

Men's decathlon high level athlete's performance characteristics

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Abstract. This paper USES grey correlation analysis of the 12th shipped all member and the 30th Olympic Games men's decathlon scores. The results show that the Chinese athletes compared with the world top athlete, gray weighted differences of each single sport of all kinds of sport gray weighting the gap between the larger, but overall the ordering of the same. Advice on the training of athletes in the future of China pay attention to the high jump, pole vault, 1500 m, and javelins on individual training, strengthening the project of throwing and endurance training, improve the quality of the body, pay attention to technical strong jump class project technical training, improve the China men's decathlon athlete selection is scientific.

1 Introduction

Men's decathlon has features of many events, difficult skills and big consumption, it needs that athletes possess sufficient physical ability, all-round techniques and strong will, is comprehensive testing on athletes and called "ironman" event. Due to Chinese men's decathlon athletes own physical quality and technique aspect reasons, Chinese men's decathlon still keeps considerable paces with world men's decathlon, it is in the state of relative backward [1-3].

On the basis of formers research, the paper makes statistics and analyzes the 12th National Games and the 30th Olympic Games men's decathlon top ten athletes performances, makes grey relational analysis of them, studies on Chinese men's decathlon athletes and world top athletes gaps, and makes suggestions on Chinese athletes training, in the hope of providing references for Chinese decathlon development.

2 Men's decathlon performance grey relational analysis

In order to analyze Chinese and foreign men's decathlon gap, the paper makes statistics Chinese the 12th National Games Men's decathlon top ten athletes performances and the 30th Olympic Games decathlon top ten athletes performances, and makes grey relational analysis of them, and studies on Chinese and foreign men's decathlon athletes performances differences [4, 5].

In men's decathlon performance, its total performance and each single event dimensions are different, in order to apply grey relational analysis of the 12th men's decathlon performance, it needs to carry out initialize processing with men's decathlon performance that is to do

normalization processing on it. In the 12th men's decathlon performance statistics, for total points, long jump, shot put, high jump, discus, pole vault and javelin throw such seven single events performances, their performance value gets bigger, and then performance gets higher, while 100m, 400m, 110m hurdle and 1500m as well as other four items single events are just on the contrary. In order to be convenient for handling with total points and each single event performance, the paper set total points, 100m, long jump, shot put, high jump, 400m, 110m hurdle, discus, pole vault, javelin throw and 1500m respectively as x_0, x_1, \dots, x_{10} , from which x_0 is main sequence, x_1, x_2, \dots, x_{10} is sub sequence. By above, it solves total points and each single event initial value as Table 1 show.

Olympic Games is highest level competition in the world, in order to analyze Chinese men's decathlon athletes competitiveness level and world athletes gap, the paper mainly makes statistics of the 30th London Olympic Games men's decathlon performance top ten athletes competition performance, its statistical data is as Table 2 shows.

3 Result and analysis

3.1 The 12th national games men's decathlon performance grey relational analysis

The paper does further processing with the 12th National Games decathlon grey relational degree, through

formula: $R_i = r_i / \sum_{k=1}^{10} r_k$ It can solve men's decathlon

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total points and each single event performance correlation degree weight, and rank their sizes. In order to analyze each single event performance and total points correlations, the paper takes each single event performance and total points grey weight value as 0.1 as limit. By Table 9, it is clear that the 12th National Games decathlon ten single event performance, single events that their grey correlation weights together with total points surpass 0.1 are six that are respectively 110m hurdle, 100m, 400m, long jump, shot put and discus, their grey

weights are respectively 0.112, 0.110, 0.105, 0.104, 0.102 and 0.101, corresponding grey correlation degrees are 0.939, 0.922, 0.879, 0.873, 0.847 and 0.845. Single events that grey correlation weights less than 0.1 are four that are respectively high jump, pole vault, 1500m and javelin throw, their grey weights are respectively 0.099, 0.098, 0.088 and 0.083, their corresponding grey correlation degrees are respectively 0.834, 0.827, 0.741 and 0.695 [6,7].

Table 1. The 12th National Games Men's decathlon performance normalization result.

Rank	1	2	3	4	5	6	7	8	9	10
Total points	1.000	0.989	0.982	0.968	0.955	0.953	0.933	0.930	0.912	0.907
100m	1.000	0.959	0.967	0.964	0.966	0.952	0.956	0.968	0.991	0.967
Long jump	1.000	0.993	1.003	0.983	0.959	0.970	0.988	1.011	1.016	1.016
Shot put	1.000	1.057	1.028	0.972	1.008	0.910	0.885	0.963	0.882	0.885
High jump	1.000	1.046	1.000	1.046	1.016	0.969	1.031	1.000	0.954	0.985
400m	1.000	0.984	0.982	0.998	0.980	1.013	0.991	0.987	1.008	0.967
110m hurdle	1.000	0.969	0.977	0.981	0.979	0.957	0.977	0.933	0.936	0.959
Discus	1.000	1.077	1.120	0.972	0.989	0.923	0.882	0.906	0.892	0.913
Pole vault	1.000	0.917	0.917	1.021	0.979	0.917	0.917	0.875	0.854	0.875
Javelin throw	1.000	1.014	1.046	0.783	0.690	0.972	0.737	0.807	0.721	0.881
1500m	1.000	1.020	1.000	1.017	1.097	1.116	1.098	1.079	1.088	0.980

Table 2. Olympic Games men's decathlon athletes top ten athletes performances.

