

# A Research on the Application of Blockchain Technology in Enterprise Finance

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## Abstract:

Since its inception, blockchain technology has been effectively applied in many fields. Based on the theoretical assumption of rational cognition, this article intends to explore the application of blockchain technology in corporate finance. According to the characteristics of blockchain technology, this paper analyzes the impact mechanism of blockchain technology on enterprise finance from the aspects of accounting processing, accounting settlement and accounting information disclosure. Taking power grid companies as an example, build a distributed energy trading platform based on blockchain technology in the web environment and sort out a system covering trading platform design, financial process reengineering and the optimization of significant notes. Combined with the internal conditions and external environment of the application of blockchain technology in the enterprise finance, this paper puts forward the coping strategy, which is called the intellectualization of enterprise accounting. The accounting intelligent system based on blockchain technology can simplify accounting processing procedures and reduce the time and labor cost of accounting work. Its distributed encrypted storage can enhance the transparency of accounting data, improve the accuracy and objectivity of accounting information, and help companies implement efficient real-time audits and automatic audits. This research is the first to explore the application of blockchain technology in corporate finance, which has certain theoretical significance. However, the construction of this model is based on the power grid industry, which has certain limitations. Because many companies cannot store large amounts of basic data like the grid.

**Keywords:** Blockchain technology, Enterprise finance, The intellectualization of accounting.

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## I. INTRODUCTION

Menger believes that human reason is limited. Economic people cause irrational decision-making due to factors such as personal cognitive ability, computing ability, and information mismatch. Therefore, rational economic people all hope to improve their rational cognition and decision-making ability and maximize their own interests by improving information symmetry and computing power. Based on its advantages of decentralization and trustlessness, blockchain technology exists in the form of a unique distributed ledger. This rational cognitive processing method optimizes the structure of the financial sharing platform.

Integrating blockchain thinking and blockchain technology into the Financial Sharing Center is a new direction in finance. In terms of enterprise finance, the application of blockchain technology can simplify bookkeeping, provide automated auditing, reduce enterprise financial operating costs and prevent financial risks. From the perspective of blockchain technology, taking the distributed energy trading of power grid companies as an example, analyzing the application scenarios of blockchain technology in enterprise finance and constructing a distributed energy trading platform can provide solutions for key technical problems of “Internet plus Finance”. From the point of internal and external environment, through the analysis of internal and external conditions and environment of enterprise applied blockchain system, countermeasures can be put forward for the improvement of internal financial management and external laws and regulations.

## **II. THE CHARACTERISTICS OF BLOCKCHAIN AND ITS IMPACT MECHANISM ON ENTERPRISE FINANCE**

### **2.1 The Characteristics of Blockchain**

Blockchain exists in a unique way of storing data in encrypting currency. It is a special data structure, including data layer, network layer, consensus layer, incentive layer, contract layer and application layer [1]. In this structure, a large amount of trading information can be stored. At present, blockchain technology mainly presents the following characteristics.

#### **2.1.1 Decentralization and distribution**

The essential feature of blockchain technology is decentralization. Under the blockchain technology, there is no centralized management organization for issuing orders in the whole system, which brings a certain degree of fault tolerance and anti-attack to blockchain technology. The distributed release of information and the distributed form of accounting and storage constitute the distributed characteristics of blockchain technology. This structure does not store all information on a single node, but dispersedly store the overall data in each node, which means that the integrity of the overall data and the unity of logic can be guaranteed only when all nodes work together.

#### **2.1.2 The whole process is traceable and tamper resistant**

Blockchain technology adopts a distributed consensus algorithm. Data can only be stored and recorded in the blockchain when being verified by various parties and reaching reasonable and legal standards. At the same time, with the continuous increase of trading information, the system will automatically bind it with trader information with a clear division of power and responsibility. Once the data is recorded in the blockchain, no one can delete or tamper with it.

### 2.1.3 Openness and transparency

During the business event processing with blockchain technology, every step is open and transparent. To a great extent, it avoids data fraud. The data on the blockchain is marked in the whole process and backed up at different nodes. If someone wants to maliciously change information, it must pass joint authentication before it can be implemented. Therefore, the data exchange in the blockchain is trustworthy.

