# Research on the Application of Blockchain Technology in Sports Events Under the Background of Asian Games

Xuehan Luo, Jiankang Zhang[(✉)], and Chenyu Ni

School of Culture and Tourism, Zhejiang International Studies University, Hangzhou, China
zhangjk@zisu.edu.cn

**Abstract.** In recent years, with the development of high-tech such as Internet technology, big data and artificial intelligence, blockchain technology has entered a brand-new stage of development, and has been gradually applied in many fields. The integrated application of blockchain technology plays an important role in new technological innovation and industrial transformation, and has the characteristics of decentralization, no tampering, openness and transparency, etc. From the perspective of promoting the development of smart sports, this paper will discuss the application of blockchain technology in sports events under the background of Asian Games, analyze the pain points of blockchain application at present, and put forward feasible suggestions and countermeasures, aiming at providing reference for its research and application in sports events.

**Keywords:** blockchain · Sports events · Asian Games

## 1 Introduction

Block Chain technology originally originated from cryptography, and its purpose is to realize direct payment between any two parties in a transaction, so as to get rid of the intervention of third-party platforms and overcome the credit problems of intermediaries. Simply put, it is a chain composed of different individual Blocks. Each block stores corresponding information, and they are arranged in a specific time sequence to form a chain. Encrypt and store by encryption algorithm to ensure that the stored information data will not be forged.

It is mainly used for information storage, and any information that needs to be saved can be written into the blockchain. With the expansion of blockchain application scenarios, it is gradually introduced into the sports industry.

## 2 Analysis of the Current Situation

Blockchain originated from Bitcoin. On November 1, 2008, a person who called himself Nakamoto Cong published the article Bitcoin: A Peer to Peer Electronic Cash System, which described the architecture concept of the electronic cash system based on P2P network technology, encryption technology, timestamp technology, blockchain technology,

etc., marking the birth of Bitcoin. On January 3, 2009, the first Genesis block with serial number 0 was born. On January 9, 2009, a block with a serial number of 1 appeared, and it was connected with the Genesis block with a serial number of 0 to form a chain, marking the birth of the blockchain.

In 2016, the State Council issued the "Thirteenth Five-Year Plan" for National Informatization, which proposed to strengthen the advanced layout of strategic frontier technologies such as blockchain. This is the first time blockchain has been included in the planning as a strategic frontier technology.
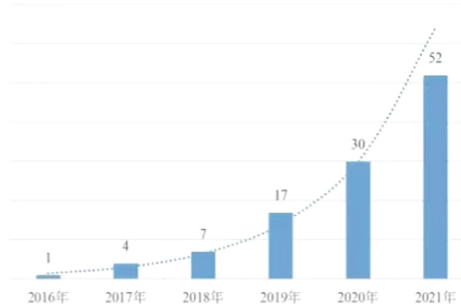
Since then, some places have successively introduced policies to promote the blockchain industry, and more than 20 provinces have laid out the blockchain industry. The relevant person in charge of the Department of Informatization and Software Services of the Ministry of Industry and Information Technology introduced that China has a certain foundation for the development of the technology industry in the field of blockchain. In terms of technology research and development, key enterprises have increased investment to accelerate breakthroughs in key core technologies and improve blockchain performance, efficiency and security. In terms of standardization, the National Standardization Committee for Blockchain and Distributed Ledger Technology has been established, and the standard system has been accelerated to build and improve. In terms of industrial ecology, an industrial chain covering underlying infrastructure, application basic platform, industry application development and surrounding supporting services has initially taken shape.

The development of blockchain has gone through three stages. Blockchain 1.0 is a digital application represented by BT, and Bitcoin is the first and most widely used blockchain at present. 2.0 mainly refers to the application of blockchain technology in the financial field, the main feature is to develop more applications on the basis of the regional blockchain, Ethereum is the most typical representative blockchain 3.0 transcends the currency, financial field, and even the business field, but also includes many aspects of our lives, covering politics, economy, medical care, education and other aspects (Fig. 1).

