

THE EVALUATION OF COMPETITION PERFORMANCE IN HANDBALL - WORLD CADETS CHAMPIONSHIP SKOPLJE, 2019.

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Abstract

This study deals with the evaluation of the competitive performance of the cadet level handball players. The subject was differences in the realization of competing activities of successful and less successful cadet handball teams in the U19 World Handball Championship, held in North Macedonia, 2019. The main goal of this study is to determine the level of efficiency of competitive activity of young handball players and the differences in the expression of competitive activity that potentially exists between successful (the place from 1st - 4th) and less successful (the place from 5th-8th) handball teams. In the study were used statistical and descriptive research methods. The sample is represented by representative handball teams (8) under 19, who participated in the recently held World Handball Championship. The analysis included 36 matches in the group of less successful teams and 36 matches in the group of successful teams in this championship. It was presented a description of the technical and tactical elements of the handball game (17 variables), which represents competitive activity in men's handball, and then was conducted a comparative analysis of these elements for different levels of success of the cadet handball team on this high-quality, international competition. For a more precise analysis, it is particularly extracted seven (7) variables, which examined the current situation/condition in the world representing handball, in terms of technical and tactical activities in the attack phase. According to the data obtained, it is clear that the coefficient of efficiency of technical and tactical elements, in numerical terms, determines the success of most handball teams at this world championship for young handball players. The results further show that there are differences in the statistical sense, for 2 out of 7 variables, identified as variables from which contributes directly to the success, respectively, with which goals are scored. The general conclusion is that there are significant differences in the realization of some competitive activities in successful and less successful men's cadet handball teams at the World Handball Championship 2019.

Keywords: handball, competition, technical and tactical activities, efficiency, attack.

INTRODUCTION

Sports games are classified into a group of sports branches in which dominate the non-stereotypical movements and situations, and they are characterized by complex presentations of basic motor skills. The intensity of the stress of the match is moving in the range from moderate to maximum, and given frequent, longer or shorter interruptions and periods of continuous play, the character of sports game efforts could be classified as a variable (Đurinović, 2016).

The analysis of competitive activity allows us to distinguish the factors on which the efficiency and the result in the chosen sports activity depend and also to assess quite precisely at what level they are. Also, this analysis can determine the amount of work to be done in the competition and what that work consists of. In that way, it comes to finding out what exactly athletes need to prepare for. (Nešić, 2006). To evaluate the performance of the technical and tactical elements of a handball game, only the performances with the interference of the opponent are counted, because such analysis gives a more realistic picture of the state of technical and tactical preparation of players in competitive situations. Data obtained in this way serve as the basis to evaluate the state of technical and tactical preparation of handball players or as operational indicators for coaches. The collecting a relevant

statistics during a sports game has become a lucrative business and every professional team or individual, in almost every sport, has its professional staff to monitor important factors, both from his team and also from opponents. The advantage of this method of monitoring the player's efficiency is that the individual statistics obtained allow an analysis of the characteristics of the applicable game systems. In other words, they can show the state of sports form the team is in. When necessary is, the coach analyzes the parameters. When necessary is, the coach analyzes the parameters (for which he estimates that they are needed for his work), to assess the condition level of the overall efficiency of the team at the matches.

METHOD

The study was designed as a qualitative, with retrospective character. The study used a descriptive and comparative research method. For the variables of the technical-tactical dimension of the competitive activity of the cadet handball players, it was used *RukometStat* to keeping statistics of the handball matches, as well as the whole competition. It is used in the Croatian handball leagues, the regional SEHA league, and as a system for statistical data processing and reports of *International Handball Federation* (IHF).

Sample

The study includes the results of the first eight (8) placed teams at the World Cadet Championships (Egypt, Germany, Denmark, Portugal, Hungary, France, Spain and Iceland). Each team has played 9 games, so a total of 72 played games makes the observed sample of this research. Therefore, the holders of information in this paper (entities) are handball matches.

