

Analysis on Characteristics of Shooting Competition in 2020 Tokyo Olympics and Successful Experience of Chinese Team

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Abstract: Analyzing characteristics of the 2020 Tokyo Olympic shooting competition, summarizing successful experience of Chinese team, can provide references for training. This research analyzes the distribution of medals, the age structure of participating athletes, the performance of the Chinese team in the Tokyo Olympic Games and summarizes the successful experience of the Chinese team in preparing for the Olympics by methods of literature, mathematical statistics, and logical analysis. The results show that the current international shooting competition is very fierce. In recent years, no country has been able to take the first place continuously. In this Olympic Games, European countries are still the international shooting power. Russia and the United States have made rapid progress, while China has shown the most outstanding performance. India, as an emerging force in recent years, has performed abnormally. In terms of age structure, compared with trap and skeet, rifle and pistol athletes are younger and have less training years, as well as the average age of gold medalists among medal winners is younger, especially the Chinese team. Comparing with the previous year, Chinese team has younger participants and better results in the competition. The successful experience of the Chinese team in Tokyo Olympics mainly includes the following aspects. The top-level management system supporting the development of shooting sports through national efforts is the fundamental guarantee for successful participation in competitions. The training concept of the Chinese team is gradually systematized, which is the ideological foundation of scientific training. The Chinese team has developed new methods for athlete selection for this Olympic Games, which is the key to achieving breakthroughs in this competition.

1. Introduction

In recent years, the International Shooting Sports Federation has continuously modified the rules of the shooting competition, such as preliminary results are not allowed to be merged into the final, the elimination system at the end of the scoring was adopted in the finals [1]. The revision of the rules has had a profound impact on the laws of shooting competitions. [2] All countries are taking steps to deal with the changes caused by the updated rules. The reality shows that the Chinese

national team's measures are the most effective. For example, in the 2020 Tokyo Olympics, the Chinese national team won four golds, one silver and six bronzes, setting a record for more medals than all previous competitions [3]. The task of this study is to analyze the characteristics of Tokyo Olympic Games and summarize the successful experience of Chinese team.

2. Distribution of Medals in the Tokyo Olympics

At the 2020 Tokyo Olympics, 45 medals included in the 15 events were awarded to 19 countries, nine of which won gold medals. This phenomenon was not significantly different from the previous two Olympics (see Table 1). The number of countries which won medals in Tokyo Olympics is the same as the Rio Olympics, but four fewer than at the London Olympics. According to the distribution of medals won by each continent in the last three Olympic Games, European countries are still the international shooting power. Although no country can occupy the first shooting place steadily, but many countries have shown the strength to win gold. China and the United States are countries with stable competitive strength in Asia and the Americas, respectively. India has played poorly at the Tokyo Olympics. This shows that the current international shooting competition is very fierce. The Chinese team is still facing great competitive pressure.

Table 1: Distribution of medals in the last three Olympic Games

London Olympic Games 2012					Rio Olympic Games 2016					Tokyo Olympic Games 2020					
rank	country	Gold	silver	bronze	total	country	Gold	silver	bronze	total	country	Gold	silver	bronze	total
1	Korea	3	2	0	5	Italy	4	3	0	7	China	4	1	6	11
2	America	3	0	1	4	Germany	3	1	0	4	America	3	2	2	7
3	Italy	2	3	0	5	China	1	2	4	7	Russia	2	4	1	7
4	China	2	2	3	7	Korea	1	1	0	2	Switzerland	1	0	1	2
5	Belarus	1	0	0	1	Vietnam	1	1	0	2	Slovenia	1	0	0	1
6	Romania	1	0	0	1	America	1	0	2	3	Spain	1	0	0	1
7	Cuba	1	0	0	1	Greece	1	0	1	2	Iran	1	0	0	1
8	Croatia	1	0	0	1	Kuwait	1	0	1	2	France	1	0	0	1
9	Britain	1	0	0	1	Australia	1	0	0	1	Czech	1	0	0	1
10	India	0	1	1	2	Croatia	1	0	0	1	San Marino	0	1	1	2
11	France	0	1	1	2	Russia	0	2	2	4	Serbia	0	1	1	2
12	Slovakia	0	1	1	2	France	0	1	1	2	Britain	0	1	1	2
13	Serbia	0	1	1	2	Baxi	0	1	0	1	Bulgaria	0	1	0	1
14	Poland	0	1	0	1	New Zealand	0	1	0	1	Korea	0	1	0	1
15	Belgium	0	1	0	1	Sweden	0	1	0	1	Italy	0	1	0	1
16	Sweden	0	1	0	1	Ukraine	0	1	0	1	Cuba	0	1	0	1
17	Denmark	0	1	0	1	Britain	0	0	2	2	Denmark	0	1	0	1
18	Ukraine	0	0	2	2	DPRK	0	0	1	1	Ukraine	0	0	1	1
19	Slovenia	0	0	1	1	Switzerland	0	0	1	1	Kuwait	0	0	1	1
20	Russia	0	0	1	1										
21	Kuwait	0	0	1	1										
22	Qatar	0	0	1	1										
23	Czech	0	0	1	1										

