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Chinese olympic winter games event development analysis and suggestions based on mathematical statistical theory

Chunling Li^{1*}, Yan Sun¹, Xueheng Li²

¹Institute of Physical Education, Jilin University, Changchun 130012, Jilin, (CHINA)

²PlAAF Aviation University, Changchun 130000, Jilin, (CHINA)

ABSTRACT

The paper applies documents literature, based on mathematical statistics knowledge, utilizes comparative analysis and other methods, makes research on Chinese participant performances in previous Olympic Winter Games and Sochi Olympic Winter Games, and compares it with European and American winter sports powers' Olympic Winter Games performance, and puts emphasis on researching Chinese snow events. Result shows: World winter sports overall pattern hasn't yet greatly been changed, China is strong in ice events but it still is weak in snow events, winter sports development in China is extremely imbalanced. The paper's analysis stresses snow events to Chinese Olympic Winter Games competitive performance promoting influence, and researches on China snow event slowly development each factor, it makes analysis and researches on Chinese ski industry development and Chinese Olympic Winter Games prospects, and gets Chinese ski industry development potential is huge, China will surely constant develop Olympic Winter Games snow events, and Chinese Olympic Winter Games performance will constantly improve.

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KEYWORDS

Snow events;
Olympic winter games;
Difference analysis;
Competitive sports;
Strategic value.

INTRODUCTION

After 17 competition days' intense competition, the XXII Olympic Winter Games has been closed in Russian Sochi Fisht Olympics stadium in the evening of Feb.23rd, 2014. Olympic Games is the highest platform for world competitive sports strength exhibiting, is also most important evidence to measure each country competitive sports levels, and is more a nation's comprehensive national strength's exhibition.

Comparing with Olympic Summer Games that has already obtained splendid achievements and dominated

in the list of total performance top one community, Chinese athletes' paces in Olympic Winter Games is quite difficult. With regard to the problem, there are lots of scholars have made systematically causes analysis of it, and put forward lots of opinions. Just by their efforts, China has achieved greatly in Olympic Winter Games events, from which: Cai Lan (2011) By analyzing 21th Olympic Winter Games medal table, she researched world winter sports overall competitive pattern^[1]; Gao Liang, Sun Yu(2012) By analyzing Chinese previous Olympic Winter Games participant performance, they proposed strategic ideas of consolidating dominant

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events, improving sub dominant events, breaking through backward events^[2]; Gao Jun, Liu Shu-Yong (2008) By researching on Chinese 11th national winter sports meeting snow events development, they proposed fully excavated and utilized social resources, expanded new advantages solution^[3]; Zhang Yun-Feng, Wang Zhi, Wang Xu(2010) By researching on Chinese skiing sport development history and its effects, they analyzed its strategic values to Chinese sports and economic as well as others' development^[4].

This paper on the basis of previous research, by comprehensive analyzing of this Olympic Winter Games Chinese participating events and its ranking as well as others each factor, through comparison of Chinese Olympic Winter Games' ice events and snow events' performance, it discusses presently Chinese development level in Olympic Winter Games, as well as Chinese winter sports strength patterns, which provides strategic ideas for realizing Chinese next Olympic Winter Games breakthrough, meanwhile it also provides references for Chinese winter sports events development.

CHINESE ICE AND SNOW EVENTS DEVELOPMENT AND CURRENT STATUS

Sochi olympic winter games overall competition pattern and China current status

Sochi Olympic Winter Games is historically largest scale, most setting events Olympic Winter Games. This Olympic Winter Games set 7 major events, 15 sub events, 98 small events, totally 88 delegations' 2856 athletes attended, and totally generated 11 items games records. Among them, Russia ranked in the top one with 13 gold medals, 33 medals, Olympic Winter Games traditional power Norway, Canada, America and Netherlands respectively ranked in the second to fifth. The five countries totally achieved this session Olympic Winter Games' approximately 60% gold medals and approximately 47% of medals, no matter in the number of gold medals or the totals of medals, they had obvious advantages than other participating countries and became genuine Olympic Winter Games "First Group". China ranked in the 11th with 3 gold medals, 9 medals performance, it remained in the Olympic Winter Games

"the second group", comparing with traditional Olympic Winter Games powers, and it kept some paces.

China previous olympic winter games performances analysis

In Olympic Games competitiveness, achieved number of gold medals and medals is an important evidence to measure a country competitive levels, from which medal table can reflect each participating country's overall strength and basis status, and gold medal tally concentrates on reflecting participating countries top competitive talents' meaning of number and amount^[7,8].