Rank	1	2	3	4	5	6	7	8	9	10
Total points	8869	8671	8523	8447	8442	8320	8283	8219	8173	8126
100m	1011	994	801	850	980	940	961	910	841	847
Long jump	1068	942	940	970	945	864	947	922	854	850
Shot put	769	807	759	819	712	782	756	754	715	831
High jump	850	794	906	850	850	714	794	794	850	767
400m	963	904	859	853	899	906	888	866	882	813
Discus	1032	1035	917	863	926	989	963	799	955	932
Pole vault	716	834	782	835	785	852	802	817	738	761
Javelin throw	972	849	819	849	819	880	790	790	760	819
Rank	767	838	996	763	780	698	661	865	810	810
1500m	721	674	744	795	746	695	721	702	768	696

By above analysis, it is clear that Chinese athletes each kind of sport grey weight analysis has certain differences, from which endurance kind is obviously weak, only is 0.088, and throwing kind grey weight is also relative small. It mainly because of Chinese decathlon athletes' selection and coaches' .Chinese athletes that engage in decathlon are mostly from jumping kind or speed kind athletics event transformation, Chinese coaches put more emphasis on jumping kind and speed kind athletics events in training. It also illustrates that Chinese men's decathlon athletes' selection is not scientific to a certain degree, which also surely leads to Chinese athletes competitive levels being lower. And meanwhile, due to high jump, pole vault, 1500m and javelin four events compare to other events, their correlation degrees are smaller to total points, and

contributions rate is lower to competition result, and such are caused by human reasons, there are considerable space to promote. Strengthen Chinese athletes throwing kind and endurance kind sports training, scientific and reasonable carry on athletes selection and coaches training and learning, improve their throwing kind and endurance kind sports performance, is a general direction for improving Chinese athletes competition levels.

3.2 The 30th olympic games men's decathlon analysis

For above solved the 30th men's decathlon performance top ten athlete performance grey correlation degrees, it makes further processing, solves their grey weights and ranks them. it is clear that the 30th Olympic Games men's

decathlon performance top ten each single event and total points grey correlation weight ranks from big to small are in order as 400 m, 110 m hurdle, high jump, 100 m, shot put, 1500 m, long jump, pole vault, javelin, throw. Among them, single events that grey weights surpass 0.1 are six that are 400m, 110m hurdle, high jump, 100m, shot put, 1500 m, their grey weights are respectively 0.112, 0.108, 0.107, 0.106, 0.103, 0.101, their corresponding grey correlation degrees are respectively 0.904, 0.874, 0.872, 0.859, 0.837, 0.813, single events that grey correlation weights less than 0.1 are four that are respectively long jump, pole vault, javelin throw, discus; their grey weights are respectively 0.097, 0.094, 0.092, 0.080, their corresponding grey correlation degrees are respectively 0.789, 0.766, 0.741, 0.6495.

Olympic Games men's decathlon performance each kind of sports grey, its speed kind, jumping kind, throwing kind and endurance kind grey weights are respectively 0.316, 0.298, 0.275 and 0.101, from its sports kinds of event performance grey weights rank, it has no bigger differences with Chinese athletes, but each event grey weight difference is smaller than that of Chinese athletes. World men's decathlon athletes throwing kind of events and endurance kind of events grey weights are smaller, ranks are lower, their competitive potential further mining space is larger, it can strength such fields training in future training. And meanwhile, to improve performance, it also needs to mine potentials in smaller grey weights events, especially in throwing kind and endurance kind of events; it can take key training surrounding them.

3.3 Chinese and foreign men's decathlon difference analysis

Olympic Games athlete competition performance represents world top athletes competitive level, National Games athlete competition performance represents Chinese top athlete competitive level. By above analysis, it is clear that though the 30th Olympic Games and the 12th National Games men's decathlon competition performance each single event performance grey weight rank difference is bigger, sports events grey weight rank is the same. Compare to Chinese men's decathlon athlete, world top athlete each single event and each kind of event competition ability development is relative coordinated. The reason for world top athlete presents such status mainly because decathlon each event has significant difference in requests of athlete competitive ability, every athlete cannot develop these sports required each kind of ability in all-round, Chinese athlete is mainly due to physical quality and special quality being lower. As world and Chinese top athletes speed kind of sports grey correlation degrees are bigger, China mainly because

men's decathlon athletes are mostly changed from speed kind of athletics events, coaches also focus on speed events during training, and world athletes is due to their stronger lower limbs explosive powers.

From above analysis, it is clear that China and world men's decathlon athletes javelin throw, pole vault and 1500 m such three items single event sports performance correlation degrees with total points are lower, the three events are the ones that world and Chinese athletes can be focused on in training. And in 1500 m sports event, Chinese athlete and world top athlete gap is bigger, it can put emphasis on strengthening Chinese athletes endurance training, improve their performance so as to shorten Chinese athlete and world top athlete performance gap. Chinese athlete keeps bigger paces with world top athlete in strength and jumping events, due to it is in the throwing events, its performance improvements can greatly shorten performance gap.

4 Conclusion

Chinese athlete on the basis of consolidating speed kind of sports, he also should focus on developing jumping kind and throwing kind events. Chinese coaches go deeper on strengthening athletes physical quality training, Chinese athlete strengthen physical quality, and meanwhile it also should focus on improving his special item technical ability, let each item quality to be all-round and balanced developed. Especially in higher special and technological jumping kind of sports events should be put higher emphasis. To some Chinese athlete poor ability single sports events as high jump, pole vault, 1500m and javelin throw, it should focus on mining them when training. Chinese men's decathlon athletes' selection should also be scientific, and pay attention to athletes with specialty when selecting.

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