

# Research on the Strategy of Ice and Snow Sports from the Perspective of Scientific and Technological Development

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**Abstract:** *A new round of scientific and technological revolution and industrial transformation is in the ascendant, which has brought profound changes to the development of Chinese sports, and provided a new path for solving and coping with the problems and challenges in the development of ice and snow sports. This article uses research methods of literature and logical analysis to deeply analyze the current situation of ice and snow sports science and technology services and the main problems, and characteristics, provide a strong theoretical basis for scientific and technological research and services; build a team of winter sports scientific and technological service talents, form a unique scientific research team and other specific development strategies, look forward to the improvement of the level of ice and snow sports science and technology, and then realize the transformation from a big country in ice and snow sports to ice and snow to the transition of a sports powerhouse.*

**Keywords:** *science and technology, ice and snow sports, Winter Olympics*

## 1. Introduction

Science and technology are the primary productive forces. How to use the power of science and technology to improve the performance of competitive sports has become the core goal of the majority of sports science and technology workers. Compared with traditional advantageous projects, the overall capability and level of scientific and technological services for Chinese ice and snow sports projects are relatively low. Looking at the achievements of the Winter Olympics in recent years, the outstanding performances and outstanding achievements of the world's ice and snow sports powerhouses have repeatedly proved the importance of science and technology, and highlighted the huge gap between China and the world's ice and snow sports powerhouses[1]. In order to realize the leap-forward development of China's ice and snow sports, it is necessary to grasp the current situation and existing problems of China's ice and snow sports science and technology services, so as to effectively promote and improve the overall level and scientific development of ice and snow sports.

## 2. Analysis of the current situation of ice and snow sports technology services

### **2.1 The number of scientific and technological personnel in ice and snow sports is increasing, and the distribution is wider**

With the 2022 Winter Olympics held in China, as a traditional cultural content and form in Northeast China, ice and snow sports have revived people's enthusiasm and attracted people's attention. There have been significant changes in the increase of ice and snow sports items, forming an ice and snow sports science and technology service team with relevant sports scientific research workers in the three northeastern provinces as the main body and supplemented by relevant national sports scientific research institutes.

Judging from the relevant scientific research achievements of ice and snow sports in the past ten years, the scientific research strength and level of ice sports are much higher than those of snow sports, and the research field involves all ice sports of the Winter Olympics. Among them, veteran speed skating is the main body, followed by figure skating and speed skating, which also shows the significance and value of scientific research to maintain the traditional advantages of ice and snow sports in China[2]. However,

the scientific research attention of ice hockey and curling projects has been relatively low. Generally speaking, there are few individual, differentiated and targeted achievements in ice hockey projects.

With the rapid development of ice and snow sports in China, more and more attention has been paid to snow sports, and related research results have been continuously enriched. From the ski industry to competitive professional research, the number of freestyle skiing, cross-country skiing, and alpine skiing has increased year by year. Especially in recent years, related achievements in ski jumping, biathlon and Nordic biathlon have also emerged. The research field is constantly expanding, and it is closely integrated with various types of competitions. Taking freestyle skiing as an example, in the past 10 years, it has expanded from a single focus on training competitions and status quo development to injury rehabilitation, reserve talents, electronic equipment and referee rules. In general, the research on snow sports has developed rapidly, moving from the accumulation of quantity to the improvement of quality, and from non-competitive categories to scientific and technological research services focusing on improving sports performance.

### ***2.2 The means of scientific and technological services tend to be diversified, and the characteristics and priorities of regional services are more prominent***

The scientific nature of ice and snow sports research is increasing day by day, and scientific and technological means are constantly increasing. The use of sophisticated medical instruments, high-definition imaging equipment and advanced medical equipment for ice and snow sports research has become the main means at present. For example, the genetic laws of athletic ability are used to identify reserve talents for winter sports; high-speed photography and computer analysis, photoelectric timers, accelerometers, joint angle changes, electromyography, and force platforms are used to measure the human body movement process. Kinematic parameters, as well as the changing laws of external and internal forces[3]. At the same time, the laws, characteristics and valuable experience of summer sports related research results, such as basic theoretical knowledge of exercise physiology, exercise biochemistry, exercise anatomy, exercise biomechanics, etc. strong theoretical support. For example, the Institute of Sports Science of the General Administration of Sports of the People's Republic of China has continuously integrated with ice and snow sports with the accumulation of years of summer project research, and has improved the ability and level of scientific and technological services for ice and snow sports. It mainly provides scientific and technological services through the research group model combining scientific research and training.

