

# The competition pattern of World Olympic Winter Games and the achievement outlook of Chinese superiority project

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## Abstract

This paper makes statistics of the medal number of every continents and part of the competition results of the competing countries in 21st XXI World Olympic Winter Games and carries on the contrast analysis. At the same time, we studied the Chinese all previous Olympic achievements and the development of Chinese Olympics results, we analyzed the competition pattern and the Chinese Olympic Games development process, limitations and development space. Results showed that China must break through the status of the single source of gold medals and we should vigorously develop China's Olympics entries, and widely develop the athletic talents of other Chinese Olympic projects, we also need to vigorously develop top athletic talent of China's Olympic sports, and make extensive training of China's ice and snow sports talents as well.

*Keywords:* Winter games, the competitive landscape, advantage, statistical analysis

## 1 Introduction

The 21st Olympic winter games was held in 2010, which referred to "XXI Olympic winter games", after 17 days of fierce competition, it was in the end of February 28, 2010. In the competition, the Chinese team won 5 gold medals, but it remained in the second group of the winter Olympics.

As for the competitive world pattern of the winter Olympics games and prospects of the development of the Chinese Olympic Games achievement, many scholars have done **systematic** research and analysis. Sun Zhongchun (2006) uses the method of literature study, video observation, logical analysis and mathematical statistics to research result of Turin Olympics game, and makes the contrast analysis of the strength difference between China and the world's elite, then puts forward suggestions for China's Olympic performance ascension [1]. Zhu Zhiqiang (2007), use the method of literature to study the development history of the winter Olympics, and puts forward that the developing countries and the tropical countries will become the main body of the Olympic Games and puts forward suggestions on the layout of the Chinese Olympic project [2]; Wang Chao-jun (2006) through video observation and literature, make a comprehensive and objective research of the 20th winter Olympic Games of various aspects information, he discusses the various problems in the game in order to prepare for the winter games that will be held in China [3]. Cai Lan (2011), use the method of comparative analysis, literature, and makes the research analysis of the 21st Olympic winter games achievement and the medal Table, she gets the conclusion that the Chinese ice project has achieved a historic breakthrough, but Chinese ice snow event still in the backward, and ice project of Asia, Europe, North America will become more competitive [4]. Gaoliang (2012) uses the method of comparative analysis, and studies the successive Chinese Olympic performance, he analyzes the all kinds of influential reasons of Chinese performance and puts forward

the suggestions that we should expand the mass base, increase investment in science and technology and so on [5].

On the basis of previous studies, this paper uses the method of literature, mathematical statistics to carry on research and analysis of the competition pattern and the prospect of development of winter sports according to the 21st Olympic winter game. We put forward the corresponding suggestion in order to provide reference for China's Olympic Games achievement of ascension.

## 2 The structure of world sports competition in XXI Olympic winter games

XXI Olympic Winter Games was the largest Olympic winter games in the history, it had a total of seven categories, 15 disciplines and 98 events, there were 2873 athletes joining in it, among them, the women's ski jumping, winter two hybrid events, there were total of 88 countries or regions, including 26 teams sharing of the 99 gold medals and a total of 295 medals.

The overall distribution of medals: The same as the previous winter games, the main powerful competition in XXI still from Europe and North America. Relative to Europe and North America, Asia and Oceania's competitiveness is very small. In this paper, we make statistical distribution of XXI Olympics medals through literature studying, which means the medal of the state of the number of gold, silver, bronze medals and the number of countries that won the medal. As shown in Figure 1.

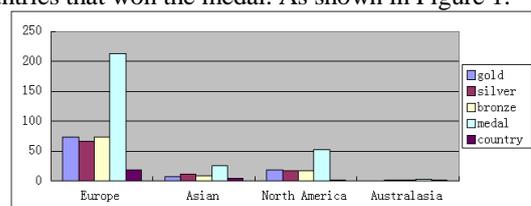


FIGURE 1 The medal of the State and the distribution of countries that winning medals

From Figure 1, we can see, whether the obtaining number of medals or the medal number of countries, Europe has an absolute advantage. In XXI winter Olympics, there are 19 European countries won the medals, occupied 73.08%. Of all the competing countries, they received a total of 73 gold medals and 213 medals, respectively accounted for 73.74% of the total number of gold medals and 72.2% of the total number of medals. Although only the United States and Canada in North America won the medals, the number of countries only account for 7.69% of the amount of national medals, but its strength is very strong, the North America won 53 medals, and a total of 19 gold medals that accounted for 19.19% and 17.97% of the total number of gold medals. Europe and North America took a total of 92 gold medals and 266 medals, occupied 92.93% of the total number of gold medals and total medals. Both scored the Olympic winter games the most gold medals and medals.

