collection and administration, and to establish a more complete and scientific tax information database through the comprehensive record of transaction data on the time axis, so as to reduce tax disputes and improve the level of tax collection and administration.

### **2.3.3. Programmable (Smart Contracts)**

Blockchain technology provides a flexible scripting code system that enables users to create advanced smart contracts, currencies, or other decentralized applications. For example, the Ethereum EUM platform provides Turing with a complete scripting language for users to build any smart contract or transaction type that can be precisely defined.

The supporting records required by the tax department to assess the tax obligations of natural persons are often large in number and numerous in sources, and there is a lack of communication among multiple departments with different functions, and there is often a phenomenon of repeated collection of information. The process of tax payment by natural persons is also lengthy and complicated. After the blockchain technology is combined with the intelligent contract, each node can perform contract verification according to the personal information included in the system, and the contract can be automatically executed after the preset conditions are met.

Therefore, for the tax authorities, the combination of blockchain technology and taxation can realize the automatic accounting and settlement of the taxable amount of individual income tax,



reduce a large number of repetitive work, help to reduce the uncertainty in tax treatment, and effectively prevent the occurrence of tax evasion and reduce tax loss.

For taxpayers, the application of the blockchain enables taxpayers to submit information at one time through free and convenient mobile devices. The subsequent automated completion of various tax payment affairs such as tax payment will also help to save tax payment costs. A priori and more timely tax refund by tax authorities on transactions will also help to reduce the cash flow burden of taxpayers.

#### **2.3.4. Open and Transparent**

In blockchain technology, the information in a data block is transparent. The tax authorities can be better reviewed and taxpayers can have a more comprehensive and thorough understanding of the tax situation.

### **3. The Innovative Design of the Individual Income Tax Collection Based on Blockchain Technology**

#### **3.1. Overall Technical Architecture**

The overall technical framework of the individual income tax collection and administration plan consists of five parts, namely, the data layer, the network layer, the consensus layer, the contract layer and the application layer.

The incentive level is not set up because the public chain corresponding to the incentive level is not applicable for tax collection and administration, and the alliance chain with administration authority is applied to the tax authority based on higher administration authority.

The explanation of each level of the individual income tax collection and administration framework based on the blockchain technology is as follows:

##### **3.1.1. Data Layer**

It is mainly used for distributed storage of individual income tax related information on a block-by-block basis and provides a data basis for authenticity, security and uniqueness verification. The data on the chain do not need daily maintenance by the tax authorities.

Among them, the components used to verify the security and uniqueness of the data include the parent hash value, time stamp, Merkle root tree, transaction quantity, transaction information, etc. Blocks are linked with the parent hash value to facilitate the search of the previous block and link the next blockchain, thus forming a blockchain to ensure continuous traceability of the data. The time stamp is used to record the block formation time so that the blocks are consistent in time. Merkle root tree is a computer language and a computer authentication mechanism to prevent tampering. Merkle data are interrelated. If any data is changed, the block structure will be completely changed, leaving footprints. Transaction volume and transaction information are the specific details that occur when the transaction occurs. This structure simplifies the traditional blockchain, eliminates random numbers, saves storage space, improves operation efficiency, and ensures the safety of natural person tax related information storage.

##### **3.1.2. Network Layer**

It mainly encapsulates the data verification mechanism and data transmission protocol of the blockchain, which enables all nodes in the system to participate in the verification and accounting process of the data blocks. Data blocks can only be recorded in the blockchain after they have successfully passed most of the nodes in the network.

Among them, the transmission of transaction information is mainly based on peer-to-peer network. Each node has equal status. The transaction information sent by B can also be received by other nodes other than A, and other nodes can also verify the transaction information by the same method as above. Data dissemination mainly includes two steps: first, new transaction information is broadcasted from the transaction node to the neighboring nodes, and the neighboring nodes continue to disseminate after verifying the data; Secondly, a new block composed of transaction information for a period of time is broadcast by the accounting node throughout the network and becomes a new block in the main blockchain after being verified by other nodes. Each node will not continue to disseminate unverified transaction information and such information will not enter new blocks. In this process, only the verified information can enter the blockchain, which ensures the reliability of the information in the blockchain. At the same time, each node can have a backup of the blockchain, which ensures the safety of the blockchain information.

