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Research article

A COMPARATIVE ANALYSIS OF THE SUCCESSFUL ATTACKS OF THE FOUR FIRST-PLACED NATIONAL TEAMS AT THE 16TH AND 18TH FIFA WORLD CUP

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Abstract. *The aim of this research was to determine and identify the number of completed successful attacks of the four first-placed teams (France, Brazil, Croatia and Netherlands) at the 1998 16th FIFA World Cup in France and the four first-placed teams (Italy, France, Germany and Portugal) at the 2006 18th FIFA World Cup in Germany, for each team individually. In this research, the samples taken from the population at large can be defined as active, professional, elite players in the regular, biggest, and strongest system of competition - the FIFA World Cup. For the realization of this study, measures of descriptive (frequency distribution) and comparative (X^2 - test and multiple classification test) statistics were used. The results obtained at both World Championships were analyzed by all the criterion variables and provided the ability to define specific actions that can be recommended for a statistical and systematic monitoring of successful attacks. Based on these results, it is possible to identify the importance of successful attacks (inaccurate, accurate and efficient) in order to achieve maximum competitive success and determine the best ways to set up a methodology of training activities.*

Key words: *football, competition, world championships, successful attacks, shot*

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INTRODUCTION

Top competitions such as the World and European Cups, the Olympic Games, as well as top-notch club competitions, can and should be a measure of quality in football. In addition to the World Cups, the Olympic Games are the best quality competitions and represent the culmination of an athlete's career. Therefore, an Olympic medal represents the dream of every top athlete, but for many, just to participate in the Olympic Games is a great success (Arnold, & Sarkar, 2015). At major competitions, especially the Olympics and World Cups, athletes have the unique aim to give their best, achieve the best score and achieve the best performance in their sports careers (Meškovska & Marković, 2013).

The capacity and effectiveness of football players are the factors which value quality, and there is no doubt that the prerequisite for this is the physical preparation of players, technical perfection and most importantly, the situational tactics of individuals and the team as a whole. Most of the previously performed investigations are not methodologically harmonized, so there is difficulty in comparing results. Leitte (2013) performed a study with the aim to analyze and quantify, in absolute and percentage terms, the incidence of goals in a total of 772 games of soccer World Cups (from 1930 to 2010), to verify in which periods and half of the games goals happen, over total time of the game, and finally to determine the critical stage of the game with the highest incidence of goals. According to author, in 772 games played in 19 World Cups a total of 2.208 goals were noted, including 951 goals in the 1st half, 1202 goals in the 2nd half and 55 goals in extra time. He determined the highest incidence of goals during the final 15 minutes, between the 76th and 90th minute. Dujmović (1979) studied the structure of the activities in a football game on a sample of 150 players of the Yugoslav first national soccer league and came to the conclusion that a shot on goal was represented by 1.6% of all activities performed. Angelov, Krstev, & Koen (1979) analyzed the link between a shot on goal at a short, medium and long distance with the final result, and took the players from the first Bulgarian national league for their sample of participants. The observation included 159 matches over a long period (from the 1973/1974 season till the 1977/1978 season). The authors concluded that on average, players carried out 13.73 shots at on goal (4.26 at a short distance, 7.26 at medium and 2.21 at long distances). Goal shots carried out from short and medium distances were very much linked with the final result. Shots on goal carried out from a long distance showed little correlation with the final result of the match. Boženko (1979) analyzed the technical and tactical elements of the game of football, carried out in extreme conditions, i.e. at the players' full speed with interference by the opponents, and with a lack of space. The author analyzed shots on goal, as well. The sample consisted of players from more than 60 local and foreign teams including players of the final game of the World Cup in Argentina (1978). The author concluded that 12% of the analyzed elements refer to struggling for the ball in the air, and receiving the ball with an obstruction by opponents and shots on goal. Sledziewski & Ksionda (1983) analyzed the matches of the 12th FIFA World Cup in Spain (1982) with the aim to establish the frequency of some technical and tactical actions and their coefficient of efficiency (number of offensive actions and the number of shots on goal). They concluded that there should be an average of more than 15 shots on goal per game, in order to classify a game as an efficient one. Simev (1987) analyzed the impact of technical and tactical actions on the success of the game football of , with a sample of 102 teams divided into three groups: 1) participants of the 12th World Cup in Spain (1982); 2) participants of the first Yugoslav national football league in

