



# Practice and Innovation of Digital Operation Mode of Smart Asian Games

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**Abstract.** The 2022 Hangzhou Asian Games, as the international sports event, has become an important booster of digital reform and an important window to showcase digital Hangzhou, digital Zhejiang and digital China to the international community. This paper combines the experience and inspiration of the digital operation case of 2022 Beijing Winter Olympic Games, digs deep into the digital operation mode of “Smart Asian Games”, comprehensively explains the new technologies of Asian Games such as OBS cloud service, IP, 5G + 8K, 9-dimensional 5-star, P-PPT-SA, BIM, etc., and on the existing basis, it puts forward the strategies suitable for the digital innovation and development of the 2022 Hangzhou Asian Games, so as to feed the “digital city”.

**Keywords:** smart Asian Games · digital · operation mode

## 1 Introduction

The “Smart Asian Games” refers to the introduction of digitalization in the implementation of the concept of intelligence in the 2022 Hangzhou Asian Games, so as to realize the intelligence of holding, participating and watching the games. As an important part of Hangzhou’s “Digital City” construction, the “Smart Asian Games” will play a very important role in supporting and guaranteeing the Asian Games.

The Hangzhou Asian Games will uphold the concept of “Smart Asian Games” and apply new technologies such as OBS cloud services, IP, 5G + 8K, 9-dimensional 5-star, P-PPT-SA and BIM on a large scale. In this paper, we consider the new idea of digital collaborative governance of sports events, actively explore the diversified innovation of digital operation mode of Hangzhou Asian Games, closely follow the “five major frameworks” of digital transformation, grasp the “three major insights” of digital development. This paper discusses the sustainable development of the “Smart Asian Games”, and provides some theoretical and empirical references. At present, the domestic research on the operation mode and promotion strategy of “Smart Asian Games” is weak.

## 2 Analysis on the Digital Operation Mode of the 2022 Hangzhou Asian Games

The Asian Games Information system (AGIS) is the core system of the 2022 Hangzhou Asian Games, which consists of three parts. Among them, the Games Management system (GMS) includes 11 modules, such as registration and certification, venues, transportation services, logistics management and so on, to provide technical support for efficient preparations and high-level services for the Asian Games.

In addition, the Games event system (GRS) is a subsystem of the Games Information system, the main task is to monitor and manage all events. Innovative digital information technology includes four aspects: venue construction, event operation, user watching, and network security, making the Hangzhou Asian Games a veritable “smart Asian Games”.

### 2.1 Venue Construction --- a Twin-Life Model of Cloud Space

The investment in venue construction of Hangzhou Asian Games is as high as 10.6 billion yuan, which is currently the largest investment in venue construction of the Asian Games, make the line diagram as shown in Fig. 1.

In 2022, Hangzhou Asian Games will carry out scientific and reasonable overall planning in the construction of venues, accurately grasp the existing problems and corresponding solutions of the venues in the Asian Games, and improve the top-level design.

The use of BIM technology, BIM technology refers to Building Information Modeling, is a multi-dimensional building model information integration management technology developed on the basis of computer aided design (CAD) technology. The brain of the intelligent stadium is constructed, and the actual information in the building is