## **3. The main problems of China's ice and snow sports science and technology services**

### ***3.1 Although the number of scientific and technological personnel has increased, the overall structure still needs to be optimized***

The scientific and technical personnel of ice and snow sports are significantly different from those of summer sports researchers in terms of overall quantity and quality, and they are mainly distributed in the Northeast region with rich ice and snow resources. From the perspective of age structure, due to the late start of ice and snow sports in China, there are not many older generation researchers engaged in this field. Practical experience, the grasp of theoretical issues such as the characteristics and laws of ice and snow sports still need to be strengthened, and at the same time, scientific and technological research capabilities and service levels still need to be improved. The educational level has improved rapidly in recent years, especially in the aspect of postgraduate training, adding the research direction of Winter Olympics and building a platform for the training of winter sports scientific and technological talents. The title structure is relatively unreasonable, there are many junior scientific and technological personnel, and there are few senior personnel. When the academic team is carrying out scientific and technological research and services, they feel powerless. Therefore, to achieve the goal of becoming a strong country in ice and snow sports, it is necessary to build a team of scientific and technological service personnel with an optimized overall structure in terms of age, education and professional titles.

### ***3.2 A comprehensive communication and cooperation model for scientific and technological services has not yet been formed, and the awareness of traditional experience is still strong***

It can be seen from the results of the recent Winter Olympics that the application of high-tech means and the improvement of the scientific level of training theory have made the drawbacks of training based on traditional technical and tactical experience unsustainable in the increasingly fierce competition. For

example, the gold medal effect and the long-term and arduous nature of training excellent athletes, coupled with the shortness of the golden period of sports life, make many athletes and coaches stagnate in improving and trying new training methods and concepts. At the same time, some training conditions and venue facilities the shortcomings also make it difficult for new technologies and concepts to be verified in practice. More importantly, the overall scientific research activities of ice and snow sports in my country started late, and the foundation is relatively weak, especially the lack of research on the training theory, methods and means of the core of ice and snow sports, making the credibility and effectiveness of scientific research results questioned. The treatment of service personnel and the nature of work and other aspects lack institutional and regulatory guarantees. These factors have formed a two-layered phenomenon in scientific and technological services and training, and the reality is that theory and practice are disconnected. In the ice and snow world, due to the young age of the sports teams, the low level of education, the more outings, the more competitions, and the large amount of exercise training, they have been in a state of exhaustion and tension for many years. Many coaches and athletes only stay on the perceptual understanding of their own experience and rich experience, and it is difficult to rise to the height of theory. In addition, the projects they are engaged in are different, which are often interlaced like mountains, closed, narrow, and self-contained. The management method of small workshops with masters and apprentices in sports teams is relatively common, resulting in outdated training methods and concepts. For example, Li Y changed the short-track speed in China[4]. In terms of cornering technology, skaters still continue the single-foot support since the 1980s, lacking the ability to accelerate in corners, bringing more innovations in short-track speed skating technology and concepts.

### ***3.3 Scientific research, training and personnel training belong to different systems, and the overall operating mechanism needs to be improved***

At present, China's ice and snow sports scientific research, training and talent training model is more conservative and traditional than summer sports. The scientific research personnel are mainly concentrated in the relevant scientific research institutes, the training and competition are handled by the project management centers, and the personnel training is largely undertaken by the primary and secondary schools and sports teams, in charge of different functional systems of the sports department and the education department. In view of the separation of people and things, rights and interests, the maintenance of mutual trust and cooperative relations requires coordination and communication in many aspects. In addition, in the context of the reform of the national sports system, the training mode of coaches, athletes, referees, and scientific researchers in ice and snow sports has not been clarified, and no major adjustments have been made. Many relationships need to be straightened out, such as various problems such as insufficient reserve talents for ice and snow sports, difficulty with scientific research institutes, and lack of contact with scientific and technological services are still common. It is difficult to establish a benign and effective long-term cooperative operation mechanism, which affects the overall development of ice and snow sports in China.