From 2016 to 2021, the number of blockchain policy documents issued by various ministries and commissions in China has steadily increased. A number of ministries and

| Web1.o | Google, SOHU, SINA, etc. through the display of web information constitute to attract users to click and watch |
| | Platform creation, platform ownership, platform control, platform benefit |
| Web2.o | Blogs, Micro-blog, and QQ spaces allow users to generate content |
| | Independently User creation, platform ownership, platform control, platform distribution |
| Web3.o | User-created content is owned by the user and is not dependent on any central organization |
| | Who creates, who owns |

**Fig. 1.** The stage of development of the blockchain

**Fig. 2.** 2026-2021Number of blockchain documents issued by ministries Source: CCID Blockchain Institute

commissions actively promote the integrated application and development of blockchain, and explore new ideas for high-quality development of the country's economy and society with blockchain as the starting point (Fig. 2).

## 3   Features of Blockchain

Decentralization. Blockchain exists independently and does not need to rely on other hardware devices to realize it. The network architecture and governance system are decentralized, so its operation cannot be controlled from the center. Blockchain takes distributed accounting and storage as the core, and carries out self-verification, transmission and management of data.

Open. The data system of blockchain is very transparent, and all data is concentrated on each node. Except personal privacy is encrypted and saved, everything else is open to each node. The openness of blockchain technology makes it easy for anyone to access its information, with high transparency and credibility.

Security. Because blockchain is a chained data structure, when a node falsifies a certain block of data, its connection with the two blocks before and after it will be destroyed, and the modified block cannot be received by other nodes, that is, it cannot be accessed.

Independence. Blockchain technology is highly decentralized, independent of each other and completely unaffected by the outside world, so it can verify and trade data without human intervention, thus ensuring the security and stability of blockchain technology.

Anonymity. The foundation of blockchain technology is the openness of transaction records, but the identity information of accounts is processed by passwords. Unless required by law, the identity information of each block node does not need to be disclosed or verified technically, and can be transmitted anonymously.

# 4   Application Mode of Blockchain in Sports Events

## 4.1   Blockchain + Sportsman Mode

For many years the General Administration of Sport has been committed to promoting the overall development of athletes, actively formulating policies, training and building platforms for athletes to develop in sporting events and professional arrival. However, there are still many issues that hinder athletes' competitive and professional development, such as training and competition management, doping incidents, personal information records, and professional athletes' contract management. Now blockchain technology, if applied to this, will provide new ideas and solutions to existing problems.

The application of blockchain technology can provide new solutions for training and competition management, doping incidents, personal information records, contract management of professional athletes and other issues, and promote the growth of athletes in sports events and career development.

**1) Scientifically standardize the competition management and training of athletes.**

By storing athletes' data in a private chain, coaches and clubs can view their training and competition records. Using the uploaded athlete data, clubs and sports schools can not only better select excellent athletes, but also provide salary reference standards for grass-roots sports training participants. In the process of athletes' growth, a public chain will be established, their value and potential will be estimated, and intelligent contracts will be customized for them, so as to ensure the standardization of the transaction process and realize the optimal solution of athletes' training.

**2) Create a contract management model for athletes with smart contracts.**

The application of blockchain technology will bring a brand-new solution to professional athletes' contract management. It can solve the problems of complicated process, many disputes and high operating cost in traditional contract management methods. Intelligent contracts can automatically manage and release funds according to preset rules, simplify the signing process of athletes, and avoid disputes and disputes caused by bad behaviors of brokers and club contract executors. Through the simplification and automation of the intelligent contract process, the negotiation and execution costs will be greatly reduced, which will not only promote the cooperation among sponsors, suppliers and athletes, but also change the operation mode of the whole industry.

