

# Based on the Application of Blockchain Technology in Construction Engineering Construction Management

Jingxin Huang<sup>1</sup>, Di Zhu<sup>2</sup>

1. Philippine Christian University Center for International Education & Nanchang Jiaotong Institute, Nanchang 330000, Jiangxi, China.

2. Philippine Christian University Center for International Education & Nanchang institute of Technology, Nanchang 330000, Jiangxi, China.

---

**Abstract:** Based on the "new normal" of current economic development, traditional extended quality management cannot meet the increasing demand of project quality management. However, there are many typical problems in the current project quality management model. As one of the most advanced and hot technologies, blockchain has the potential to establish a chain of trust among building quality control personnel. This feature ensures the safety and traceability of quality information. Project quality objectives can be achieved through an effective distributed decision-making mechanism.

**Keywords:** Block Chain Technology; Construction Engineering; Construction Management

---

## Introduction

In the future, we must build a new generation of information network and use 5G technology to build information centers. Paper documents are easy to lose. Once organizational problems arise, they are hard to find. Therefore, how to apply blockchain and other technologies to project construction management has become the main research goal of future researchers.

## 1. Concepts related to blockchain technology

### 1.1 Blockchain technology

Blockchain in terms of its constituent elements, blockchain consists of three key elements: transaction, blockchain and chain. The current concept of "transaction" has led to behavior that changes the state of blocks on the blockchain. This block is a data structure encapsulated after the hash algorithm, which processes all transaction data within a specified time interval. A chain is a series of pieces. As each block is packaged and concatenated through the beginning of the hash value of the block title, it is sorted according to the timestamp. From a technical point of view, a blockchain is a distributed database, essentially a collection of information technologies. The nodes in a block chain form a peer-to-peer network without having to store data through a central data server over a P2P transport protocol. Each node jointly maintains distributed accounts by writing, reading, archiving, and validating transaction data. Chains ensure that each node uses encryption methods such as hashing algorithms and asymmetric encryption algorithms to generate, validate, and exchange transaction data, stores consistent transaction data using common identity algorithms, and processes transaction data automatically through programmable smart contract scripts.

### 1.2 Blockchain structure

Blockchain structure includes block structure and chain structure. And combine three hash 23 operations to get the hash root hash value 0123. Each calculated hash value is recorded in a block to form a Merkle tree with a tree data structure. The value of the first hash operation of transaction data is the table node, and other non-table nodes are computed recursively

from the layer of the hash value of the first table. In block chains, it is common to see two fork message trees, with only two child nodes per non-leaf node, and few more trees are used. Tree Merkle is an important mechanism for chain validation of data. The hash value of the previous block causes the join of the previous block. Use the block hash in each node of the chain in the block to obtain the block hash value. The timestamp records the block generation time in seconds. Random numbers are numbers from 0 to 32 bits generated during ordinary identification. The target hash is the extraction difficulty factor. Merkle root is used to validate high-speed data to save block storage space. Blocks are ordered strictly by timestamp size and are chained by concatenating the beginning of the block hash value to the block header. It is located in the target block and can be located at the target data location based on time series and mixed values.

## **2. Blockchain structure in construction engineering**

### **2.1 Data validity**

Blockchain technology itself is a kind of accounting activity, each data transaction will form a corresponding trajectory. At the same time, the corresponding database will be created. The block belongs to the data storage unit, which records all transaction information for each node and action, append the corresponding time stamp and reference the hash value of the previous block. Each block forms a data structure linked chronologically. For the project, all information about the project and related activities shall be recorded as transactions. The chain itself is a tampering test. In the real estate registration process, it can ensure that the best data is in a real and legal state.

### **2.2 Electronic signature**

In various lifestyles, electronic signature technology is mainly based on Ca and implemented in credit systems. Companies, banks and other institutions can purchase local Cas to establish trust and mutual authentication of electronic signatures and seals. In 2003, the theory of authenticated public key encryption system was formally published. In this theory, the user has complete autonomy over the key. At the same time, the public key algorithm is self-verified.

### **2.3 Multi-unit seamless docking**

Blockchain technology has some advantages. Blockchain technology is compatible. Construction engineering units, such as major construction units, construction personnel, supervision agencies, equipment supply companies, etc., also include different roles and division of labor of different construction companies. Therefore, during the implementation of project management, different employees must work together to ensure the quality of project construction.