the 1981/1982 season; 3) the participants of the second Yugoslav national football league in the 1982/1983 season. The author concluded that offensive actions, quick attacks, precision kicks at the goal and taking over the ball showed the greatest contribution to score performance. Radosav (1996) analyzed a number of occasions of F.C. Vojvodina (Novi Sad) in the late 80s, while competing in the first Yugoslav national league: he determined a shot on goal of 1.6 times per match, on average. Marjanović (1995) analyzed the tactics in matches of the 9th European Football Cup in Sweden (1992) on a sample of 8 national competing teams and 15 matches. A total of 277 successful attacks (an average of 18.46 per game, or 9.23 per team, 32 effective attacks that is 11.11% of the total number of successful attacks) were analyzed. Janković (1999) analyzed matches of the 16th World Cup (1998) in France and compared those results with the results of the 15th World Cup in USA (1994). The author concluded that 54.5 % of the total scored goals at the 16th World Cup, 93 goals were given by attackers, while at the 15th World Cup in Italy, the percentage of goals scored by attackers was 66.7 %. Novitović (2001) analyzed the 16th World Cup in France (1998), i.e. the technical and tactical activities of the four most successful national teams (France, Brazil, Croatia and Netherlands) in the attack. He concluded that France and Brazil had the most effective attacks (14 per match), and 2 goals per match. According to author, the best four teams carried out a total of 495 successful attacks (goal shots), i.e., 134 were from France, 101 from Brazil, 114 from Croatia, and 146 from the Netherlands. An average for all four teams was 17.68 successful attacks (inaccurate successful attacks 59.97 %, accurate attacks 29.31 %, and effective attacks 10.72 %). Janković (2004) analyzed the 17th World Cup in South Korea and Japan (2002), and compared those results with the results of the 16th World Cup in France (1998). Based on the theoretical analysis and research results, the author made the following conclusion: at the 17th World Cup, the four finally the best positioned national teams had on average 80.25 successful attacks, while at the 16th World Cup, the four finally the best positioned national teams had on average 123.75 successful attacks, meaning that a defensive style of play dominated. In relation to the inaccurate-accurate successful attacks, according to author, at the 17th World Cup there were, on average, 67.75 compared to the 110.75 at the 16th World Cup. At the 17th World Cup in South Korea and Japan (2002), there were 12.50 efficient attacks, on average, and 13 at the 16th World Cup in France (1998), with a slight increase in attempts, but also more failures in France compared to South Korea and Japan, where the game became more "rational". Investigations on technical and tactical activities is very rare in our country and in the world. By studying professional literature, it was found that investigations done 20 or 30 years ago were more intensive, with researchers showing greater interest for these issues. Since then, football has made progress in all areas including technical and tactical capacities of individuals and the team as a whole, and therefore this lack of appropriate literature should be compensated by constant monitoring and research, i.e. by realization of professional settings of research projects. The most important goal in this research was to accurately analyze and compare successful attacks in the matches of the four best teams in the 16th and 18th FIFA World Cups in France (1998) and Germany (2006), respectively.

