

# An Analysis of the Approaches of Digital Empowerment for the High-quality Development of Sports Venues

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**Keywords:** digital empowerment; sports venues; high-quality development; approach analysis

**Abstract:** With the rapid development of science and technology in the new era, digital technology has given new vitality to sports venues, and it is also an important driving force to promote the development of the sports industry. Using the literature review method and logical analysis method, this paper understands the rapid development of stadiums in the digital era from a systematic and innovative perspective, explores the problems faced by their high - quality development and makes a path analysis. It is believed that digitally empowered stadiums can increase the benefits and benefits of the sports industry, optimize the sports experience of the people, and help build a sports power. However, the current situation is not enough to support the higher -quality development of sports venues, and it is facing a lack of micro policies, a lack of effective organization and management, a lack of obvious digital empowerment, insufficient funds, and a shortage of talents. Suggestions: (a) broaden micro policies and strengthen organizational management; (b) link capital investment to improve the level of digitalization; (c) strengthen talent training to fill the talent gap.

## 1. Introduction

With the continuous development of information technology and science and technology in China, digital empowerment is becoming an important driving force to promote the high-quality development of stadiums, promote the steady progress of China's sports industry, accelerate the construction of a sports power and promote Chinese modernization. In December, 2021, the State Council issued the "14th Five-Year Plan for the Development of Digital Economy", which proposed that by 2025, the added value of the core industries of digital economy would account for 10% of GDP, and the application penetration rate of industrial Internet platforms would reach 45% <sup>[1]</sup>. This points out the general direction for the development of digital technology in sports industry, and stadiums, as the pillar industries of sports industry, are also undergoing digital transformation. In October, 2021, the State Sports General Administration issued the 14th Five-Year Plan for Sports Development, which clearly stated in the column of digital sports construction project that it was necessary to "speed up the digital transformation of sports facilities, promote the local digital upgrading and transformation of not less than 1,000 sports venues, and build a number of smart stadiums", which pointed out the direction for the digital development of sports venues <sup>[2]</sup>. The report of the 20th National Congress of the Communist Party of China pointed out that it is necessary to accelerate the development of digital economy, promote the deep integration of digital economy and real economy, build a modern infrastructure system, and accelerate the construction of digital China <sup>[3]</sup>. High-quality development of sports venues is the top priority of building a sports power, and the 20th National Congress also pointed out that high-quality development is the primary task of building a socialist modern country in an all-round way. However, there are still many difficulties in the high-quality development stage of digital empowerment stadiums and gymnasiums in China. In the era of rapid development of science and technology, stadiums and gymnasiums need to systematically and innovatively guide themselves to develop in the direction of high quality. Based on this, from the perspective of digital empowerment, this paper examines the high-quality development of stadiums and gymnasiums, explores the path of high-quality development of stadiums and gymnasiums, and promotes the high-quality development of digital empowerment stadiums and gymnasiums.

## **2. Digital empowerment drives the high-quality development of sports venues**

### **2.1 Systematization has become the general grasp of digital empowerment stadiums**

Systematization refers to a well-defined whole. Indicators of different dimensions are at different levels, forming a certain order, and there is a clear logical relationship between indicators at the same level and between indicators, making it more complete, more penetrating and closer to the essence. That is, from the overall situation, multi-dimensional view and objective analysis of problems, combing and digging out the direct relationship between problems and things, so as to find the most important and core elements.

The high-quality development of digital empowerment stadiums involves many factors, so it is necessary to systematically promote its high-quality development from many aspects. Digitally empowered stadiums and gymnasiums are a complex system with many elements, including hardware equipment, software application, personnel facilities, safety monitoring, ticket management, publicity planning, information release and so on. For example, Beijing Wukesong Gymnasium, as the main venue of the 2019 FIBA World Cup, digitally upgraded and rebuilt a series of hardware facilities such as lighting system, screen display system, audio system, venue facilities and media facilities [4]. Systematic use of digital empowerment events for overall planning and strategic layout, with a systematic approach to achieve the unity of key breakthroughs and overall promotion, from the improvement of venue facilities to the cooperation of software and hardware, from venue operation and maintenance to service guarantee, there is a systematic existence everywhere. In the digital age, it is even more necessary to have a perfect system to manage stadiums and gymnasiums, and to improve the intelligent level of stadiums and gymnasiums by various scientific and technological means, so that stadiums and gymnasiums can develop with higher quality.

### **2.2 Innovation has become the new kinetic energy of digitally empowered stadiums**

Innovation refers to the behavior of improving or creating new things, including but not limited to various products, methods, elements, paths, environments, etc., by using existing knowledge and materials in a specific environment in order to meet the needs of idealization or society, and to obtain certain beneficial effects [5]. And innovation is the new kinetic energy in the transformation of digital empowerment stadiums in China.

