A Summary of the Application of Block Chain in Accounting and Finance System

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Abstract: Block chain is the most popular technology in the field of Internet finance, which has brought profound changes to the financial industry. Based on the principle of block chain technology and the business activities of enterprises, this paper combines block chain technology with accounting and financial system, solves the problems of traditional accounting processing, such as many links, long time-consuming and high financial risk, simplifies the cumbersome procedures of accounting processing, and improves the accuracy of accounting information, promotes the standardization and standardization of accounting and accounting letters and comparability and fairness of interest rates.

1. Introduction

1.1. The Concept of Block Chain

Block chain technology is a chain composed of a series of data blocks (data blocks are generated based on cryptographic principles) which are linked in threads and orderly. The chain forms a new and decentralized information recording and data storage system. The database information in the system can’t be changed and tampered with. The data storage system takes the form of blocks, as shown in Figure 1.

Each block in the block chain consists of the following elements: data record, root Hash1 of the current block, root Hash2 of the previous block, timestamp and other information. The content of data record is set by different needs, including asset transaction record, intelligent contract record and liquidation record. Data records are generally stored in blocks in the form of trees, such as Merkel trees; data records trees are computed by hashing algorithm from top to bottom to get the root node hash of the data records tree. Timestamp refers to the time when blocks are generated, through which data blocks form a Ring-Linked and continuous honest data storage system. Other information refers to block signature and other information. Through the interaction of the above related elements, an honest data storage system is finally formed, which is commonly called a trustworthy distributed database[1].

![Figure 1 The Structural Sketch of Block Chains.](image)
1.2. Basic Principles of Block Chain

In block chains, each block is sequentially connected by timestamps to form a block chain. Based on this operation principle, the advantages of block chain technology can provide great convenience for the verification mechanism, and provide a very reliable guarantee for verifying the authenticity of a data or a record.

Although the block chain network is open and transparent within the deployment scope, it does not mean that anybody can freely get the data information recorded in the system, because it uses the scientific principles of cryptography for confidentiality and interpretation, which also means that the financial accounting system has all the past transaction records, and every new data record is based on the past data records. Because of the authenticity of past data records, each block data in the chain is connected by time stamps in chronological order, and each data record is linked in a loop, so if you want to tamper with and forge the past data records, you need to modify all the data records in the past, in other words, you need to create a new data chain; Over time, the data chain will continue to grow, creating a new data chain, its manufacturing difficulty and cost are rising rapidly, so the possibility of forgery is almost zero. In addition, Block Chain technology has the characteristics of decentralization. Each client of Block Chain technology is a server at the same time. It is different from the traditional technology with storage data center. Any client of Block Chain technology can save all data information in Block Chain Network. All of them will not collapse due to the failure of one client, nor will the data center be attacked. Sum up, block chain network is a trustworthy system that can’t be tampered with, forged and broken.

The basic principle of block chain mainly solves the problem of how blocks in block chain are added to the chain and whether all block information can be added. The following is a schematic illustration of the block chain operation process, as shown in Figure 2.

![Figure 2 The Block Chain Flow Chart.](image)

Each computer accessed in the block chain financial accounting system is a bookkeeper in the accounting system. It is responsible for recording the transaction data of each business in the data block. Each computer accessed is called a node. It should be noted that not every node can be booked at will. Nodes need to compete in computing power through consensus algorithm. Only the winning node can be booked. Block chain network in order to encourage all nodes to participate in the competitiveness of computing, it will be in accordance with the rules of the winning node to account
for the corresponding incentives\cite{3}.

As shown in Figure 2, it is assumed that there is only one sending node and two receiving nodes, A and B, in the whole network. When a transaction occurs, the sending node first broadcasts the new transaction records throughout the network, and then the receiving node A checks the received information first. After passing the test, the A node agrees to put the information into the block chain and sign it. Next, the receiving node B will check the transaction information, and after the node B agrees and signs, the transaction record will be incorporated into a block. Finally, the system will use Hash algorithm to calculate the block. After the block is passed, it will be formally stored in the block chain. That is to say, the whole network node accepts the block and creates new blocks on the basis of the original block chain. This is the case when there are several nodes in the whole network.

2. Combination of Block Chain and Accounting and Finance System

2.1. Combination of Block Chain and Accounting System

Block chain network has open and transparent distributed accounts, while traditional accounting is a centralized accounting model, which is just the opposite. The combination of block chain technology and intelligent contract can make up for the shortcomings of many traditional accounting models\cite{4}.