METHODS

Procedures

The basic research technique was the observational one. Observation is a general research technique in which the visual experience of the observer-researcher is the main criterion for the selection and interpretation of results, suggesting the elaboration of one of the key research assumptions, objectivity. For objective data collection it was very important to spot the relevant facts and interpret them in the right way. The observation technique is most commonly used to display the observed phenomena, and often in the part related to the expression of results it is combined with some other general research techniques (Perić, 2001). By using the expertise of the observer with a previously well-designed protocol of observation, the DVD recordings of the matches of the four best teams from the 16th ad 18th FIFA World Cups were analyzed in details and in a reliable, objective, valid and accurately controlled manner. The first phase of the research included the separation of the matches that are essential for this research, i.e., seven matches per each team. The second phase included the separation of the 28 matches per World Cup, that is, a total of 56 games, and after an analysis of successful attacks (attacks that ended with attacking technical and tactical elements of a shot at goal) was carried out. When allocating successful attacks, each observation was carried out twice, with an appropriate pause between them. This was extremely important because of the possibility of the occurrence of a "subjective" error while observing match only once. After a "double" inspection protocol of a match, it was possible to approach the comparison of the results obtained, and if the results did not coincide, another analysis was carried out to obtain accurate data. The high quality recorded matches were downloaded from the Eurosport channel. Matches were shot with a large number of cameras, which gave the opportunity to watch successful attacks from different angles. Modern computer technology with its technical characteristics (above all the possibility of slowing down the action) can contribute greatly to a more accurate observation of the smallest details, which enables the fulfillment of one of the key research assumptions - objectivity. In this research, an observation protocol specially constructed for its needs was used - an observation sheet. Each team in each match had its own special watch list that was valid only for that match.

The observation technique refers to successful attacks, strikes completed at the goal. The total successful attacks are all attacks that end with a goal strike without being bounced by the opponents, regardless of precision (inaccurate, accurate and efficient). By using dubbing and typing in the watch list, we can get the exact number of successful attacks. The total inaccurate attacks in successful attacks are all attacks that end with a goal strike, whereby the ball goes through the goal, next to the goal, in the goal or is left in the field. The "type" of accuracy was entered in the observation sheet, in this case, as inaccurate. The total accuracy of assaults in successful attacks are all strikes that end with a goal strike, requiring the intervention of the goalkeeper, the opposing player who was at that moment closer to the goal than his goalkeeper, or the rules of the game prevented the ball from passing through the goal posts. In addition, the strike at the bar or the goal is also counted. The "type" of accuracy was entered in the observation sheet, in this case, as accurate. The total effective attacks in successful attacks are all attacks that ended with a goal, in accordance with the rules of the game. Both inaccurate and accurate were recorded in the observation sheet and in this case they were marked as efficient. Inaccurate-accurate successful attacks are the sum of all inaccurate-accurate successful attacks described in the previous section.

Statistical analysis

For the realization of this study, measures of descriptive (frequency distribution) and comparative (X^2-test and multiple classification test) statistics were used. All data obtained are shown using tables and figures.

RESULTS

Table 1 Accurate, inaccurate and efficient successful attacks at the 16th World Cup

Final standing		Accuracy			Total
		Accurate	Inaccurate	Efficient	
1. France	Count	82	38	14	134
	% within ranking	61.2	28.4	10.4	100
2. Brazil	Count	57	30	14	101
	% within ranking	56.4	29.7	13.9	100
3. Croatia	Count	73	30	11	114
	% within ranking	64.0	26.3	9.6	100
4. Netherlands	Count	85	48	13	146
	% within ranking	58.2	32.9	8.9	100
Total	Count	297	146	52	495
	% within ranking	60.0	29.5	10.5	100

The second-placed striker, Brazil 57, had the smallest number of inaccurate attacks, third-placed Croatia had 73, first-ranked France 82 and the fourth-placed Netherlands 85. The highest number of successful inaccurate attacks were observed in the Netherlands (48), then in France (38), after in Brazil and Croatia (30, each). Efficiency attacks were mostly observed in France and Brazil (14, each), then in the Netherlands (13) and in Croatia (11).

