A New Mode of Enterprise Economic Management Utilizing Blockchain Technology in the Digital Economy Era

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Abstract. This paper mainly explores the new mode of blockchain technology in corporate finance in the era of the digital economy. With the advent of the digital age, blockchain technology has gradually become widely used in various industries. In the field of corporate finance, blockchain technology can provide a secure, efficient, transparent, and traceable new model, which can play an important role in reducing transaction costs, improving information credibility, and enhancing risk management. In this paper, an in-depth analysis drawing from the basic principles of blockchain technology, the current status and issues of its application in corporate finance, and the new models of this technology in corporate finance will be conducted, with the goal of providing more effective digital tools for corporate finance departments.

Keywords: Digital Economy, Blockchain Technology, Corporate Finance, New Model, Supply chain finance.

1 Introduction

In the era of the digital economy, intelligent finance has become a key resource for enterprise value creation [1]. The "14th Five-Year Plan and Long-Term Goals for 2035 of National Economic and Social Development of the People's Republic of China" proposes the acceleration of digital development, the creation of new advantages in the digital economy, and the synergistic promotion of the digitization and digital industrialization transformations of industries. Obviously, digitization is an inevitable trend, and the digital economy, with its digital knowledge and information, is changing the patterns of technological and management innovation [2], thus promoting the "digital intelligence" transformation of enterprise management. The arrival of the digital economy era has brought greater challenges and opportunities to corporate economic management, as the effective operation of economic management directly affects whether a company can continue to operate smoothly [3]. This paper aims to explore the new model of blockchain technology in corporate finance under the digital economy era and how to apply this technology to improve economic management efficiency and reduce costs.

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2 Current Models of Economic management

2.1 Current Situation

Unfortunately, the information technology needed for transformation and reform has brought new challenges for enterprises, such as information asymmetry, high transaction costs, and difficulties in risk management [4]. Moreover, due to the risk of single-point failures and vulnerability to attacks in centralized ledger systems, corporate economic management faces a series of security risks. At the same time, the rapid development and widespread application of blockchain technology has also brought new solutions to corporate economic management. Back in September 2018, Finance One released the ALFA Smart ABS platform, which uses blockchain technology to penetrate the underlying assets and provide a solution for on and off-market ABS issuance.

Blockchain technology is a distributed ledger technology based on cryptographic techniques and decentralized thinking that can be used to securely transmit, store, and verify data. The core principle of this technology is the generation of hash values for data through encryption algorithms and the continuous linking of these hash values to form a blockchain. Each block contains the hash value of the previous block, thereby forming an immutable and decentralized ledger system.

The distributed ledger feature of blockchain technology can be used to solve the problem of information asymmetry in traditional economic management [5]. The basic algorithm for the operation of a blockchain system is as follows [6]:

Nodes send transactions

Output: · Generate {{Block_i}} · Broadcast Block_i

Refresh nodes: All nodes receive and verify transactions. · Verify transactions. · If true, Add transaction to buffer.

Create block: All nodes calculate a hash value. Get transactions from buffer. · Construct new block. Calculate hash value of block header: hash{block header}.

Loop: If hash{block header}<Bits, go to step 2 (output).

2.2 Problems Faced in Corporate Finance

Due to the problems of information opacity and difficulty in evaluating risks in economic management models, various unfair and opaque transactions and investment behaviours have occurred. Therefore, even though companies are currently starting to adopt blockchain technology, it is difficult for blockchain systems to cope with large-scale transaction demands and may lead to network overload and congestion due to the fact that each node must record the complete blockchain data, and may also threaten the stability and security of the blockchain due to a number of potential vulnerabilities and attack vectors, such as 51% attacks, double flowers, etc.(For example see **Figure 1.**)

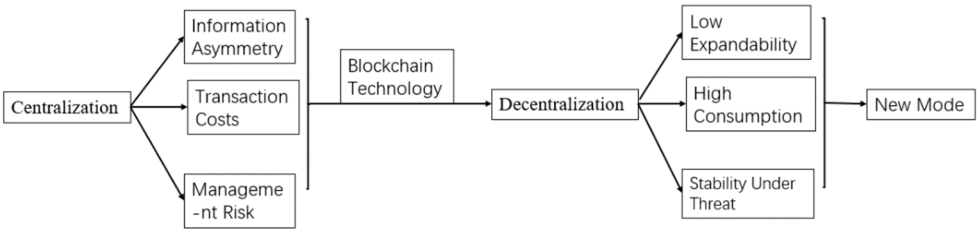

Fig 1. Problems faced in corporate finance

3 Application Methods of Blockchain Technology in Corporate Finance

By using blockchain technology, companies can establish a decentralized ledger system to share, verify, and trace information. Specifically, the application of blockchain technology in corporate economic management includes the following aspects (see **Figure 2.**):

