

Research on the Dilemma and Paths of Developing Smart Sports Parks in Cold Areas from the Perspective of Big Data

Di Jiang*, Zhenjun Xu

Department of Physical Education, Changchun Institute of Technology, Changchun, Jilin, 130012, China

jiangdi@ccit.edu.cn

*Corresponding author

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Abstract: This article uses literature method, logical analysis method and other research methods to clarify the concept of China's cold city smart sports park under the perspective of big data information technology, explore the obstacles and paths of wisdom development, create a digital management platform for national fitness, and promote the modernization of cold city sports park management. At the same time, this paper can also meet the multi-level fitness demands of the fitness public and give them high-quality fitness services. Development barriers are as follows: lack of norms for construction standards, immaturity of the platform wisdom functions are missing, sports software has security risks, lack of sports composite talents, and imbalance between supply and demand. The development paths are as follows: to develop a smart sports park plan for cold cities; to build a big data management platform for sports parks; to revitalize composite human resources; to optimize intellectual support, and to meet the diversified fitness needs of gym-goers.

1. Introduction

As urban development and construction accelerates in the new era, people's living standards have improved, but people's physical quality has generally declined, and some people have physical and psychological problems [1]. In 2016, the Central Committee of the Communist Party of China and the State Council issued the "Outline of the Health China 2030" plan; in 2019, the State Council published the "Opinions of the State Council on the Implementation of Health China Action" and the "Outline of the Construction of a Strong Sports Country"; in 2020, the State Council issued the "Opinions on Strengthening the Construction of Fitness Facilities for All People and Developing Mass Sports"; in 2021, the State General Administration of Sports issued the "Highlights of the Work of Mass Sports in 2021" [2-3]. In 2021, the State General Administration of Sports issued the "Main Points of Mass Sports Work in 2021", under the guidance of which people are paying more and more attention to their health issues and are increasingly enthusiastic about national fitness, and the construction of smart sports parks is gaining more and more attention.

By clarifying the connotation concept of urban sports park wisdom, analyzing and sorting out the dilemma and path of wisdom development in cold urban sports parks, promoting the research process of wisdom in cold urban sports parks in China, the development of wisdom in sports parks, and promoting the wisdom of national fitness. This study will provide important practical guidance for the construction of a higher level of public service system for national fitness [4].

2. The connotation of a Smart Sports Park in a Cold City

2.1 Cold Cities

A cold region city refers to a city with an average temperature of 0 °C (32 °F) or below in January [5], as shown in Figure 1. During the International Conference on Cold Region Cities, experts from various fields further strengthened the concept of cold regions: "regions with latitudes higher than 45 ° and average temperatures below 0 °C (32 °F) in January," which is commonly referred to as cities with extremely cold climates. Cold region cities typically have long winter seasons, short daylight hours, average temperatures below 0 °C during winter, significant snowfall, and distinct seasonal changes. In China, these cities include the northeastern regions of the three provinces in the eastern part and Inner Mongolia Autonomous Region. From November to April of the following year, these cities are enveloped in cold weather. The climate conditions have a significant impact on outdoor activities in these cities [6].

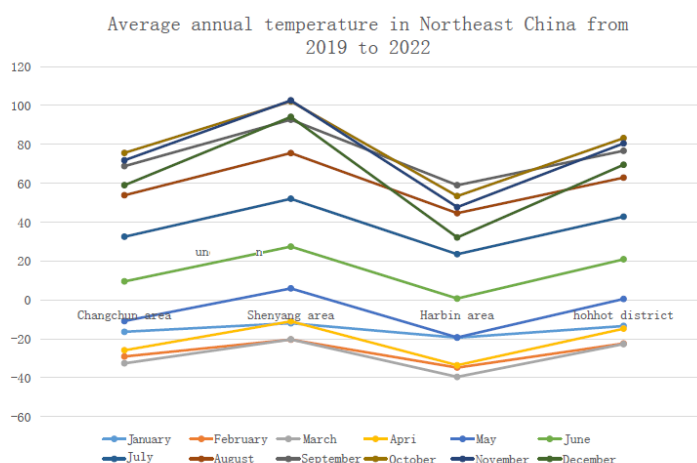


Figure 1: Average temperatures in cold region cities over the past three years.

2.2 Sports Parks

At present, there is no unified concept of sports park internationally, and the concept of sports park has been defined from different levels and perspectives in the current existing research, for the definition of the concept of sports park which is determined by the space and the environmental layout. The book “World Park” points out that: sports parks are generally built in picturesque garden spaces, with sports venues and facilities, where sports competitions, sports performances, fitness exercises and leisure and entertainment can be carried out; defined from the function of sports parks, the main role is to meet the needs of the people’s national fitness multifunctional places, with sports exercise, sports competitions, leisure and entertainment, tourism, ecological protection and other functions. The main function of the sports park is to meet the needs of the people as a multifunctional place for national fitness.