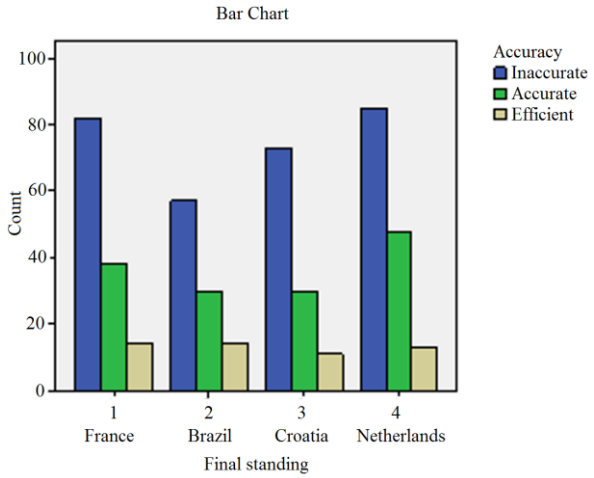

Fig. 1 Inaccurate, accurate and efficient successful attacks at the 16th World Cup

A comparative analysis of the results showed no significant differences in terms of the type of accuracy shown by the four first-placed national teams at the 16th FIFA World Cup and the final placement. This conclusion also indicates the value of the X^2-test of 0.787 (Table 2), i.e., it can be concluded that there are no statistically significant differences between the observed parameters that would affect the placement. All four teams had inaccurate, accurate and effective successful attacks of a different number. The final placement in this competition was not conditioned by quantitative parameters of this type.

Table 2 X^2-test: accurate, inaccurate and efficient successful attacks at the 16th World Cup

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	3.168[a]	6	.787
Likelihood Ratio	3.084	6	.798
Linear-by-Linear Association	.036	1	.849
N of Valid Cases	495		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.61

Table 3 Accurate, inaccurate and efficient successful attacks at the 18th World Cup

Final standing		Accuracy			Total
		Accurate	Inaccurate	Efficient	
1. Italy	Count	39	33	10	82
	% within ranking	47.6	40.2	12.2	100
2. France	Count	48	31	9	68
	% within ranking	54.5	35.2	10.2	100
3. Germany	Count	62	35	14	111
	% within ranking	55.9	31.5	12.6	100
4. Portugal	Count	57	48	7	112
	% within ranking	50.9	42.9	6.3	100
Total	Count	206	147	40	393
	% within ranking	52.4	37.4	10.2	100

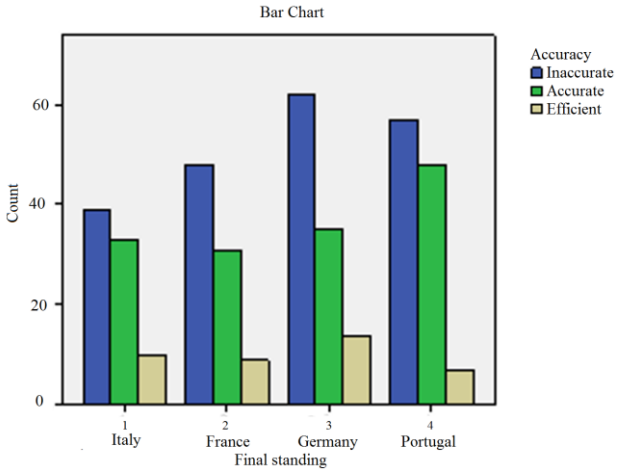

Fig 2 Inaccurate, accurate and efficient successful attacks at the 18th World Cup

The first-placed Italy had the largest number of accurate successful attacks (39), second-placed France had 48, fourth-placed Portugal had 57 and the third-placed Germany had 62. Fourth-placed Portugal had the most inaccurate successful attacks (48), Germany had 35, had 33, and France had 31. Third-placed Germany had the most efficient attacks 14, first-placed Italy had 10, second-placed France had 9 and fourth-placed Portugal had 7.