Asia and Oceania in the Olympic competition strength cannot be compared with Europe and North America, accounts for 15.38% of the total award countries, only 7 pieces of gold medal number, account for 7.07% of the total gold medals, there were 26 gold medal, accounts for only 8.81% of the total medal. Oceania countries only won one medal, and two silver medals, one bronze medals, their competitiveness is very weak.

The analysis of comparison of the snow project and the ice project: Winter Olympic Games are divided into the snow project and ice projects. In the 98 events in XXI, there are 69 events is snow project, it produced 70 gold medals and 208 medals, the ice project has 29 events, a total of 29 gold medals and 87 medals. Snow event occupy 70.41% of the Olympic Games, the ice project account for only 29.59% of the games. Therefore, a country's snow project movement strength largely determines the results of the competition at the winter Olympics. To make a contrast analysis of the important degree of the results of the competition in the winter sports relative to the snow project and ice sports in a country in the Olympics. In this article, we counted the gold medal Table of the top 10 countries and its total snow project gold medal, the statistical data as shown in Table 1.

TABLE 1 The structure of the top 10 countries in XXI Olympic games

ranking	1	2	3	4	5
gold medal	13	11	10	9	8
the medal of Snow sports	7	11	5	8	0
ranking	6	7	8	9	10
gold medal	8	6	5	4	4
the medal of ice sports	8	6	5	4	4

Thus it can be seen that Europe has strength in the competition of the winter Olympics gold medals.

From Table 1, we can see that Russia, Canada and the Netherlands only won gold medals from the ice movement, its gold medal proportion is larger, the Dutch won eight gold medals of the gold medal from the ice, and Russia and Canada's gold medal were from the amount of snow sports they were numbers 7, and 5 respectively. We take its income by 53.85% and 50.00% of the total gold medals; they are no less than 50%. Eight of the nine gold MEDALS from snow project are in the United States, its high proportion of 88.89%, snow sport gold medal number accounts for the vast majority of the number we obtained

the gold medal in the Olympics. In XXI Olympics medal of the top 10, six other countries won the gold from the snow sports. The ten countries from total of 78 pieces of gold medal, its incomes are 58 of gold medal in a snow event and, occupied the 74.36% of the total gold medals.

Known from the analysis of the above, in the winter Olympics games, snow project occupies the most, while as for the top 10 countries in XXI of the medals Table, the snow sports achievement has more influence than the ice sports, with six out of 10 countries all the gold from the snow sports. In XXI, China won three gold medals, and the entire gold are from the ice project, through the comparison and statistical analysis of the above data and the variance analysis shows that the development of snow sports is the key to improvement of China's Olympics.

The analysis of scores compassion of the part of the competing countries and Chinese: This paper makes statistics of the total gold medal in the rank top 10 countries and China's total medals. Through statistics in this paper, the analysis of the number of gold medals in XXI, we can see that the strength of the four countries, Russia, Norway, Canada and the United States are stronger than other countries. Figure 2 and Figure 3 statistics are the gold medal number and the number of medals of each of these four countries and China respectively and the account for the percentage of XXI Olympics gold medal and the medal.

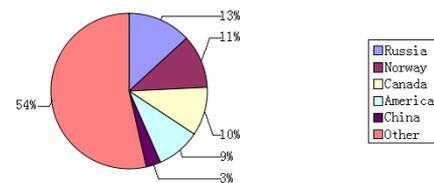


FIGURE 2 The structure of gold medal in the winter Olympics

The number of the gold medal a country had won in the winter Olympics represents the power of the national of the snow and ice sports top athletic talent. Figure 2 shows total percentage of the Russia, Norway, Canada, the United States and China's gold medal numbers income of five countries in XXI Olympics games. Including Russia, Norway, Canada and the United States won 43 gold medals, which occupies the total number of XXI Olympics gold medal of 43.43%. With 13 gold medals, Russia, among them became the top of the arch of the winter Olympics in XXI, accounted for 11%. Norway, Canada and the United States only won 11 gold MEDALS, the second, three, four won 10 gold medals and 9 gold medals that are at the top of the Table and occupied XXI Olympics gold medal of the total respectively 11.11%, 10.10% and 9.09%, the four countries capsule took XXI nearly half of the gold medal. China accounts for only XXI Olympics gold medal of the total of 3.03, compared with the first four countries, the difference is very large.