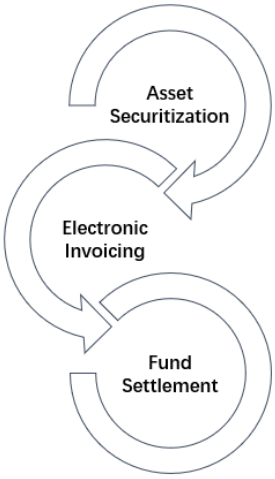

Fig 2. Application Methods

3.1 Asset Securitization

Asset securitization is a structured financial process in which illiquid credit assets held by banks are packaged and credit enhancement and credit rating measures are applied to transform them into standardized, tradeable securities that can be bought and sold on capital markets. Studies suggest [7] that, in terms of its application in asset securitization, the technological features of blockchain can provide value in establishing a reliable system for authenticating and preventing

the counterfeiting of information, ensuring the authenticity and reliability of both basic asset original information and dynamic information during the asset securitization process, improving the asymmetry of information between the trading parties, and overcoming the risks associated with information leakage, distortion and risk diversification arising from the multilink processing involved in the asset securitization process. Blockchain technology can enable end-to-end management of asset securitization through the establishment of a decentralized platform for securities issuance and trading. Additionally, blockchain technology enables the divisibility and tradability of securities, thereby increasing the liquidity and trustworthiness of the securities market.

3.2 Electronic Invoicing

This is a digital financial instrument that enables transactions and fund settlement between enterprises. Blockchain technology can be used to establish a decentralized electronic invoicing platform to achieve full-process management of electronic invoicing and to share and verify transaction information. The supervision function of the blockchain distributed ledger ensures the integrity and reliable security of corporate assets [8]. For each economic transaction, all relevant original vouchers are recorded and saved in electronic form along with complete transaction data recorded by each record block. Based on the data chain records of sales business data and original vouchers, the entire transaction process can be fully recovered, and efficient self-auditing can be achieved when combined with distributed ledger statistics.

In a blockchain environment, the blockchain infrastructure satisfies the various needs of users and establishes an agreement framework among enterprises, banks, and customers [4]. As long as the block information is sound, there are no gaps, and all nodes agree on this state, automatic auditing of commercial operations can be performed proactively. The special control system of the blockchain eliminates the need for application submission regarding audit information as required in traditional internal audits. Distributed ledgers without centralized management authority can conduct internal controls in steps and stages, and the effective operation of enterprises can be divided into blocks. Effective management control systems can be established for each specific block, ensuring the healthy operation of each block.

Additionally, blockchain technology can also be used to make electronic invoices tamper-evident and traceable, thus enhancing their credibility and security.

3.3 Fund Settlement

Fund settlement is the most critical part of corporate economic management. In traditional fund settlement methods, there are issues such as high transaction costs, slow settlement speeds, and lack of transparency. In a blockchain environment, the cost calculation model is embedded into the financial system in the form of smart contracts. This allows holding cash opportunities, scarcity costs, management costs, and total costs to be calculated in a timely and accurate manner, making it easier to determine the optimal amount of cash for enterprises to hold [9]. This maximizes the use of cash, controls operational risks, and achieves maximum operating profits. Blockchain technology can be used to establish a decentralized settlement platform to achieve real-time, secure, and low-cost fund transactions.

4 Combining Supply Chain Finance with Blockchain Technology

This is a new model of economic management based on the supply chain (see **Figure 3.**), which enables the flow of funds and the financing of various links in the supply chain. By establishing a decentralised ledger system, it enables real-time sharing and verification of transaction information and capital flow information across all links in the supply chain, thereby improving efficiency and security [10].

