



Comparative evaluation of the main parameters of racing distances of the largest international and all-Russian competitions in modern road cycling

UDC 796.093.554



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Abstract

Objective of the study was to conduct a comparative assessment of the difficulties of the racing distances of the largest international and Russian road cycling competitions.

Methods and structure of the study. The distance profiles of all stages of the Grand Tour series for the period 2018-2021 were collected and analyzed (220 stages in total), as well as the Russian championships in group races for men over the same period. Also, the methods used in cycling and other sports for assessing the difficulty of competitive distances were studied and their characteristic features were identified.

Results and conclusions. A publicly available method based on open data for assessing the difficulty of distances is proposed, recommendations are given for modernizing the structure and content of the calendar of Russian road cycling and sports training programs for young athletes. The obtained results of the study give specialists the necessary grounds for modernizing the structure and content of the calendar of all-Russian road cycling competitions, and also set clear guidelines in the development of the strategy and tactics of training programs for Russian cyclists in the context of the system of long-term sports training.

Keywords: *road cycling, competitive distance, distance difficulty.*

Introduction. The most spectacular and popular competitions in road cycling are group races - one-day and multi-day. The results demonstrated in recent years by Russian road cyclists at the main international competitions under the auspices of the UCI International Cycling Union allow us to talk about the dominance of them mainly by foreign athletes: in the UCI world ranking at the end of the 2021 sports season, among the 150 best athletes, only one represents the Russian Federation - A. Vlasov (35th place). At the end of the season, only six athletes - representatives of the Russian Federation were able to win UCI ranking points, which ultimately allows Russia to take only 19th place in this ranking.

According to leading coaches and experts in road cycling, one of the possible systemic reasons for such

a lag of athletes representing the Russian national team in the international sports arena may be the lack of the necessary volume of medium-mountain and especially mountain tracks in the competitive practice of Russian athletes.

An analysis of information sources on the issue of assessing the difficulty of distances in road cycling showed the presence of various methods. So, for example, the organizers of multi-day races of the Grand Tour series set the categorization of racing distances at their discretion and, in fact, create their own local classifiers. It should be noted that the UCI does not have a unified classification of the difficulty of racing distances (UCDD). The current UCI road cycling regulations contain only guidelines for the length of distances in a certain type of race for athletes of different

ages, genders and sports fitness; there are no uniform requirements for competitive distances in terms of their difficulty - the number of lifts on the track, their location along the length of the distance and their other parameters [1]. The absence of UCDD does not allow coaches and specialists to carry out high-quality planning of the training process and preparation for competitions and greatly complicates the possibility of predictive assessment of the level of sports results of Russian riders at all-Russian and international competitions.

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Methods and structure of the study. The distance profiles of all stages of the Grand Tour races for the period 2018-2021 were collected and analyzed (a total of 220 stages), as well as the championships of Russia in group races for men over the same period. The methods used in cycling and other sports for assessing the difficulty of competitive distances were also studied and their characteristic features were identified.

The materials proposed in the article were prepared as part of the Federal Scientific Center of Physical Culture and Sport (VNIIFK), the research work "Study of the structure and content of the sports training system for highly qualified athletes in long-term cycling locomotion."

Results of the study and their discussion. The analysis of various sources of information in terms of determining the parameters of the profiles of racing distances of the main competitions confirmed the lack

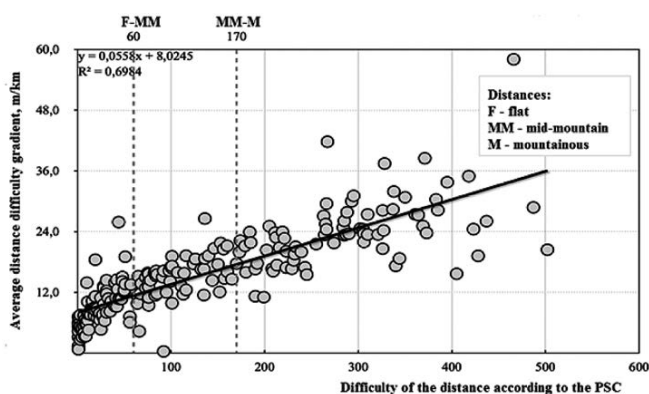
of a unified approach to determining the categorization of climbs and the nature of their difficulty. One of the most informative and reliable resources on the subject of road cycling is ProCyclingStat, which presents its method for assessing the difficulty of distances¹ - the «PCS» method, in which the distance difficulty parameter (ProfileScore) is calculated based on three variables: 1) the position of each specific climb on the track in relation to the finish line, 2) its steepness and 3) its length.

This, according to the developers, makes it possible to obtain a very accurate description of the difficulty of the route by determining the integral estimate of the difficulty of all climbs on the distance and their location on it.