China attended first Olympic Winter Games was American Lake Placid the 13th Olympic Winter Games in 1980. And in the 13th to 15th Olympic Winter Games, China hasn't achieved one medal. China first Olympic Winter Games medal was that in 16th France Albertville Olympic Winter Games, Ye Qiao-Bo achieved speed skating two silver medals, and Li Yan achieved straight-away skating one silver medal. Till 19th American Salt Lake City Olympic Winter Games, China then gained first gold medal. With Chinese economic society constant development, sports competitive ability has been constantly improved, Chinese performance in Olympic Winter Games has also been constantly improved; in the 21th Canada Vancouver Olympic Winter Games, China ranked in the seventh of medal table with five gold medals two silver medals four bronze medals such good result, relative data is as TABLE 1 show.

Sochi Olympic Winter Games performance is slightly poorer than that of last Vancouver Olympic Winter Games; it still keeps in the Olympic Winter Games the

TABLE 1 : Previous olympic winter games China achieved gold medals and medals amounts as well as ice events and snow events amount

	Ice event		Snow event		All events	
	Gold medals	Medals	Gold medals	Medals	Gold medals	Medals
The 16 th	0	3	0	0	0	3
The 17 th	0	3	0	0	0	3
The 18 th	0	7	0	1	0	8
The 19 th	2	8	0	0	2	8
The 20 th	1	9	1	2	2	11
The 21 st	5	8	0	3	5	11
The 22 nd	3	7	0	2	3	9

second group. But this Olympic Winter Games is still a breakthrough, Zhang Hong has achieved speed skating women 1000m gold medal, which has realized China “breakthrough of zero” in Olympic Winter Games basic major event. But by TABLE 1, Chinese Olympic Winter Games participating performance is still not going well, and Chinese snow event proportions are even very little. China has achieved first ice event medal in the 16th Olympic Winter Games, and till the 18th Olympic Winter Games, Chinese player Xu Nue-Nue has achieved freestyle skiing Ladies’ Aerials silver medal, which has broken through Chinese snow event no medal achievement history. In previous Olympic Winter Games’ achieved 12 gold medals, only one of them is from snow event, and during the achieved 53 medals, it also only 8 of them are from snow event. How to improve China Olympic Winter Games performance has already become Chinese sports one urgent problem.

China olympic winter games development prospects

The paper makes statistics on Chinese previous Olympic Winter Games achieved gold medal and medal amounts as well as their respectively derived from snow event and ice event amounts, by which it makes

mathematical analysis and difference analysis of China Olympic Winter Games development prospects.

Figure 1 and Figure 2 draw the amount trend of gold medals and medals amount that China achieved in Olympic Winter Games, by comparison of their ice event and snow event achieved gold medals and medals amount, and it analyzes China ice and snow events development.

By Figure 1, it is clear that Chinese gold medal total amount and derived from ice event gold medals, they are overall in the rising trends, though Sochi Olympic Winter Games gold medals numbers are lower than that of last Vancouver Olympic Winter Games, China ice events’ straightaway speed skating, figure skating and speed skating as well as other aspects have stronger powers, with China economic strength constantly improvement and ice and snow events rapidly development in China, China’s performance in Olympic Winter Games ice events in future will surely constant improve. And Chinese snow events gold medals, it only achieved one gold medal in the 20th Olympic Winter Games, gold medal tally concentrates on reflecting participating countries’ top competitive talents amount, which shows China’s top talents amount in snow events still keep larger paces with traditional European and American

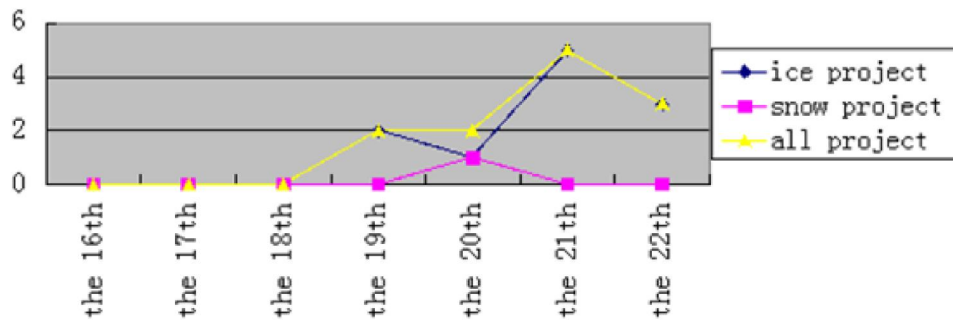


Figure 1 : China previous olympic winter games achieved gold medals amount and respectively derived from ice event and snow event amount

