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Improve the level of governance system and accelerate the implementation of strategic transformation - Application analysis of blockchain technology

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***Abstract*—With the continuous development of the Chinese economy, China's digital economy has entered the fast lane. We need to promote the deep integration of digital and real economies. The integrated application of blockchain technology is essential in new technological innovation and industrial change. Blockchain technology is developing rapidly in our country and profoundly integrating with many industries. It promotes trust between upstream and downstream sectors, enables efficient data sharing, and enhances risk prevention capabilities. Therefore, by analyzing the strategic requirements of "Five businesses of China Communications Construction Co., Ltd. " and the governance system of building a "living community," this paper explores blockchain technology's essence and application scenarios. It proposes to build a governance system and implementation path of "trust the Internet" with the help of the application of blockchain technology in China Communications Construction Co., Ltd. Group to improve the overall governance level. Finally, we conducted a risk analysis of the CCCC governance system based on blockchain technology to ensure the smooth implementation of the scheme.**

***Index Terms*—governance system, community, blockchain**

I. Introduction

"Five businesses of China Communications Construction Co., Ltd. (CCCC)" is essential for the company to upgrade its industry, improve its comprehensive competitiveness and achieve the strategic goal of "taking the lead in building a world-class enterprise." It is the strategic upgrading of the company based on the existing business, market, and resources according to the change in the external environment and internal development needs. It is not only the development of industry but also the scientific positioning of the company's future development from the overall and systematic perspective. To achieve this goal, we need to accelerate the transformation of the industrial chain into the value chain and strengthen the leading role of the headquarters in the overall situation. We should accelerate the construction of adaptive organizations, further innovate the development model, and constantly promote management improvement to build a "community of interests" and a "community of life." It enables the company to achieve scientific and sustainable development in the fierce market competition with solid cohesion and value creation ability. The premise of building a "community of interests and life" is to realize the "community of information." Only through integrated management, decision-making, and implementation based on the joint production, operation, and resource information can the headquarters, subsidiaries, and organizations at all levels distributed at home and abroad be effectively linked as a whole to achieve efficient internal coordination.

Today, the world economy is undergoing a digital transformation, and the development of China's digital economy has entered a fast lane [1]. The integrated application of blockchain technology played an essential role in new technological innovation and industrial change. We should take blockchain as a necessary breakthrough for the independent creation of core technologies, clarify the main direction of attack, increase investment, focus on tackling several key core technologies, and accelerate the development of blockchain technology and industrial innovation.

The main business of China Communications Construction Co., Ltd. covers the construction industry of water transport and highway infrastructure engineering, which mainly focuses on coastal and inland port engineering and the survey, design, construction, and supervision of highway, bridge, and tunnel engineering, the equipment manufacturing industry, which mainly focuses on port machinery, road construction machinery, and bridge crane components, as well as the foreign trade industry, which focuses primarily on international engineering contracting labor cooperation, and import and export trade. At the same time, it has the general contracting capacity of large projects and the investment and financing capacity of projects. As a leading enterprise in the global construction industry, we use blockchain technology to carry out technological innovation and industrial transformation. Finding out the feasible standardized infrastructure of "building+CCCC+blockchain" from the bottom, based on the whole country and facing the world, is essential support for creatively implementing the deepening, refinement, and implementation of the "five

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businesses of CCCC" strategy, creating a collaborative, agile, efficient and sustainable community of interests, adjusting the industrial structure, changing the development mode, and improving the level of management and service.

Therefore, to adapt to the development requirements of the "Five businesses of CCCC," combined with the actual work, this paper analyzes how to improve overall corporate governance through blockchain technology. The remainder of this paper is organized as follows. Section II shows the essence and application of blockchain technology. In section III, we give the details of the CCCC governance system, and section IV makes a risk analysis. Finally, we make a summary in section V.

II. The essence and application of blockchain technology

A. The Essence of Blockchain Technology

In the past 20 years, the Internet has been fully integrated into social production and life, leading to significant changes in the world. However, due to the historical limitations of technology, the fundamental issues of fairness, value, and security of the network world have yet to be satisfactorily solved for a long time. And even many problems that endanger public safety, social ethics, and national security have been derived from it and become a new stubborn disease in society. Therefore, it is more necessary and urgent than ever to carry out a profound technological revolution in the Internet world.

