

Retraction

Retracted: Improved Blockchain Technology for Performance Optimization Model Design of Sports Clubs

Journal of Electrical and Computer Engineering

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] S. Wang, "Improved Blockchain Technology for Performance Optimization Model Design of Sports Clubs," *Journal of Electrical and Computer Engineering*, vol. 2022, Article ID 4436471, 8 pages, 2022.

Research Article

Improved Blockchain Technology for Performance Optimization Model Design of Sports Clubs

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Professional sports clubs are an important part of professional sports, and their development has a certain role in promoting the strength of China's competitive sports and the prosperity of the sports industry. However, the development of professional sports clubs in China is still facing many challenges. Among them, the key to their long-term development is to improve their financing ability and solve their financing difficulties in order to improve the performance of professional sports club. At present, research on the financing methods and financing difficulties of professional sports clubs has achieved certain results, but no systematic research on the application of blockchain technology to solve the pain points of professional sports club financing has been established. This study systematically compares the current situation and development problems of financing for professional sports clubs in China from the new perspective of combining blockchain and professional sports club financing. In addition, this article proposes a solution for the application of blockchain technology to optimize the performance of professional sports club, which has important theoretical and practical significance for promoting the development of professional sports clubs.

1. Introduction

The difficulties of running professional sports clubs around the world are still an essential topic for discussion, and the most effective solutions have yet to be found. China's professional sports clubs are also facing difficulties in operation, financing, and serious losses, which require the relevant personnel to explore the development direction of club operation with a more positive attitude and help professional sports clubs to break through the financing barrier. In recent years, with the continuous innovation and integration of technology, the breakthrough in the application of blockchain technology in the field of finance has also brought inspiration to the solution of the financing issue of professional sports clubs. Thus, applying blockchain technology to optimize the performance of professional sports clubs is a promising solution.

Blockchain technology has become one of the most representative achievements of current information technology, attracting numerous scholars to research and application in this field. The growing economic and social

benefits of this industry have led countries around the world to seize the opportunity and shift the focus of their information research to blockchain technology. Although China's research shows the shortcomings of late start and weak foundation compared with the current leading level of blockchain technology research worldwide, China has always shown a positive and open attitude towards blockchain technology. However, judging from the current development trend and future application potential, China's blockchain technology research is expected to achieve great progress, better integrate the technology with China's real economy and industries, and promote the landing of blockchain technology in China.

Blockchain technology is an important breakthrough in opening up the next digital technology era, promising to revolutionize, like Internet technology change the shape of human social activities. The leading role of blockchain technology in industrial transformation cannot be underestimated. The future trend in blockchain technology is not only the continuous updating of the technology itself, but also the integration of the technology with various

industries. The characteristics of blockchain technology have injected new vitality into the sports sector, and scholars and related practitioners at home and abroad are actively exploring the application of this technology in the sports industry. With the support of blockchain technology, the innovation of the sports industry is accelerating. Therefore, in light of the role of blockchain technology in boosting the financial industry, it will become a new hot topic to explore whether professional sports clubs can introduce blockchain technology in order to improve their performance. This integration can solve the painful problem of club financing and thus optimize the performance of professional sports clubs in China.

2. Literature Review

Since the introduction of Bitcoin in 2008, blockchain technology has evolved rapidly and many scholars have continued to study the underlying theory behind the technology, and it has gained a solid theoretical foundation. Swan argued that the essence of blockchain is the application of cryptography to generate blocks of data, and that each block contains information about all transactions over time, which can be used to verify validity and generate the next block [1]. Paul Vigna and Casey linked blockchain technology to the problem of trust in transactions and suggested that blockchain is a kind of ledger and a fact machine that can solve the problem of mutual trust in online transactions to some extent [2]. Mougayar believed that blockchain will not only be the backbone of fintech innovation but can also be used for social and political change, and that when the commercial application stage is achieved, blockchain technology will go beyond commerce, currency, and value to help build a more decentralized world [3]. Hofmann et al. proposed that blockchain is a shared database in which all asset transactions involved are recorded in a cryptographic algorithm and are difficult to modify, while the system does not require the involvement of any centralized institution or any single trusted third party, thus eliminating the associated trust risks [4]. There is also a great deal of research in regard to the security of blockchain because this is essential to the development of blockchain [5–8]. Li et al. conducted a systematic study of blockchain security threats, investigating the corresponding real attacks by examining popular blockchain systems in order to propose some solutions that will help the development of various blockchain systems [9]. Cheshun et al. constructed a new approach for distributing cryptographic tokens in decentralized Ethernet applications, defining the main stages of application elaboration and providing an algorithm for distributing cryptographic tokens capable of using correlation tables and dictionaries [10].