## 4.2   Blockchain + Sports Event Trading Mode

As each block in the blockchain is time-stamped, its chronological data reinforces the immutability and traceability of the information. The decentralised nature of blockchain technology makes it independent of a unified central database, giving it a natural advantage in terms of traceability and anti-counterfeiting, making it impossible for participants in event tickets, sports transactions, etc. to be adulterated and credible. Smart contracts, on the other hand, do not require manual verification of transactions, simplifying the process of traditional transactions. The procedural rules in the blockchain automatically determine whether a transaction is valid, which helps to reduce transaction costs and risks. It is therefore possible to handle the purchase, settlement and validation of event
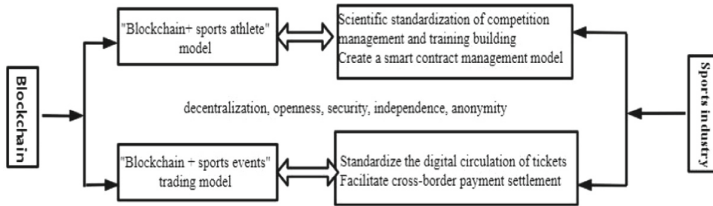
**Fig. 3.** Application mode of blockchain in sports events

transactions based on the underlying blockchain without the need for intermediary mechanisms to intervene and coordinate. Digital tokens based on blockchain technology can also be used for transactions in the blockchain sports marketplace, reducing transaction costs and transaction frictions.

**1) Blockchain regulates the digital circulation of ticketing.**

In traditional sports events, unreasonable ticket pricing and rules will cause certain trust problems. These problems have seriously affected the participation and enthusiasm of sports users. Due to time and space constraints, sports users scattered around the world lack a unified channel for purchasing tickets, and it is difficult to obtain timely and effective information. This brings great difficulties for users to purchase tickets, and the global transparency of blockchain technology makes ticket circulation visual, tracking the life cycle of each ticket more accurately, and preventing the circulation of fake tickets, which is helpful to promote the change of the management mode of bill data recording, transmission and storage and improve the efficiency of data transaction.

**2) Cross-border payment and settlement in the event.**

On the one hand, blockchain technology can realize cross-border settlement and payment by issuing digital tokens, which helps to improve the efficiency of communication and settlement among countries, so as to finish international competitions more quickly.

On the other hand, through intelligent contract rules, tokens can circulate naturally in sports information, sports entertainment, sports malls, etc. Blockchain platform records sports event products and services, and extends to surrounding areas along sports events, including IP creation, celebrity endorsement, fan consumption and other links. This helps fans to settle and pay for cross-border consumption, and can accelerate the promotion of sports transparency in event transactions (Fig. 3).

### 4.3 Blockchain + Event Dissemination and Copyright Protection Model

Blockchain technology can be used to build a complete and advanced media system for sporting events, storing event-related information in a network block, enabling a transparent information base and easy traceability. The openness of blockchain technology enhances the ability to disseminate relevant information and reduces the intermediate dissemination of relevant information. Blockchain technology is also used in the 2022 Beijing Winter Olympics, which is decentralised, open, transparent and tamper-proof.

**1) Blockchain drives data dissemination for sporting events.**

Blockchain technology can enhance the comprehensive integration and encrypted dissemination of event data, and enhance the whole process monitoring of sports competitions. It allows athletes and spectators of every sporting event to have quicker, more complete and accurate access to event data information, and also allows coaches to track each athlete's information, enabling traceability of athlete and competition data, highlighting the fairness of sporting competitions and enhancing the transparency of sporting competitions, thus improving the credibility of sporting event enforcement and dissemination.

For example, in April 2018, at the Xi'an City Wall International Marathon, the organisers combined blockchain technology with the marathon event and all participating athletes were given a blockchain certificate, thus enabling each participant's participation information to be stored on an internet node with block data, enhancing the authenticity and traceability of the race information.

**2) Blockchain helps protect sports copyright.**

In terms of sports souvenirs, blockchain technology chains data from raw materials, production and processing, transportation and sales, ensuring that each link is tagged with an anti-counterfeiting code, increasing the difficulty of counterfeiting and further reducing the circulation of counterfeit goods. In terms of sports event and brokerage copyright protection, the blockchain timestamp identifies sports events and copyrights, and subsequent transaction links are recorded on the blockchain, effectively safeguarding sports events and brokerage copyrights. With the blockchain technology innovation sports copyright development model, the interests of sports copyright holders are protected and the intelligence of sports copyright services is promoted.