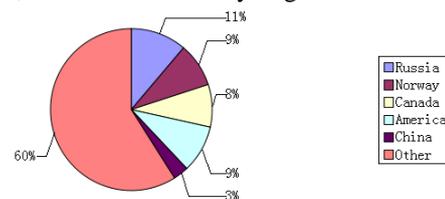


FIGURE 3 Winter Olympics medals Table structure

The number of medals a country has won in the Olympics represents the strength of the national in snow and ice movement. Compared with gold alongside, America's total medals are more than Norway and Canada, got 28 gold medals, occupied 9.49% of the total Olympic medals, ranked second, Norway and Canada respectively in 26 medals and 25 medals ranked third and fourth, respectively occupied 8.81% and 8.47% of the total Olympic medals. China only got 9 medals, accounted for 3.05% of the Table.

Known from the analysis of the above, whether it is a gold medal for quantity, or the number of the wining medals, Russia, Norway, Canada and the United States have occupied a lot of advantages, and is worthy of the name in the winter Olympics in XXI "first group". Compared with these four, China's strength is quite weak in the winter Olympics.

**3 The development of the winter Olympics and the outlook of Chinese achievement**

The brief introduction of winter Olympics and Chinese team: The size and influence of the winter Olympics in the 90 years are growing, its project by the first Olympic winter games of seven disciplines, 16 events has spread to 15 disciplines and 98 events of Olympic winter games, the game disciplines and events number expanded 2.14 times and 6.13 times respectively. The participating countries have increased from 16 countries' 247 people to 88 countries'2873 people, which expanded 5.5 times and 11.63 times respectively. Since 1980, China participated in the 13th annual DE winter Olympics, China has participated in 10 times of Olympic winter games until the winter Olympics in XXI. In the 15th Olympic winter games, and the 13th Olympic winter games, we did not win any medals, until the 16th Olympic winter games, China won the first medal of Olympics, China has won 12 gold medals and 51 gold medals in the 21st Olympic winter games in XXI. The size and the competing scores have been greatly

TABLE 2 The number of Chinese athletes proportions of the winter Olympic games

	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>	20 <sup>th</sup>	21 <sup>st</sup>	21st
The number of participators	35	27	60	71	76	91	66
percentage	1.94%	1.55%	2.76%	2.96%	3.03%	3.46%	2.03%

As can be seen from Table 2, Chinese participants in the 17<sup>th</sup> winter games and the 21st Olympic winter games fell, the proportion of Chinese athletes in the Olympic winter games, also declined compared with its previous, but in terms of overall development, China's Olympics participants and parameters proportion of Chinese athletes is on the rise. It also suggests that in the continuous development

TABLE 3 The number of project of winter sports and Chinese participating project and proportion

	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>	20 <sup>th</sup>	21 <sup>st</sup>	21st
The number of the project	6	5	7	7	9	10	4
The number of the participating project	12	12	14	15	15	15	15
percentage	50.00%	41.67%	50.00%	46.67%	60.00%	66.67%	26.67%

From Table 3, we can see that in the statistics of the winter games, winter Olympic sports categories in the 18<sup>th</sup> and 19<sup>th</sup> has increased and other number of projects are the same than the previous winter Olympics equals. Suggesting that after years of development, the Olympics move-

improved.

The analysis of winter sports participants: Due to China's first medal in 16 Olympic winter games, so this paper takes 16th Olympic winter games as a starting point on the Olympics and the Chinese teams of the winter games were analyzed. This paper make statistics from the 16th Olympic winter games to the total number of the 21st Olympic winter games athletes, as shown in Figure 4.