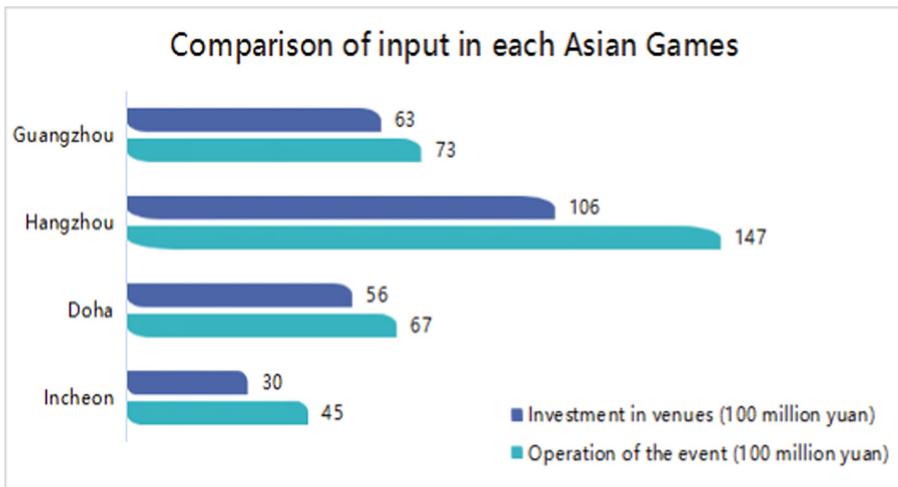


Fig. 1. Comparison of input in each Asian Games

**Table 1.** Digital platform

Digital platform	Introduction
Asian Games Nail App	Provide online collaborative office competition service
OSMA	Provide “cloud closed loop” epidemic prevention service and intelligent and convenient event service
Panoramic VR platform	One-click tour of the venues of the six cities of the Asian Games
AR Intelligent bus Application	Create autopilot and provide mobile digital services and experience
Asian Games PASS	Integrate all kinds of QR codes to provide users with “one code pass” service

simulated by digital information, so as to improve efficiency, shorten the construction period and save cost. The parametric model forms a twin model with the venue space, and the data is shared and transmitted in real time during the operation and maintenance of the whole project life cycle, so that engineers and technicians can correctly understand and effectively deal with a wide range of construction engineering information.

Establish and improve the regional policy coordination system of “top-level design-policy coordination-policy implementation-implementation assessment”. At the same time, we will speed up the construction of the “Yangtze River Delta Intelligent Sports Public Information Service platform” and realize the establishment of the database of stadiums and stadiums in the Asian Games. Use data to drive the improvement of operational efficiency and promote the digital and intelligent management of sports venues in the Yangtze River Delta. Give full play to the driving effect of intelligent venues to promote the intelligent development and intelligent transformation of venues in the Asian Games [2].

## 2.2 The Operation of the Event---The Intelligent Helper of Watching the Game Experience

The Hangzhou Asian Games is not limited to the conversion of hardware and equipment to digital intelligence, but mainly focuses on improving the digital integrated services of hardware and software. On the basis of the International Asian Games Information System (AGIS) platform, an “event online” command system was built, covering four major areas: events, activities, security and personnel, to provide insight, control and decision-making for event command and to enhance the modernization of the operation of Asian Games events (Table 1).

## 2.3 User Viewing --- a Smart Helper for the Viewing Experience

On the one hand, the 2022 Hangzhou Asian Games focused on the core business of audience service, on the other hand, it made use of new information technologies such

as blockchain and the Internet of things to create the first one-stop digital public service platform for the World Comprehensive Games. According to the six major needs of “food, housing, transportation, travel, shopping and entertainment”, combined with ticketing and epidemic prevention planning functions, the platform integrates all kinds of urban public services and provides “one-stop” services for users to watch the games.

On the other hand, it innovates the field of digital live broadcast, switching from analog TV to digital TV. In addition, the event organizers have worked together with the streaming media platform to deeply tap the needs of users, increase the added value of subscription business, and have successively launched a variety of live streaming forms, such as audience first view live broadcast, specific star tracking live broadcast, multi-machine live broadcast, and so on, using 360°VR panoramic live broadcast, ultra high definition video live broadcast and other live streaming methods to provide a more humane digital experience.