### 2.1.4 Smart contract

Blockchain technology intelligentizes data information. Data query and transaction need to be performed in strict accordance with smart contract, which greatly reduces the dependence on manpower that is replaced by the trust in procedures and systems, so as to further promote the sharp reduction of labor cost and enterprise cost.

## 2.2 The Impact Mechanism of Blockchain on Enterprise Finance

Blockchain has some exclusive advantages in improving data reliability and relevance. If it can be applied successfully in the accounting field, it will be beneficial to the improvement of the quality of enterprise accounting information [2].

### 2.2.1 The part of accounting processing

Blockchain can be regarded as a recording system with time stamp, which can realize the complete traceability of historical information. Carrying out accounting processing based on blockchain technology will improve the reliability and relevance of accounting data. In terms of reliability, blockchain technology retains a complete copy of data at each time node in the system. The confirmation of each accounting elements must be recognized by all network participants. Compared with the trial balance method of double entry bookkeeping, blockchain technology has stronger error correction ability. Moreover, the data is stored in a distributed way and the database is jointly supervised by all network nodes. There is no centralized or specific hardware management organization. Because the failure of individual network nodes does not affect the stable operation of the whole blockchain system, the safe storage of data is more reliable. In the meantime, in the process of accounting information processing, the blockchain considers modification as manipulation. For possible bookkeeping errors, we can only start from the source of the wrong data and correct the results of the previous wrong operation with another irrevocable operation. In this way, the tampering of accounting data can be eradicated fundamentally and the reliability of data in accounting processing can be greatly improved.

In terms of relevance, based on blockchain technology, the trading system has collective participation and complex verification mechanism, which can match blockchain nodes and realize the synchronization of logistics, information flow and value flow in the transaction process. This traceable accounting processing method that is real-time linkage can not only reduce the intensity of accountants, but also

greatly enrich the high-quality sources of business information related with accounting information, effectively realize the organic unity of accounting and business activities and ensure that multi-dimensional basic financial information can be obtained in a instant, accurate and reliable manner. In addition, It can significantly improve the decision-making usefulness of accounting information and provide high-quality data to support for business analysis and strategic decision-making.

#### 2.2.2 The part of accounting settlement

In the process of accounting settlement, the technology of blockchain smart contract can enforce the agreement and cannot be changed. This feature can have a fundamental impact on the existing manual financial settlement mode. Specifically, this technology can make the automatic operation of accounting trading confirmation and settlement come true. Once the node trading is confirmed, the system will automatically record the debtor-creditor relationship into the distributed account book, simultaneously update the distributed ledger of other nodes and automatically preform according to the settlement rules agreed in the smart contract to combine business flow and fund flow. Thus the enterprise settlement cycle is upgraded from the current hour level to minute level and second level. Meanwhile, the synchronous implementation of fund payment and accounting process can effectively solve the impact of account inconsistency caused by temporal differences on the relevance of accounting settlement information.

#### 2.2.3 The part of accounting information disclosure

Under the accounting information disclosure of traditional method, it is difficult to fully meet the personalized needs of informants. However, blockchain technology can put stakeholders under the transparent and real general ledger and further improve the relevance and reliability of accounting information disclosure effectively. The technical characteristics of decentralization and distrust can reduce or even cancel the part of verification and audit of accounting information disclosure. Accounting information disclosure can even change from fixed time disclosure to instant disclosure to improve the timeliness of information disclosure. The application of blockchain technology can promote the transformation from traditional passive accounting information disclosure to personalized active disclosure. Based on the application of blockchain technology, each transaction in the daily enterprise operation will be automatically written into the blockchain in chronological order which shall not be tampered with or deleted. Theoretically, users can obtain all data in the chain in real time but they actually query relevant data and materials within their own permissions due to different user permission and then improve the relevance level of accounting information disclosure.

### **III. THE APPLIED ANALYSIS OF BLOCKCHAIN TECHNOLOGY IN ENTERPRISE FINANCE**

Nowadays, the mature application of blockchain technology is still concentrated in the field of digital currency. But at the same time, the application research in other economic fields has also been carried out intensively, one of which including the field of distributed energy trading. Distributed energy is a compositive energy utilization system that is distributed at the user side. With the establishment and

maturity of the free power sales market and the transformation of power grid enterprises from power traders to public service providers, a large number of power trading needs will be directly generated among the distributed energy trading subjects. Applying blockchain technology to distributed energy trading can give full play to its safety, reliability and transparent and it is consistent with the decentralized network structure of distributed energy. Taking the distributed energy trading of power grid enterprises as an example, the application scenario of blockchain technology in enterprise finance will be explained in detail.