# 5 Specific Application of Blockchain Technology in Sports Events of Hangzhou Asian Games

## 5.1 Hangzhou Asian Games Smart Tickets Are Linked with Fidelity, and the Anti-counterfeiting of Tickets is the First to Be Realized

In order to solve the trust problem of ticketing system in fare, statistics, event information, etc., with the help of blockchain technology, the official ticketing website of Hangzhou Asian Games realized the uploading of all tickets, effectively solving the problem of fake tickets [7]. To ensure the authenticity of ticketing. This will help to improve the efficiency and accuracy of ticketing operations. The ap-plication of blockchain technology in the tickets of Hangzhou Asian Games and Asian Paralympic Games in 2022 has achieved great success, providing an ex-ample for anti-counterfeiting applications in other industries.

## 5.2 Traceability of Blockchain Food to Ensure Food Safety in the Asian Games

Blockchain technology can help us to establish a food safety traceability system, so that once a food safety accident occurs, anyone can trace it back to every transaction node through blockchain technology, thus discovering the problem. Blockchain technology

provides a standardized method for food traceability, which can unify all links of food from production to sales, thus realizing food traceability. The reliability and traceability of blockchain technology ensure the safety of Asian Games food.

### 5.3 Hangzhou Asian Organizing Committee and Alibaba Signed a Contract Through Ant Financial Blockchain Trusted Deposit Technology

Blockchain trusted storage technology is to make the deposit certificate impossible to tamper with by uploading identities, information, assets and behaviors to the chain, which is convenient for sharing by all parties, and as electronic evidence in the event of disputes, to achieve traces in the whole process, full link trust, full node witness, efficient resolution of enterprise disputes, reduce enterprise risk control costs, and create a business environment of mutual trust. Using a fully distributed architecture, data encryption, computing and interaction are completed independently between multiple computing nodes of encrypted data, without a central control node, and the real guarantee cannot be tampered with. At the same time, it ensures that the data is minimized, and all calculations are calculated after encryption or desensitization, so as to ensure the security of personal privacy data to the greatest extent. Merchants and partners can have one-stop access to provide full-process certificate storage, certificate issuance, and rights protection services.

### 5.4 The Raw Materials for the Hangzhou 2022 Asian Games Torch Will Be Digitally Uploaded to the Chain Through Blockchain Technology

The image of the torch of the 19th Asian Games in Hangzhou 2022 was released, named "Fire Torch", the torch is supported by natural flame and intelligent technology, and the raw materials are digitally uploaded to the chain through blockchain technology, using a traceability mechanism to ensure authenticity. The "blockchain" can trace and encrypt the origin of materials, and at the same time it is immutable, ensuring the authenticity and uniqueness of each torch through raw materials (Fig. 4).

## 6    Problems Existing in the Application of Blockchain Technology in Sports Events

Sports industry plays a vital role in promoting high-quality economic development. The construction of the whole people has become the demand of the times, and the development of sports industry is also more and more rapid. In recent years, with the continuous upgrading of blockchain and sports events, the com-bination of blockchain and sports industry has gradually developed.

The application of blockchain in sports scenes has great potential, such as making sports transaction data more secure, making sports collections more authoritative, and making data storage more convenient. However, at present, this is only the initial stage of the combination of the two, and there are still some defects and deficiencies in the application.
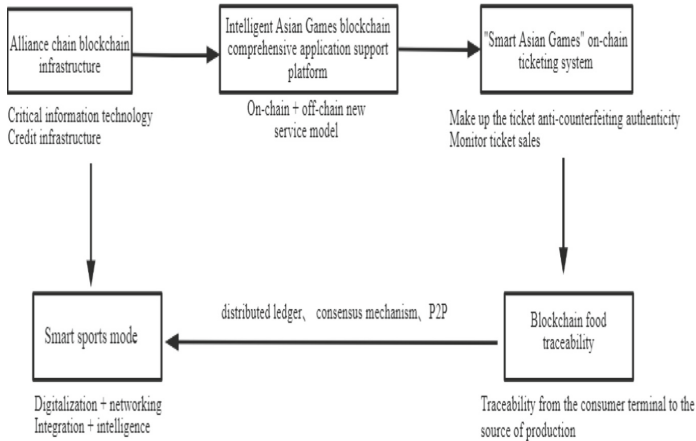
**Fig. 4.** Specific application of blockchain technology in sports events of Hangzhou Asian Games