#### **2.4 Cybersecurity ---the “Bodyguard” for Virtual World Events**

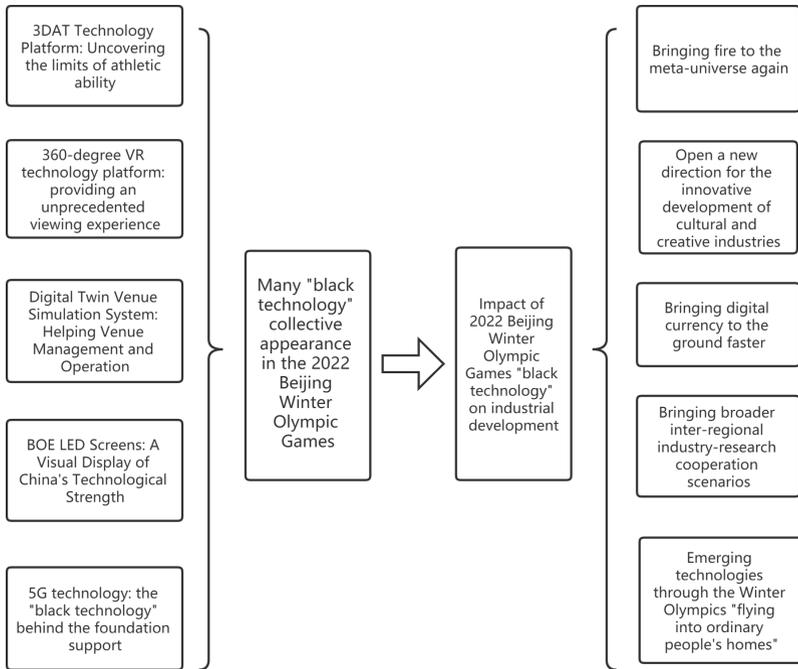
Put forward the new system of “P-PPT-SA” information security guarantee, providing new thinking for Internet security guarantee.” P-PPT-SA” refers to the construction of an open, intelligent, agile and empowered network security guarantee system for industrial Internet enterprises through the industrial Internet security situation awareness platform, which is based on the “strategies” of national network security laws and regulations, security standards and guidelines, supported by the three elements of “personnel, process and technology”, and driven by professional “security services” and practical “security activities”. Using the network security information situation and awareness platform to build an open, intelligent, agile and empowering industrial Internet enterprise network security protection system, to escort the “Smart Asian Games” Internet security. Launched the “nine dimensions and five stars” network security scenario system to ensure “zero error” in Hangzhou Asian Games. The most critical part of the “nine dimensions” system is to limit all risks to emergency response, so that the full-site all-weather service permeates every detail of the Asian Games network security [3], making the “smart Asian Games” safe and wonderful.

### **3 Case Study: Study on the Digital Operation Model of the 2022 Beijing Winter Olympics**

From inside to outside, from the competition to the spectacle, the 2022 Beijing Winter Olympics can be said to be an event ‘armed’ with technological innovations. New technological achievements have been applied to give the Games a cool “technological colour”, providing strong support for the “simplicity, safety and excitement” of the 2022 Beijing Winter Olympics (Fig. 2).

#### **3.1 Digital Twin Technology: Retransmission Breaks Through Time and Space Constraints**

The Beijing Winter Olympics built a secure, flexible and intelligent UHD video transmission network platform, adopting 4K UHD footage for the first time for the entire



**Fig. 2.** The digital technology behind the 2022 Beijing Winter Olympics

broadcast and applying 5G + 8K technology (5G Transmission + 8K Ultra High definition Video Technology) for the first time for the live broadcast of the opening ceremony. The digital transformation breaks through time and space limitations, bringing a new digital wisdom experience to the audience. At the same time, on behalf of the global media digital communication to achieve new breakthroughs usher in new opportunities. The Beijing Winter Olympics is full of cutting-edge emerging technologies, such as OBS cloud services (OBS Cloud Service) for optimizing live broadcasts, applying IP-based technologies (Uniformly convert different types of information flows that need to be transmitted over the link into TCP/IP data streams) to empower signal broadcasts, and creating a dual-center signal convergence model. The 5G wisdom empowering the Winter Olympics is the biggest highlight, achieving the first full coverage of 5G venues in the history of the Winter Olympics, while creating a new milestone in the history of Olympic broadcasting that breaks through time and space limitations with full 4K + HDR (TV display resolution) production and IP-based backbone system [4], which can also clearly see the future development of digital broadcasting technology.

### 3.2 Remote Production and Broadcast Technology: Towards “Full Cloud”

In the development of cloud technology, the Beijing Winter Olympics Cloud OB achieves full access to the cloud. Based on the OBS cloud, OBs can transfer operations that used to require hardware support to the cloud and perform content delivery, signal processing, post-editing and other operations through the cloud platform. Cloud OB has technical

features such as remote guide production in the cloud, multiple versions of the same event production, and dual cloud main backup support, which realizes cloud-based OB equipment and remote personnel services [5]. At the same time, through Ali cloud to the global broadcast, based on the “bullet time” super free view effects and the cloud concurrency, low latency characteristics of the support, to bring real-time ultra-high definition interface, to meet the professional service needs of large events broadcast, but also to meet the global audience’s personalized content needs, to achieve “The digital technology will provide the best solution for sports broadcasting. Digital technology will continue to empower sports broadcasting, forming a scale effect and promoting the overall improvement of production efficiency.