### 3.1 Demand Analysis of Participants in Distributed Energy Trading

Distributed energy trading involves diversified stakeholders such as investors, trading subjects, trading objects and service institutions. Investors include domestic superior enterprises, such as power generation enterprises, power grid companies, local urban investment companies, oil and gas companies, as well as individual residents and village collectives with a higher proportion. The object mainly refers to the users of distributed energy. Considering the energy-provision characteristics of distributed energy, the object mainly refers to the nearby power users. In addition, in the whole distributed energy trading chain, there are supporting service institutions, such as financial institutions among which banks and insurance companies are familiar to people, equipment mounting technical service institutions and etc.

With the continuous promotion of incentive policies, for example, photovoltaic poverty alleviation, together with the rapid development of distributed energy, micro energy suppliers show a geometric growth trend. Because of the high trading cost caused by the complexity of participants, the lack of trust mechanism and the demand for high-frequency and small amount transactions, the traditional mode of energy trading processing has been difficult to meet the needs of the development of distributed energy. A research on distributed energy trading platform based on blockchain technology which aims to support the diversified needs of distributed energy trading subjects has become the development trend of distributed energy market trading.

### 3.2 Construction of Distributed Energy Trading Platform

The photovoltaic trading platform based on blockchain technology is an intelligent management platform that triggers and performs corresponding smart contracts according to business rules to deal with photovoltaic transaction and settlement of the whole business process under appropriate human intervention. It aims to provide a completely decentralized energy trading system in which energy supply contracts can be directly transmitted among distributed energy trading subjects.

The grid distributed energy trading platform takes the data forced trust mechanism of blockchain technology as the basis for providing measurement, billing and settlement processes, changes the basic rules of energy trading and breaks the boundary between buyers and sellers. In terms of business process setting, the smart contract is distributed to the corresponding trading nodes. By triggering the corresponding smart contract in different business notes, obtaining and inputting parameters, controlling

the executable process of the smart contract and dealing with abnormal conditions, the whole distributed energy transaction business process is handled in a standardized, reliable and efficient manner. As a result, it can timely switch in, transform, track and automatically settle accounts to reduce the marginal cost of distributed energy trading (see Figure 1 for details).

