

Swimming Comparative Analysis 50m Freestyle

The subject of the research is competitive swimming in Europe (EUR) and Bosnia and Herzegovina (B&H) from 2008 to 2018, discipline of 50m freestyle for men's seniors. The problems of the research are trends, dynamics and differences between swimmers from Bosnia and Herzegovina and Europe. The objectives of the research are to: 1. Identify trends in swimming development in EUR and B&H from 2008 to 2018. 2. Determine the statistical significance of differences between swimmers from EUR and B&H. 3. Evaluate the results for 2020 based on linear functions. In accordance with the set goals of the research, appropriate statistical methods and tests were applied, which enabled an exact answer to the set hypotheses and goals. The variables were monitored in this study were: 1. The time of the eight finalists 2. The time of the first three swimmers. 3. The Winner time. 4. The Record time. Based on the results obtained, it can be validly and reliably concluded that there is generally an improvement in results for swimmers from the EUR area and from B&H's area. It is statistically proven that there is a significant difference in the results achieved. Swimmers from Europe showed better results that were statistically significant. Linear functions i.e., trends suggest that differences are slightly narrowing. There are more reasons for lagging of B&H's swimmers behind the European swimmers. In the post-war period there are no elementary material, professional, coaching and other assumptions that enable better results not only in swimming but also in other sports in Bosnia and Herzegovina.

Keywords: swimming, freestyle 50m, comparative analysis

Introduction

Swimming is a natural form of movement for all living beings. Only the human being like the most perfect being cannot swim without training, learning and torture. The endurance and man survival is linked to water from its inception to the present. Old, ancient drawings and paintings on caves show and depict a man swimming. Swimming is also mentioned in the Bible. The famous saying of Plato reads; "A man who cannot read, write and swim is illiterate"

If athletics is the queen of sports, swimming is undoubtedly a sister and a brother. It is no accident that the swimming beside the athletics is a basic sport since the first modern Olympic Games held in Athens in 1896. That swimming is a natural form of movement is confirmed by the fact that in the process of learning and self-learning, the discipline of the breaststroke is first mastered. In the first official and unofficial competitions, the first technique was just breaststroke. Practice has confirmed that results are better if the strokes are above the water, so that the "Crawl" technique is known as "Freestyle".

Numerous scientific and empirical findings confirm that swimming is the healthiest sport. In accordance with Archimedes¹ Law By entering the water, man apparently gets rid of some of his own weight. Contact with water, movement in and through water is a special experience and an irreplaceable massager. Lying down on water is apparently losing its own weight, where it relaxes the spine, joints, arms and legs, while accelerating the cardio-vascular and respiratory system. It speeds up the circulation and activates the overall musculature, which all together has a very beneficial effect on the physical and mental health of man.

Bathing i.e. swimming is the first activity practiced by birth, i.e. by coming to the world. Swimming is the only activity where it cannot go wrong when to start and when to stop. It goes without saying that it is only natural to learn to swim first, then to walk and run. For years with growing older, there is an inversion, first giving up running and jumping, then walking and again returning to the healthiest activity of swimming. In practice, this is not so, statistics show that many people come and go from this world, and they have never learned to swim, walk and run properly.

Development of Sports Swimming

Famous world and English poet (*George Gordon Byron*)², encouraged by Greek mythology in 1810, swam the Dardanelles (*Helospont*). At that point, the strait was about two kilometers wide, and it took Lord Byron 65 minutes to reach the other strait bank. In memory of the great Poet in England, and then in the other European countries, it became a traditional one-mile swimming. It may also be the first swimming where time has been measured. It should be noted that the famous poet was lame

Reformer, educator and humanist (*John Amos Comenski*) introduced compulsory swimming instruction into the physical education program.

(*Zan Zak Rousseau*) devoted a great deal of writing to the physical education of young people, modeled on Locke and Comenius in his work "*Emil*" or About Upbringing. In one place it states³.

Prussian General (*Ful*) founded the first military swimming school in Prague in 1810, which is also the first school of its kind in Europe. He introduced swimming into the Prussian army program, and in 1817 General Ful published a book, "*On Swimming*", where he outlined his methodology for training non-swimmers. The first swimming school was established in Russia in Petrograd on Neva in 1827. The first sport's swimming club was founded in 1869 in England. The first national swimming championship was also held in

¹"Archimedes' principle states that the upward buoyant force that is exerted on a body immersed in a fluid, whether fully or partially submerged, is equal to the weight of the fluid that the body displaces".