Taking into account the opinions of experts and the availability of real opportunities to obtain from the websites of the organizers of cycling races necessary for the analysis of open data, in the course of the research work, a method was proposed, the application of which makes it possible to determine and compare the difficulties of the distances of various races in road cycling. The method is based on two main parameters of the racing distance: 1) the total amount of positive elevation changes over the distance - TC (Total Climb) and 2) the length of the distance - D (distance). Their ratio - TC/D - gives the parameter "average gradient of the total climb over the distance" - G. Hence the abbreviated working name of the method - "GTCD". The application of the GTCD method makes it possible to analyze an almost complete array of data on UCI races, as well as the main All-Russian competitions of the last few years.

Comparative analysis of data processing racing distances of the stages of all Grand Tour races for the period 2018-2021. (220 stages in total) by two methods - "PCS" and, more accessible in calculations - "GTCD", give fairly close results: there is a linear type dependence between them with an approximation coefficient of 0.6984 (see figure).

The figure also shows the vertical base lines (dotted line) at the level of 60 and 170 units of the parameter "difficulty of the distance according to the «PCS» method, which, according to the organizers of the GT "Tour de France", characterize the conditional division of distances into flat, mid-mountain and mountain. It is easy to establish that according to the GTCD method,



The relationship between the parameters "difficulty of the distance according to the «PCS» method and the average gradient of distance difficulty according to the «GTCD» method at the stages of the Grand Tour 2018-2021 (n=220)

¹<https://www.procyclingstats.com/info/profile-score-explained>.



the difficulty of the tracks equivalent to the PCS score can be taken as follows:

- flat distance: total distance gradient less than 11 meters per kilometer of distance, or $G < 11$;
- mid-mountain distance: $11 \leq G < 17$;
- mountain distance: $G \geq 17$.

An analysis by the developed GTCD method of all stages of the races of the Grand Tour series held over the past four years revealed an approximately equal distribution of distances according to their difficulty: flat stages make up 34% of their total number, mid-mountain stages - 29% and mountain stages - 37%.

At the 2018-2021 Road Cycling World Championships (WCH) the difficulty of distances for men ranged from 8.4 to 17.9 m/km. The analysis of the data showed that with an average length of distances in the world championship races equal to 260 km, the average distance values of the speed of the competition winners *vw* are relatively small and, according to the Unified All-Russian Sports Classification (URSC), are approximately at the level of "candidate for master of sports". The exception is the group race of the 2021 World Championship, the result of the winner in which corresponds approximately to the level of the "master of sports of Russia of international class" according to URSC. However, it should be noted that this was the most "flat" distance of all four WCHs: its average *G* was 8.4 m/km.

In the road group race for men at the 2020 Olympic Games in Tokyo (Japan), athletes competed over a distance of 234 km with a total climb of 4865 m, that is, an average *G* of the distance is 20.8 m/km, which is characterized as "mountainous". According to this indicator, the Olympic distance turned out to be much more difficult than the distances of the world championships of the last four years.

The average length of distances for men at the championships of Russia (CR) of the last four years is 181.6 km, which is 69.5% of the length of racing distances at the world championships. By this indicator alone, the races in the Czech Republic are one third less difficult than the races in the world championships. The level of difficulty of racing tracks in the Czech Republic is also lower than in the World Cup: the average *G* of the races of the Russian championships is on average 10.0 units against 13.7 at the World

Cup. The average speed of *vw* winners in the Czech Republic is equivalent to the level of Candidate Master of Sports in URSC.

In the course of the study, it was also obtained that the average distance gradient *G* affects the average distance speed of the riders in inverse proportion: an increase in the difficulty of the racing distance in terms of its average *G* by 10–11 m/km is equivalent to a decrease in the average distance speed by one qualification level of URSC.

Conclusion. The method developed in the course of research work for determining the difficulty of competition tracks in road cycling based on measuring the average distance gradient made it possible to establish that the race distances of group races for men at the Russian championships of the last four years are on average 30% shorter and less difficult than similar distances at the World Championships and the Olympic Games.

In order to meet modern requirements for the level of preparedness of Russian athletes in road cycling and increase their competitiveness at international sports competitions, it is necessary to bring the parameters of the length and difficulty of the racing distances of the main All-Russian competitions among men and women closer to the similar parameters obtained in the research work of the races of the UCI World Tour, and also observe the principle of equal volumetric distribution of the difficulty of racing distances "1/3 - flat, 1/3 - mid-mountain and 1/3 - mountain distances" when forming the calendar plan of all-Russian competitions, using the "GTCD" method for this.

The work was carried out within the framework of the state task of the FGBU FNTs VNIIFK No. 777-00026-22-00 (subject code No. 001-22/2).

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