Variables sample

The variables monitored in the study are from the area of technical and tactical activities which take place in the handball attack phase, and they were selected based on a unique criterion that characterizes the completion of an offensive action - creating the conditions for a shot on goal in situations where the number of players on the court is equal, respectively, larger or smaller number of players in the attack phase.

Based on this, 17 variables were used in the study, as follows: PGUT - average goals per game, BRŠ - the total number of shots, BRG - the total number of goals, BRŠK - the total number of wing shots, BRGK - the total number of wing goals, BRŠ7M - the total number of 7m shots, BRG7M - the total number of 7m goals, BRŠ9M - the total number of 9m shots, BRG9M - the total number of 9m goals, BRŠ6M - the total number of 6m shots, BRG6M - the total number of 6m goals, BRŠPR - the total number of breakthrough shots, BRGPR - the total number of breakthrough goals, BRŠKN - the total number of fastbreak shots, BRGKN - the total number of fastbreak goals, PRIMG - the total received goals, BRNAP - the total number of attacks.

Statistical procedures

To process the data obtained were used a descriptive statistics procedures which contain methods and procedures for presenting and summarizing data and comparative statistics. It was also used the procedures of graphical and tabular

presentation of data, as well as a calculation of measures of central tendency and variability:

1. Mean - arithmetic mean;
2. Std.Dev. - standard deviation;
3. Min. - minimum;
4. Max. - maximum;
5. Coe.var. - coefficient of variation.

For each situational variable from the field of technical and tactical dimensions was calculated the coefficient of efficiency (KE). To calculate it, it is necessary to know the total number of executed game elements, as well as the number of successfully executed game elements. The general formula for calculating KE is (Godik, 1976):

the total number of executed game elements

KE= -----

the number of successfully executed game elements

From a field of comparative statistics were used: t-test (test of mean difference for small dependent samples), which determines the significance of the difference in efficiency between more and less successful national teams (technical and tactical dimension) at the 2019 World Cadet Championship with. Statistical data processing was done using application software SPSS 20.0, on the laptop Acer, Aspire E1 - 510.

RESULTS

The sample included a total of 72 matches, which were divided into two groups, 36 matches for less successful national teams (rank from 5th to 8th place) and 36 matches for successful national teams (rank from a 1st-4th place) at the World Cadet Handball Championship, Skopje, 2019.

Table 1. Basic statistical parameters for variables from the TT dimensions field- sample of played matches

Variables	N	Mean	Min.	Max.	Coe. var.	Std.Dev.	K-S
PGUT	72	30.943	26.89	34.22	0.0718	2.224	0.765
BRŠ	72	424	386	458	0.0635	26.944	0.444
BRG	72	266.88	242	308	0.0753	20.110	0.669
BRŠK	72	65.88	49	86	0.2025	13.346	0.313
BRGK	72	42.125	26	59	0.2722	11.470	0.451
BRŠ7M	72	31.5	21	38	0.1819	5.732	0.648
BRG7M	72	23.375	16	28	0.1920	4.489	0.758
BRŠ9M	72	165	212	204	0.1960	32.341	0.561
BRG9M	72	80.25	43	113	0.2922	23.456	0.564

BRŠ6M	72	57.625	40	73	0.2409	13.886	0.572
BRG6M	72	42.75	28	57	0.2594	11.093	0.489
BRŠP	72	55.5	40	72	0.2031	11.275	0.380
BRGP	72	41.625	25	54	0.2377	9.898	0.408
BRŠKN	72	39.626	31	50	0.1716	6.802	0.457
BRGKN	72	31.5	26	40	0.1679	5.291	0.669
PRIMG	72	226.5	208	245	0.0665	15.071	0.539
BRNAP	72	465.75	386	567	0.1278	59.545	0.337