Distributed ledger in block chain can set up multiple nodes through the same algorithm. These nodes jointly maintain the update and operation of the network, and can ignore the distance space between multiple nodes for anytime business transactions and data sharing. Nodes need to access their books through public and private keys. Any business transactions initiated between two nodes will be broadcast in the block chain network. Accounting nodes need to obtain the power of accounting through algorithms, record business transaction information accurately and completely, and add it to the information of the block chain. Accounting nodes will get the reward of accounting. After receiving successful broadcasting, other nodes will update their own block chain account book in time. Once the information in the account book is recorded, it can’t be modified at will. Each node uses the same, real and untouchable account book, which is the unique feature of the block chain accounting method. If there are large-scale changes in block chain network, more than 51% of the nodes must agree to it before it can be recorded in the distributed accounts of most nodes. Only the distributed accounts supported by most nodes can be finally recognized. This ensures the objectivity and authenticity of the account information in the block chain, and makes the whole account more open and transparent.

The application management of block chain can be classified into three categories: first, basic information storage, that is, users can establish databases on block chain network as a kind of retention certificate; second, more complex authentication applications use block chain network to process complex logical data, such as binding personal identity information with various applications and transaction information, and using it through the main chain and branches. The combination of direct links to achieve faster and faster data support; third, transactional applications, such as free exchange between different currencies through the block chain network, which requires the whole operation of the block chain network to complete the initiation, auditing, trading, bookkeeping and other links. From the accounting point of view, the successful implementation of the three functions relies on the distributed books under the block chain technology.

Distributed books are databases that exist with each participating node, share transparently and update synchronously. Distributed accounts record all kinds of transaction information between participating nodes in block chain network, such as currency transfer, exchange of asset data, etc. This shared distributed account reduces the time and cost of accessing traditional centralized accounts\cite{5}. The participating nodes of block chain network automate the updating of distributed accounts through a unified consensus mechanism and algorithm, without the participation of third-party centralized institutions. Each block chain information in the distributed book has a fixed timestamp and digital password signature, which ensures that all transaction data of the distributed book can’t be changed at will.
2.1.1. Combination with Accounting Confirmation
The accounting confirmation of block chain network can be summarized as one party's initiation and group confirmation. The traditional double-entry bookkeeping method is mainly used to confirm the relationship between various accounting subjects, while the block chain distributed bookkeeping is the vertical extension of each accounting subject in time. Traditional accounting achieves balance of trial calculation by borrowing two-way accounting, while block chain network achieves balance by checking and confirming each node. Each node in the block chain network is the confirmer of accounting information. The final confirmation of accounting elements needs the approval of all nodes, so as to ensure the accuracy and objectivity of accounting elements [6].

2.1.2. Combination with Accounting Measurement
All nodes of block chain network keep all data information of all transaction processes, and can view every transaction at any time, and are arranged in chronological order. Therefore, the factors affecting accounting measurement in the block chain network are open and transparent, all of which provide more objective and accurate information for historical cost, replacement cost, net realizable value, present value and fair value measurement attributes, and create a more objective environment for standardized measurement of financial data [7].

2.1.3. Combination with accounting records
Business transaction information on block chain is recorded in real time, and after the completion of the previous block, the record of the next block will begin. Only the initial information source will be recognized by other nodes, thus solving the problem of "double payment" [8].

Decentralize accounting model of financial system of block chain. The centralized collection of accounting vouchers is omitted, and the prior business transaction information can be automatically balanced. The verification of all business transaction information is automatically completed by the network. Tracing the source of business transaction information in time no longer requires traditional manual accounting. The accuracy and legitimacy of account books are fully guaranteed. This can effectively prevent the impact of bookkeepers on financial data, greatly ensure the accuracy and objectivity of accounting data, and reduce the wind of financial accounting fraud [9].

2.1.4. Combination with accounting report
The open and transparent characteristics of financial data in block chain can realize the automatic and real-time disclosure of financial data. Traditional Internet data disclosure tends to be fragmented and low-level, while in block chains, users can easily access complete distributed accounts, and the asymmetry of information no longer exists. Because each user has different access rights, "one key can only open a lock", each user can not view information beyond his authority, and can save the whole process of accounting report records and all operating traces, reducing the risk of important financial data leakage [10].

As far as daily financial reimbursement is concerned, if combined with the characteristics of non-tampering of block chains, employees have their own digital identity certificates when purchasing. Sales units directly register sales information and purchaser's digital identity in the block chain financial system when sales business occurs. When it is necessary to verify the authenticity of these economic business, relevant units can directly communicate with employees' digital identity. Connecting to the sales unit block chain system, it reduces the reimbursement links and the reimbursement information provided by employees, and reduces the time and manpower costs of reimbursement links.