On the one hand, the traditional venue model is not suitable for new stadiums, which leads to a weak sense of experience for contestants, users and spectators, while digital empowerment stadiums can greatly improve this deficiency, such as the cool "digital torchbearer" at the opening ceremony of the 2023 Hangzhou Asian Games, which innovatively uses high-tech technology to build a 20-meter-high super-large IMAX stereoscopic retina. Through this way, a visual feast will be delivered to the audience, which will make the audience feel the shocking and different opening ceremony, greatly deepen the audience's understanding of digital empowerment stadiums and optimize the people's physical examination. On the other hand, the development of science and technology promotes the creative development and innovative transformation of digitally empowered stadiums more rapidly, and the digital development permeates the facilities of stadiums. For example, Nanjing Yunxiangtong focuses on the construction and development of stadiums, and the XSPORTS Yuedong platform independently developed by Yunxiangtong covers business operation software, internal management software, intelligent equipment, self-service terminals, big data analysis, etc. Pay more attention to the innovative development of facilities and functions, innovate their own technologies to create digital development, serve 54 cities in 17 provinces including Jiangsu, Beijing, Shanghai and Guangdong, innovatively develop stadiums and gymnasiums relying on digital technology, and use science and technology to help build a sports power. However, at this stage, there are still some difficulties in the construction and management of digital empowerment stadiums and gymnasiums and the lack of financial support. At the same time, the lack of innovative talents is also one of the factors that hinder the high-quality development of stadiums and gymnasiums.

### **3. Problems faced by the high-quality development of digital empowerment stadiums and gymnasiums**

#### **3.1 Micro-policies are few, lacking effective organization and management**

As early as 2015, the country put forward the strategy of "internet plus" for the first time, which promoted the emergence of "Digitalization", and in 2019, it issued the policy measures of "Outline of Building a Sports Power", which made the construction of digitally empowered stadiums become a hot spot in the industry. However, in general, the transformation of digitally empowered stadiums in China is facing problems such as less micro-policies and lack of effective organization and management. On the one hand, the lack of micro-policies on stadiums is an important factor for the slow development of digital empowerment stadiums. At present, the only policies on stadiums issued at the local government level are the "Code for Intelligent Construction of Gymnasiums" issued by Zhejiang Province [5]. On the other hand, for digitally empowered stadiums, the organizational management system is the foundation of stadiums. Today's stadium management system only includes organizational structure, division of responsibilities, management processes, etc., and there is no coordination of all aspects to build a sound organizational management system to ensure the efficiency and quality of stadiums. In terms of safety and controllability, how to use digital empowerment to standardize the operating environment of stadiums and gymnasiums efficiently, and how to embed digital technology into various facilities and systems of stadiums and gymnasiums. In terms of green environmental protection, green development is an economic growth and social development mode with efficiency, harmony and sustainability as the goal. Green development has become an important trend of high-quality development of digitally empowered stadiums and gymnasiums, and whether the environmental protection concept possessed by stadiums and gymnasiums conforms to the green development in the digital age. In terms of scientific and technological support, whether the latest scientific and technological support of digital technology is embedded in stadiums with the help of scientific and technological achievements in the digital technology era, and whether the high-quality development of stadiums is promoted through the latest intelligent scientific development and innovative development.

#### **3.2 Insufficient financial support, digital empowerment is not obvious**

With the continuous development of stadiums and gymnasiums in China and the acceleration of the marketization process of stadiums and gymnasiums, it is even more necessary for stadiums and gymnasiums to develop in the direction of digitalization. At the same time, stadiums and gymnasiums are also an important carrier to promote the development of sports industry, promote sports consumption and improve the competitiveness of sports industry. However, the shortage of funds in most digital empowerment stadiums in China is an important factor that hinders the high-quality development of digital empowerment stadiums, and the role of embedding digital empowerment in the construction, management and operation of stadiums is not obvious.

First of all, in terms of capital, capital is an important foundation of digital empowerment stadiums. Professional digital empowerment stadiums have high daily maintenance costs. For investing in digital empowerment stadiums, the scale of funds is relatively large, and there is a risk of high investment-low return. And digital empowerment stadiums need to consume a lot of money on hardware and software facilities and infrastructure, and they also need to consider daily maintenance and iterative upgrade of products. At present, only some cities with developed science and technology and abundant funds, such as Huanglong Sports Center and Olympic Sports Center used in Hangzhou Asian Games, have achieved the transformation of venues. Secondly, the construction, mainly reflected in digital technology, is not uniform in the construction of digitally empowered stadiums, and should be systematically integrated with the functions, nature, use and scale of stadiums and gymnasiums by using digital technical means. Taking the venues of the 2022 Beijing Winter Olympics as an example, Yanqing and Zhangjiakou are located in mountainous areas with complex terrain, with high construction difficulty coefficient and high requirements for digital construction technology and implementation, which will face great challenges in terms of building energy consumption, venue location and post-game operation, while the construction of short-track speed