Legend: **PGUT** - average goals per game, **BRŠ** - the total number of shots, **BRG** - the total number of goals, **BRŠK** - the total number of wing shots, **BRGK** - the total number of wing goals, **BRŠ7M** - the total number of 7m shots, **BRG7M** - the total number of 7m goals, **BRŠ9M** - the total number of 9m shots, **BRG9M** - the total number of 9m goals, **BRŠ6M** - the total number of 6m shots, **BRG6M** - the total number of 6m goals, **BRŠPR** - the total number of breakthrough shots, **BRGPR** - the total number of breakthrough goals, **BRŠKN** - the total number of fastbreak shots, **BRGKN** - the total number of fastbreak goals, **PRIMG** - thr total received goals, **BRNAP** - the total number of attacks.

By reviewing the results and statistical parameters for variables from the TT dimension field, for a sample of played matches (Table 1), it is stated that the handball players gave on average ≈ 31 goals per game, that on average, each team shot the goal in total of 424 times in the nine (9) matches that each team played in the tournament. They achieved 266.88 goals on average, per national team. From the position of the wing players, the average shooting was a little over 65 times, and the goalkeepers net shook 42.12 times. From the 7m line, it was shooting an average of 31.5 times and achieved an average of 23.38 goals. From the 9m field, it was shot an average of 165 times and achieved a little more than 80 goals. From the pivot play position, the ball is shot almost 58 times on average and almost 43 goals were achieved.

There were 41 goals achieved from the breakthrough, and there were almost 40 opportunities to fastbreak with an average of 31.5 goals. The average number of attacks per one

handball national team, from the 9 played games, was 465.75.

Considering the values of the coefficients of variation, it is confirmed that the sample is quite uniform even by the criterion of attack. According to the present parameter values, the distribution of the results for the whole sample of variables ($N = 72$) is in the range of normality which indicates the homogeneity of the sample of variables, which provides the further processing of data. In order to verify the efficiency of national teams, of the 17 observed variables, for further analysis are taken into account only those related to the achievement of goals. For these purposes has been extracted seven (7) variables.

Table 2. Efficiency coefficient (KE) of the eight best-placed teams - TT elements of attack

Mark	EGY	GER	DEN	PORT	HUN	FRA	ESP	ISL
KE_G	0.672	0.666	0.641	0.617	0.645	0.597	0.626	0.517
KE_GK	0.730	0.636	0.509	0.530	0.675	0.686	0.689	0.600
KE_G7M	0.750	0.892	0.800	0.710	0.714	0.740	0.593	0.761
KE_G9M	0.557	0.519	0.562	0.529	0.462	0.425	0.355	0.430
KE_G6M	0.742	0.739	0.700	0.700	0.777	0.833	0.802	0.630
KE_GPR	0.750	0.740	0.809	0.805	0.781	0.625	0.807	0.655
KE_GKN	0.769	0.794	0.780	0.838	0.864	0.833	0.800	0.697

Legend: **KE_G** - Shot efficiency coefficient (goal), **KE_GK** - Wing efficiency coefficient, **KE_G7M** - 7mshot efficiency coefficient, **KE_G9M** - 9mshot efficiency coefficient, **KE_G6M** - 6mshot efficiency coefficient, **KE_GPR** - breakthrough shot efficiency coefficient, **KE_GKN** - fastbreak shot efficiency coefficient

By looking at the results (Table 2.) obtained by calculating the efficiency of a shot as an element of attack, Egypt could be the most effective in scoring

goals (**0.672**), and least effective in scoring goals, Iceland national team (**0.517**). The most effective in achieving the goals from the wing position was

Egypt (**0.730**), and the worst Denmark (**0.509**). From the 7m position, the most efficient were the Germans (**0.892**) and the worst Spaniards (0.593). From the field of 9m, the best realization of the attacks had the Danes (**0.562**) and the worst Spaniards (**0.335**). On the 6m position, the French were the most efficient (**0.833**), and the national team of Iceland (**0.630**) had the lowest score in this segment of the game. The highest coefficient from the breakthrough was achieved by the Danes (**0.809**) and the least by the French (**0.625**). By the fastbreaks, the most successful were the Hungarians (**0.864**) and the least successful were the Icelanders (**0.697**).