²Byron.G.G. <https://www.biografija.org/>.

³"All young people learn expensive riding, and no one swims, although every rider may find himself having to swim".

England in 1879. At that time, there was a free choice of swimming technique in all competitions. In Germany and France, breaststroke was used more, while English competitors swam laterally. At the first modern Olympic Games in 1896, men-only swimming in the 100, 500 and 1200 meters were organized in Athens. Women compete for the first time at the 1912 Stockholm Olympics. The first official World Swimming Championship was organized and held in Belgrade in 1973. The competition was organized according to the program and rules of the World Swimming Federation (FINA)⁴.

Literature Review

The title of this paper, the goal, the topic and the overall issue is very specific, one might say, unique, so we decided to write about something that has been written a little. However, there are touch points with this topic, i.e. with 50m freestyle competitive swimming. Similar professional and scientific publications are in the reference journals Kinesiology and Sports Medicine. It has been much written about swimming history. The chronology dates from the old days onwards. Mostly these are classic textbooks where the first chapter is devoted to swimming history.

Vladan Markovic (2017). The author describes the historical path of the origin and development of swimming from prehistory to modern swimming. Similar publications are found in numerous textbooks about swimming. The texts are imaginative, narrative, inspired by many anecdotes and metaphors, drawings and graphics. Numerous historians agree that the first records of swimming in Latin date from 1538. Much later, in 1778, *Vinmann, N.*, wrote the first book about swimming.

Patrick Pelayo and Morgan Alberty (2011). They organized the first scientific international symposium dedicated to swimming. The symposium was held in 1970 in Brussels. The topic of the meeting was related to the need, justification and necessity of including science. In addition to kinesiology, particular importance is given to the medical sciences and biomechanics.

Inmaculada Yustres, Jesús Santos del Cerro, Fernando González-Mohino, Michael Peyrebrune and José María González-Ravé (2019). Scientific work that is very comparable in terms of theme, methodology and statistics to this work. The sample consists of the best juniors and seniors in Europe.

Esther Morales and Raul Arellano (2018). Regression analysis was applied to a sample of 280 regional swimmers of both gender, ages from 9 to 22. Swimmers were classified into five age categories. The time was monitored at distances from; 5m, 10m, 15m, 20m and end time at 50m. Statistics showed that Spanish swimmers were approaching international swimmers. Anova and t-test results showed that girls were better at 12 years of age. After 12 years there was a gradual inversion in favor of the boy. Significant differences were found in favor of boys over 17 years of age. Differences in swimming speed were accompanied by differences in weight and height, also in favor of boys.

⁴According to official data, there were 29 disciplines in the program.

Damir Sekulic, Natasa Zenic, Nada Grcic Zubcevic (2007). The primary objective of the study was to determine the influence of body height, body weight, and body mass index on freestyle swimming results at 50m. The statistical significance of the predictions was determined by linear and nonlinear regression models. The nonlinear regression model has been shown to be better than linear. Boys who had above average height and average body mass index scored better.

*Carl Valle*⁵ The author of this article believes that the path to a world record is extremely complex and uncertain. Factors of particular importance are; modeling, programming and interaction between coaches and competitors. It goes without saying that the coach is honest, professional, diligent, innovative and talented. The competitor must also possess the same qualities. A high level of these factors is the formula for good swimming results in the 50m freestyle. Setting and breaking world records in addition to known factors are extremely important details. Details are kept in confidence throughout the competitive and coaching career.

Mihajlo Mijanovic (2007). The work presented statistical algorithms that were determining: validity, reliability, objectivity and discriminability of measurement and testing. The original values were transformed into *z-values*. In the further algorithm, standardized *z-values* were the basis for the construction of measurement scales, standards and norms.

Muhammad Tahir Nazeer et al. (2016). In a rich bibliography of professional and scientific communications on swimming, thematically this work is very compatible with our work. Nazeer et al compared the results of Pakistan swimmers with swimmers at the 2012 European Championships held in Hungary. The special cameras tracked four passing times and total time of the competitors. The average swimmer speed of Pakistan was $1.84 \pm 0.06 \text{ ms}^{-1}$ which is 0.41 ms^{-1} worse than the speed of European swimmers. The difference is statistically significant. The error level is less than ($p < 0.01$).