2.3 Smart Sport

Smart refers to the ability to understand and solve something quickly, flexibly and correctly when faced with it. Smart is the extension and expansion of wisdom, which means that through the use of various modern science and technology, something can be intelligently controlled and self-optimised in terms of its certain functions. The introduction of the concept of wisdom on the basis of traditional sports park functions is a dynamic optimisation of urban sports parks in terms of resource deployment, management assurance, ecological management and sports services. In summary, by sorting out the relevant concepts, the urban smart sports parks is defined as: the deep integration of intelligent facilities and digital technology with urban sports parks, through the use of modern information means, active perception and visual management of the park, to improve the park's composite operational capacity, to create intelligent sports space, and ultimately to achieve the transformation and upgrading of urban sports park construction, management, services and industrial business model, etc. This will ultimately lead to the transformation and upgrading of urban sports parks in terms of construction, management, services and industrial business models [7].

The above definition mainly reflects the following four connotations: firstly, scientific construction. Through the intelligent analysis of digital technology, the best design and planning scheme is obtained, and the ecological environment is organically integrated with the sports environment to maximize the spatial carrying capacity. Secondly, efficient management. Using digital information technology such as 5G, cloud computing and the Internet of Things, we build a smart management platform and data processing platform to deliver visualisation result data to different fields in real time, to control the internal resource deployment, to service integration and environmental monitoring of urban sports parks, to realize scientific decision-making and smart management from top to bottom, and to realize efficient operation effectively within the parks. Thirdly, service refinement. Through intelligent facilities such as intelligent information collection stations and intelligent large screens, the park will keep abreast of the public's fitness demands and place sports services precisely, expanding the content of intelligent services while meeting the public's fitness needs. Fourth, intelligent industrialization. The digital technology as well as intelligent equipment on which the intelligent development of urban sports parks is based will be provided by the market. More and more enterprises will invest in the research and development of intelligent software and hardware for national fitness, and the sports data related to it will become an important resource for building a large database for national fitness, and more enterprises will use sports data as a guide to promote the development of intelligent sports industrialization [8].

3. Barriers to the Development of Smart Sports Parks in Cold Cities

3.1 Lack of Specification of Construction Standards for Smart Sports Parks in Cold Cities

Based on the guidance of scientific management theory and behavioral science theory, as well as searching and processing relevant literature, this paper finds that there is a lack of relevant legal regulations in the construction process of sports parks in cold cities, a lack of a relatively complete and sound scientific evaluation system, and no analysis of the environmental design of cold cities. Also in terms of visual environment, physical comfort, shelter facilities, recreational and leisure activities and traffic design and sustainable development, the design strategy for the outdoor environment of cold-land sports parks merely relies on the simple provisions of relevant documents such as the Urban Land Use Classification Standards and Planning and Construction Land Use Standards to provide a general understanding of the area of sports parks. No scientific and accurate behavioral guidelines have been provided so far, and it has not been possible to effectively

implement the construction of site sizes, the effective planning of spatial layouts, and the effective expansion of construction projects [9-10].

3.2 Immature Smart Sports Park Platform in Cold Cities Lacking in Wisdom Functions

A smart sports park is an intelligent park featuring information and digitization. The immaturity, or even the lack of a smart platform, makes it difficult for a smart sports park to be effective. Through a series of data transfers, the smart platform is able to provide timely feedback on various types of sports information to the fitness crowd. At present, only in a very few intelligent sports parks there are platforms to establish databases, however, after collecting data and establishing databases, the exercise and physiological data collected from the fitness crowd is merely a statistical summary. It has not been done through big data technology to sample, analyse, compare and excavate it, nor has it been able to meet the scientific fitness of the public and provide the fitness public with an intelligent service of scientific fitness guidance and effect evaluation. To give a reasonable fitness program and meal program to the fitness citizens in the smart sports park, it fails to effectively play the role of big data technology. For WeChat small programs and other applications, mobile phone app function is not complete and perfect, the application method is more cumbersome, is the mobile phone sports software development should solve the problem [11].

3.3 Security Risks Associated With Smart Sports Park Sports Software

Smart sports parks collaborate with third-party platforms such as WeChat Mini Program, Alibaba Group, etc., which require users to scan QR codes, log in, and bind their mobile numbers, as well as register personal information. However, this approach fails to guarantee the privacy of citizens' personal information. The security risks of QR codes are illustrated in Figure 2. Additionally, facial recognition technology, while convenient for fitness users to synchronize their exercise data and physical condition, also carries the risk of facial recognition data leakage, which can be exploited by malicious individuals to steal users' facial information and cause harm to citizens. Consequently, fitness enthusiasts are reluctant to register accounts and have their data collected in the sports park due to concerns about potential invasions of their personal interests. This reluctance results in difficulties in acquiring comprehensive exercise and physiological data from the fitness community, impeding the establishment of an effective database and hindering the completion of relevant data analysis tasks. As a result, the application of big data technology in sports parks becomes incomplete and lacks effectiveness [12].