A comparative analysis of the results showed no significant differences in terms of the type of accuracy shown by the four first-placed national teams at the 18th FIFA World Cup and the final placement. This conclusion also indicates the value of the X^2-test of 0.467 (Table 4), i.e., it can be concluded that there are no statistically significant differences between the observed parameters that would affect the placement. All four national teams had inaccurate, accurate and effective successful attacks, of different numbers. The final placement at this competition is not conditioned by quantitative parameters of this type.

Table 4 X^2-test: accurate, inaccurate and efficient successful attacks at the 18th World Cup

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	5.619[a]	6	.467
Likelihood Ratio	5.849	6	.440
Linear-by-Linear Association	.686	1	.407
N of Valid Cases	393		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.35

Table 5 Accurate, inaccurate and efficient successful attacks at the 16th and 18th World Cups: Comparative analysis of individual results of eight national teams

Team		Accuracy			Total
		Accurate	Inaccurate	Efficient	
1. France	Count	82	38	14	134
	% within the team	61.2	28.4	10.4	100
2. Brazil	Count	57	30	14	101
	% within the team	56.4	29.7	13.9	100
3. Croatia	Count	73	30	11	114
	% within the team	64.0	26.3	9.6	100
4. Netherlands	Count	85	48	13	146
	% within the team	58.2	32.9	8.9	100
5. Italy	Count	39	33	10	82
	% within the team	47.6	40.2	12.2	100
6. France	Count	48	31	9	88
	% within the team	54.5	35.2	10.2	100
7. Germany	Count	62	35	14	111
	% within the team	55.9	31.5	12.6	100
8. Portugal	Count	57	48	7	112
	% within the team	50.9	42.9	6.3	100
Total	Count	503	293	92	888
	% within the team	56.6	33.0	10.4	100

The fourth-placed Netherlands and Portugal had the total most successful attacks at the 16th and the 18th World Cups (146 and 112, respectively), and second-placed Brazil and first placed Italy at the 16th and the 18th World Cups had the least successful attacks (101 and 82, respectively).

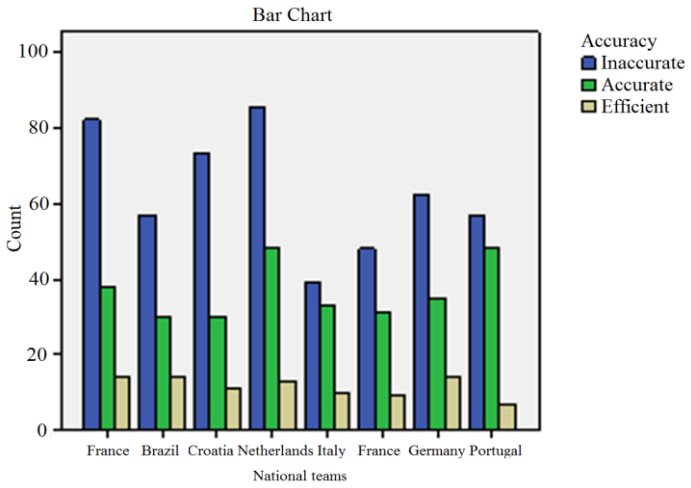

Fig. 3 Inaccurate, accurate and efficient successful attacks at the 16th and 18th World Cups: Comparative analysis of individual results of eight national teams

A comparative analysis failed to show significant differences in regards to the type of precision which was shown by the national teams, the four first-placed teams at two world championships, the 16th and the 18th. This is attested by the value of the X^2-test of 0.356 (Table 3.1), that is, we can conclude that between the observed parameters there were no statistically significant differences which would impact the effect. All eight national teams had inaccurate, accurate and efficient successful attacks of a different number.