Methodology

Subject and Problem of Research

The subject of the research is the level of competitive (*sports*) swimming in Europe and Bosnia and Herzegovina from 2008 to 2018. This is a comparative analysis based on the 50m freestyle discipline.

The problem of the research is the dynamics of swimming development in Europe and Bosnia and Herzegovina⁶ during the mentioned period, as well as the estimation of results for 2020.

⁵"Talented athletes are teachers to coaches, and coaches have always learned from their protégés".

⁶The swimmers of Europe and Bosnia and Herzegovina are hereinafter referred to as (EUR) and (B&H).

Objectives of the Research

1. Determine trends in EUR and B&H swimmer results in the period 2008-2018.
2. Use linear models to evaluate the results for 2020.
3. Identify quantitative differences between EUR swimmers and B&H swimmers.

Research Hypotheses

H₁: It is assumed that there will be an improvement in swimmer performance over the observed period EUR and swimmers from B&H.

H₂: EUR swimmer performance is assumed to be better than B&H swimmer.

H₃: The difference is assumed to be statistically significant⁷.

Sample of Respondents and Variables

The sample of respondents is represented by male seniors, participants of the final races at the European Championships and Bosnia and Herzegovina Championships from 2008 to 2018. Eight competitors participated in the final races. The variable that determined the difference was the 50m freestyle discipline. The example is a composite variable of four variables: (1. Finalists 50m freestyle), (2. The first three swimmers), (3. The winner of the race and) and (4. Record).

Statistical Methods

In accordance with the problem, goals and hypotheses, a number of statistical methods and tests were applied in the paper. Basic (*descriptive*) statistical indicators were calculated: (*arithmetic means, standard deviations and standard errors of arithmetic means*). In the following procedure linear trends (*linear functions*) with accompanying values were calculated⁸. The difference of arithmetic means was tested. It was applied (*Student-t test*) for small independent samples. At the general level, one-factor analysis of variance (*Anova*) was applied⁹.

Results and Discussion

In accordance with the set goals of the research, statistical methods were applied that enabled an exact answer to the set hypotheses. The official data base is presented in the appendix to the A&B Table. The variables monitored

⁷Statistical significance of differences will be determined by error ($p < 0.05$).

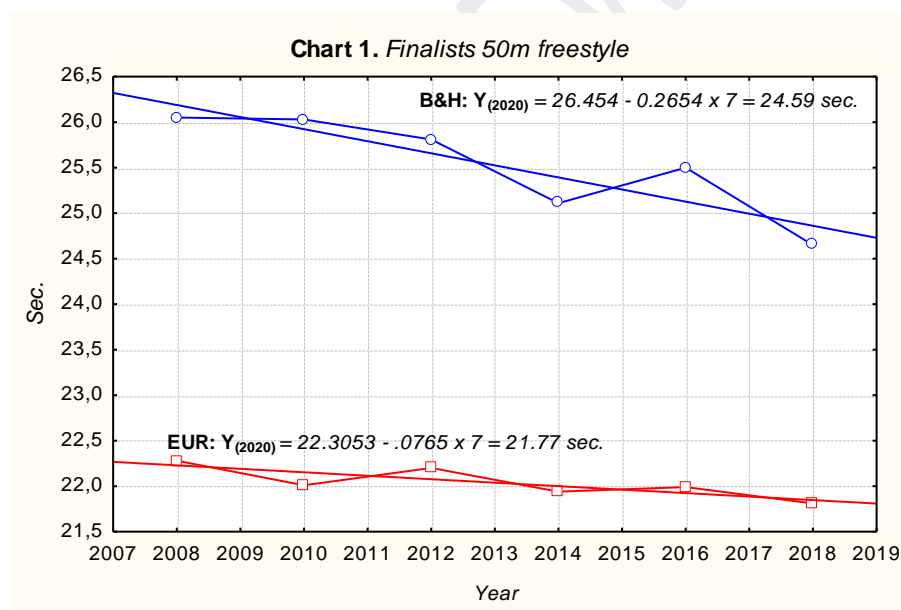
⁸(*Constant*), *Dep. Var.*: *Best time*, *Coeffic. (B)*, *Std. Error*, *Coeffic. (Beta)*, *t*, *Sig.*).