skating hall adopts (Building Information Modeling, BIM) digital construction technology, which realizes the whole process, high-precision simulation and intelligent construction, saves nearly 75% of steel compared with traditional construction methods. Therefore, the construction of digitally empowered stadiums and gymnasiums should start with digital technology and embed it in the construction of stadiums and gymnasiums. Finally, in terms of management and operation, the management and operation system has a great restriction on the development of digitally empowered stadiums and gymnasiums, which is mainly reflected in the fact that the management mode of digitally empowered stadiums and gymnasiums has not turned to the enterprise management mode, and there is no embedded digital development system in the management and operation of stadiums and gymnasiums. Most stadiums and gymnasiums are mainly operated by public institutions, resulting in low marketization degree and relatively aging age structure of stadium personnel. The traditional "person-to-person, face-to-face" manual service is still the main way of venue service, so that some venue authorities, operating agencies and grass-roots employees lack motivation in thinking, and it is difficult to adapt to the new requirements of digital operation and light personnel after the transformation of digital venues.

### **3.3 There is a talent gap and a shortage of innovative talents**

Digital empowerment stadiums and gymnasiums are seriously short of relevant digital innovative talents. Due to the rapid development of sports industry, and the level of related management talents can not meet the management needs of digital stadiums, this has caused various problems in stadiums. Digital empowerment stadiums and gymnasiums have a certain degree of dependence on innovative operation management talents and professionals, including digital technical talents and digital economic talents. These innovative talents need to have cutting-edge ideas and professional knowledge, and can think about the high-quality and quantitative development of stadiums and gymnasiums from a new angle and in a new way. Due to the lack of scientific and technological talents, digital empowerment stadiums can only be developed in some developed cities and cities with great demand in this field, and the lack of technical operation talents leads to the relatively short development time and short service life of some digital empowerment stadiums. The construction and development of digital empowerment stadiums need a large number of high-quality talents to ensure the construction and control of all kinds of hardware and software in the stadiums, and also need to arrange corresponding professionals to maintain and manage the systems and equipment. At present, the talent training system in this field has not been established in China, which makes the stadiums unable to develop and transform with high quality.

## **4. Digital Empowering the path of high-quality development of stadiums**

### **4.1 Broaden micro-policies and strengthen organizational management**

In the current development stage, there are many digital development policies at the national level, but few specific local development policies, which leads to the regional development of digital empowerment stadiums. Therefore, while further developing sports industry policies, both the state and local governments should systematically combine various influencing factors according to the local economic development, sports development trend, and the transformation of stadiums and gymnasiums, and at the same time, systematically divide the functional distribution of stadium construction, and set the terms of reference of relevant departments for targeted high-quality development.

First, the government should make overall scientific plans for the development of different regions and develop long-term plans for the development of digitally empowered stadiums. In May 2022, the State Sports General Administration convened the industry standard of "Guide to Intelligent Evaluation of Gymnasiums", which determined the idea of standard preparation, but it is still in the preparation stage. Therefore, it is even more necessary to introduce corresponding local construction standards and industry standards, and strengthen the construction of the standard system of digitally empowered stadiums so that all elements of stadium development can be integrated into a system;

Encourage local governments to strengthen the formulation of micro-policies, consider regional differences and the economic development level of different places, and carry out the transformation strategy of localized sports venues according to the actual conditions of local venues, so as to promote the digital transformation and upgrading of traditional sports venues. Digital stadiums and gymnasiums involve the stadium economy as an indispensable part of the sports economy, and should give full play to its due advantages with the blessing of digital empowerment. Second, strengthen the organization and management system, establish a digital management organization to take charge of the digital operation and development of stadiums, systematically organize and manage according to the functional orientation, development direction and management measures of stadiums, establish and improve the responsibility system and division of labor and cooperation mechanism in the vertical direction, embed digital technology into the organization and management of stadiums so as to realize efficient, scientific and rational organization and management, conduct digital learning and communication with various departments in the horizontal direction, improve the quality of management and service, and make the organization and management of stadiums from top to bottom. Generally speaking, in the construction of its high-quality development system, we should improve the development of the system from the beginning, speed up the formulation of relevant standards and policies for the construction and management of digital empowerment stadiums, improve the internal management of stadiums by using digital technology, and promote the high-quality development of stadiums, so as to improve the relevant system.

#### **4.2 Linkage capital investment, improve the level of digitalization**

As an important pillar of China's sports industry, stadiums and gymnasiums are an important part of China's sports economic development. At the same time, sports industry can promote the construction of a healthy China and is an important part of accelerating China's construction of a sports power. In the era of science and technology, systematic financial support is the economic basis for the development of stadiums and gymnasiums, and it is particularly important to improve the digital level of digitally empowered stadiums and gymnasiums during construction, management and operation.