## 6.1 The Underlying Technology Needs to Be Improved, and Information Barriers Are Difficult to Break Through

As far as the development cycle of blockchain is concerned, its technology has been born for a short time, and its technology is not yet fully mature and stable. The data involved in sports industry is multifaceted and large in capacity. However, the capacity of sports industry blockchain is not infinite, so in data storage, blockchain still can't meet the high requirements of data storage, which greatly limits the processing capacity of blockchain.

Therefore, the basic technology based on cloud computing needs to be improved. In addition, the information barrier is also a big challenge for the application of blockchain in sports industry scenes. Cross-departmental and cross-domain is the key for blockchain technology to play its role. All parties must participate in the sharing and exchange of data. If all parties are not involved, the blockchain will lack data sources, and "data islands" will be formed.

However, the security mechanism of blockchain for major sports events needs the consensus of all parties in the world who have the right of examination and approval. The difference of global time difference and working mode will lead to the delay of authorization process and reduce the efficiency of business transactions.

## 6.2 Lack of Unified Governance Standards, Uncertainty of Laws and Regulatory Policies

As an innovative technology, blockchain has a narrow application range compared with other mature technologies. Therefore, there is a lack of unified measurement standards and grammatical paradigms for the definition of blockchain and its application in different scenarios. The uneven standards will hinder the efficiency of the application of blockchain technology. Participants in major sports events come from different countries, and the laws, policies and cultures of different countries are also very different.

Therefore, the sports blockchain technology has not yet formed international uniform standards and rules, and the legal and regulatory policies are highly uncertain.

### 6.3 Blockchain is Still in the Development Stage, and the Key Technical Talent Resources Are Scarce

Blockchain has great potential, rapid development and strong policy support. However, at present, the scale of enterprises is small, and the reserve of key technical talents is still slightly insufficient. Because the innovation and popularity of blockchain in scene applications are not high, blockchain still stays at a simple level in the cognition of ordinary large and medium-sized, and it is difficult to promote its upward development.

In addition, the underlying operating system of blockchain is quite complex, and the sports industry in China lacks technical talents. According to statistics, in recent years, the shortage of sports-related talents in China is as high as hundreds of thousands. Only by building a compound talent pool that understands both sports, information technology development and operation management can we truly realize the application and promotion of blockchain technology in sports industry.

## 7  Development Countermeasures and Suggestions

### 7.1 Adhere to the Supervision and Leading Role of the Government and Support and Encourage the Development of Blockchain

Although blockchain is developing rapidly, its development cycle is too short. At present, there is no unified standard, and there is no hard policy guarantee. In view of the immaturity of the application of blockchain technology, there may be problems such as illegal information dissemination and network infringement in the application of blockchain, which brings risks to the security of information and data, and at the same time, the security of enterprises, industries and countries will also be threatened to a great extent.

Therefore, the government must play its leading role in supervision, crack down on illegal behaviors, create a good atmosphere for the application of blockchain in sports scenes, provide institutional guarantee, support and encourage its healthy and sustainable development, and promote the integrated development of "blockchain + sports".

### 7.2 Strengthen the Technical Performance at the Grass-Roots Level, and Unify the Standards for Application and Realization of Scenarios

To realize the blockchain technology to promote the development of sports events, we need to strengthen the algorithm-based technology first. Because of the limitations of blockchain development, it not only creates commercial value, but also brings huge cost consumption, such as high delay, high calculation cost and limited storage space. To solve these problems, technicians need to continuously strengthen the technical performance of blockchain, and strengthen the efficiency, stability and value of blockchain in the application of sports industry.