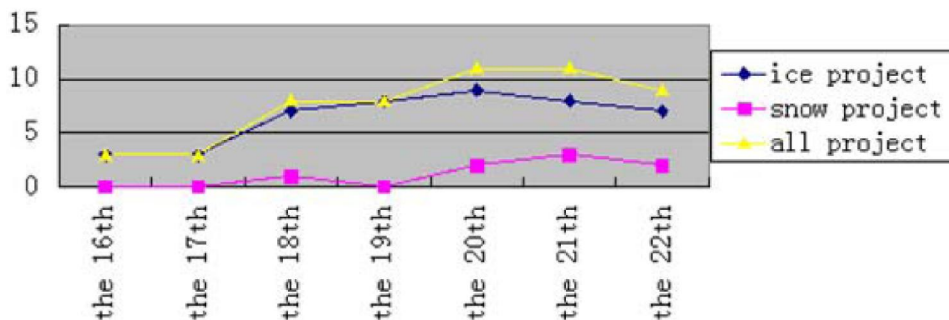


Figure 2 : China previous olympic winter games achieved medals amount and respectively derived from ice event and snow event amount

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ice and snow powers by comparing.

By Figure 2, it is clear, Chinese medals amount, no matter derived from ice event or snow event, or medals total amount, all are in good rising trend. Medal table can reflect each participating countries overall strength and basic status, which reflects Chinese participating group overall strength is constantly increasing, meanwhile it also reflects Chinese sports talents are constantly increasing, sports facilities are constantly improving. Though China now keeps larger paces with traditional European and American powers in ice and snow events by comparing, China overall strength in ice and snow events are constantly improving.

But meanwhile by comparison, it can also find though most of Chinese medal amounts are from ice events, the achieved medals in snow events have some improvement both in quantity and proportion, which also reflects Chinese skiing constantly development.

This Olympic Winter Games, China totally had 66 athletes attended 4 major events, 49 small events competition, from major event, it only had skiing, skating, curling and winter total events, and this Olympic Winter Games totally set 7 major events, 98 small events. Relatively speaking, Chinese Olympic Winter Games competition events have certain development space. And with Chinese snow mass sports and competitive sports constantly development, in Chinese unorganized Olympic Winter Games competition events, China has strength to organize multiple snow sports.

For example, northern Europe two events competition are China easier expanding snow competition events. Northern Europe two events skiing is a kind of mixed snow competitive event that composed of cross-country skiing and ski jumping, is a branch of skiing that listed as skiing in international sports classification, has higher requirements of athletes ; in Olympic Winter Games, China has not yet attended the event. But no matter northern Europe two events competition rules changes or Chinese athletes' physical conditions, both

are beneficial to northern Europe two events organizing. Meanwhile, Chinese athletes' cross-country skiing and ski jumping strength are stronger, which also builds foundation for China organizing northern Europe two events. And China has already held northern Europe two events competition in 2009 Harbin winter universiade, which also builds foundation for China attending Europe two events in future Olympic Winter Games^[9].

Most of Chin achieved medals are from ice events, and snow events account for larger parts of Olympic Winter Games, China snow events extension will surely increase China gold medal-winning strength in Olympic Winter Games. China rank in Olympic Winter Games medal table will also surely step over the second group to the first group.

STRATEGIC ANALYSIS OF IMPROVING CHINA OLYMPIC WINTER GAMES PERFORMANCE

Comparative analysis of olympic winter games powers and chinese medals

The paper makes research and analysis of this Olympic Winter Games medal table top four and Chinese performance, makes statistics of the five countries gold medals and medals amount, and carries out analysis of these countries' snow events and ice events performances effect on their total performance, it concludes China differences in Olympic Winter Games events from traditional ice and snow powers, which provides scientific evidence for Chinese ice and snow events development strategic decision.

By TABLE 2, it is clear that this Olympic Winter Games medal table ranked top four's Russia, Norway, Canada and America, no matter in gold medal amount or medal total amount, snow events medals amount proportions of total medals were not lower than 50%.

TABLE 2 : Partial participating countries' gold medal and medal amounts and their snow events proportions

		Russia	Norway	Canada	America	China
Gold medal	Total amount	13	11	10	9	3
	Snow event (%)	53.9	100	50	88.9	0
Medal	Total amount	33	26	25	28	9
	Snow event (%)	60.6	100	52	85.7	22.2

With regard to snow events minimum proportion's Canada, its snow events gold medals and medals proportions also respectively arrived at 50% and 52%. America derived from snow events gold medals and medals proportions were respectively 88.9% and 85.7%. And medal table ranked second Norway, the achieved 11 gold medals and 26 medals were even all from snow events. And in China delegation's 9 medals, only 2 was from snow events, and the achieved 3 gold medals, even all were from ice events. Norway and America respectively ranked in medal table the second and the fourth, their achieved gold medals and medals proportions that came from snow events were all surpass 85%, thereupon snow events occupied important position in Olympic Winter Games.