### 3.1.3. Consensus Layer

It mainly encapsulates the mechanism for forming, reviewing and reaching consensus of each node. Through the consensus mechanism, the tax authority has the administration authority of the alliance chain, which is different from the traditional completely decentralized bitcoin blockchain. The system is led by the tax authority to optimize the internal structure of the original block and eliminate the "mining" mechanism. Chameleon hash, d-PBFT and other algorithms can be used.

Access the tax administration unit and jointly maintain the alliance chain with other departments. Access parties with authority are all departments related to the system to ensure the integrity and reliability of the data in the alliance chain. This level mainly includes tax departments, enterprises, natural persons, banks, public security departments, property administration departments and tripartite payment institutions, etc.

The design focuses on authority administration. As the traditional blockchain is a public chain, each node is in the same position and authority, and there is no distinction between high and low authority. The tax authority is equivalent to one of the undifferentiated nodes. This means that the tax authority has no administration writing ability, which is not in line with the reality and is not conducive to the administration of the tax authority. The system should establish a coalition chain with tax authorities as the main body, including banks, property administration departments, industry and commerce departments, public security departments and securities administration departments. When the coalition chain is mature, the coalition chain will be incorporated into a third-party organization to master more personal tax-related information. Each node in the alliance chain has the same accounting authority, but has different administration authority and access authority. As the tax department dominates the alliance chain and has the highest access authority, the account number of the tax department accessing the system will leave traces during the access, and the access authority is supervised by other nodes. Of course, tax authorities at different levels have different access rights. For example, tax officials at the grass-roots tax authorities can only access tax-related information of natural persons within their respective jurisdictions. Taxpayers in other jurisdictions can only consult with the consent of the tax authorities at the next higher level. For personal information involving commercial secrets between companies and government departments, there is no complete exchange, and companies and government agencies can be divided into multiple levels with authority delegated from large to small.



#### 3.1.4. Contract Layer

It mainly provides various kinds of intelligent contracts to solve specific problems in the process of tax collection and administration and to realize automatic execution. Include high-level contract language, contract deployment, scripting code and contract interfaces.

The essence is to convert the personal income tax law and collection and administration principles into computer language. Taxpayers' behavior meets certain conditions. Each node can automatically execute when the conditions are met according to the intelligent contract. After the conversion is completed, the intelligent contract will save the converted data, and all nodes can reach a consensus. Smart contracts can not only regulate the behavior of taxpayers, but also supervise the law enforcement behavior of tax officials. Government information will also be published on the chain for taxpayers to read. The behavior of tax officials will be incorporated into the personal income tax collection and administration system, enabling tax officials to use tax-related information under the supervision of taxpayers and curbing internal corruption.

The specific operation mechanism is as follows: a plurality of users in the blockchain jointly formulate an intelligent contract, and participants respectively digitally sign the contract content converted into a programming language by using respective private keys; Subsequently, the smart contract is added to the transaction information in the form of code, which is propagated and verified through the peer-to-peer network and then stored in the blockchain. When the preset triggering conditions are met, the smart contract is automatically executed [14].

#### 3.1.5. Application Layer

It mainly encapsulates various specific applications to meet the tax authorities' demand for tax-related information in tax collection and administration, and completes various application scenarios of "blockchain+tax". The objectives that can be achieved by using the blockchain technology include statistics of natural person information, and functions such as market forecast, macro-control, policy optimization, tax risk administration, after-tax inspection and tax credit rating.

For the use of data specifications, several principles should be set up. First, to ensure the safety of the data, any data access and use under any scene should leave traces in the blocks, and record the digital signatures of the visitors, so as to facilitate subsequent reference and division of responsibilities. Secondly, a search engine for blockchain is built to realize the function of inputting key words to access information. At the same time, access rights are embedded, so that nodes after authentication can access this level of data. To access high-level data, access requires authorization and consent from the administrator. Combined with artificial intelligence learning, real-time monitoring of the income of high-income groups, risk identification, property control, discovery of irregularities, warning in advance, warning does not change, take corresponding measures to implement the punishment. Finally, the port is set. The blockchain can be used for client settings for different service objects. It can learn from the existing clients of personal tax authorities, personal access inquiry clients and corporate withholding clients. In the future, it will also add other alliance clients such as clients from the Asset Administration Department, financial institutions and public security departments.