At present, the innovative application mode of "sports + blockchain" has gradually developed. However, due to the subversive and innovative means and mode of blockchain

technology, this requires the sports industry to unify its market entry standards, so that the development of "blockchain + sports" is more reasonable and scientific.

### 7.3 Cultivate All-Round Talents in Sports Science and Technology, and Break Through the Dilemma of Scarcity of Professional Talents

The creativity of the combination of blockchain and sports events is produced by the joint efforts of many aspects. At present, the application of blockchain in sports events also belongs to an innovative stage. Compared with traditional sports events, sports competitions embedded with blockchain technology are more scientific, safe and fair. However, these advantages all need deep technical support.

Nowadays, the development mode of sports events is no longer single, which requires training more professionals to invest in the application of "block-chain + sports". There is still a shortage of talents in this field in China. Relevant universities should make great efforts to cultivate professionals, integrate block-chain and sports industry, and promote talent cultivation and scientific and technological innovation. The government should also increase efforts to support school-enterprise cooperation and promote the vigorous development of block-chain in sports industry.

### 7.4 Build Iconic Leaders and Project Brands

At present, the business process of "blockchain + sports" at home and abroad is still in the exploration period, and it is necessary to keep up with the trend of global blockchain technology, strive to seize the leading position of blockchain technology application in the sports industry and sports field, let Chinese sports lead the historical process and industry trend of "blockchain + sports", and build a strong technical backing for the construction of sports events. Special attention should be paid to building iconic leading enterprises, demonstration projects and high-quality brands of "blockchain + sports", and cultivating and creating a group of sports blockchain enterprises, projects and brands with international vision and global influence. Accelerate the internationalization of "blockchain + sports" enterprises and projects, make full use of both international and domestic markets and resources, and enhance the international image and influence of China's sports blockchain products and enterprises. This is the top priority of using new blockchain technology to promote the development of Chinese sports events to the world and enhance the influence of events.

## 8 Conclusion

Blockchain technology is promoting the construction of a strong sports country, Promote the innovation and development of sports industry. Play an important role, providing a good environment for the development of smart sports and promoting industrial transformation and innovation. Although the blockchain technology is not fully mature at present, facing challenges such as complex ap-plication environment, limited application scope and lack of professionals, with the continuous development and improvement of the technology, it will surely achieve safe, efficient and organic intelligent development.

With the rise of a new round of scientific and technological revolution, human society is entering a digital era characterized by openness and sharing, ecological diversity and extensive intelligence. As a key technology in the digital age, blockchain is the cornerstone of building the next generation of Internet of trust and value. As the new goal of sports development, smart sports has become an urgent task to accelerate the layout and promote the research and application of blockchain technology, consolidate and cultivate competitive advantages, and achieve high-quality and high-level growth.

# References

1. Application and prospect of edge chain collaboration technology in energy Internet data management-Yan Jing, Gao Tianlu, Zhang Jun, Wang Xu http://www.doc88.com/p-675870 23914685.html
2. Application of Blockchain in E-commerce Li Yifan-Research on Industrial Innova-tion-2020
3. Mavericks Capital: Digital copyright industry has a "stubborn disease" and blockchain becomes a "good doctor" _ Daily Express (ttkbao.com) http://ttkbao.com/news/12626.html
4. New Sports Change-Blockchain Empowering Sports Industry-Today's Headlines (toutiao.com) https://www.toutiao.com/article/6771715089004233230/?&source=m_redirect&wid=167 0687862711
5. An Zhang: Blockchain Core Technology to Be Breakthrough-Today's Headline (toutiao.com) https://www.toutiao.com/article/6823507015034208775/?&source=m_redirect
6. What are Bitcoin and cryptocurrency? [Chain Currency] Block-chain http://www.norun.cn/index.php/2020/09/16/10948/, an application information and bitcoin market analysis community in digital currency
7. Blog of CEC _ Finance, Money, Digital Age (2)_51CTO Blog https://blog.51cto.com/u_1534 2942/article/year2021/month8/p_2