Table 6 X^2-test: comparative analysis of accurate, inaccurate and efficient successful attacks of eight national teams at the 16th and 18th World Cups

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	15.330[a]	14	.356
Likelihood Ratio	15.318	14	.357
Linear-by-Linear Association	1.114	1	.291
N of Valid Cases	888		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.50

Table 7 Accurate, inaccurate and efficient successful attacks at the 16th and 18th World Cups: a comparative analysis of two World Cups

World Cup		Accuracy			Total
		Accurate	Inaccurate	Efficient	
France (1998)	Count	297	146	52	495
	% within the championship	60.0	29.5	10.5	100
Germany (2006)	Count	206	147	40	393
	% within the championship	52.4	37.4	10.2	100
Total	Count	503	293	92	888
	% within the championship	56.6	33.0	10.4	100

At the 16th World Cup in France (1998), there were a total of 495 successful attacks in regard to the 393 successful attacks at the 18th World Cup in Germany (2006). At the 16th World Cup in France (1998), there were a total of 297 accurate, 146 inaccurate and 52 efficient successful attacks in regard to 206, 147, and 40 (respectively) at the 18th World Cup in Germany (2006).

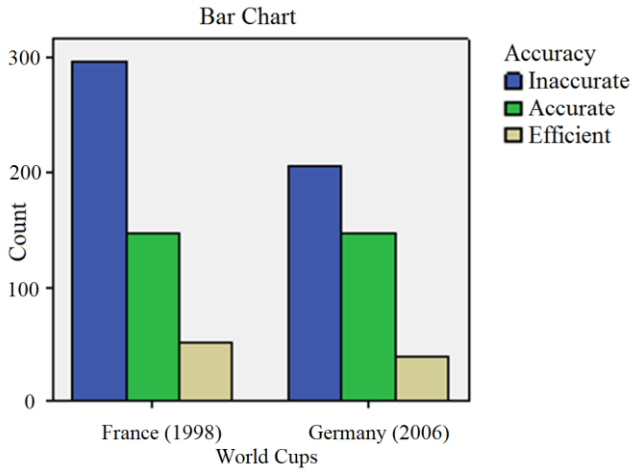

Fig. 4 Inaccurate, accurate and efficient successful attacks at the 16th and 18th World Cups: a comparative analysis of two World Cups

A comparative analysis of results has shown significant differences in regard to the types of precision which was shown at the two world championships, the 16th and the 18th. This is attested by the value of the X^2-test of 0.041 (Table 8), i.e., it can be concluded that the observed parameters create statistically significant differences between the two competitions. At both championships, all national teams carried out accurate, inaccurate and efficient successful attacks of a different number.

Table 8 X^2-test: comparative analysis of accurate, inaccurate and efficient successful attacks of the 16th and 18th World Cups

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	6400[a]	2	.041
Likelihood Ratio	6.385	2	.041
Linear-by-Linear Association	2.527	1	.112
N of Valid Cases	888		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 40.72

DISCUSSION

The obtained results of the research can only partially be compared with the previous investigations of other authors. The main reason lies in the fact that the research methodologies differ and therefore make comparisons more difficult. A small number of authors previously investigated the current issue, as most authors studied the motor skills and functional abilities of football players. Also, one of the significant problems is related to the quality of the sample in individual research. At the heart of this research is the successful attack and it is essential to show how real its significance is in the modern football. The technical-tactical activities in the attack, i.e., a successful attack, ended with a goal strike and its accuracy is the main criterion of a comparative analysis in this research. By reviewing the previous research we can see that some researchers have studied accuracy (Wrzos 1981; Sledziewski & Xionada, 1982; Marjanović, 1995, Radosav, 1996: Janković, 1999; Novitović, 2001; Janković, 2004; Leitte, 2013) with other samples of participants and have come up with different research results, which only opens the question of defining a conditional "model". The seemingly inaccurate successful attacks seem to dominate, the accuracy seems equal in number, but they are different in terms of representation, and it can be seen that more goals have been achieved at the 16th World Cup (although the representation is almost identical). After all, it can be concluded that there are certain model states (Koprivica, 1988) that relate to football players, the space of technique and tactics related to this research. The competition activity at the most important competitions (in this case at the 16th and 18th World Cups), where the best players are participating, reveals the tendencies of the development of the football game itself, as well as the elements of the structure of competitive success that determines the result to the greatest extent. And the training process, as the most complex type of model, as well. Leitte (2013) concluded that physical performance should directly interfere in the technical, tactical and psychological performance of a team, with the highest incidence of goals in the final 15 minutes of the game associated mainly with the drop in physical performance. This clearly shows the importance of physical fitness for good performance of a soccer player during the game, so that he can quickly achieve technical and tactical actions, performing well throughout the game without a performance drop. All this determines the content and structure of the training process, and requires continuous registration of all the elements of the training process, the study of effects and the finding of optimal variants of the player's preparation for the competition, especially for the most important and the greatest ones. Without investing in sports and athletes, achieving superior results is an illusion. Progress can occur only in environments where people seriously approach the problem of producing top results and, in accordance with their needs, create favorable conditions for its realization.