First, in terms of funds, we can't rely solely on one aspect of financial support to promote its high-quality development, but integrate the linkage and cooperation between various elements. The government is the main sponsor of the construction of sports venues, providing necessary funds for key sports venues through financial allocation, special funds and project support. The venues themselves should attract social capital to actively participate in raising funds for venue construction, such as the naming of Dalian Sports Center Gymnasium and Barley Group, which increases the influx of social capital and promotes the digital development of venues. Establish a diversified social capital investment mechanism, encourage people from all walks of life who have a great demand for digital empowerment stadiums to participate in the construction and operation of stadiums and gymnasiums, and set up stadiums and gymnasiums development funds. Through the joint investment of the government, society and the venues themselves, the digital empowerment stadiums and gymnasiums will be developed with high quality. Secondly, in terms of construction, the builders of stadiums and gymnasiums should have the application of information technology, pay attention to the application of digital technology, integrate informatization and dataization into the design, construction and construction of stadiums and gymnasiums, use technologies such as Internet of Things, Internet and big data to save resources and construction costs, form a point-to-point construction mode, and pay attention to data collection, integration and analysis in the process of construction and transformation, and optimize the design, layout and service of stadiums and gymnasiums through data-driven methods. Seize the opportunity in the early stage to actively introduce high technology, develop online terminals according to the service content and use purpose, and build and maintain the relevant equipment of the venue in the later stage to update and improve the service. Thirdly, in terms of management and operation, it is particularly important to change the management and operation mode. It is necessary to pay attention to the intelligent management of digitally empowered stadiums and gymnasiums and turn to the enterprise management mode. Most stadiums and gymnasiums are

designed to solve the problem of insufficient public sports venues and meet the needs of the masses for sports development. Therefore, it is very important for the management mode to become enterprise, and the traditional management and operation mode should be abandoned to make the personnel structure tend to be younger. Through artificial intelligence, Internet of Things and other technical means to achieve automatic management of venue facilities, in the process of digitalization of stadiums, real-time tracking of customer data through big data, dynamic management and comprehensive analysis of the data in the venue operation system, thus improving the operational efficiency of digitally empowered stadiums. In the development of sports industry, a scientific and reasonable fiscal policy helps to give consideration to both macro-planning and micro-effectiveness, is an important starting point to solve a series of shortcomings, and is an important guarantee to support the high-quality development of sports industry [6].

### **4.3 Strengthen personnel training to fill the talent gap**

Innovative talents are an indispensable foundation in the development of the digital age and the key to promote the high-quality development of digital empowerment stadiums. Digital empowerment stadiums and gymnasiums need some professional management talents and innovative talents, and cultivating professional talents and innovative talents requires the joint efforts of the whole society and the cooperation and participation of the government, enterprises, universities and research institutions. First of all, we should establish an innovative talent training system, strengthen the cooperation between the government and universities, encourage them to participate in digital innovation, provide opportunities for internships and exchanges, formulate special talent training plans and policies, offer professional courses related to sports, and improve the pertinence and professionalism of innovative talents. For example, the School of Sports Engineering established by Beijing Sport University in 2018 focuses on intelligent sports engineering, science and big data. Secondly, it is necessary to fill the digital talent gap in sports enterprises, practice the talent demand system of "going out and bringing in", improve the sports stock resources, strengthen exchanges and cooperation between enterprises, and share talent resources through cooperation with other sports venues and enterprises and institutions in related fields to improve the quality and efficiency of talent training. Finally, the innovation potential of major research institutions should be released, relevant digital technology research institutions should be well connected for horizontal cooperation and development, relevant digital infrastructure construction should be well matched, and perfect digital infrastructure should be built, so as to increase the intensity and breadth of related innovation research and development according to the needs of stadiums and gymnasiums, and provide technical support for the high-quality development of digitally empowered stadiums and gymnasiums. In a word, with the rapid development of digital technology and digital economy in the current society, the problem of cultivating talents in stadiums needs to be improved systematically and innovatively, and stadiums that meet the development needs of the digital age should be built through all efforts to promote their high-quality development.

## **5. Conclusion**

Digitally empowered stadiums and gymnasiums are an important pillar to promote the high-quality development of China's sports industry, and it is also an irreversible trend of the development of stadium economy in the digital age. Digital empowerment of the high-quality development of stadiums and gymnasiums is also an important factor of social and economic progress at present. On the basis of stadiums and gymnasiums, through the mutual cooperation of the government, enterprises, stadiums, society and individuals, we should improve the system construction of stadiums and gymnasiums systematically and innovatively, increase the capital investment of stadiums and gymnasiums, improve the training of related talents, and make them develop in the direction of high quality.

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