The technical characteristics of blockchain may respond to this demand [2]. In essence, blockchain is a set of governance architecture whose core is the incentive and constraint mechanism based on various technology combinations [3]. It integrates distributed data storage, point-to-point transmission, consensus mechanism, encryption algorithm, and other technologies to carry out subversive innovation on the computing model and significantly raise the threshold of "evil." In addition, blockchain also promotes the transition from "information internet" to "value internet" and "trust internet" by setting incentive mechanisms to fully tap the internal positive forces, maintain the ecological order of the network world, and then achieve a more benign governance structure, effectively enable the modernization of national governance system and governance capacity. Therefore, it may cause global technological innovation and industrial change [4].

B. Application of Blockchain Technology

With the support of a series of policies, blockchain technology is developing rapidly in our country and profoundly integrating with many industries [5]. China's blockchain industry has been complete, coordinated, and orderly, from upstream platform services and security services to downstream industrial technology application services, to industrial investment and financing, media, and talent services to ensure industrial development and jointly promote the continuous development of the industry [6].

Realizing identity information data sharing will save a lot of time to fill in personal information repeatedly and make business handling more convenient [7]. Some regions are already trying to apply blockchain technology to government services. For example, many government affairs systems in Xiongan New Area in Hebei Province were built based on blockchain technology, Shanghai started building a blockchain technology innovation and industrialization base in 2018, and Hangzhou Internet Court released the judicial application of intelligent contracts based on judicial blockchain technology. Top-level national institutions are also widely involved in the application of blockchain technology. For example, the People's Bank of China Digital Currency Institute announced the construction of the People's Bank of China trade finance blockchain platform. Central enterprises are also involved in blockchain and actively cooperate with Internet companies. For example, State Grid recently announced that its wholly-owned subsidiary State Grid Blockchain Technology (Beijing) Co., Ltd. has been officially established, which will be highly compatible with its construction of electric Internet of Things, promote mutual trust in upstream and downstream industries, realize efficient data sharing, and improve risk prevention ability.

III. CCCC governance system based on blockchain technology

A. Analysis of the Relationship between Construction Industry and Blockchain Technology

The construction industry is highly regulated. The production, productivity, and production relations factors will affect the final delivery results. For example, the road, bridge, and port structures are sound and solid, and the construction materials are durable and environmentally friendly. The fire door width and escape route signs shall be clearly and reasonably designed in case of fire. The primary electrical equipment is in good operation, efficient and energy-saving, and will not cause electric shock, leakage, etc. The government and the industry have issued a series of building standards and specifications, aiming to have a unified measurement scale at the level of implementation and supervision. However, the vast, professional, and complex production factors, productivity, and production relations of the construction project pose a comprehensive management and cooperation challenge to the project's high quality, high standard, and timely delivery.

With the gradual promotion of technology and the application of the Building Information Model, the efficient collaborative cooperation model in various fields is accelerating its evolution. From the construction of traditional information systems to platform-based services, the purpose is to realize the interconnection of information. The productivity improvement brought by the interconnection of information is significant [8]. Still, it has a strong constraint on the production relationship, resulting in an unreasonable benefit distribution mechanism that reversely deceives the quality, progress, and standard of the delivery of construction achievements. Break through the traditional "information internet" to develop into "value internet" and "trust internet" so that the project funds can be fairly distributed to the enterprise units of the labor

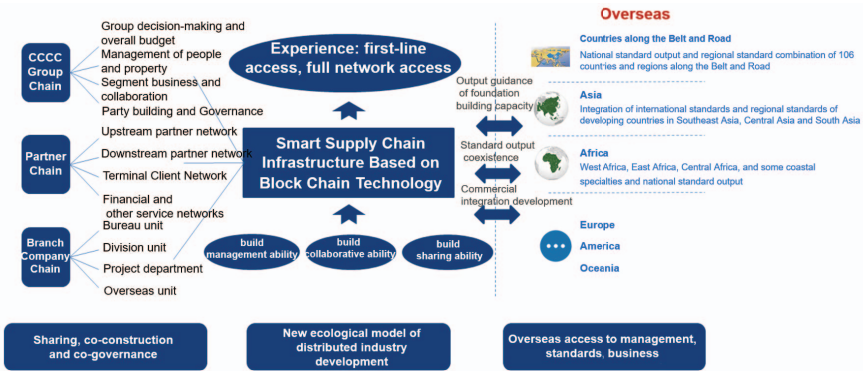

Fig. 1: Architecture

participants so that the product can only serve productivity, not be constrained by the production relationship, create a high-quality business environment, and promote the sustainable development of the industry.