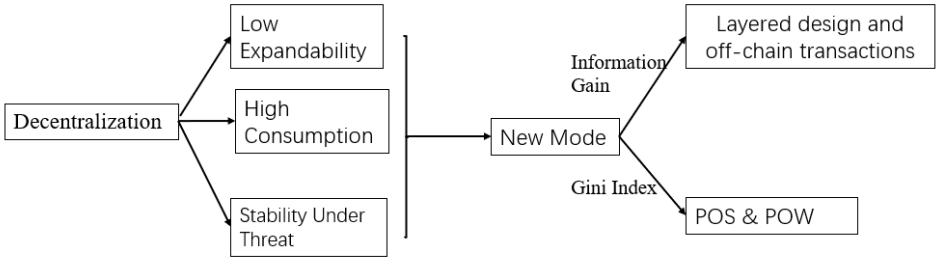

Fig 3. A new model of economic management

Blockchain networks can be used to create a new type of accounting confirmation method. When any block begins to input accounting information, other blocks respond to it and conduct reviews and confirmations simultaneously. This type of block data chain enables information and data to be propagated infinitely to all other nodes. From this perspective, decision tree algorithms can be combined with supply chain technology to achieve supply chain finance. The decision tree algorithm is a method for approximating discrete function values. First, data are processed to generate readable rules and decision trees using induction algorithms. Then, decision analysis is conducted on the new data.

4.1 Information Gain

$$Gain(X,Y) = H(X) - \sum y \in Y \mid X \mid\mid Xy \mid H(Xy) \quad (1)$$

Information gain represents the amount of change in the purity of a set of samples that occurs when a new feature is added. Here, X represents the original sample set, Y represents the subset formed by dividing X based on a specific attribute, and Xy represents the sample set belonging to category y in subset Y.

When applying decision tree algorithms, supply chain operators can be classified into three categories of low, medium, and high risk based on different features and indicators and classified using data-driven methods. On this basis, the information gain algorithm can be used to determine the optimal parameters and applied to financial solutions, thus providing targeted solutions for supply chain enterprises. It also adopts layered design, off-chain transactions and side chains to improve the carrying capacity of blockchain systems and promotes the use of economical and environmentally friendly consensus mechanisms such as proof-of-stake (PoS) and proof-of-work (PoW) combined with hybrid consensus mechanisms to reduce the computational energy consumption of blockchains.

4.2 Gini Index

$$Gini(X) = \sum i = 1np(i)(1 - p(i)) \quad (2)$$

The Gini coefficient is commonly used to measure the impurity of a sample set, where $p(i)$ represents the proportion of the i-th data type in the total number and n is the number of categories in the sample set.

As there are many data records in supply chain management, including production processes, goods flow, transaction information, etc., these data can be further processed and analysed to address more economic management issues in enterprises, especially those related to logistics and supply. We can express p(i) as the proportion of a certain indicator (such as order quantity, purchase price difference, and inventory turnover rate) in the entire dataset to identify the influence of each indicator.

In terms of prediction, this proportion can be used as an indicator to evaluate supply chain stability. Different prediction models can be constructed for various scenarios and conditional differences, allowing enterprises to better recognize specific delays and respond quickly with appropriate measures.

At the same time, it is also necessary to strengthen the cyber security protection of the blockchain, improve the security of the blockchain system through perfect code audit, vulnerability repair, multiple signatures and other measures, establish a scientific and reasonable blockchain governance structure, and build a governance framework by adopting the models of community shared governance and win-win cooperation in order to achieve the development and upgrading of the blockchain ecology.

5 Conclusions

With the advent of the digital economy, the use of blockchain technology in corporate finance has become an undeniable trend. Through the establishment of a decentralized ledger system, blockchain technology can be used to address issues such as information asymmetry, high transaction costs, and risk management in traditional economic management, thus improving the efficiency and security of economic management. In particular, the application of blockchain technology in areas such as supply chain finance, asset securitization, electronic invoices, and fund settlement has been widely recognized and applied.

However, to comprehensively apply blockchain technology in corporate finance, there are still technical and policy barriers that need to be overcome. For example, further research and solutions are needed for issues such as the performance, scalability, and security of blockchain technology. Meanwhile, policymakers need to establish relevant laws and regulations to ensure the legality and sustainability of blockchain technology in the financial sector [11].

In conclusion, blockchain technology has become a new mode of corporate economic management in the digital economy. Through blockchain technology, companies can establish a decentralized, secure, and trustworthy ledger system to share, verify, and trace information, thereby improving the efficiency and security of economic management. With the constant

progress of technology and policies, the application prospect of blockchain technology in corporate economic management will become even broader.

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