



Research on Construction Engineering Quality Management Based on Block chain Technology

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ABSTRACT

With the progress of society, there is a contradiction between the demand of building quality and the imbalance of building quality. Quality management is an important means to improve the quality of construction projects. According to the existing problems of building quality management, combined with the technical characteristics of block chain, such as decentralized storage, non-tampered data, transparent and traceable information, a new and information-based quality management method is created to solve the problems of current construction quality management.

Keywords: construction engineering, quality management, block chain, traceability

1. INTRODUCTION

Construction engineering is the main project in China's urbanization construction. With the progress of society, people's demand for the quality of construction engineering has gradually increased, and construction engineering has entered a new era of synchronous development of quality and quantity. However, in recent years, engineering quality problems have emerged frequently, and there is a contradiction between the demand for construction quality and the imbalance of construction quality. Whether the engineering quality problems can be solved directly relates to the interests of the people and the development of society.

Quality management is an important means to improve the quality of construction projects, promote the digital and intelligent upgrading of construction quality management, promote the high-quality development of construction projects, and ensure the quality of construction projects.

2. PROBLEMS IN ENGINEERING QUALITY MANAGEMENT IN CHINA

2.1 Quality management personnel's quality consciousness is shallow, the matter quality management does not take seriously.

At present, China's laws and regulations on construction quality management have been relatively

perfect, but the quality management process depends on whether the quality management personnel can carry out the inspection in strict accordance with the relevant laws and regulations. Otherwise, there will be problems that the quality management personnel are not strict with the quality inspection of raw materials entering the field, the inspection and installation of mechanical equipment are not strict, and the daily quality management mode is loose and not implemented according to the node. They cannot strictly do the work of quality acceptance and quality inspection in the event, and often wait for the quality problems to be investigated. ^[1]

2.2 Technical backwardness

From the technical level, the supervision technology used in various construction projects is still relatively backward, and the supervision methods of most projects are old and single, which cannot effectively carry the Internet to form 'cloud supervision'. The organization of quality management is not strong enough, professional and technical personnel lack of experience, missing a number of intermediate links, and even occasionally hidden details of the project missing, supervision personnel did not strictly follow the relevant provisions of quality acceptance inspection and acceptance. ^[2]

2.3 Uncoordinated operation mode

In the construction process of construction projects, there are many stakeholders. For supervision units, they are given the position of quality supervision by the

government, but the supervision cost is paid by the construction unit. This operation mode affects the fairness and authority of law enforcement of supervision units. On the other hand, some supervision units do not establish standardized supervision management system, resulting in unclear rights and responsibilities, unclear positioning, relevant law enforcement procedures are not standardized, problems cannot be solved in a timely manner.

2.4 Poor coordination and poor communication among quality management participants

In the process of construction, it is not easy to achieve complete informatization. The project itself is an integral whole, but before the formation of this whole, there are many and complex relationships involving relevant stakeholders in the construction process. There are differences in the information obtained by each construction subject from the market. Such information difference brings obstacles to the quality management of the project. Many quality problems, even if found, the relevant departments or personnel for various reasons, not timely records and feedback, resulting in quality control work is seriously disconnected, construction work continues to progress to the next link, and eventually lead to construction accidents.^[3]

On July 3, 2020, the Ministry of Housing and Urban-Rural Development and other departments jointly issued guidance on promoting the coordinated development of intelligent construction and construction industrialization Opinions put forward : market-led, government guidance; based on the current, focus on the long-term; cross-border integration, collaborative innovation; energy conservation and environmental protection, green development; the five basic principles of independent research and development and open cooperation guide the application practice of block chain and other technologies in the construction industry.

3. CONCEPT OF BLOCK CHAIN

Block chain is a new database for storing data, which integrates computer Internet technology, distributed technology, point-to-point technology and other science and technology, and plays a huge role in different fields. From a scientific and technological point of view, block chain is a science and technology problem covering mathematics, cryptography, the Internet and computer programming, a sustainable, high security, low maintenance system.^[4]

Block chain, as a trust carrier for the construction of industrial Internet in the digital economy era, has the characteristics of decentralization, open information, untamperable, safe, reliable and traceable. It is also suitable for the quality management of construction projects^[5]. If block chain technology can be applied to

the quality management of construction projects, the information of each participant in construction projects can be linked, the cooperative information is transparent, the trust cost is reduced, and the cost reduction and efficiency increase are realized, the management mode and method will be promoted to be more efficient, safe and intelligent. Therefore, it is of great practical significance to study the application of block chain technology in the quality management of construction projects^[6].

4. HOW TO INTRODUCE BLOCK CHAIN TECHNOLOGY IN CONSTRUCTION ENGINEERING QUALITY MANAGEMENT

The application of block chain technology in construction quality management can be said to be a change. It breaks the ideological shackles of traditional construction quality management, and its core goal is to break through data barriers and establish a "data network".