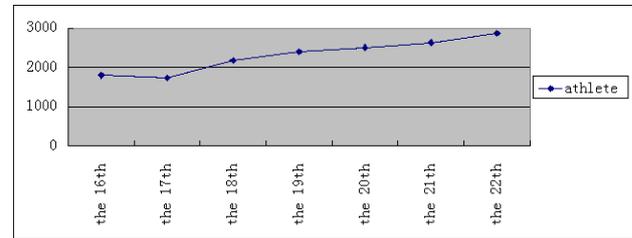


FIGURE 4 The number of the athletes in 16th ~ 21st Olympic winter games

The 16<sup>th</sup> Olympic winter games had a total of 1801 athletes to join in, from the 16<sup>th</sup> games to the 21st Olympic winter games, the number of athletes of 17<sup>th</sup> Olympic winter games have declined, only 1737 people, fell by 3.55%, other Olympic winter games are increasing, the change tendency is shown in Figure 4. Among them, The number of athletes from 8<sup>th</sup> Olympic winter games to 21st Olympic winter games respectively 2176, 2399, 2508, and 2632, the seven-time average annual growth of the number of Olympic athletes are 9.92%, which means the winter Olympics movement develop rapidly.

The expanding of scale and the growing influence of winter Olympics, at the same time, China's Olympic movement also in the continuous development, this article counted the 16<sup>th</sup> ~ 21st Olympic winter games in China and its total parameters in proportion to the number of athletes, the statistical data as shown in Table 2.

of China's Olympic movement.

The analysis of the development of winter sports project. This paper makes statistics of the number of events in the 16th ~ 21st Olympic winter games and entries of Chinese athletes. The number of categories of the statistical data of the winter Olympics and the Chinese teams as shown in Table 3.

ment sports has become saturated, and Chinese Olympic movement is still in the stage of development, its development space is very large. Although Chinese participating sports declined in the 17<sup>th</sup> and 21st Olympics respectively, but the overall pf the number of participating sports in

China is rising, the proportion of Chinese of the total number of Olympic sports overall growth trend is large. At the same time, with the continuous development of Chinese Olympic movement, the number of Olympic sports in China is also increasing.

TABLE 4 The number of winter sports events and Chinese team's quantity proportion

	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>	20 <sup>th</sup>	21 <sup>st</sup>	21st
The number of the project	57	61	68	78	84	86	98
The number of the participating project	34	34	40	38	47	49	49
percentage	59.65%	55.74%	52.82%	48.72%	55.95%	56.98%	50.00%

The Table 4 shows that since the 16th Olympic Games, the small sports events continue to increase, from the 57 events increased to 98 events, it increased by 71.93%, the average annual rate of 11.99% increase in the number of events. On the 19th and the 21st winter Olympics it increased 10 events, its growth rate were 14.71% and 10.86% respectively, the number of events of the 18th is also increased by 11.48%. This suggests that, as for events, the winter games development momentum is very large still.

China's Olympic event entry also has a growing number of developments, from 34 of the 16th to the 21st's 49 items. The proportion of Chinese participating events occupied 50%, its highest percentage is 59.65%, and the lowest is 48.72%. Known from the analysis of the above, the developments of Chinese events are roughly the same with the development of the Olympic events, so its development space is very large.

At the same time, the literature review shows that China has not yet carried out part of the Olympic movement, in a short period of time it can become China's Olympic Games project completely. Such as the Nordic combined skiing is composed of cross-country skiing and

TABLE 5 The gold medal income of each project and the successive account of Chinese gold medals proportion

Project	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>	20 <sup>th</sup>	21 <sup>st</sup>	21st
freestyle skiing					1		
speed skating							1
Figure skating						1	
short-track speeding skating				2	1	4	2
Total				2	2	5	3
percentage				2.56%	2.38%	5.81%	3.03%

The Table 5 shows that Chinese income Olympic gold medal number and the proportion of gold medals, Chinese Olympic movement has some development, and the short track speed skating is the main project of winter Olympic Games that China won the gold medals. In 19<sup>th</sup> Olympic winter games we first won the gold medal, but there are only four times of the Olympic winter games that we won the gold medal. Although there were ups and downs of the total percentage of gold medals Chinese has won in the four terms, but the overall are on the rise. Of the 12 gold medals, there are 9 from the short track speed skating,

TABLE 6 The project income medal and successive Chinese income proportion of the total medals