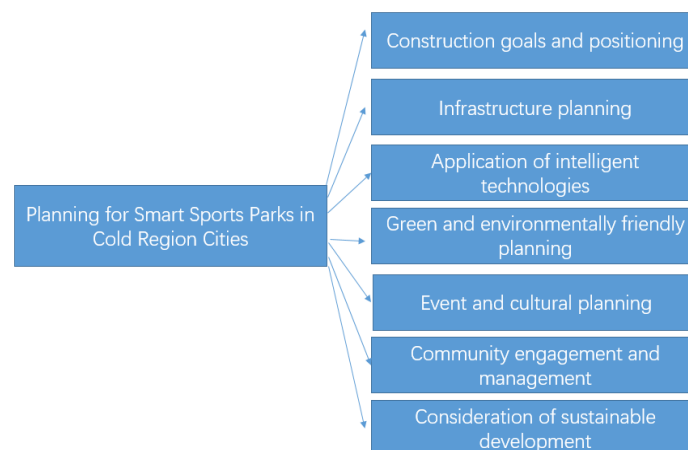


Figure 2: Security Risks of QR Codes

3.4 Lack of Intelligent Sports Composite Talents in Smart Sports Parks

After big data technology has been introduced into sports parks, if the two are to integrate perfectly and develop sustainably with high quality, they must rely on a large number of complex talents who combine sports technology, management, information technology and fitness instruction skills. The development of big data technology is inseparable from the training of cutting-edge technical personnel, and the innovative and sustainable development of smart sports parks is inseparable from the support of professionals. The lack of professional talent is the essential problem in the development of smart sports parks. In the process of building smart sports parks in cold cities, there is a lack of three types of professional talents. First, the lack of intelligent professional and technical personnel. The most prominent difference between smart sports parks and other parks is the use of intelligent, technological and virtualized technical equipment. Secondly, there is a lack of social sports instructors. Social sports instructors produce many maladjustments while adapting to intelligence, and not only are the number of staff scarce, but they are also inadequate to adapt to the new environment. Thirdly, there is a lack of sports managers. Social association organizations are the main responsible for the management of intelligent sports parks, but the management of sports parks is only a part of their job description, and there is no complete department independent of the division of sports parks, and they fail to fully understand the connotations of intelligent sports.

3.5 Imbalance between Supply and Demand for Smart Sports Parks in Cold Cities

The urban smart sports park is an important element of physical fitness, which is of great significance in meeting the growing demand of the public for physical fitness, improving people's quality of life and promoting the construction of a strong sports nation. At present, the cold land smart city sports park fails to meet the needs of the fitness masses, as shown by the fact that the passenger flow eye is not applied to the sports park, the weather station and signage supply is less, there is no fitness equipment use and management information service, there is no smart body measurement station, and there are fewer smart sports cabinets. Fitness users need mobile phone app or WeChat app to view timely information pushing, such as more tips on the number of sports, timely sports population diversion function; query can get to provide wind speed, air humidity, air temperature and other weather elements, provide suitable outdoor exercise time; view fitness idle equipment; timely assessment of fitness condition of fitness users issued exercise prescription, etc.

4. The Path to Smart Sports Park Development in Cold Cities

4.1 Development of a Smart Sports Park Plan for Cold Cities

Smart Sports Parks in cold region cities are sports public service projects aimed at ensuring the fitness of the entire population. To meet the needs of fitness enthusiasts in cold region cities, planning should be developed as shown in Figure 3. Considering the unique geographical and climatic conditions of cold region cities, surveys should be conducted among local residents to classify them based on factors such as age and gender. The survey should collect information on their exercise preferences, proximity requirements, and service needs. Furthermore, it is important to explore the unique features of cold region cities and analyze the development of ice and snow resources from various aspects such as festivals, culture, activities, and landscapes. By focusing on aspects like wind protection, extending daylight hours, and establishing winter protection systems, efforts can be made to create suitable spaces for cold weather sports, thus improving the outdoor exercise environment and enhancing the winter landscape vitality for residents of cold region cities.

Establishing spatial structure layout and functional zoning, special designs should be implemented in areas such as transportation organization, public facilities, winter landscapes, plant cultivation, hard paving, nighttime lighting, and ecological considerations. The goal is to create a smart sports-themed park that integrates sports, leisure, and ecology.