2.1.5. Combination with cross-border payment systems
Financial operation is not only an important part of enterprise financial accounting, but also the key to improve competitiveness. Numerous enterprises' financing, investment and operation activities are full of fierce market activities. The development of Internet, big data, block chains and other technologies are all intensifying these competitions. More powerful enterprises begin to go abroad to find cheaper
costs and broader markets. However, the transnational economic activities of enterprises often have higher capital operation cost and time operation cost.

Low-cost capital operation can often provide great convenience to enterprises, but due to the existence of financial intermediaries such as banks, the allocation of funds of enterprises often requires higher handling fees. In the face of the overseas market, the complex operation procedures and higher processing costs are more prominent. Especially for small and medium-sized enterprises, high processing costs may be a huge obstacle for them to carry out transnational business [11]. Import and export companies based on Renminbi often go through many procedures when making cross-border payments. The participants in the whole process are as many as several, including importers and exporters, banks of both importers and exporters, and clearing banks of settlement currencies. In this way, the whole cross-border payment process has many links and complicated processes, and each link will have a different fee and a longer application review period [12].

Figure 3 The Cross-border payment flow chart

As shown in Figure 3, the cross-border payment business of enterprises generally involves many links, which are the joint participation of import and export parties, import and export banks and intermediate currency clearing banks. The complex process of purchasing and settlement of foreign exchange reduces the efficiency of the operation of funds, and can’t guarantee the timely arrival of funds. Generally speaking, cross-border clearing meetings need 3-7 working days, while stock transactions need 2-3 working days. Such a long waiting time obviously reduces the turnover speed of enterprise funds, and also consumes considerable time costs and processing costs [13].

For the complex process of cross-border payment, block chain network will make these processes simple and fast. On the platform of block chain, the point-to-point free transactions between enterprises can be carried out directly, and these cumbersome processes can be perfectly avoided, thus realizing the low-cost operation of financial activities. As far as fund-raising activities are concerned, the involvement of third-party personnel, such as banks, consultants, lawyers, risk assessors and so on, is essential nowadays. But these intermediaries are not involved in the block chain network. In the block chain network, a new point-to-point transaction can be carried out. Any individual or enterprise can become a node and participate in the use of the block chain network. The access threshold is relatively low. In practical applications, users can use block chain network, which makes the transaction on block chain network simple and fast, and the cross-border settlement time can be reduced from the previous days and weeks to a few minutes or even seconds. Using block chain platform can not only greatly improve the payment efficiency, but also make these links clear, transparent, query, and transaction more secure.

3. Summary
Block chain accounting financial system solves many problems of traditional accounting processing, such as many links, long time-consuming, high financial risk. Generally speaking, the advantages of block chain accounting and finance system can be summarized as follows: high efficiency and low cost. Efficiency is to simplify the cumbersome procedures of accounting treatment. Low cost includes
reducing time cost and intermediate cost, which are highly related to the operation system of block chain network. In addition, the immutability and timestamp function of block chain accounting and finance system provide convenience for supervision, self-audit and real-time audit, improve the external supervision environment of enterprises, and improve the efficiency of enterprise supervision.

The combination of block chain technology and accounting and financial system can effectively improve the following four aspects:

First, it simplifies the cumbersome procedures of accounting processing, improves business processes by using block chain technology, reduces the workload of accounting from the source, and ensures the full automation of accounting data from acquisition of accounting to balance-sheet report.

Second, it crosses the threshold of cost-benefit principle and improves the accuracy of accounting information. Block chain technology combined with accounting and financial system greatly reduces the traditional accounting account registration, complex settlement and multi-party’ communication, check these manual records and operations. Block chain technology realizes the automation of the whole process of accounting data acquisition, recording, analysis and reporting, greatly avoids manual operation and decision-making, and can provide users with more efficient and accurate information services.

Third, it can promote the standardization and standardization of accounting, as well as the comparability and fairness of accounting information. Block chain technology has standardized accounting processing procedures, which can produce standardized accounting processing results. Through information sharing function, it can strengthen communication with similar enterprises, and effectively suppress the phenomenon of information asymmetry. In addition, the acquisition of accounting information has become more simple, efficient, timely and fast, and accounting measurement attributes have become more reasonable.

Fourthly, block chain technology can preserve the whole process records and all operation traces of accounting reports. Its immutability and timestamp function provide convenience for supervision, self-audit and real-time audit, improve the external supervision environment of enterprises, and improve the efficiency of enterprise supervision.

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