⁹Data processing was done under SPSS statistical and mathematical software.

were: 1. Finalist swim time. 2. Time of the first three swimmers. 3. Winner time and 4. Record time. As the European Championship is held every other year, the observed time intervals were: (2008. 2010. 2012. 2014. 2016. and 2018). Statistical results are presented in tables: (1. 2. 3. and 4.) and chart: (1.2.3. and 4.).

The linear trend function for swimmers from Bosnia and Herzegovina is: $Y_{(B\&H)} = (26.454 - 0.2654x)$. According to this function, swimmers from B&H are expected to achieve an average time in 50m freestyle in 2020 of **24.59 sec.** The linear function of the trend for swimmers from Europe is: $Y_{(EUR)} = (22.3053 - 0.0765x)$. In line with the above methodology, it is expected that swimmers from Europe will achieve an average time of **21.77 sec.** in 2020.

Trend functions suggest that there is generally an improvement in results for both swimmers. Evidently, there is a significant difference as seen in Chart 1. Standardized coefficients (*Beta*) Table 1. indicates that a greater and statistically significant improvement in results was observed for B&H swimmers compared to swimmers from Europe ($-0.892 > -0.825$). Comparing the magnitude of the non-standardized values (*B*) the conclusion would be similar ($B\&H_{(B)} = -0.265 > EUR_{(B)} = -0.076$). Finally, these differences are confirmed by values (*t-test*) and values of statistical significance (*Sig.*). It is concluded that differences between swimmers in Europe and Bosnia and Herzegovina are narrowing. (See Chart 1 and Table 1).