In addition, there are many studies that focus on the core features of blockchain technology [11–15]. Chen and Belavitis argued that the decentralized nature of platforms built using blockchain technology is the most significant feature of blockchain technology as opposed to centralized organizations built using Internet technology [16]. Puthal et al. examined the characteristics of existing blockchain technology and pointed out its advantages in preventing data

tampering, but this characteristic also has its shortcomings [17]. As a neutral and position-free information technology, there is a possibility that blockchain can be used by special people in certain special business scenarios, which may cause risks.

The development of blockchain technology is divided into three main directions: digital currency payments, financial asset management, and broad-based applications, and the application research results are also focused on these. In terms of digital currency payments, Saito, K., and Iwamura believed that blockchain technology has the ability to build a new type of value transfer transaction model, enabling economic activities that can be achieved by both parties to a transaction without third-party credit guarantees [18]. In terms of financial asset management, Kuhle et al. argued that a new type of financial market can build a foundation using blockchain technology, and that digital instruments equipped with this technology can enable the circulation of financial assets free from traditional centralization [19]. Sullivan and Burger concluded that the most efficient clearing method in the financial market is the interface between digital notes and digital currency, which will also become a new topic in the future development of blockchain technology [20]. Ahluwalia et al. proposed a financing model that combines logistics, capital flow, and information flow to improve the financing environment by analyzing the financing situation of small and medium-sized manufacturing industries [21]. In terms of broad-based applications, blockchain technology has certain advantages for solving problems such as information processing, information security, and risk control. Mardisentosa et al. analyzed the fit between blockchain technology and file management and proposed a solution for the integration of blockchain technology and student achievement records [22]. Cai and Zhu believed that blockchain technology can improve mutual trust between buyers and sellers of telecommunications transactions and prevent transaction fraud due to malicious withholding of information and evaluation [23].

In addition to the above three categories of application scenarios, scholars in the field of sports are also studying the rationality of the application of blockchain technology and have achieved certain research results. Depending on the purpose of its application, it can be divided into noncommercial applications of blockchain technology and commercial applications in two categories. On the noncommercial side, Lv et al. suggested that blockchain technology could be used in the future for sports logo of licensing, anti-counterfeiting, and counterfeit product tracking [24]. Yu argued that blockchain technology can solve the problem of data trust, and that sports big data can apply this feature for the purpose of integration and dissemination [25]. Jin et al. proposed that the application of blockchain in the field of public sports platform can integrate social service sports resources and public sports services [26]. On the commercial side, Naraine focused on the commercial application of blockchain in the sports industry, arguing that the technology can be landed in four types of application scenarios, namely government, enterprise,

technology, and talent, and analyzed and planned its application technology and realization path [27]. Liu argued that the problems of lack of standardized and correct business models and excessive centralization in the sports industry can be improved by relying on the new technology of blockchain [28].

Research has shown that blockchain technology has achieved fruitful results in the areas of digital currency payments, financial asset management, and broad-based applications, and many scholars have proposed many practical and effective solutions to problems in these areas. However, the analysis of the current research in the field of sports suggests that the research on the application of blockchain technology is more inclined to the noncommercial application in the field of sports, while the research on the commercial application in the sports industry is slightly insufficient. Therefore, the failure to promote the better implementation and integration of blockchain technology will be a new issue for the future development of the integration of sports industry with new technologies.