New concept of construction quality management: system development, multi-party replication, collaborative management, mutual recognition and sharing. The project participants can realize the interconnection of information systems and the real-time opening of management data, so that the management efficiency of the whole process of each participant is transparent. At the same time, the project can realize the control of funds, engineering quality and engineering progress.

4.1 Effective coordination of information among project participants to boost industry management

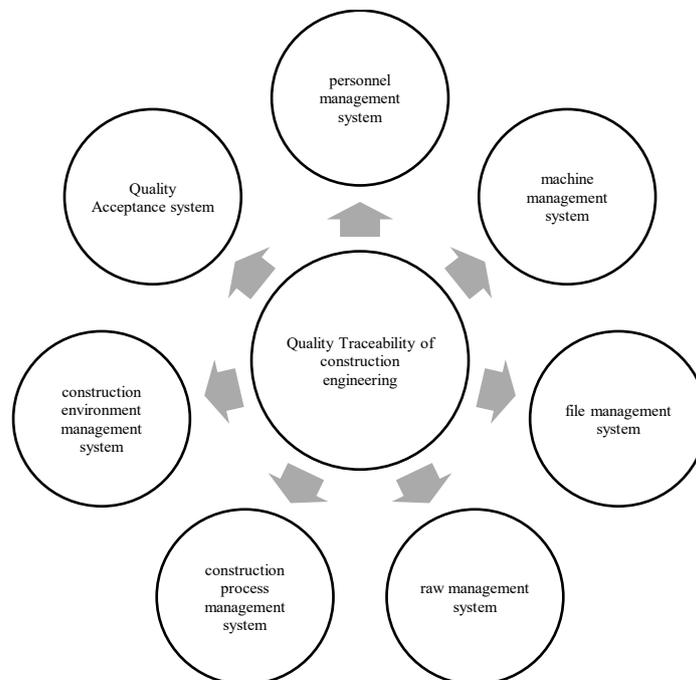
Block chain technology can accurately record all process information on the chain, and can completely record all engineering-related data in the process of complex engineering management. It can deal with a series of problems existing in traditional engineering management, such as poor data security, poor linkage ability and poor data consistency.^[7] Comprehensive digitization of engineering quality management business process, as well as chain management of digital records, realize all quality management information retention and non-tampering, optimize the traditional engineering quality management mode, reduce the probability of quality accidents, improve the overall quality management level.^[8]

4.2 Engineering quality traceability survey using block chain technology

To improve the quality of construction projects, it is necessary to establish a reliable quality traceability technology, which can be provided with traceability by

using block chain technology. In the investigation of quality and safety accidents in construction projects, it can quickly and clearly verify which step is not operated in accordance with the quality and safety standards, and which engineer should be responsible for the construction unit. The traceability investigation of engineering quality is more convenient and accurate under the block chain technology, so as to further ensure the quality of construction projects, which is conducive to the real-time supervision and accountability of government regulators for market participants.^[9]

Based on the five main factors affecting product quality in total quality management: human, machine, material, method and ring, this paper establishes the traceability system of construction engineering quality management. The key problem to be considered at this level is the collection, processing and analysis of various data, and enables it to support block chain applications at project level and enterprise level.^[10]



Traceability Map of Construction Engineering Quality Management

4.3 Block chain technology realizes automation of information verification and promotes the formation of integrity environment in construction industry

In the block chain information environment, from the content of the record, the block chain technology can store the data dispersed in the construction project participants in each block of the system at the same time, and these blocks can be connected to the block chain network to realize the cross-regional, cross-sectoral and cross-unit linkage of information resources in real time. And once these data become a permanent part of the distributed ledger and are accepted by all the participating departments in the block chain network, they will not be tampered with. Therefore, the application of block chain in construction engineering quality management can realize verification automation and improve supervision efficiency. If some enterprises appear dishonest behavior in the process of project operation, their dishonest behavior will also be broadcast to each port of the block chain. Over the long term, the industry chaos will be able

to rectify, can promote the construction industry integrity environment accelerated formation.

This paper introduces the new technology of block chain into the quality management of construction engineering, and puts forward the use of block chain to closely link each stage of construction engineering quality management with multiple participants, which is of great significance to promote the modernization reform of engineering construction industry. It can use digital services to solve the traceability problem in the process of construction engineering quality management. At the same time, the mechanism and significance of block chain technology in engineering construction quality management are explored, which provides the possibility for the future block chain technology to be widely used in the construction field, and helps to solve the problems of internal trust, supervision and development in the construction industry. The integrated application mode based on block chain technology is formed to accelerate the construction industry into the era of industrial Internet 4.0.^[11]

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