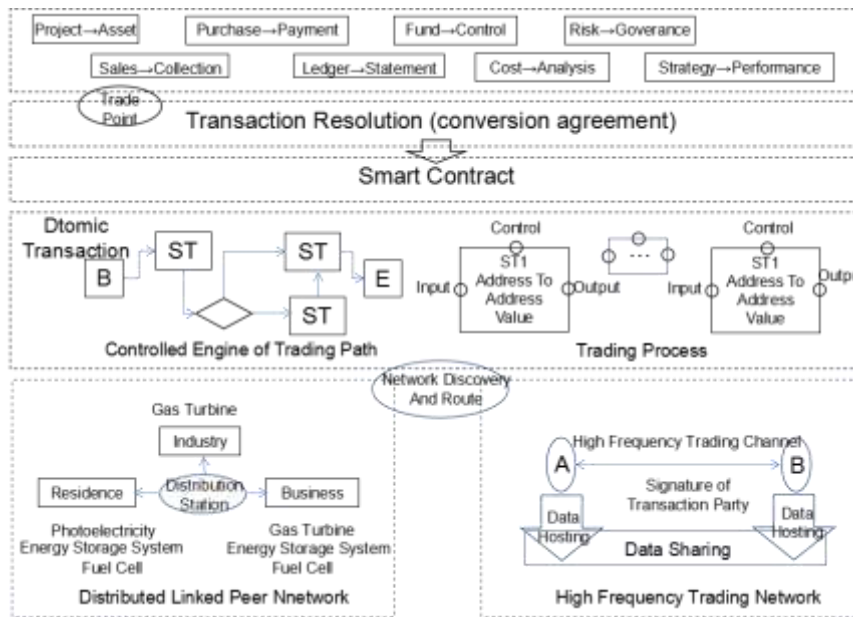


Fig 1: Node configuration diagram of grid distributed energy trading platform

### 3.3 Procedure Analysis of Distributed Energy Trading

Transactions between users can be conducted directly on the distributed energy trading platform based on blockchain technology. Transactions are subject distributed accounting rather than managed by a third-party center. The trading platform supports building three different types of nodes in the background, assigns common attributes such as address, public key, identity ID and category to the three types of nodes, as well as other unique attributes such as user account number, electricity meter number and profit center and maintains photovoltaic power generation users, electricity meters and power grid companies in the form of nodes. The background of trading platform provides the opportunity of viewing the electricity meters and associating new electricity meters to nodes. Besides, users can modify or view the attributes of nodes in the background but the attribute information of unique identification can only be viewed and cannot be modified. In the actual trading process, users only need to connect the business links injected with credible genes to the blockchain and convert business transactions into smart contracts, in which the complex smart contracts are decomposed into minimum atomic transactions, without interfering with the operation of the original system. Many atomic transactions are self executed in distributed peer-to-peer networks and high-frequency trading networks through the way called “network discovery and routing”.

### 3.4 Bookkeeping and Settlement of Distributed Energy Trading

The distributed energy trading blockchain does not record the detail account of the whole trading chain at all nodes. In order to save storage space, the distributed energy trading blockchain of power grid enterprises adopts the holographic account mechanism and the detail account can be stored by both parties. As long as the hash header and general ledger are recorded in the net, there is no need to record the trading details. In the actual bookkeeping and settlement process, similar to the address to address payment in the blockchain, the logic of all the payment of the distributed energy trading blockchain is electricity meter to electricity meter and the bookkeeping information of it comes from the power generation meter, online meter and electricity consumption meter. Moreover, the settlement is carried out through point-to-point confirmation and the normalized and multi-frequency automatic settlement of distributed energy trading is implemented. On the basis of ensuring safety and low marginal trading costs, the settlement efficiency has been greatly improved.

## IV. COPING STRATEGY OF FINANCE APPLIED BLOCKCHAIN TECHNOLOGY

Through the analysis of internal and external conditions of enterprise finance applied blockchain system, the SWOT analysis matrix can be obtained (see Table I for details).

**TABLE I. The SWOT analysis of finance applied blockchain technology**

SWOT analysis	<p><b>Opportunity</b>                  Countries actively explore blockchain technology; Blockchain research in the accounting industry is relatively leading.</p>	<p><b>Threat</b>                  Industry standards have not been established; Relevant laws are still blank.</p>
<p><b>Strength</b>                  Improve processing efficiency;                  Reduce transaction costs;                  Enhance risk control;                  Ensure data security;                  Reduce financial delays.</p>	<p><b>SO strategy</b>                  Make full use of relevant government industrial development policies and combine the advantages of the enterprise's own business and blockchain to improve benefits;                  Guide the popularization and application of blockchain platform, promote the practice of theory, put blockchain technology into practice and promote the rapid development of enterprises;                  Achieve the seamless connection between the</p>	<p><b>ST strategy</b>                  Deeply study the application scenarios of blockchain, find problems in time and establish corresponding solutions;                  Advocate the establishment of relevant industry standards, laws and regulations and standardize the application of blockchain technology;                  Give priority to using technical advantages to improve complex and non-core business and reduce the risk caused by the lack of law.</p>

	blockchain financial system and the traditional financial system and ensure the security of business process and data.	
<p>Weakness</p> <p>Performance issues need to be broken through;</p> <p>Privacy protection needs to be strengthened;</p> <p>Upgrade and repair need to be explored;</p> <p>Traditional accounting needs to be transformed.</p>	<p>WO strategy</p> <p>Strengthen technological development, reduce technology costs and establish a high-speed and efficient blockchain network;</p> <p>Build a weakly centralized blockchain network, apply blockchain technology to improve business mode, while retaining the advantages of partial centralization;</p> <p>Carry out training for traditional accountants, actively understand new technologies and new development mode and cultivate growth-type accountants.</p>	<p>WT strategy</p> <p>Improve the laws related to blockchain as soon as possible to reduce legal disputes at the initial stage of application of emerging technologies;</p> <p>Promote and guide the improvement of accounting industry rules and promote the perfect connection between traditional accounting business mode and blockchain accounting mode;</p> <p>Strengthen training, improve accountants' legal awareness and rule awareness and minimize subjective errors.</p>