3. Blockchain Technology-Based Financing

3.1. Blockchain Technology-Based Financing Business Model.

The use of accounts receivable, orders, and pledges for financing on a blockchain technology-based financing service platform enables the platform to secure financing for sports clubs. At the same time, the platform can participate in the information of all parties thus running through the whole financing process, and the transaction information is all transmitted in an orderly manner in the supply chain strip, while the blockchain technology escorts the whole process and improves the safety, stability, and reliability of the financing process. Blockchain technology escorts the whole process, which improves the security, stability, and reliability of the financing process.

As shown in Figure 1, the cloud database based on blockchain technology includes capital flow, commercial flow, logistics, and information flow. With the core enterprises as the bridge for information transmission, providing two-way credit guarantee for distributors and suppliers, it can be seen that the quality of the core companies in the chain also plays a key role in the financing effect. The use of blockchain technology can help professional sports clubs to screen out quality core companies when raising funds, thus enabling information storage and data transfer. In addition, with the assistance of blockchain technology, digital asset matching agreements can be generated with the help of smart contracts, and the transaction records can be perfectly recorded on the agreements, such as transaction signature and pledge supervision.

As shown in Figure 2, its internal depository system involves four modules, including permissions management, credit management, smart contracts, and credit data. The transactions, information and funds of core enterprises, upstream and downstream suppliers, and banks and other financial institutions in the financing platform are entered, approved, and monitored in the chain.

At the same time, multilevel suppliers upstream of the core enterprise, upon receiving blockchain instructions, can transfer accounts receivable and other data of production transactions to the distributed ledger in a timely and accurate manner. The blockchain accounts for and shares these data and registers it on an intelligent covenant. Professional security issuers are able to rely on intelligent covenants without the need for other intermediaries, thus avoiding ineffective management by multiple parties. The accounts receivable registered on the distributed ledger and completed the verification of the rights are independently collated and vetted, and the vetted accounts receivable certificates are packaged and issued as public products on the security market exchange to facilitate investment and subscription by other financial institutions.

3.2. Current State of Blockchain Technology-Based Financing.

From Figure 3, it can be found that the scale of blockchain finance in China has been increasing year by year, and the demand of domestic enterprises, especially small and medium-sized enterprises, for blockchain financing that can support their capital security has become increasingly strong. In 2013, the blockchain finance size was 1.47 trillions of yuan, but in 2021, this size was increased to 2.51 trillions of yuan. At the same time, blockchain technology has also catalyzed the development of supply chain financing towards the trend in high efficiency, security, fairness and transparency, and low financing cost, but these industries are also bound to be limited by the current level of development of blockchain technology and technical standards, as well as the coupling degree of blockchain technology and financing, the maintenance of relevant systems operation, and other drawbacks. In addition, to some extent, there is still the disadvantage of information asymmetry, which requires the cross-chain integration of blockchain to achieve the sharing of information.

Furthermore, the application cases of the platform are mainly small, medium, and microenterprises in first and second-tier cities, for example, TCL's SimpleHub, whose financing needs are mainly for small, medium, and microenterprises in Guangdong, is not completely popular nationwide. Due to the level of regional and local economic development, the extent and scope of technology diffusion, there are still insurmountable lending thresholds for some disadvantaged micro and small enterprises, and the financing service platforms adopt a single financing model. Finally, there are currently no standard laws and regulations to regulate these platforms, financing service providers can only adapt to local conditions, and the government lacks the relevant scientific and technological talents.

4. Blockchain in Financing of Professional Sports Clubs

4.1. Current State of Blockchain Technology in the Sports Industry. Blockchain technology is a new technological framework that can be applied in numerous fields and has the potential to change business trust models and create