### 3.2. Individual income tax collection process based on blockchain

For individuals, the transaction can be taxed automatically by simply registering (and subsequently authenticating with a private key).

### 3.2.1. Registration and Authentication of Entities (Institutions and Natural Persons)

Before taxpayers enter the alliance chain, asymmetric encryption is used for identity verification to determine the identity of natural persons.

The specific operation is as follows: each node carries out user registration in the leading alliance chain of the tax authority, the individual tax payer sends a registration application to the individual tax certification center of the tax authority, the certification center system will automatically generate the public key K1 and the private key K1' of the taxpayer and feed back to the taxpayer application information table and the public key K1 at the same time, the taxpayer encrypts the registration information with the sent public key to generate R1, and feeds back the encryption generated result R1 to the certification center, after the certification center decrypts with the public key and the corresponding private key K1', checks whether they are consistent, and sends K1 and K1' when they are consistent. The private key can then be used directly for authentication. This process is similar to the registration of the personal income tax APP. The public key is the mobile phone number and the private key is the password. The content sent is equivalent to the verification code. After the certification is completed, the tax authority will send the network access certificate to the taxpayer. The number of the network access certificate sent to the taxpayer is used as the tax payment identification number. Since then, the economic behavior of the taxpayer will be recorded on the blockchain. The tax department and other nodes in the alliance will share the latest information to pay tax to the taxpayer according to the intelligent contract. This will ensure automatic tax payment, availability in the data chain and openness and transparency of income.

### 3.2.2. Uplink and Storage of Transaction Information

When a taxpayer obtains a network access certificate through identity authentication, its transaction behavior is recorded on the blockchain. For an individual, the other party to the transaction may be an enterprise, an individual, a payment institution and other relevant departments. When an individual completes a transaction, the transaction information will be broadcast throughout the network. Each node will confirm and keep the information on the block after confirmation. Through the intelligent contract layer, the purpose of automatic collection of personal tax upon completion of the transaction is achieved. Compared with the existing methods, it can complete the collection of tax more intelligently, efficiently and automatically. At the same time, the settlement and refund of taxes existing at the beginning of the year can also be automatically executed through smart contracts.

## 3.3. Levy Intelligent Contract Design

Intelligent contract tax collection and administration is mainly divided into two parts. One is the tax deduction in the transaction process, the other is the year-end settlement.

### 3.3.1. Pre-deduction in Tax Payment

In the transaction scenario, a personal tax rate is set for each transfer income, which is automatically collected in the form of a contract.

Taking labor remuneration as an example, natural persons log into the system, blockchains record their transaction information, and the intelligent contract system extracts the required information. Assuming that the taxpayer obtains a labor remuneration income with an income of  $x$ , assume that the critical points  $a$  and  $b$  of tax payment in the contract are 20000 and 50000 respectively. Comparing  $x$  with the tax threshold  $a$ , if  $X < a$ , according to the tax law, a withholding rate of 20% is applied to the labor remuneration, the tax is automatically withheld by the contract, and a tax collection information is added and included in the blockchain. If  $X \geq a$ , take  $x$  to the next step and compare it

with b. if  $b > X \geq a$ , apply the 30% tax rate and the quick-calculation deduction of 2000, set the conditions in turn and increase the tax records. until the end of this process, for taxpayers who deliberately forge false information offline to escape the tax obligation, compile the corresponding punishment measures into an intelligent contract to deal with illegal taxpayers. The advantage of the intelligent contract is that it can help the tax department to screen the transaction information for a large number of taxpayers and transactions without manual collection and administration one by one, thus saving collection and administration costs. For personal income, there is no need for certificate supervision, real-time monitoring of hidden income and transfer income of high-income groups, automatic withholding, zero tolerance of tax evasion from the source, so that taxpayers will take the initiative to find the reasons for the decrease in income, forcing taxpayers to raise their awareness of tax payment.

### 3.3.2. Year-end Settlement

In addition to tax deductions in the course of transactions, the personal income tax law still contains a portion of deductions based on various conditions, such as education for children, support for the elderly, medical treatment for serious illnesses, housing loans, etc. Therefore, it is necessary to design an intelligent contract and make settlement according to the relevant information of the Civil Affairs Bureau, medical institutions, banks, etc.