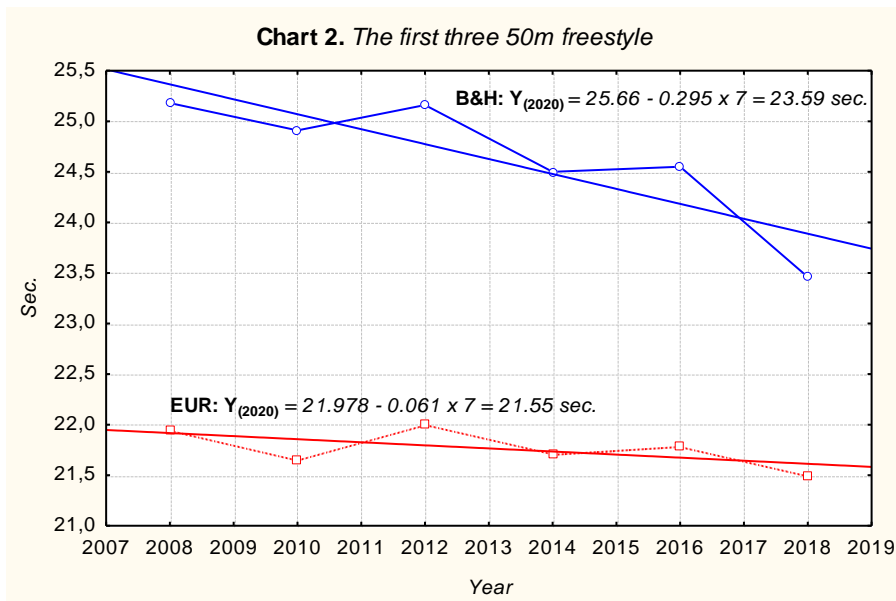


1 **Table 1. Regression Analysis (Trend Coefficients)**

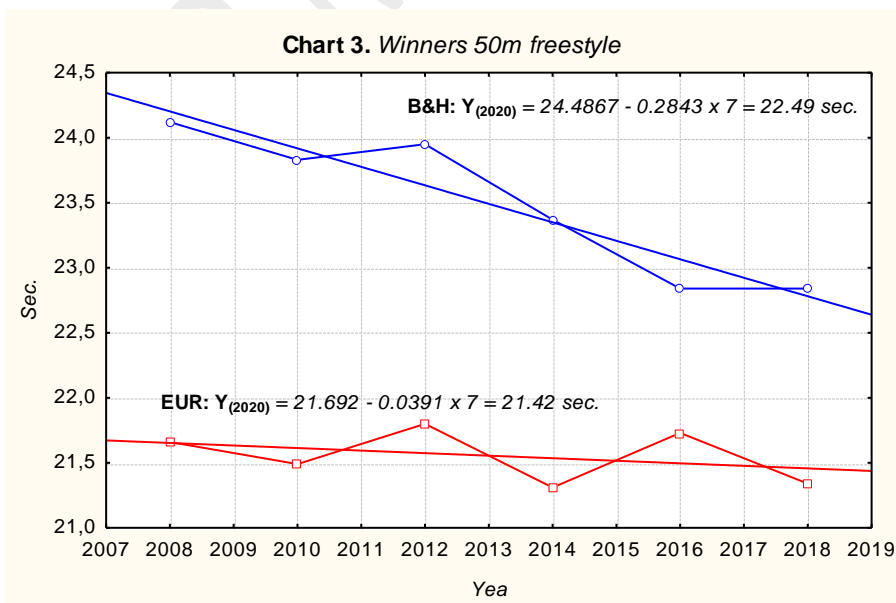
Variable	Unstandard. Coeff. (B)	Std. Error	Standardized Coeff. (Beta)	t	Sig.
B&H (Constant)	26.45	0.262		100.8	0.000
Dep. Var.: Finale	-0.265	0.067	-0.892	-3.94	0.017
EUR (Constant)	22.30	0.102		219.5	0.000
Dep. Var.: Finale	-0.076	0.026	-0.825	-2.92	0.043
B&H (Constant)	25.66	0.338		75.9	0.000
Dep. Var.: The first three	-0.295	0.087	-0.862	-3.4	0.027
EUR (Constant)	21.97	0.160		137.2	0.000
Dep. Var.: The first three	-0.061	0.041	-0.595	-1.48	0.213
B&H (Constant)	24.48	0.191		127.9	0.000
Dep. Var.: Best time	-0.284	0.049	-0.945	-5.7	0.004
EUR (Constant)	21.69	0.200		108.2	0.000
Dep. Var.: Best time	-0.039	0.051	-0.356	-.761	0.489
B&H (Constant)	23.92	0.131		183.1	0.000
Dep. Var.: Record	-0.150	0.034	-0.913	-4.4	0.011
EUR (Constant)	21.31	0.180		118.4	0.000
Dep. Var.: Record	-0.080	0.046	-0.655	-1.7	0.158

2
3 Chart 2 shows the trend values of the first three B&H and EUR competitors.
4 $Y_{(B\&H)} = (25.66 - 0.295x)$. That is, $Y_{(EUR)} = (21.978 - 0.061x)$. According to the
5 established dynamics in 2020, the results are expected: $(B\&H_{(2020)} = 23.59sec.)$,
6 and for $(EUR_{(2020)} = 21.55sec.)$. Unstandardized value (*Beta*) and coefficient (*B*)
7 Table 1 indicates that the differences are gradually decreasing in favor of
8 swimmers from B&H. Unstandardized value for swimmers from $(B\&H_{(Beta)} = -$
9 $0.295)$ and standardized $(B = -0.862)$. The same parameters and values for
10 competitors from Europe are: $(EUR_{(Beta)} = -0.061)$ and $(B = -0.595)$.

11 Thus, both parameters and values (*t* & *Sig.*) show that the progress is higher
12 with the B&H competitors. Based on the above parameters, it can be concluded
13 that this variable reduced the differences between competitors from Bosnia and
14 Herzegovina compared to competitors from Europe. The conclusion is that the
15 decrease in differences in the first variable is accompanied by a decrease in
16 differences in the second. Trends and tendency of the first three swimmers from
17 B&H and EUR are shown in Chart 2.



The best results for the B&H and EUR winners are shown in Chart 3 and Table 1. The linear function of the winners from B&H is: $Y_{(B\&H)} = (24.486 - 0.284x)$, i.e., the linear trend function for swimmers from Europe is: $Y_{(EUR)} = (21.69 - 0.039x)$. Standardized coefficient (*Beta*) for B&H swimmers (*Beta*) = (-0.945) and for swimmers EUR (*Beta*) = (-0.356). The above values as well as the value (*t* & *Sig.*) Suggest that the results of the competitors of the winners from B&H are improving, as this improvement is statistically significant, while the results of the competitors from Europe are generally stagnant. Based on linear functions, the expected results for 2020 are: $B\&H_{(2020)} = 22.49 \text{ sec.}$, And for $EVR_{(2020)} = 21.42 \text{ sec.}$ Movement dynamics and visual differences are presented using Chart 3.