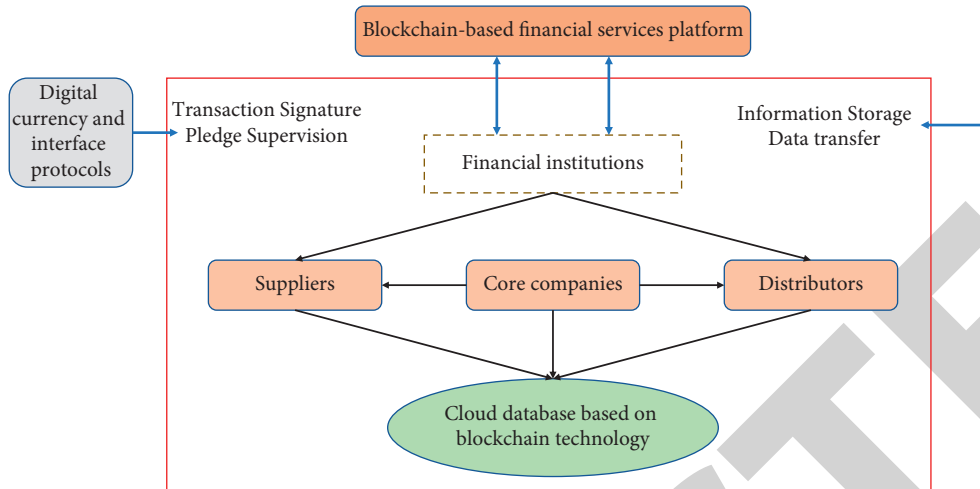


FIGURE 1: Blockchain platform financing process.

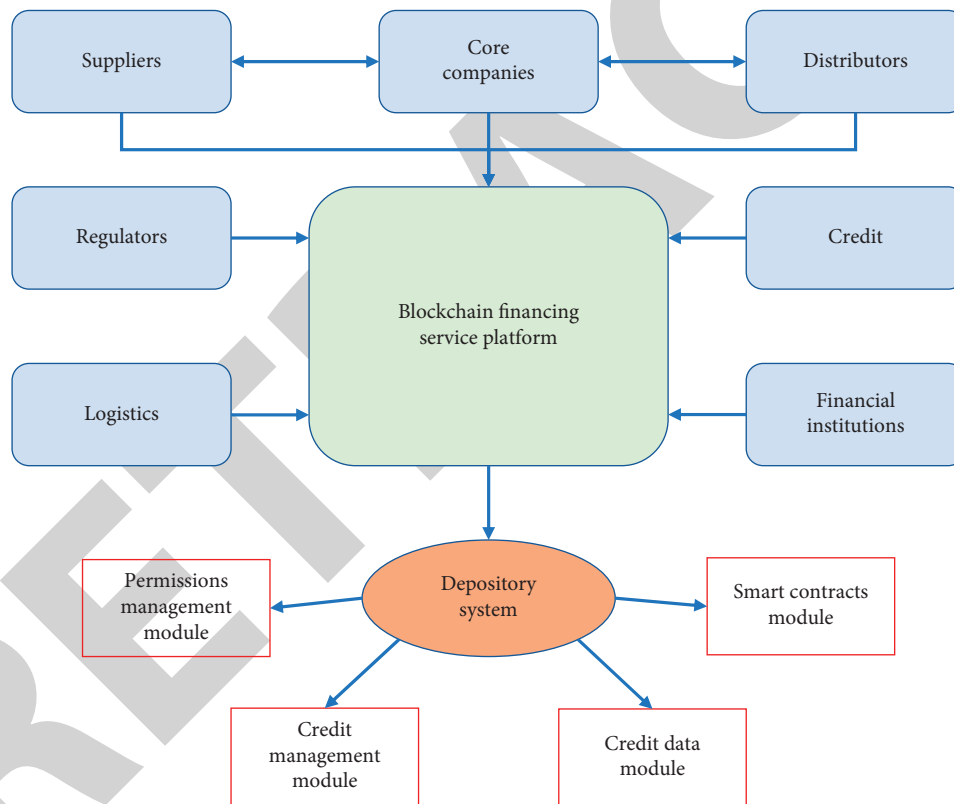


FIGURE 2: Blockchain financing service platform.

new management structures. In recent years, blockchain technology has landed rapidly in China, and its integration and innovative applications with various industries have gained momentum, including currency and finance, Internet of Things and logistics management, social management, and many other fields. At the same time, the application of blockchain technology in the field of sports is also highly valued by the industry. Apart from the management of stadium facilities and public services of social sports, blockchain technology has gradually entered the

field of sports industry. This study summarizes and collates public data from IT Orange database (see Table 1), which shows that blockchain technology has been applied to sports products, sports events, and sports business services, and more than half of them have already received investment and financing, which indicates that blockchain technology can promote innovation and development in the sports field, and the combination of the two can become a strong driving force for the development of the sports industry.