Taking the education of children in special additional deductions as an example, the Civil Affairs Bureau uploads the relevant information of taxpayers' children to the alliance node and shares the information with other nodes. The natural person logs into the system, the blockchain records its basic information, and the intelligent contract system extracts the required information. Taxpayers can receive a special additional deduction refund for the number of children  $\times 1000 \times 12$  months in accordance with the tax rules entered in the smart contract.

The same applies to other tax deductions. For example, special medical deductions for serious illness can be refunded according to the information of medical institutions, special additional deductions for housing loan interest can be refunded according to the bank information, and special additional deductions for supporting the elderly can be refunded according to the information of the Civil Affairs Bureau.

## 4. Summary and Future Outlook

Today, blockchain technology is booming and gradually entering the public's vision. Because of this, based on the current situation, this paper puts forward that the blockchain technology can be combined with the tax collection and administration work, which can ease or even solve a series of thorny issues facing the tax collection and administration today. Then, this paper gives the design of personal income tax collection and administration scheme based on blockchain technology, which makes the tax work more efficient, safe and transparent by using intelligent contracts.

However, it should also be pointed out that blockchain technology relies on the underlying algorithms such as distributed storage, data transfer protocol and consensus mechanism. It is precisely thanks to the continuous development of these underlying technologies that the blockchain technology can continuously innovate. Therefore, the scheme design based on blockchain technology also needs to be continuously improved depending on the development of these underlying technologies.

At the same time, blockchain technology is facing the challenge of how to balance transparency and privacy. Finding a reasonable balance point is the foundation of combining blockchain technology with other fields. Therefore, before the data protection and public rights related laws and

regulations are enacted, a rational and cautious attitude should be maintained towards the application of technology.

## References

- [1] Jeffrey Owens, Zhenhua He, Wang Sifan, et al. *Prospect of Blockchain Technology and Analysis of Its Application Prospect in Tax Field* [J]. *International Tax*, 2017(9):36-40.
- [2] Pan Xiaozhen. *China's individual income tax collection efficiency evaluation and improvement* [J]. *Journal of Yangzhou University School of Taxation*, 2011(2):60-64.
- [3] Yan Hua, Xia Taibiao, Chen Jiandong. *Personal income tax revenue turnover rate sample survey* [J]. *Tax Research*, 2016(11):48-52.
- [4] Li Jianjun. *Individual income tax collection efficiency: theoretical and empirical analysis* [J]. *Economic Science*, 2013(2):109-119.
- [5] Li Wei, Wang Shaoguo. *Estimation of Individual Income Tax Potential in China's Provinces and Analysis of Influencing Factors — Empirical Evidence of Comprehensive Progressive Individual Income Tax Reform* [J]. *Contemporary Economic Science*, 2015, 37 (1): 25-31.
- [6] Guo Hongyu. *Analysis on the Main Causes of the Loss of China's Individual Income Tax and Countermeasures* [D]. *Shanghai Customs Institute*, 2021.
- [7] Zhang Zhile. *Assumption of Promoting Tax Compliance with Blockchain Technology* [J]. *Tax Research*, 2017(12):108-111.
- [8] Zhao yichen, Lu yang, Zhai mingxue. *blockchain technology: Web3.0+ a possibility of taxation* [J]. *modern business*, 2021(12):104-108.
- [9] Hu Qilei. *Research on the application of blockchain technology in the field of tax sharing* [J]. *Friends of Accounting*, 2021 (11): 150-156.
- [10] Xie Qinghua, Zhou Zhiyong. *Dynamic game between blockchain enabling tax collection and administration and tax planning* [J]. *Taxation and Economy*, 2021(4):40-47.
- [11] Ainsworth RT, Alwohaibi M, Cheetham M. *VATCoin: The GCC's Cryptotaxcurrency* [D]. *Boston University School of Law*, 2017.
- [12] Du Li, Zheng Yuwen. *Application of Blockchain Technology to Promote Innovation of Value-added Tax Administration in China: Mechanism Analysis and Scheme Design* [J]. *Tax Research*, 2018(6):72-79.
- [13] Jia Yizheng, Zhang Zhujin. *Opportunities and challenges of blockchain technology in tax administration* [J]. *Friends of Accounting*, 2018 (4): 142-145.
- [14] Chang Kai, feng han. *Blockchain: From digital currency to Credit Society* [J]. *State-owned Enterprise Administration*, 2018(07):18.