Project	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>	20 <sup>th</sup>	21 <sup>st</sup>	21st
freestyle skiing			1		2	3	2
speed skating	2	1			2	1	1
Figure skating		1		1	2	2	
short-track speeding skating	1	1	5	7	5	4	6
Total	3	3	6	8	11	11	9
percentage	1.75%	1.64%	2.94%	3.42%	4.31%	4.26%	3.05%

The statistics of the number of Chinese previous income medal and the proportion of medal problem are shown in Table 6. The Table 6 shows that Chinese medal

In the continuous development of winter sports at the same time, the events are also continue to grow, the number of categories in Olympic game project develop too. The large number of statistical data of the winter Olympics and the Chinese teams are shown in Table 4.

ski jumping, a hybrid snow sports event is a branch of skiing, which is listed as skiing in the international sports classification, the demands for the athletes is higher. At the winter Olympics, China has not to participate in this project. But China has strong strength in the cross-country skiing and ice and snow ski jumping, which has laid a certain foundation for the Nordic combined movement of China's development. Nordic combined developments in China are favorable to the improvement of winter sports.

The analysis of the development of Chinese Olympic sports scores. Although China's Olympic movement scale and entries has made considerable development, but according to the medal and project analysis, Chinese winter sports development is not optimistic. This paper makes statistics of the 16th ~ 21st winter Olympics gold medal and the medal sport in China project and its quantity; we calculate the 7th winter Olympics gold medal numbers and the proportion of Chinese income gold medals and total medals. The statistics of the gold medals are shown in Table 5.

accounted for 75.00% of the total. Three other pieces respectively from the freestyle skiing, speed skating, Figure skating, and among them the highest percentage of total medals we won was the 21<sup>st</sup> Olympic winter games, was just 5.81%, and the annual four of five gold medals were from the short track speed skating program. So, we find that in order to really improve the number of Chinese Olympic gold medal, we must break through the situation that most of medals came from speed skating movement, and widely develop other winter sports on the number of top sporting talent.

also comes from the freestyle skiing, speed skating, Figure skating and short track speed skating. Since the 16<sup>th</sup> games, China won the first Olympic winter games silver medal, it

has been seven Olympic winter games that we won a medal. It is the same as the gold medal of the project, which mainly from short track speed skating. China won 51 gold medals, of which there are 26 pieces come from the short track speed skating project, occupy 50.98% of the total medals gained by the Chinese, and occupies the half. From the freestyle skiing, speed skating and Figure skating, the medals respectively is 8, 7 and 6 blocks, respectively accounted for 15.69%, 13.73% and 11.76%. At the same time, by the successive games in Table 6, we can see that in the number of medals won by China, the percentage of Chinese scores showed a trend of rising.

Known from the analysis of the above, the grades of Chinese Olympic medals are generally rising, but it mainly comes from the short-track speed skating. To make the big breakthrough of the Chinese medal result and break the limitation that the medal mainly comes from the speed skating movement, we should cultivate athletic talents for other Olympics projects; and improve China's overall strength in the other Olympic projects as well.

#### 4 Conclusions

From the above analysis, we can see that the Olympics movement in the developing rapidly, the number of the athletes and participating countries, the competition sports and events quantity are increasing, the influence of the winter Olympics are also constantly expanding, the influence of snow sports result is larger than the ice sports scores, so the strength of Europe and the United States and

other countries in the winter Olympics are large, Asia and other countries are difficult to match with them. China's Olympic competition scale and the development of the competing scores are developing gradually. But at the same time, China's gold medal and the medal mainly comes from the projects of short track speed skating on the ice, both in gold medals and medals, it comes from the number of short track speed skating project which have accounted for more than half of the number of China's medal income, Chinese single wining project largely limits the improvement Chinese Olympic performance. Relative to countries that have string strength the participator number, income of gold medal, and medal, our strength is very weak, and the momentum of the development of China's Olympic sports is not strong. But the developing situations of us have a positive side. As a whole, no matters are the Gold grades or medal Table, we has a certain development, the size of Chinese participating is in a development, and the development of China in winter sports have a certain space, etc.

For China's Olympic sports, China should break through the single source of status quo of gold medals and other medals; we should increase the participating project in the Olympic Games, developing other Olympic sports in China, especially developing the strength of snow projects. We should cultivate athletic talents of other projects, and widely cultivate the talents, thus improve the performance of Chinese gold medal Table and the medal Table in the Olympics games.

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