The record and the best result are different, the record rarely happens, but it rarely breaks. World, Olympic and European records are rare. In athletics, some records are more than twenty years old, while swimming records are slightly shorter. In the specific example, the European 50m freestyle record dates from 2010 and lasts until 2020, perhaps longer. It is evident that swimmers from the B&H area are of lower quality, so the probability of breaking the record is more certain.

The momentum of moving the record is shown in Chart 4 and Tables 6 and 7. Based on Chart 4 and the numerical indicators, it can be concluded that the trend in B&H competitors is more positive and representative than in Europe. The standard error of the trend of B&H competitors is (*Std.Error*=0.034) and the standardized coefficient (*Beta*=-0.913). The values of the competitors' parameters from Europe are: (*Std.Error*=0.046) and (*Beta*=-0.655).

The expected result for a competitor from Bosnia and Herzegovina in 2020 is: $B\&H_{(2020)}=22.88 \text{ sec.}$ and for a European competitor: $EUR_{(2020)}=20.75 \text{ sec.}$ In both cases, the standard errors of the linear model are small, implying a smaller error, i.e., better prediction.

The statistical significance of the model corresponds to the values: B&H ($t=-4.4$ & $Sig.=0.011$) and EUR ($t=-1.7$ & $Sig.=0.158$) Table 1. The probability that BIH swimmers will break the record sooner is a theoretical and empirical fact. Records are known to break faster and easier where existing results are worse. (See Chart 4).

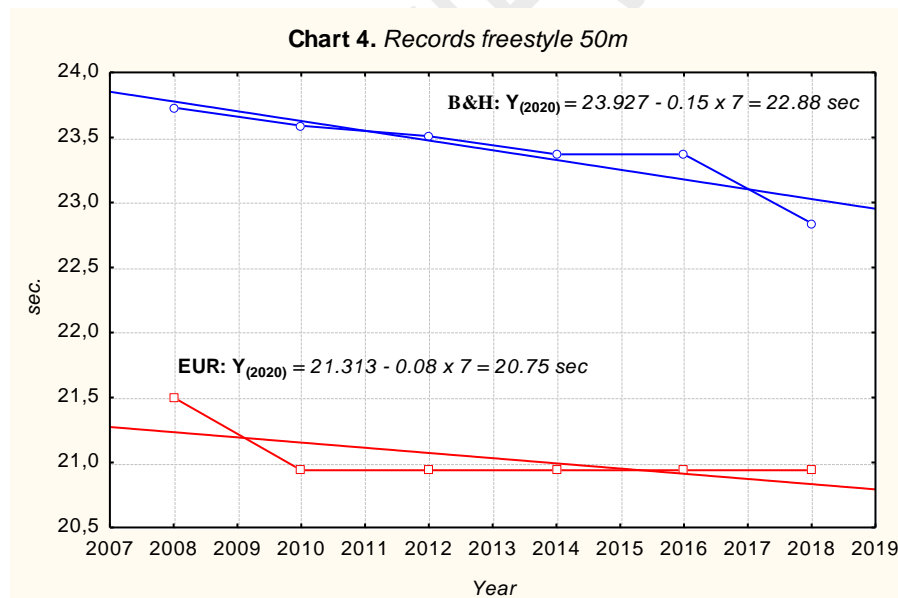


Table 2 presents descriptive statistics (*Minimum, Maximum, Mean and Std. Deviation*). These values are necessary and very important for analysis, discussion and controversy. Since the aim of the paper was to determine the differences between B&H swimmers and swimmers of EUR descriptive value, i.e., the arithmetic mean and standard deviation are necessary in the further process of determining the differences.

Table 2. Descriptive Statistics

Variable	N	Min.	Max.	Mean	Std. Dev.
B&H Finale	6	24.65	26.05	25.5250	0.55684
EUR Finale	6	21.81	22.28	22.0383	0.17291
B&H The first three	6	23.46	25.18	24.6267	0.64093
EUR The first three	6	21.49	22.01	21.7650	0.19139
B&H Best time	6	22.84	24.12	23.4917	0.56276
EUR Best time	6	21.31	21.80	21.5550	0.20599
B&H Record	6	22.84	23.73	23.4017	0.30740
EUR Record	6	20.94	21.50	21.0333	0.22862

The values are expressed in seconds.