The essence of building value and trust interconnection is to establish a neutral and fair governance structure. Using the characteristics of blockchain technology, from the perspective of efficient collaboration, information sharing, and business governance, build a standard infrastructure of the construction industry based on the country and facing the world, and carry commercial value and trust. Let the new form of distributed commerce accompany the development of the business sector of CCCC Group, co-exist with the domestic and global peers horizontally, and develop vertically and ecologically.

B. Analysis of CCCC Scheme of Blockchain Technology

The core value of CCCC Group's use of blockchain technology: one firm, two open. That is, strengthen horizontal and vertical digital governance within the group, eliminate risks and save the truth, activate potential productivity, and rationalize the distribution of people and property; The domestic alliance is open, unifies standards, and constructs "two circles and one ecosystem," a public basic service circle centered on state-owned assets supervision, government affairs, and government data, a business service circle centered on partners, peers, and finance, and an ecosystem based on co-construction, sharing, and co-governance. Overseas joint opening, national export standards, and differential integration build a "cross-platform cooperation node group" and implement the transformation from "CCCC globalization" to "CCCC globalization." The architecture is shown in the Figure 1.

The first is the analysis of strategic objectives. The business layout of CCCC Group and the construction of digital economic infrastructure are implemented in parallel. And the infrastructure is fully opened to realize the sharing, co-construction, and co-governance at home and abroad, thus establishing the digital standard of Chinese architecture in the world, first-line access, and global reach.

The second is management-level objective analysis. From the perspective of production, operation, and operation quality management, optimize the governance structure of information, value, and trust at the group level based on the principles of neutrality and fairness and break through the risks of distortion, implementation deviation, and supervision vacancy caused by traditional information interconnection.

The third is business-level goal analysis. Based on the business of CCCC Group, from the perspective of efficient collaboration, information sharing, and business governance with upstream and downstream industries at home and abroad, promote standardization and digitalization, and establish a new form of open and distributed commerce. Create an ecological "smart contract" economy, and realize the healthy and coordinated development of domestic industrial and commercial integration, service transformation, and external industrial and financial integration.

The fourth is the goal analysis of industrial governance. CCCC Group should gradually transition from the absolute core of the industrial chain to multi-chain ownership and open government. Promote industrial alliance, and position itself in the responsibility and obligation of the coalition. And jointly promote its business's healthy and coordinated development through the industrial neutral and fair governance structure.

The fifth is the analysis of the objectives at the party-building level. The Party building is embedded in the production and operation through the digital form. The smart contract technology establishes the Party's supervision probe, the group-wide layout rules, and the encrypted information transmission channel. So that the Party's leadership is strengthened, the characteristic Party building is more prominent, the Party's management of cadres is more scientific, the Party's conduct and enterprise conduct are more apparent, and the development of joint force is more cohesive.

C. Implementation Path Ainstractionnalysis

The first stage (essential work in 2020): verification scenario and positioning value. Select scenarios from CCCC Group to verify the value. For example, in the field of supply chain and other scenarios involving multi-party cooperation and controllable risks, try and summarize first.The first stage intelligent supply chain governance architecture is shown in the Figure 2.