### **3.3 Virtual Reality Technology: The Most Immersive Experience**

Create a real operation of virtual venues, visualize, dynamize and parameterize the process of stadiums and sports activities in three dimensions through virtual reality technology, and create a one-to-one replica of digital and intelligent venues on the cloud [6]. VR technology has been applied in the Beijing Winter Olympics to make a breakthrough. 8K technology makes the picture quality more high-definition and the simulation more realistic. 5G technology development makes the realization of VR scenarios more diversified, VR + 8K + 5G mode is committed to creating an immersive and realistic atmosphere for users, creating the “most immersive Winter Olympics”. The VR + 8K + 5G model is dedicated to creating an immersive and realistic atmosphere for users and creating “the most immersive Winter Olympics”. In addition, Intel has proposed rich and diverse entertainment center solutions during the Beijing Winter Olympics, bringing cutting-edge technology and innovative digital experiences, VR experiences for winter sports such as skiing, VR virtual spaceships and submarines, as well as diverse traditional Chinese cultural experiences.

### **3.4 Smart Communication Technologies: The Wrap-Around Winter Olympics Field**

First, the development from “big screen” to “small screen”, from “unified reception” to “accurate push” transition. The “smart communication” scenario, vigorously promote the atmosphere of the Winter Olympics, and realize the diversity and richness of the Chinese sports storytelling system. Second, the interaction outlines the architecture of the realistic space. The use of digital virtual technology, so that the audience’s social scene more three-dimensional, so that the virtual space more realistic, in the digital information era, to achieve mass communication and interpersonal communication college intermingling. Third, the simulation space shapes the space-time. Through 5G technology empowered cloud live, live platform directly controlled by the audience, according to the inner needs of the independent switch sports events live scene, to meet the same time to watch multiple events, and fingers to achieve cooperation to achieve the free choice of space and time, through the wisdom of communication technology to create a wrap-around “Winter Olympics field”, to achieve the subject of inter-temporal Interaction.

## 4 Diversified Innovation of Digital Operation Mode of Hangzhou Asian Games

### 4.1 “Smart Asian Games” Digital Operation of Multiple Paths

#### 1) Promote multi-subject collaboration and create a new model of digital collaborative governance.

The main structure of the Asian Games is multi-organizational participation, multi-factor influence and multi-responsibility sharing. on this basis, the whole “chain” scheme of horizontal penetration and vertical opening is put forward. Reform and establish a digital management system of multiple subjects, such as government departments, institutions, associations, and so on, and form new rules for the digital operation mode of the Asian Games with the combination of offline and offline means.

The governance of the digital operation mode of the Hangzhou Asian Games focuses on the cooperation and opening based on digital services, the management and provision of information based on big data, and the coordination and sharing based on digital content.

This paper puts forward the digital governance scheme of the global “digital” governance of the Asian Games, and promotes the formation of a new digital governance model of the Asian Games with the elements of full data integration, omni-directional monitoring, the whole process, and the interconnection between the upper and lower parts of the Asian Games. “enhance” and “empower” the digital operation mode of the Hangzhou Asian Games.

#### 2) Promote multi-subject collaboration and create a new model of digital collaborative governance Strengthening the linkage between the “Smart Asian Games” and the “Digital City”.

Take the national strategy of “Digital China” as the link, pay close attention to “high quality” and “integration”, and clarify the complementary role of “Wisdom Asian Games” and “Digital City”. By combining big data’s development experience of the Asian Games with urban development, digital management and Internet applications, we will promote social digital transformation, enhance digital interaction, and create a new big data experience.

In the era of “post-epidemic” and “double cycle”, in order to promote the diversified and three-dimensional digital development of the Asian Games and international sports events, we should adhere to the development path of digital transformation of the sports industry.

We will jointly promote cooperation in the fields of sports intelligence and sports health of the Asian Games, and promote the daily life and facilitation of grass-roots sports through digital construction to realize the project and competitive operation of the digital sports industry of the Asian Games.

The “Wisdom Asian Games” will be formally incorporated into the provincial digital reform digital government system “runway” to promote the high-quality development of Hangzhou “Digital City”. Take advantage of the opportunity of the Asian Games to broaden and improve the development path of the “digital city” of Hangzhou, coruscate the new image of the “digital city”, and make the wisdom of the Asian Games feed the “digital city”.