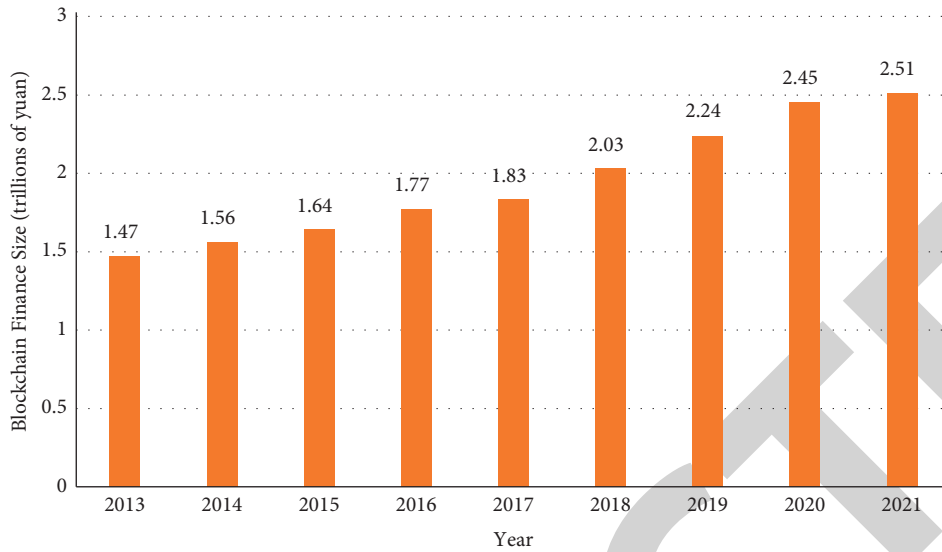


FIGURE 3: Blockchain financing size.

TABLE 1: Public data from IT Orange database.

Name of the firm	Date of establishment	Financing round
Faxport	01/2016	Strategic investment
SportX	02/2017	Angel round
Unigame	08/2017	Angel round
FanX	01/2018	Strategic investment
Prophet	05/2018	Angel round
VICTORTOKEN	08/2018	Strategic investment

The analysis of the company's positioning and main business shows that the above example of the integration of blockchain technology with the sports industry focuses on the innovation of blockchain technology, using its unique advantages of information storage security and efficient information circulation to build a new sports trading platform, thus providing higher standard services for the sports industry. Although it is not yet involved in the financing of professional sports clubs, it proves that the integration of blockchain technology with the sports industry is possible and can also provide some technical reference for its application.

China's sports industry started with the success of the 2008 Beijing Olympic Games and its later development has been inextricably linked to national policies. In recent years, as people's spending power and willingness to spend in the field of sports has increased, coupled with the impact of the imminent start of the Winter Olympics, the volume of the industry has continued to expand. As China's sports industry is gaining momentum, it is able to drive larger scale residential consumption. As a result, investors generally believe that it has high certainty for long-term investment and are rushing into the sports industry, contributing to the capital dynamics of the sports industry in China have been increasing. As shown in Figure 4, the total amount of financing investment gradually increased from 2014 to 2021.

4.2. Exploration of Blockchain to Solve Financing Issue of Professional Sports Clubs

4.2.1. Establish Decentralized Trading Platforms. Before the introduction of blockchain technology, investors would mostly deliver their funds to financial institutions for investment in order to reduce financial risks (as shown in Figure 4). This type of investment and financing transaction is also called indirect financing, where the third-party financial institution involved in the transaction acts as an intermediary to connect the demand for funds with the investor and receives a fee for its services. The main forms of exogenous financing for professional sports clubs are public listings, the introduction of venture capitalists, and credit facilities, as described above. Among them, financial institutions such as security institutions, banks, and venture capital companies play the role of intermediaries, which to a certain extent increases the financing cost of professional sports clubs.