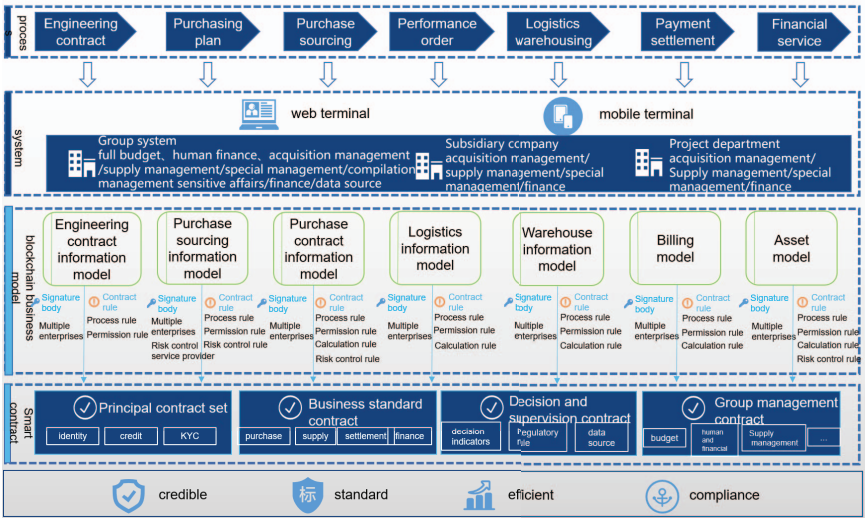

Fig. 2: The First Stage: Intelligent Supply Chain Governance Architecture

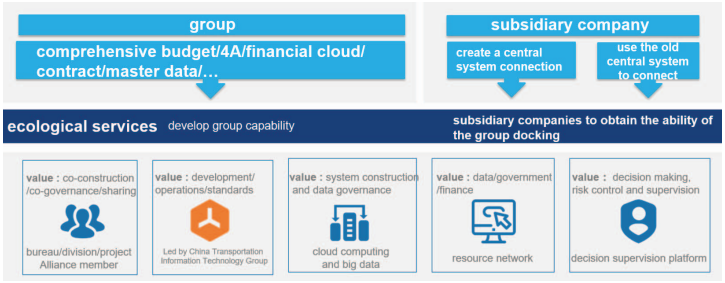

Fig. 3: The Second Stage: "Trust Interconnection" Governance Architecture

Based on the implementation results of "CCCC Cloud Commerce" and other platforms, the CCCC smart supply chain governance system and platform are built based on profiting from the old and innovation. The goal is to make the supply chain management of the chain group, provide convenient services for the subsidiary companies and projects, and strengthen the innovation and development capacity of the grassroots.

The second stage (medium-term plan for 2020-2021): top-level design, the first solid. Fully evaluate its value through the results achieved in the first stage. Based on this, combined with the strategic planning of CCCC Group, the top-level design is carried out to guide the blockchain technology to optimize the governance structure within CCCC Group and transform from "traditional information interconnection" to "value interconnection" and "trust interconnection." The second stage, "Interconnected Trust" governance architecture, is shown in the Figure 3.

The third stage (long-term plan for 2021-2025): is alliance operation and parallel development. The domestic alliance is open, and the overseas partnership is available, with the standard as the core, the scene as the target, and the rolling development.

IV. Risk Analysis

A. *Recognize and Perceive Risks*

Blockchain is not only a technology but also a management and thinking direction [9]. Blockchain is a bridge connecting the virtual world and the real world. Blockchain can turn enterprise informatization into informatization enterprise and individual informatization into informatization individual. Although only one Chinese character is out of order, the two have essential differences. Personal informatization is to digitize personal attributes, characteristics, and data in a single system. Personal informatization digitizes people as a whole in the network and becomes a node. Enterprises and enterprises, people and people, enterprises and individuals will become nodes.

Therefore, on the one hand, we need to solve the problem of "taking root" of blockchain in CCCC at the cognitive level and promote the integration with company management and business model. At the same time, it is also necessary to strengthen the publicity and implementation of superior documents, top-level design, management systems, and basic knowledge.

B. Risk of Missing Professionals

The need for more professionals limits the implementation of blockchain in CCCC. On the one hand, blockchain is still a very new technology, and the company has few talents engaged in researching core technology and implementing application methods [10]. On the other hand, there need to be more cross-border compound talents who understand both technology and industry, making the efficiency of scene adaptation low.

Therefore, we need to use the industry-university-research platform of the Information Technology Group to introduce talents further, improve the ability of independent research and development, and build a solid and self-owned professional technology research and development team and application team. Find high-quality partners from outside and work together to finally form a comprehensive talent team that understands blockchain technology and business integration.

V. Conclusion

By using blockchain technology, on the one hand, we can solve the problems of electronic production and financing documents, the authenticity of production and financing information, and the interconnection of production and financing. On the other hand, it can solve the problems of cooperation, information sharing, governance, and supervision of multiple units within the company or the industrial chain. In summary, constructing a modern "trust internet" governance system, including systems, standards, and ecosystems, will promote the continuous deepening and development of the "Five Businesses of CCCC" strategy to improve the company's overall governance level.

Acknowledgment

The first author is the corresponding author.

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