CONCLUSION

All eight national teams played 7 games, or 28 at each World Cup, a total of 56 games. At the 16th World Cup, there were 495 successful attacks, and at the 18th there were 393, or a total of 888 successful attacks. Only the national team of France was among the top four at two championships (first place in 1998 and second place at the 2006 World Cup). After the obtained research results, their interpretations and discussions and in accordance with the formulated and fulfilled goals, there were certain analyses of group and individual results

that could or should represent certain models in the technical-tactical attack activities in modern football. The obtained results allow us to carry out the appropriate conclusion: the differences that were shown by the comparative analysis of two World Cups (the 16th and the 18th, i.e., 495 and 393 successful attacks, respectively), clearly indicate that it is not important to perform the most shots on goal, that is, to have the most successful attacks. The trend that occurred in one competition does not necessarily mean that it will be repeated in another. France became the World Champions at the 16th World Cup with 14 goals scored out of 134 successful attacks, and Italy became the World Champions at the 18th World Cup with 10 goals scored out of 82 successful attacks. For the Netherlands at the 16th World Cup, 146 attacks against the goal were insufficient as its players scored 14 goals, which was enough only for fourth place, and an even more drastic example is Portugal at the 18th World Cup with 112 successful attacks and only 7 goals scored, which, however, was also adequate only for fourth place in this competition.

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KOMPARATIVNA ANALIZA USPEŠNIH NAPADA ČETIRI PRVOPLASIRANE REPREZENTACIJE NA 16-TOM I 18-TOM SVETSKOM PRVENSTVU U FUDBALU

Cilj ovog istraživanja bio je da *se utvrdi (identifikuje) za svaku reprezentaciju pojedinačno, broj izvršenih uspešnih napada, četiri prvoplasirane reprezentacije (Francuska, Brazil, Hrvatska i Holandija) na 16-tom svetskom prvenstvu u Francuskoj, 1998. godine i četiri prvoplasirane reprezentacije (Italija, Francuska, Nemačka i Portugalija) na 18-tom Svetskom prvenstvu u Nemačkoj, 2006. godine. U ovom radu uzorak entiteta dobijen je iz populacije koja može da se definiše kao populacija aktivnih, profesionalnih, vrhunskih fudbalera u redovnom, najvećem i najjačem sistemu takmičenja – FIFA Svetskom prvenstvu. Za realizaciju ovog istraživanja korišćene su mere deskriptivne (distribucija frekvencija) i komparativne (X^2 - test i test višestruke klasifikacije) statistike. Dobijeni rezultati na oba svetska prvenstva analizirani su po svim kriterijumskim varijablama i daju mogućnost definisanja konkretnih postupaka koji se mogu preporučiti za statističko i sistematsko praćenje uspešnih napada. Na osnovu dobijenih rezultata moguće je utvrditi zanačaj uspešnih napada (nepreciznih, preciznih i efikasnih) u cilju ostvarenja maksimalne takmičarske uspešnosti i najcelishodnije postaviti metodiku trenažnih aktivnosti*.

Ključne reči: *fudbal, takmičenje, svetska prvenstva, uspešni napadi, udarac na gol*