The most important development direction of blockchain technology is to further weaken the intermediary function and realize peer-to-peer asset transactions. Blockchain can be seen as a kind of electronic account ledger independent of third parties. Building a financing trading platform supported by blockchain technology is like delivering funds to an algorithm-guided trading mechanism (see Figure 5). This allows the investee to access funds directly from the investor without the constraints of a financial institution and without paying hidden costs. In the future, it is possible that the market will abandon traditional financial intermediary platforms and professional sports clubs can bypass financial institutions; achieve free peer-to-peer transactions through the application and expansion of blockchain technology; and leverage the flow of funds to meet financing needs (Figure 6).

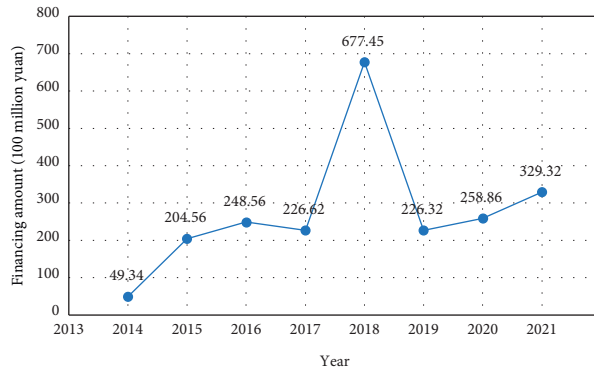


FIGURE 4: Financing amount in sports field in China from 2013 to 2021.

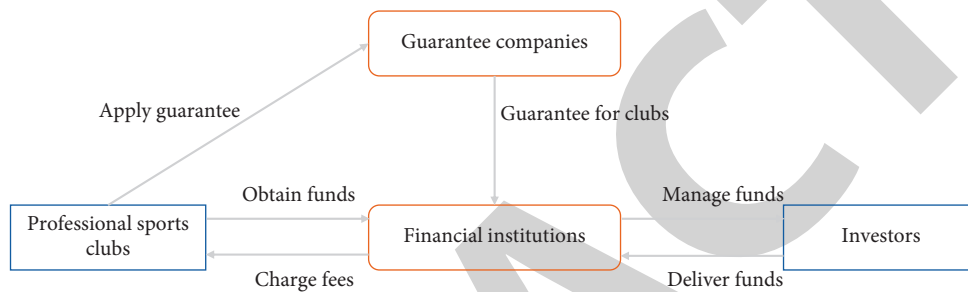


FIGURE 5: Guaranteed financing process for professional sports clubs.

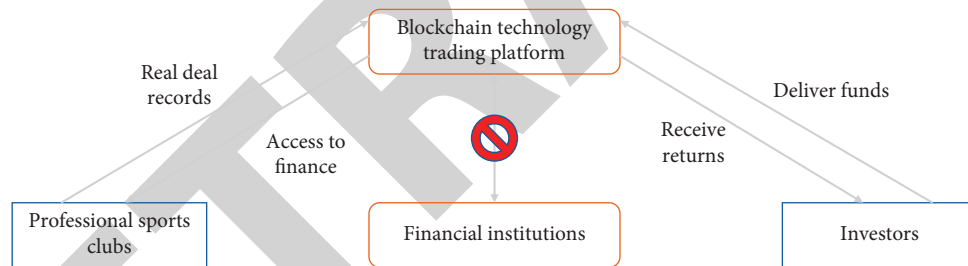


FIGURE 6: Guaranteed financing process for professional sports clubs based on blockchain technology.

4.2.2. *Establish Shared Ledgers.* The biggest breakthrough and contribution of blockchain technology is that it provides a new data storage model. This way of recording data and transferring information allows all nodes in the chain to store and read new transaction information, and all rely on code to maintain data recording and information sharing, without the participation of third-party intermediaries. For the investment and financing of professional sports clubs, the problem of information inequality is one of the obstacles to their smooth financing. The huge difference in information available between the two sides of the financing equation increases the risk factor for the information disadvantaged party, making them more cautious and even more conservative in their financing choices. Some clubs may also package their profitability, etc., in order to obtain more funding, breaking the rules of the market.