## **4. The development strategy of ice and snow sports from the perspective of scientific and technological development**

### ***4.1 Further establish the concept of scientific and technological services and increase investment in ice and snow sports technology services***

The rapid development of science and technology and information engineering has raised the dependence of competitive sports on technology and various talents to an unprecedented height. On the Internet, new materials and new equipment are frequently unveiled, and the details of training and the refinement of technological services are crucial for competitions where the outcome is determined by a few hundredths of a second or even a few thousandths of a second. It is reported that with the help of the Sports Research Institute of the Korea Skating Federation, it has increased research investment and scientific training, and analyzed the physical conditions and starting reactions of each athlete to help them overcome their weaknesses and make them suitable for men and women at the PyeongChang Winter Olympics[5]. Unexpectedly won the championship in the 500m speed skating competition. For another example, at the Turin Winter Olympics, the secret weapon of the British curling team was to install sensors and memory cards on the brushes, which turned into "sweep dynamometers", which were helped by researchers from the University of Edinburgh and spent 22,000 by the Scottish Sports Institute developed in sterling[6].

#### ***4.2 In-depth research and mastery of project laws and characteristics, to provide a strong theoretical basis for scientific and technological research and services***

Although the tradition of ice and snow sports in China has a long history, the research on the laws and characteristics of modern ice and snow sports is still insufficient. For example, many researchers and trainers do not have a clear understanding of the laws and characteristics of short track speed skating and speed skating, especially since many snow sports are often mixed, such as biathlon, etc. In-depth understanding and research of laws, ignoring subtle differences and different analysis, it is difficult to adopt detailed, targeted and professional training methods, it is difficult to improve the level and overall level of the project, and it restricts the improvement of technical and tactical capabilities. Therefore, on the basis of fully understanding and grasping the development trend of winter sports in the world and the development status of winter sports in China, and with the close cooperation of coaches and technical service personnel, clarify the characteristics of each winter sports, site conditions and the impact on physical function and form details such as requirements are the key to victory in fierce international competitions and competitions. At present, the research on the characteristics and laws of China's ice and snow sports advantage items is relatively thorough, but the research on potential advantage items and general items is relatively backward; skill items are better than physical fitness items.

#### ***4.3 Build a team of winter sports science and technology service talents and form a distinctive scientific research team***

At present, China's ice and snow sports scientific researchers are concentrated in sports departments and related scientific research institutes in the Northeast. "Science and technology services will never be able to make a comeback." It is necessary to accumulate experience at the theoretical and practical levels, build a scientific research team for ice and snow sports, absorb and unite domestic sports science and technology forces, and give full play to the advantages of equipment and instruments, scientific research achievements and multi-disciplinary advantages. The new situation of scientific and technological research on ice and snow sports is an important guarantee for the scientific and effective realization of scientific and technological services for ice and snow sports. The traditional "skirmish" service method cannot support various high-level ice and snow sports competitions based on comprehensive strength, making it a necessary trend to build a scientific research team with characteristics and strong comprehensive ability to tackle key problems. The establishment of a characteristic scientific research team requires top-down support from the relevant sports management departments in terms of policies, information, funding and conditions, especially for the relevant colleges (departments, institutes) to build platforms and policies for close cooperation with winter sports teams based on this, it is also necessary for all relevant scientific research institutes (departments, institutes) to pay full attention to the scientific research work of the winter project, and to give preference to scientific research management, funding, conditions and training, and gradually form an integrated scientific research service model.

## **5. Conclusion**

With the rapid development of the times, science and technology are increasingly playing an important role in various fields of sports. At any time the 2022 Winter Olympics are about to be held, China's ice and snow sports should fully draw on the huge advantages of science and technology, and adhere to the technology-driven strategy, based on the principles of task orientation, reform, innovation and development, it will play an applied role in building a strong country in ice and snow sports.

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