3. Characteristics of Age for Athletes Participating in the Tokyo Olympics

According to Table 2, in the 15 events, the average age of gold medal winners is smaller than that of silver and bronze medal winners, medal winners, and finalists. This phenomenon is more evident in the rifle and pistol events. It was also found that the average age of medal winners and finalists in the rifle and pistol events was lower than that in trap and skeet events. In addition, in the

rifle and pistol events, the average age of gold medal winners is significantly lower than that of silver and bronze medal winners, while there is little difference between gold, silver, and bronze medal winners in trap and skeet events. This indicates that the athletes in the rifle and pistol events at this Olympic Games are younger comparing to the trap and skeet events.

Table 2: Age of Tokyo Olympic athletes (unit: years)

	all discipline	rifle and pistol	trap and skeet	Chinese team
Gold Medalist	28.94±7.03	25.75±6.29	35.33±2.81	24±5.13
Silver medalist	31.28±8.20	28.03±7.44	37.67±5.47	-
bronze medalist	31.33±8.43	29.80±6.11	34.30±11.20	-
Medalist	30.52±7.99	27.89±6.85	35.80±7.50	25±6.06
Finalist	29.22±7.19	27.65±6.37	33.03±7.63	25±5.35

According to Table 3, it was found that the average training years of rifle and pistol athletes were also significantly shorter than those of trap and skeet athletes, but the training years of gold medalists in rifles and pistols were not less than those of silver and bronze medalists. These phenomena suggest that a longer training period for trap and skeet athletes may be a general characteristic of the winners of this event. Under the current competition rules, the champion athletes in the rifle and pistol events are younger in age but their training years are not short, which becomes a new characteristic of these two events.

Table 3: Training Years of Athletes at the Tokyo Olympics (Unit: Years)

	all discipline	rifle and pistol	trap and skeet
Gold Medalist	17.19±6.53	15.18±5.94	21.60±5.54
Silver medalist	15.06±6.45	12.5±4.17	21.20±6.79
bronze medalist	17.11±8.13	15.27±3.84	20.5±11.94
Medalist	16.44±7.16	14.26±4.90	21.06±8.81
Finalist	15.71±6.75	14.35±5.78	19.21±7.72

4. Performance of the Chinese Shooting Team in the Tokyo Olympics

In the 2020 Tokyo Olympics, a total of 23 Chinese athletes (10 men and 13 women) participated in 14 events, including 18 athletes in the rifle and pistol events and 5 athletes in the trap and skeet events. Among them, 14 athletes successfully entered the final, accounting for 59%, winning 4 gold medals and 11 medals, with gold and medal rates of 17% and 46% respectively. Comparing to the performance of the Chinese team in all previous Olympic Games (see Table 4), the number of gold medals won in this Olympic Games is one less than that of the Beijing Olympics, and the number of finalists is ranked second (three less than that of the Athens Olympics), but the number of medals won is the highest. It is sufficient to demonstrate that the overall preparation work for the Tokyo Olympics by the Chinese team was successful. But we also found that the Chinese team performed much better in rifle and pistol competitions than in trap and skeet.

In the previous Olympic Games, there were a total of 17 athletes in the Chinese team for rifle and pistol events. The average age of all athletes was 29.3 (± 4.2) years old, and the number of medal winners was 28.3 (± 2.9) years old. Among them, 6 had Olympic experience and were all former Olympic champions. The age of athletes participating in this Olympic Games is younger than previous Olympic Games. We have calculated the average age of athletes participating in this Olympic Games, which is 24.8 (± 4.52) years old. Among them, gold medal winners and medal winners are 24.0 (± 5.13) years old and 24.4 (± 6.06) years old, respectively. The Chinese team has shown a younger trend compared to athletes from other countries (see Table 3).