For exact determination of differences, a *t-test* for small independent samples was applied (Table 3). Differences at the overall level were determined by applying one-way analysis of variance Anova.

Table 3. Arithmic Mean Differences between B&H and EUR Swimmers

Pair	Paired Differences	Mean	Std. Err.	Lower	Upper	t	Sig.
Pair 1	B&H:EUR Finale	3.48	0.173	3.041	3.931	20.14	0.000
Pair 2	B&H:EUR The first three	2.86	0.199	2.348	3.374	14.33	0.000
Pair 3	B&H:EUR Best time	1.93	0.213	1.387	2.486	9.05	0.000
Pair 4	B&H:EUR Record	2.36	0.110	2.084	2.652	21.43	0.000

The values are expressed in seconds.

The values in Table 3 confirm that there is a statistically significant difference in the results achieved between swimmers of Bosnia and Herzegovina (B&H) and swimmers from Europe (EUR). Differences in arithmetic means are shown in the (*Mean*) column. The standard errors of the arithmetic means in the column (*Std.Err.Mean*) were used to calculate (*t-values*). The value (*Sig.*) shows the statistical significance of the differences of arithmetic means, that is, the probability of error.

Differences in arithmetic mean of swimmers B&H and EUR range 1.93sec. to 3.48sec. Well versed in the sport, especially the freestyle 50m sprint specialists know the differences are big. They are especially large if one knows that it is not about beginners but about the best swimmers in Europe and B&H. The largest difference in arithmetic means between B&H swimmers and EUR was on the variable 1.Finalists 50m. The difference of arithmetic means was 3.48 sec. The smallest difference was on the variable 3.Race winner. The difference is 1.93 sec. If the above differences are converted to meters per second ms^{-1} , the difference is 3.48 sec. is equivalent to $0.31ms^{-1}$. The difference of 1.93 sec. it is equivalent to $0.19 ms^{-1}$. Statistical significance of arithmetic mean differences was determined by *t-test*. The error probability is shown in the column of *Sig.Table 3*. In the example, the error probability that there is no

difference is less than $p < 0.00$. By this procedure, hypothesis H2 is exactly confirmed. So there are differences and they are statistically significant. (See Table 3).

Differences of arithmetic means at the total (*general*) level were determined using the One-way analysis of variance (*Anov*). Table 4 shows the algorithm and the value of the relevant parameters. The values (*F* and *Sig.*) Explicitly confirm the conclusion that there is a statistically significant difference between swimmers from Europe and swimmers from Bosnia and Herzegovina. (See Table 4).

Table 4. ANOVA - Variance Analysis

Ekipa	N	Mean	Std. Dev.	Sum of Squa.	df	Mean Square	F	Sig.
B&H	24	24.26	1.02216	85.120	1	85.120	139.38	0.000
EUR	24	21.59	0.42020	28.092	46	0.611		
Total	48	22.92	1.55202	113.212	47			

The reasons for the differences should be sought in the difference in size of the population from which the athletes of Europe and the B&H athletes were selected. A factor that has a negative effect on the results of swimmers and other athletes from the B&H area is the poorer social and material situation that has lasted for more than two decades. The fact is that the best swimmers are representatives of B&H with better financial standing, some live and train abroad, so the real differences are even greater.

Encouraged by the fact that there are interested and extremely talented people for this sport in B&H. Confirmation that this is so young swimmers (*juniors*) who are slightly or slightly behind their peers from Europe.

“Nothing is impossible. With so many people saying it couldn’t be done, all it takes is an imagination.” – *Michael Phelps*

Conclusion

Based on the exact data obtained in accordance with the rules of the World Swimming Federation FINE and the European Swimming Federation LEN an explicit answer to the hypotheses was provided, following the scientific and statistical methodology.

In the observed period, there has been an improvement in the results of B&H swimmers and EUR swimmers. According to the linear model statistics, hypothesis H₁ is accepted, noting that B&H swimmers have made more and more progress. (See Charts).

The second hypothesis H₂ states that swimmers from Europe will be better than swimmers from Bosnia and Herzegovina. The arithmetic means and other statistical indicators in Table 2, directly confirm hypothesis H₂.

The third hypothesis of H₃ states that the differences will be statistically significant at the error level $p < 0.05$. The statistics in Tables 3 and 4 confirm

that swimmers from Europe performed better over the observed time in all the variables observed. The values of the *t-test* and the *F-test* explicitly and explicitly show that there is a statistically significant difference between swimmers of Europe and swimmers of Bosnia and Herzegovina (EUR>B&H). According to the obtained results, hypotheses H_3 are accepted, with an error less than $p<0.001$.