In Olympic Winter Games, snow events proportion is far larger than ice events, in this Olympic Winter Games, snow events have 69 medals, and ice events have only 29 medals. Medal table ranked in the top four's Norway and other countries are also all snow sports major countries. China only achieved 2 medals in freestyle skiing aericals. Therefore, to improve China performance in Olympic Winter Games, it should have breakthrough in snow events.

China snow events relative backward causes' analysis

Snow events competitive pattern

The paper makes statistics on this Sochi Olympic Winter Games each region competition performance, it researches snow events world competitive pattern by analyzing each continent achieved medals amount in competition.

By TABLE 3, it is clear that this Olympic Winter Games snow events, Europe achieved medals account

TABLE 3 : Sochi olympic winter games each continent medals percentages

	Gold (%)	Silver (%)	Bronze (%)	Medal (%)	Country (%)
Asia	0	7.4	5.6	4.3	11.8
Europe	81.4	75	70.8	75.7	70.6
North America	18.6	14.7	19.4	17.6	11.8
Oceania	0	3.0	4.2	1.4	5.9
South America	0	0	0	0	0
Africa	0	0	0	0	0

for 70.8% of totals, and its gold medals share has even arrived at 81.4%, and its winning countries amounts account for 70.6% of whole winning countries. North America competitiveness is next to Europe, its medals and gold medals shares respectively have arrived at 11.8% and 18.6%, and its winning countries amounts account for 11.8% of whole winning countries. Europe and North America has taken all gold medals in this Olympic Winter Games, the two medals shares and winning countries ratios have also respectively arrived at 80% and 82.4%. Asian and Oceania medals shares are respectively 11.8% and 5.9%, their winning countries amounts respectively account for 11.8% and 5.9% of whole winning countries, which are far lower than Europe and North America. South America and Africa have no competitiveness in this Olympic Winter Games. China has great gaps with Europe and America in snow events, researching and analyzing China and Europe as well as America powers differences will be the key to China's breakthrough in future Olympic Winter Games.

China and European & American powers snow events comparative analysis

Comparing with traditional European and American powers, China relative poor competitive level in snow events have many reasons, such as lack of sports base, mass attentions as well as scientific and technological supports and so on.

Chinese mass skiing is still in the starting phase, lacking of mass base, though skiing has already extensive rose in China, compared with Europe and America as well as other ice and snow powers, number of Chinese skiing sportsmen are still fewer, even compared with Japan and South Korea, it also quite inferior to them. As Chinese snowboard event, though number of snowboard players are increasing, compared with number of Chinese other sports events players, the population is relative very little, while compared with European and American some ice and snow powers, the population gap is even bigger, number of European and American some countries snowboard amateurs even arrive at several thousand.

Meanwhile, in training, China keeps greater paces with European and American ice and snow powers. Our ice and snow athletes' training mostly carries out in domestic, training required each aspect facilities and

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others are not perfect, even sometimes it can only research on foreign excellent ice and snow athletes training videos to learn, which surely will cause Chinese ice and snow training's efficiency be far away from that of long-term European zip assembled training by comparing. The more important is, in European and American ice and snow powers, lots of snow events have already become a kind of professional competitiveness, top level European and American professional players' annual income even arrives at as high as ten million dollars. While in China, national investment is still the unique source of snow events' momentum of development, sports base huge gap also lets Chinese snow events training cannot more effective improve performance³.

OUTLOOK OF CHINA OLYMPIC WINTER GAMES AND OTHER SNOW EVENTS

Compared with Europe and America as well as other developed countries, Chinese modern skiing started later, and the earliest skiing population is the least proportions in skiing population that was competitive skiing population. Chinese modern skiing started from 1930, till 1950, China also just has fewer athletes gone in for the event, and skiing facilities were very simple and crude. Until 1995, Chinese first ski resort——Yabuli windmill manor ski resort just opened to the public. Chinese skiing industrial development can be analyzed from annual skiing person-time and its annual growth rate as TABLE 4.