Table 4: Shooting Competition Results of the Chinese Team in the 23rd to 32nd Olympic Games

session	Gold Medalist	Silver medalist	bronze medalist	Medalist	Finalist
23rd	3	0	3	6	8
24 rd	0	1	1	2	7
25 rd	2	2	0	4	10
26 rd	2	2	1	5	12
27 rd	3	2	2	7	12
28 rd	4	2	3	9	17
29 rd	5	2	1	8	13
30 rd	2	2	3	7	11
31 rd	1	2	4	7	13
32 rd	4	1	6	11	14

5. Successful Experience of Chinese Shooting Team's Olympic Preparation

5.1 The Top-level Management System Supporting the Development of Shooting Sports through National Efforts is the Fundamental Guarantee for Successful Participation in Competitions

The development of shooting sports is restricted by the Gun Control Regulations in China. At present, the level of marketization and professionalization development of shooting sports in China is not very good. Therefore, safety management, capital investment, and other aspects mainly require government support [4-6]. The cultivation of outstanding athletes, talent selection, team formation and management of national teams, training, participating in competitions and holding competitions in the context of the COVID-19 epidemic all benefit from national system. The advantage of this system is the fundamental guarantee for the success of participating in this Olympic Games.

5.2 The Training Concept of the Chinese Team is Gradually Systematized, which is the Ideological Foundation of Scientific Training

On the basis of over 60 years of development, Chinese shooting seniors have summarized valuable experience. For example, the Chinese team has developed a set of basic skill testing standards with density as the core basing on the concepts of "aiming is the premise of shooting skills, stability is the foundation of precise shooting, coordination is the key to high accuracy of shooting, and consistency is the ultimate goal of shooting competitions" [7]. At present, the Chinese team has formed a relatively mature ideological system. "Physical fitness training is the foundation, technology is the core of training, psychology is the guarantee of training, and the effective combination of psychological and technical abilities is the key to winning".

5.3 The Chinese Team has Developed New Methods for Athlete Selection for this Olympic Games, which is the Key to Achieving Breakthroughs in this Competition

5.3.1 Selection Methods for Athletes

Significant adjustments have been made in the selection of athletes in preparation for this Olympic Games. For example, the selection of athletes in individual events is divided into two steps. The first step is the initial selection in the year before the Olympics (formation of the national team). The second step is to select outstanding athletes from the newly formed national training team in the year of the Olympic Games. This article compares the selection methods of athletes during the

preparation period for the Tokyo Olympics and the Rio Olympics (see Tables 5 and 6). The selection of athletes for these two Olympic Games is based on the sum of their scores in international and domestic competitions. However, there have been significant changes in the rules for determining which competitions can receive points and how to give points based on the results of the competitions.

Table 5: Selection Process and Basis of Athletes for Two Olympic Games

	Rio Olympic Games Preparation Cycle	Tokyo Olympic Games Preparation Cycle
Selection Process	① In the year before hosting the Olympics, a national training team was initially formed based on the points obtained from three domestic selection competitions and international competitions.② In the year of the Olympic Games, another three domestic selection competitions was organized, and Olympic participants will be selected from the preliminarily formed national team based on the sum of all previous individual points.	
Selection basis	Some international competitions, including three Olympic Games from 2004 to 2012, the World Championships from 2014, and the World Cup from 2013 to 2015, are awarded points based on ranking. Points will be awarded based on ranking in 6 domestic selection competitions, and points will also be awarded if a new record is set.	International competitions that can earn points include the 2018 Asian Games, the 2018 World Championships, and the 2019 World Cup. More detailed requirements have been made for the points of the last three domestic selection competitions. For example, in the final, points are given based on the number of shooting rings, and performance standards are set for qualifying events.

Table 6: Comparison of Points Methods for International and Domestic Trials in Two Olympic Cycles