#### 4.1 SO Strategy & WT Strategy

According to the SO strategy (strength-opportunity), China is one of the leading countries in the research on blockchain technology, which is listed in the “2017 global blockchain enterprise patent ranking (top 100)” and far ahead other countries. Among the top 100, 49 enterprises in China are listed, followed by 33 enterprises in the United States. In addition, there are 7 Chinese enterprises and 2 American enterprises in the top 10. Among the top 100, the three institutions of the Central Bank of China applied for 68 global patents, ranking first in the world [3]. Nowadays, the Chinese government strongly supports the application research of blockchain technology and provides preferential policies and funds. Therefore, the most important thing for enterprises now is to understand and accept blockchain technology. Enterprises should have foresight, go along with the trend and actively explore the practical application of blockchain to improve the efficiency of enterprises by combining their own business and the advantages of blockchain in the basis of relevant policy dividends. If enterprises can actively adopt blockchain technology, it will have a far-reaching impact on the future development of enterprises.

According to WT strategy (weakness-threat), it can be seen that currently the biggest hidden danger of the application of blockchain technology is the lack of industrial laws and regulations. The development of blockchain, especially the emergence of digital currencies such as Bitcoin, has challenged to the legal tender and existing laws and regulations of many countries and it also triggered many social problems and property risk disputes. Even though blockchain technology has many advantages, the application also



inevitably faces great risks in a real situation. Besides, the effectiveness of the smart contract in blockchain technology has not been officially confirmed by law and justice. The contract text embodied in the form of digital coding cannot be sure whether it could include the elements of a contract that has taken effect and cannot be sure whether it can meet the authenticity, legality and effectiveness of the evidence to be accepted by justice. Therefore, the alliance of accounting enterprise should step up the exploration and formulation of industry blockchain rules, reduce trade disputes and accomplish the smooth transition from traditional accounting business to blockchain accounting business. Moreover, relevant government agencies should follow the trend to lead the drafting of relevant laws and regulations and fill in the legal gap as soon as possible in order to protect the development and application of new technologies. At the same time, if enterprises start to study and try out the blockchain financial system, they should pay attention to the cultivation of quality of employees, improve the legal awareness and rule awareness of accountants and minimize subjective errors.

#### 4.2 WO Strategy & ST Strategy

According to the WO strategy (weakness-opportunity), the current blockchain technology has limitations when it applied in real situation and it has disadvantages in promotion. Blockchain is not a “panacea” so it cannot solve all problems. The current blockchain technology can not be popularized and applied in a wide range. The main challenge is to speed up the research of technology, reduce operating cost, improve operating efficiency and create leading applications. In addition, complete decentralization is difficult to operate in society today and may produce more derivative problems. Therefore, the optimal model is to try to use blockchain technology gradually on the basis of traditional business to realize weakly centralized distributed ledger management. In this way, while giving full play to the technical advantages of blockchain, enterprises can ensure that their data privacy is not leaked, independently control the system repair and upgrading and achieve the purpose of using technology to improve results.

According to ST strategy (strength-threat), it can be seen that the application of blockchain technology is carried out step by step, which requires the joint action of many factors such as technology, talents and environment to realize the transfer of technology from laboratory to enterprise. Before the application, the rules go first. The relevant blockchain industry laws and regulations should be prepared and established in advance. While exploring blockchain technology, the operation environment should be tested before. In the process of exploration, possible problems and disputes should be assumed before and corrected in time. In the process of applying blockchain technology, we can give priority to using technical advantages to improve complex and non-core businesses, observe timely and think about the results so as to reduce the risk caused by the lack of regulations.

## V. CONCLUSIONS

The distributed ledger of the blockchain uses advanced technologies such as unified algorithm, encryption technology, lightning network and smart contract to build an anonymous credit mechanism and establish a decentralized ecosystem. The accounting intellectualized system based on blockchain

technology can simplify accounting procedures and reduce accounting time and labor cost. Its distributed encrypted storage can enhance the transparency of accounting data and improve the accuracy and objectivity of accounting information, which can help enterprises operate real-time audit and automatic audit efficiently. In a word, the accounting industry should seize the opportunity, actively explore the application of blockchain technology and use this advanced technology to promote the development of the industry.

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