TABLE 4 : China skiing person-time statistics

Years	1995	2000	2005	2010	2015
Person-time (ten thousand)	0.27	10	300	1000	2000

Before opening and reforming, Chinese skiing population only had hundred people and all are professional athletes. Until 1995, Chinese mass skiing population emerged, the number of people is not more than three thousand. After that, number of Chinese skiing people has sharply increased at some time. From 1996 to 2000, Chinese skiing person-times average annual growth range arrives at 109%, after that, Chinese skiing person-times growth rate has slightly decreased, from 2001 to 2005, Chinese annual skiing person-times average annual growth range arrives at 53%. From 2005 to

2010, Chinese skiing person-times have been further decreased that reduced to 20%, from 2010 to 2015, Chinese skiing person-times will keep around 10%.

There are various reasons for Chinese mass skiing growth range decreasing, such as skiing population effective cardinality, per capita income, age, living style and traditions as well as other factors. Compared with European and American powers, Chinese population structural and age structural differences largely affect Chinese skiing population effective cardinality. China has around 85415 ten thousand of rural population, which cannot be calculated into skiing population effective cardinality. And Chinese skiing industry developed later, Chinese baby boom(from year 1950 to 1960)born population cannot effectively contact with skiing event that China real skiing population effective cardinality should be calculated from population that born in 1970. Meanwhile, skiing is slowly developing in Chinese history, is always not taken seriously, these cause Chinese skiing industry slower development. At the same time, per capita income is also the main reason that effects on Chinese population converting into skiing population. In the view of European and American skiing powers skiing population growth statistics, when per capita GDP arrives at 3000 to 10000 dollars, it is skiing population adjustment growth period. Chinese per capita GDP in 2010 has arrived at 3678 dollars. From the perspective of GDP, Chinese lots of regions skiing market space has already nearly saturated, Beijing development space³ is only 4%, the three northeast provinces are only 7%. China skiing industry is still in preliminary development period, living styles, men and women skiing proportions and others are also the important reasons that affect China skiing industry development. Meanwhile, due to Chinese lots of sliders are major in experiencing skiing, skiing time is short, skiing quality is poor, which also leads to China skiing industry imbalanced development.

By reason analysis of China mass skiing growth range decreasing, it can outlook Chinese future skiing industrial trend. Chinese urbanization level is constant increasing, according to statistics; Chinese average annual urbanization ratio is 1.3%, till 2020, Chinese urbanization ratio will arrive at 58%, a great deal of population will transfer from village to city. Meanwhile, with China newborn constantly born, it will surely increase

Chinese skiing population effective cardinality. By statistics of China future urbanization ratio and birth ratio, until 2020, Chinese skiing population effective cardinality will arrive at 5 hundred million people. Till 2025, with urbanization constant perfection, analyze Chinese skiing population age structures, which also greatly improves Chinese skiing population conversion ratio.

TABLE 5 : Beijing sliders age distribution

Age	Frequency	Percentage (%)
Below 25years old	69	24.8
26-35 years old	126	45.3
36-45 years old	59	21.2
45-55 years old	21	7.6
Above 55 years old	3	1.1

By TABLE 5 investigation on Beijing skiing population, it is clear that population from 26 to 35 years old skiing frequency is the most that accounts for 45.3% of skiing population, and below 25 years old population is the secondary, the totals of the two arrives at 70.1% that is main force of skiing. Above 36 years old skiing population only accounts for 29.9%. It shows that skiing is more favored among the youth. With Chinese rural youth constantly migrating to city, future situations will surely beneficial to Chinese skiing development.

By above analysis, with China urbanization constantly improving, new generation population constantly growing, economic levels constantly improving, Chinese mass skiing industrial growth will usher in a new growth peak after falling into the bottom.

CONCLUSIONS

Competitive sports level improvement is up to sports mass base and professional training. Mass sports are the base for improving sport levels, technical improving, professional guiding can be developed only on the basis of mass sports. General view Chinese superiority sports events all have widely mass base. Excellent sports athletes generate from mass sports and serve to mass sports. Chinese skiing industry constantly development, snow events constantly popularization, no matter in economy or in athletes selection, or in training apparatus development, all will provide good guarantees for Chinese snow competitive sports development. To Olympic Games snow events, China still has lots of

events not yet organized. Mass skiing constant development will surely accumulate precious experiences for Chinese snow events organizing. Meanwhile, skiing industrial constant development, it will also propel to Chinese snow events professionalism, and will greatly improve China professional athletes' competitive strengths in snow events. Future Olympic Winter Games performance will also constantly improve.

China attends little in Olympic Winter Games snow events, by far it is difficult to confront to European and American powers. But China skiing industry develops rapidly, skiing population effective cardinality will constant increase, snow events mass base is constant developing, all builds foundation for Chinese skiing talents selection and training. Meanwhile, Chinese performance has been constantly broken through in Olympic Winter Games, and the performance in future Olympic Winter Games will be also constantly improved.

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