### **2.4 Data sharing**

In the application of block technology, especially in merge classification, can clarify the main basic information and main content of various operations. This provides convenience for managing the storage of construction engineering data. In the course of investigating a trading system, public key record information can be confirmed by the owner and made available to individuals for reading.

## **3. Application of block chain technology in construction process**

### **management construction**

### **3.1 Monitoring and supervision work is strengthened**

With the development of Internet technology, some cities are actively implementing the "Internet Plus" project supervision and management system. However, existing monitoring systems only store and analyze monitoring data and publish information, and do not have the technical means and ability to identify and monitor data manipulation, tampering,

intrusion, deletion and other behaviors. The authenticity and security of data cannot be guaranteed. The whole process of soil structure, maintenance structure and surrounding environment change from the beginning to the final completion of the construction project is comprehensively recorded, and the main causes of construction project accidents are solved and analyzed. Based on the opening of blockchain technology, data from all monitoring devices can be uploaded in real time. Based on the characteristics of immutable and traceable, data can be traced at any time, convenient for accident investigation and management.

### **3.2 Effectively carry out bidding**

Without the ability to manipulate blockchain technology, the experience of workers in the construction industry has become more transparent and reliable. For example, when providing large projects, there are stricter and more detailed requirements for company qualifications, professional qualifications, and previous experience in projects of the same scope and specialty as the main project, according to the current standards. It takes a lot of time and energy to verify the authenticity of government projects and social investment projects. The adoption of blockchain technology can better reflect the actual experience of workers in construction and export, and effectively reduce transaction costs.

### **3.3 Intelligent management of project contract**

Smart contract management of project contracts is applied to contract management of engineering projects through smart contract of blockchain technology, which helps reduce contract wringing between owners and contractors. Two-way information flow exists between project construction units, design units, construction units, supervision units and professional consulting organizations, such as various visas, technical approval letters, payment applications, meeting minutes and procedures. On the other hand, according to the management of the smart contract process, the transfer of all assets is determined by contract. At the same time, enhanced implementation and monitoring of construction contracts and changes, as well as early management credits, can help reduce construction delays and overcome investment and disputes on all fronts.

### **3.4 Strengthen the logistics efficiency of construction materials**

According to the consensus mechanism and distributed conservation characteristics of blockchain technology, the problems of large weight, large volume, long transportation connection multiple functions and poor mixing of building materials can be solved. Construction materials are shipped from the manufacturing plant, stored, transported and stacked, and finally used reasonably.

### **3.5 Define management objectives**

Clear management objectives enterprises to constantly optimize management methods, improve the project manager and project responsibility system. On the one hand, in the process of work development, the owner project department should delegate power, and the whole project manager should supervise and manage the quality problems of construction. On the other hand, the project department of the owner should also cooperate with the perfect assessment system, so that the actual work of the manager can be effectively supervised and cooperated, so as to ensure that the project manager can be responsible for the whole project and promote the improvement of management efficiency. In addition, it is necessary to recruit high-quality project managers, assess their professional qualifications and the actual effect of operation, and promote the continuous improvement of management efficiency.

### **3.6 Innovative management concept**

Innovation management concept Construction enterprises should constantly improve the application degree of innovative ideas, update the management concept, and constantly innovate the supervision system and management system. First, let "mentoring" play a maximum role, give full play to the enthusiasm of the old staff, and carry out effective skills training and industry organization, so that the current construction management model can play the maximum value. Second,

strictly control the introduction of green materials, and through horizontal and vertical comparison, a comprehensive analysis of the construction process, to avoid construction pollution caused serious harm to the human body. Third, in the process of project management, construction engineering enterprises should always have high standards and strict requirements.

## **Conclusion**

At present, the development of science and technology is mainly focused on information technology and bionic technology. As the emerging block chain technology in the development of information technology, it will also be an important technology that all fields need to contact and apply in the future.

## **References**

- [1] Peng, D., Practice of curriculum Group Setting for engineering cost specialty based on "Blockchain" and "Project Education Method" [J]. Journal of Science and Education,2020(12):81-82.
- [2] Xu, H., The concept construction and practical innovation of blockchain technology in the development evaluation of "double first-class" construction [J].
- [3] Li, O., Lin, X.C., Wang, L., Zhang, J., Bai, L., Gansu science and technology, 2020, 49(10): 62-65.