	Rio Olympic Games Preparation Cycle	Tokyo Olympic Games Preparation Cycle
Points for international competitions	Athletes who rank in the top 8 (top 6 in rapid pistol) at the World Championships and 2015 World Cup can earn points based on their final ranking; Champion athletes who have won three or more gold medals in the 2013-2014 World Cup can receive points as rewards. The top 3 athletes in the London Olympics can earn points. Athletes who have participated in the 2004 and 2008 Olympic Games and won championships and are currently training can earn points.	Athletes who rank in the top 6 (top 5 in rapid pistol) of the World Championships and World Cups and whose qualifying results are not lower than the selection criteria can receive points based on their ranking. However, if their qualifying results are lower than the standard, 5 points will be deducted. If the final result equalizes with the world record or sets a new world record, reward points can be earned. Athletes who rank in the top 2 at the Asian Games will receive bonus points. A standard for failing the qualification in international competitions has been proposed. If an athlete's qualification results in the above competition falls below this standard, 3 points will be deducted for every occurrence.
Points for domestic selection competitions	Ranking points: For the first 3 competitions, the top 8 of the qualifying competitions will receive points based on their ranking, while for the next 3 competitions, the top 6 of each competition will receive points on their ranking. Score points: Athletes who rank in the top 8 (top 5 in rapid pistol) in the competition and have tied the world record or set a new world record in qualifying can receive points.	Ranking points: In the first three competitions, the top 6 of the qualifying competition (top 5 in rapid pistol) enter the finals, while in the next 3 competitions, the top 5 enter the finals. The qualification competition results of the finalists shall not be lower than the selection criteria, and points shall be deducted by 5 points if they are lower than the criteria. Score points. Firstly, athletes ranked in the top 8 (top 6 in rapid pistol) of the 6 qualifying competition can receive points from the qualifying competition. Secondly, in the last 3 competitions, points were added specifically for the finals. Athletes who meet the basic scores before the elimination stage in the final can receive basic points, while those who ultimately reach the top 2 in the final and meet the final scores can receive additional points. Although athletes will receive reward points for having tied the world record or set a new world record in the finals of 6 domestic competitions, the reward points for the last 3 competitions are even higher.

5.3.2 Selection Experience of Athletes

The successful experience of the Chinese team in selecting athletes can be summarized as follows.

Firstly, effectively selecting athletes with good competitive performance is an important part of selecting athletes. The competitive state of athletes undergoes periodic changes. The purpose of selecting athletes is to select the athletes with the best competitive condition to participate in the competition. The reform of the athlete selection method this time can try to select athletes who are in good competitive condition in the early stages of the Olympic Games as much as possible. They will have more chances of winning the game.

Secondly, the rational formulation of quantitative assessment standards is a powerful measure to stimulate athletes' motivation to pursue better performance, develop their sports potential, and ultimately promote the achievement of high-level and stable performance. A major highlight of this selection method is the quantitative assessment method developed based on the characteristics of the competition, which provides points based on the competition ranking and points based on the number of shooting rings. This assessment method has replaced the previous assessment method that only focused on ranking points. Accurately setting assessment standards to the number of shooting rings can provide clearer goals for athletes' training and competition. This method can help stimulate the potential of athletes, while also improving the effectiveness of training, thereby consolidating the basic skills required for shooting. In addition, setting standards for meeting the standards for qualifying competition results and reducing scores for athletes who do not meet the standards in international competitions can help to avoid abnormal performance and improve the stability of competition performance.

Thirdly, enhancing the specificity of the final ability assessment is the key to achieving athletes' stable victory in the competition. Since 2013, the International Shooting Federation has been using new rules, that is, qualifying results are not included in the final, and the elimination system at the end of the scoring was adopted in the finals. From then on, the importance of the final results significantly increased. And it was precisely because the Chinese team did not perform well in the final that the Chinese team ultimately experienced a situation of "good qualifying results but a drop in the final" in the Rio Olympics [8]. In response to this, during the preparation process for the Tokyo Olympics, based on the characteristics of the shooting finals, detailed requirements for the finals were formulated in the selection method. The final points are divided into two parts, namely the basic score before the start of the knockout round and the final score after the end of the knockout round. This greatly improves the effectiveness of assessing athletes' abilities in the final. And this is also conducive to detecting the "weaknesses" of athletes in the final, and through the testing of multiple matches, it can provide reference for coaches to analyze athletes' "competitive personality".[9-10]

6. Summary

From the performance of the Tokyo Olympics, the current competition in international shooting is very fierce, and in recent years, there has been no country that can steadily rank first. In this Olympic Games, European countries are still the international shooting power. Russia and the United States have made rapid progress, while China has shown the most outstanding performance. India, as an emerging force in recent years, has performed abnormally. In terms of the age of participating athletes, compared to trap and skeet, rifle and pistol athletes are younger in age and have less training experience. The average age of gold medal winners is smaller, with the Chinese team being the most prominent.

The excellent performance of the Chinese team in the Tokyo Olympics indicates that their

preparation work was successful, and the athletes were younger but their performance was better comparing to the previous Olympics. The successful experience of the Chinese team in Tokyo Olympics mainly includes the following aspects. The top-level management system supporting the development of shooting sports through national efforts is the fundamental guarantee for successful participation in competitions. The training concept of the Chinese team is gradually systematized, which is the ideological foundation of scientific training. The Chinese team has developed new methods for athlete selection for this Olympic Games, which is the key to achieving breakthroughs in this competition.

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