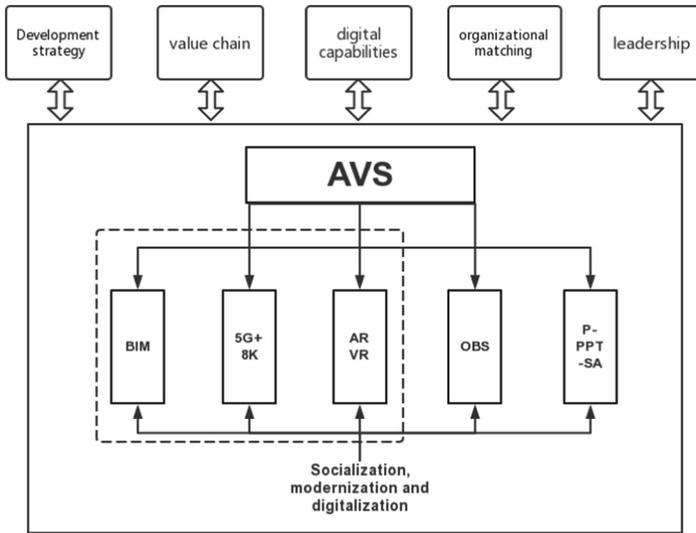


Fig. 4. AVS virtual competition system

production process are carried out on the cloud server event platform, using the human-computer interaction form of virtual reality and AI intelligence, scene simulation and other high-tech means to present, making some sports that are usually not easily accessible within reach, revitalizing the digital economy and improving the digital quality and technology of all people. Digital quality and technology. To achieve the optimal layout of virtual sports and the real economy, to extend the Asian Games digital industry chain with physical venues as the carrier, and to make AVS a national virtual sports event demonstration model.

## 2) A “five-ring framework” for digital transformation to help reshape the value of sports organizations.

The digital transformation path of the Asian Games sports industry can be summarized into five key links: development strategy, value chain, digital capabilities, organizational matching and leadership, five links layer by layer, around the development, each ring will have a direct impact on the overall effect of the Asian Games sports digital industry transformation.

Under the “five-ring framework”, AVS will be launched to realize the digital transformation of the sports industry, leading to leveraging the three major changes in quality, efficiency and power, building a system pattern, focusing on digital transformation and expanding application scenarios. The Asian Games will form a digital strategic consensus around the “five-ring framework” for the digital development of the sports industry, digitize from the most significant entry point for improving efficiency, use data as a “new energy”, and promote the socialization and contemporary development of Asian Games sports organizations. At the same time, the implementation of the Asian Games value realization and dissemination, to help strengthen the Asian Games brand building.

### 3) Grasp the “three insights” of digital development and build a digital sports industry system.

Carry out scientific and rational overall planning and grasp the “three great insights” of digital development [9]. The “three great insights” of digital development refer to:

- Insight 1: Two-wheel drive to achieve accurate matching of supply and demand, AVS is built from “demand pulling supply, supply creating demand” to promote a higher level of dynamic balance of the Asian Games event system.
- Insight 2: Soft and hard decoupling, promoting technology migration to the cloud, AVS cloud will collect massive data to optimize and train the algorithm module, and finally send the data back to the edge, thus promoting the Asian Games sports industry to the development of everything intelligent, everything connected [10].
- Insight 3: Digital native, exploring the path of inclusive and low-cost digital transformation, cloud native is the variety of new technologies and products derived from the cloud, providing a third inclusive, low-cost and personalized path for digital development, which will become the driving force of digital transformation in the future sports industry.

## 5 Conclusion

The 2022 Hangzhou Asian Games will be empowered by digital innovation, including the use of cloud-based spatial dual-life models for smart venues, virtual technology for smart spectators, “nine dimensions and five stars” network security, collaborative digital governance of multiple entities, virtualized sporting event systems, and digital marketing systems that will add to the Hangzhou Asian Games. Digital technology glory. Based on digital twin technology and cloud technology, we will improve the digital optimization of broadcast links and promote the shift of broadcast production to remote and digital transformation. Based on virtual reality technology support, the boundary between live and virtual venues will be broken by creating immersive experiences. Under the new development pattern, Hangzhou is actively playing a smart digital economy, leading the development of new advantages, creating new infrastructure for digital venues, new technologies for digital information, new mechanisms for digital management and new experiences for smart spectators, building Hangzhou into a global city of smart sports highlighting the characteristics of sports, and thus unfolding a new chapter of meaningful, exciting and brilliantly outstanding Asian Games.

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