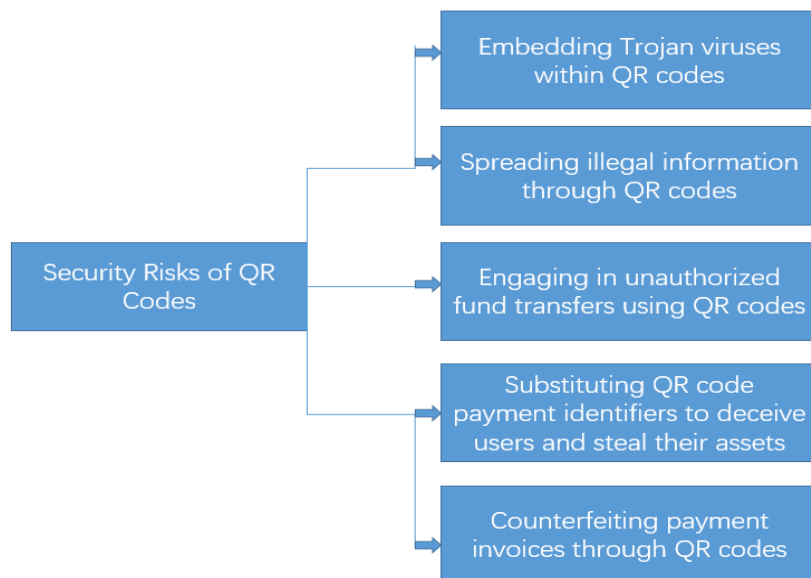


Figure 3: Planning for Smart Sports Parks in Cold Region Cities

4.2 Building a Big Data Management Platform for Sports Parks

In the future, we should build a smart sports park management service platform, and should take the “Outline for the construction of a strong sporting nation”, the “Fourteenth Five-Year Plan” for sports development, and the “Guidance on promoting the construction of sports parks” as policy guidance to further build a sports park that includes the development of smart sports parks based on modern information means. If internal facilities, city residents and organizational management are interconnected, a big data management platform can be created for sports parks in cold cities. These platforms include Official Websites, Smart Sports Park APPs, WeChat public numbers, Small Programs, Official Shake and Official Snapshot Numbers and there smart sports public platforms, and providing security for the security of personal user information that currently exists in smart sports parks.

As the “brain” of the smart sports park, the platform uses information data as a grip to understand the situation in the park in real time through visual data and make accurate predictions and decisions. Through big data, the physiological and sports data of the fitness public will be repeatedly screened, analyzed and compared. We will establish physiological index standards for different age groups, and circle the normal range of physical fitness test standards for the same age group and gender, and collect physical fitness and sports data from the people who go to the sports park, and then sample and compare them with the normal range values, so as to remind the fitness people of their physical condition in time. Through scientific exercise prescriptions, physical exercise is carried out and a more humane effort is made for the health of the public.

4.3 To Revitalize Complex Human Resources and Optimize Intellectual Support

Composite talent is an important guarantee for the development of intelligent sports venues. Stadiums in the reserve of composite management personnel, professional and technical personnel

to take a step ahead of the opportunity. The operation of the main urgent need to be proficient in information technology professionals and both skilled use of information technology and master a wealth of experience in the operation of the complex talent. Information technology professionals, major institutions of higher learning have formed a more mature training mechanism, can quickly adapt to the human resources needs of the sports market. Composite talents are often the backbone of the development of intelligent venues in China. Therefore, we should vigorously train and introduce complex professional and technical talents and business management talents. On the one hand, the development of “attracting wisdom and borrowing brains” new ideas, to grasp the arena industry talent growth, use and flow of law. From the cultural, creative, marketing and other cross-industry fields to select and recruit “know technology, good management” of the elite talent, for the intelligent stadium operation to provide solid intellectual support, to create a good environment for training talent, attracting talent, retaining talent. On the other hand, enrich the talent training measures multi-channel, multi-forms, hierarchical re-education and rotation training for stadium practitioners. Relying on higher education institutions, professional operating agencies and other planned, batch-specific training for existing personnel on venue information technology, both to learn venue operations.

4.4 To Meet the Diverse Fitness Needs of Gym-Goers

In the new era, people’s demand for physical fitness has changed from a simple physiological need to a multifaceted demand for health care, social interaction, entertainment and self-actualization. The smart development of urban sports parks will be based on providing higher quality services to meet the multi-level fitness demands of the public, thereby enhancing the quality of healthy living. The smart development provides intelligent services with scientific fitness guidance and effect evaluation as the core. Through the sports park’s big data management platform, passenger flow eyes, weather stations and signs, fitness equipment use and management information services, intelligent body testing stations, intelligent sports cabinets, intelligent body mass monitors, energy heart rate columns, intelligent fitness stations and other facilities to reasonably arrange fitness plans, as well as scientific and effective fitness guidance and body testing feedback, thus truly allowing the public to experience the organic combination of physical fitness and technology.

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