In addition to testing hypotheses, the aim of this research was to predict the results for 2020 on the basis of linear models. The particular value of this paper is precisely the prediction and success of predicting swimmer results from EUR and B&H for 2020.

- Linear swimmer models from EUR: 1. Finalist swimmer time 21.77sec. 2. Time of the first three swimmers 21.55 sec. 3. Winner time 21.42 sec and 4. Record time 20.75 sec.

- Linear swimmer models from BIH: 1. Finalist swimmer time 24.59sec. 2. Time of first three swimmers 23.59 sec 3. Winner time 23.49 sec and 4. Record time 22.88 sec

What happened, what is proven and what is seen is that the swimmers from B&H are in an average time lag of (1.93 to 3.48 sec.). Equivalent differences in meters range from (4.58 to 8.27 m). Of course, it's not small, but it's not unattainable either. Empirics confirm that surprises happen in sports, which is why the sport is of constant interest to young and old rich and poor alike.

As can be seen, this paper did not address the causes of the differences obtained, as well as the models, i.e., factors that determine the swimmer's superior performance. Science has proven, and empirics has confirmed, that a number of factors affect sports performance. Using serious scientific methods, relevant factors have been identified that affect a swimmer's athletic performance. Predictive success factors should be considered when selecting young swimmers. Particular attention should be paid to factors affecting sports performance, which at the same time cannot be substantially transformed through the training process. This is primarily related to genetic, psychological, biomedical and motor factors.

Empiricists confirm that 50m freestyle discipline is an excellent criterion and predictor variable for the selection of young swimmers. In selected competitors, this discipline is a good predictor variable for other swimming disciplines

Swimming is a specific sport, swimming is learned by swimming, training and competition include swimming pools that are few in B&H. A number of adverse factors in the recent past have influenced the stagnation of the overall standard, which is causative of sports performance, especially top performance. Considering the many unfavorable factors, the results shown by B&H swimmers compared to European swimmers are statistically bad, but given what has happened in the last two decades in these areas, the results are essentially good, one might say excellent. A valid answer about the causes, consequences and strategies of swimming development in the B&H area requires a serious professional and scientific approach.

Science and the profession agree that talents are born. The undisputed champion must be born, and it is created by the interaction of coaches and competitors, with tremendous work under optimal conditions. Encouraged by the fact that there is talent, interest, will and positive energy for swimming in the territory of Bosnia and Herzegovina.

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Appendix

Table 5. B&H Results 50m Freestyle from 2008-2020

Rang	2008	2010	2012	2014	2016	2018
1.	24.12	23.92	23.83	23.95	23.37	22.84
2.	25.56	25.01	25.80	24.60	25.09	23.05
3.	25.86	25.81	25.86	24.94	25.18	24.49
4.	25.96	25.90	25.94	25.21	25.59	24.94
5.	26.12	26.42	26.04	25.27	25.83	25.25
6.	26.49	27.05	26.10	25.54	26.21	25.28
7.	26.92	27.07	26.20	25.61	26.22	25.69
8.	27.35	27.09	26.67	25.78	26.54	25.70
Record	23.73	23.59	23.59	23.51	23.37	22.84

The values are expressed in seconds.

Source: <https://www.swimrankings.net/?page=rankingDetail&club=BIH>.

Table 6. Europe Results 50m Freestyle from 2008-2020

Rang	2008	2010	2012	2014	2016	2018
1.	21.66	21.49	21.80	21.31	21.73	21.34
2.	22.00	21.69	22.04	21.88	21.79	21.44
3.	22.16	21.76	22.18	21.93	21.85	21.68
4.	22.27	22.09	22.22	21.94	21.89	21.74
5.	22.28	22.14	22.22	22.09	22.01	21.97
6.	22.42	22.24	22.22	22.10	22.07	22.08
7.	22.70	22.26	22.24	22.13	22.07	22.11
8.	22.75	22.38	22.65	22.14	22.51	22.14
Record	21.50	21.94	20.94	20.94	20.94	20.94

The values are expressed in seconds.

Source: <https://www.swimrankings.net/?page=rankingDetail&club=EU>.