The use of blockchain technology to record economic transactions and financial flows will leave traces on the data chain that cannot be easily modified, which ensures that the information about the club's transactions and assets is

absolutely true and reliable. Clubs using blockchain technology for financing can save the original transaction data and operations to a private chain and submit key transaction information or a summary of the operations of the business to the public blockchain, also known as the shared ledger. Investors can query the club's operations through the public chain and, if needed, request access to the original data stored on the private chain. Using this type of information sharing, both investors and financiers do not have to worry about their business data being leaked, while at the same time they can access the vast amount of trusted data they need. With sufficient and authentic information, investors will be able to have a good grasp of the club's operations and make more accurate investments. The shared ledger will greatly solve the problem of information inequality, which will reduce the risk of financing, increase the dynamism of financing, and improve the overall transparency of information in the industry, which will be beneficial to optimize the market environment of professional sports in China in the long run.

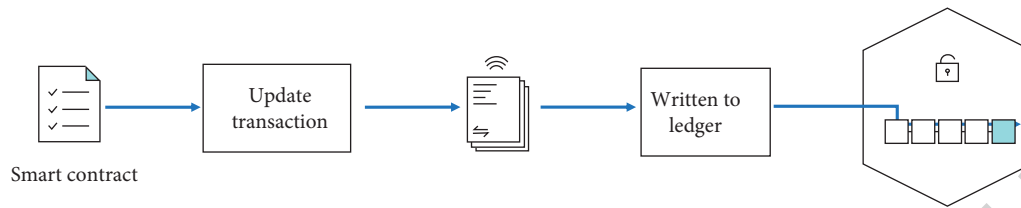


FIGURE 7: Process of smart contracts.

4.2.3. Establish Smart Contracts. A smart contract is a special protocol in the form of a digital code designed to provide, validate, and enforce contracts (Figure 7). The function of a smart contract can be compared to that of a vending machine in a blockchain network. When a counterparty delivers digital currency or property to the system, the smart contract will use the code already written to check its requirements and conditions and will automatically execute the contract when the conditions of the contract are met. Smart contracts are fully automated processes, eliminating all human intervention, as long as the code requirements set out in the smart contract are met. The contract can be completed by satisfying the code requirements set out in the smart contract, thus increasing efficiency and saving costs to a significant extent.

Most professional sports clubs have difficulties in meeting the standards of financial institutions and passing their documentation compared to more established industries and companies, and the complex approval process and cumbersome documentation requirements do not help professional sports clubs to obtain financing successfully. The introduction of smart contracts will reduce the manual review process and shorten the time it takes for information to be passed on, significantly improving efficiency. As long as the club can meet the conditions set out in the smart contract in advance, the contract will be fulfilled quickly. Smart contracts have the potential to bring new momentum to the financing of professional sports clubs, as professional sports are a high-growth industry where investors may choose to invest cautiously as it is difficult to fully grasp the risks of financing in the early stages, while introducing blockchain-enabled continuous financing to club investments can reduce the risk for both investors.

5. Conclusion

This study takes the exploration of the application of blockchain technology in the financing of professional sports clubs as the research object in order to optimize the performance of sports clubs and proposes that blockchain technology has the ability and core application value of establishing a new credit mechanism. Also, it can improve the efficiency of information transmission and reducing the risk of data storage, and it is feasible to introduce blockchain technology into the field of financing professional sports clubs. Many pain points of professional sports club financing can be solved by establishing a decentralized financing trading platform, introducing smart contracts to reduce financing costs, building a club blockchain application

platform, and issuing club digital tokens. Some of the blockchain technology solutions are building a decentralized financing platform, introducing smart contracts to reduce financing costs, creating a club blockchain application platform, and issuing club digital tokens. However, there are still many shortcomings in the development of blockchain technology. Before it can be officially applied to the financing of professional sports clubs, there is still a need to strengthen the theoretical research on blockchain technology, unify the operational standards of the blockchain industry, and accelerate the construction of the system and improve the corresponding legal regulatory system to create a good environment for the operation of blockchain.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The author declares no competing interests.

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