The key question of the research is: is the numerical difference between less successful (place of 5th-8th) and successful (place of 1st-4th) big enough, to be considered as statistically significant? To make the necessary conclusion easier, it should be said that the national teams are divided by the criterion of success into two groups (1) and (2).

Group 1 consisted of better-placed teams (Egypt, Germany, Denmark, and Portugal), while Group 2 consisted of lower placed teams (Hungary, France, Spain, and Iceland). The results were obtained based on the values of the degree of freedom **df=71** and the limit value of the two-way t-test. For the statistically significant values accepted are those whose (limited) value of t-test is higher than, or equal to **t ≥ 2.000**, at a significance level of **p = 0.05**.

According to the results in Table 3, it is clear that there are also differences between the groups in two (2) variables out of seven (7) marked as a variable from which contributes directly to the success, that is, which achieves goal with. Statistically significant differences are shown in the variables Wing efficiency coefficient (**KE_GK**) **p = 0.033** and 7m shot efficiency coefficient (**KE_G7M**) **p = 0.044**. For other variables, there was no statistical significance at this level of inference.

Table 3. The differences between less successful and successful handball teams

Variables	Groups	N	X	SD	Skew.	Kurt.	t	df	p
KE_G	1	36	30.94	19.756	3.210	1.741	2.128	71	0.123
	2	36	28.31	12.685	-2.547	0.377			
KE_GK	1	36	3.88	10.519	-5.290	0.124	-3.742	71	0.033
	2	36	5.47	7.804	1.196	0.188			
KE_G7M	1	36	2.97	1.258	2.227	-1.129	3.356	71	0.044
	2	36	2.22	3.741	1.500	0.764			
KE_G9M	1	36	10.55	20.704	0.074	-1.048	1.647	71	0.198
	2	36	7.27	16.583	1.934	-0.877			
KE_G6M	1	36	4.50	14.456	-5.905	0.017	0.642	71	0.567
	2	36	5.50	8.041	3.796	1.938			
KE_GPR	1	36	4.97	10.750	-5.614	-0.067	1.022	71	0.383
	2	36	4.27	9.327	2.704	-1.597			
KE_GKN	1	36	3.39	5.916	2.229	1.545	-0.405	71	0.712
	2	36	3.61	5.260	2.235	1.443			

Handball belongs to the group of so-called. high-intensity intermittent sports. The main characteristic of this group of games is multiple short periods of high-intensity explosive movements, separated by periods of short rest. The essence of the handball game is reflected in the efficiency of handball players in all phases of the game. Its recognition and understanding are not possible without

researches which is related to determining the relationships of standard indicators of situational efficiency and performance in the game with differently defined criteria of that performance. Many previous studies of situational efficiency in handball are based on this idea and they explored efficiency considering play positions (Guić, Vuleta & Milanović, 2006), Ohnjec, et al., 2008), efficiency

considering the shooting zones (Pokrajac, 2008, Rogulj, 2000), and efficiency considering a different ways of shooting (Delija & Štimatec, 1994; Vuleta, Milanović & Sertić, 2003; Čeleš, et al., 2014). Furthermore, they were also explored the differences between the frequency and the success of the shot with the success of the team (Apitzs & Lui, 1997; Taborsky, 2008), the influence of tactics elements on success, and the influence of the variables in the attack ending on the final result of the match (Srhoj, et al., 2001; Rogulj, Srhoj, V. & Srhoj, Lj., 2004; Rogulj & Srhoj, V. 2009).

Speaking about the frequency of certain technical-tactical activities, a figure of 567 attacks, how many teams from Egypt has made in 9 played matches, clearly indicates that modern handball is played fast and offensively. Teams from Germany (482 attacks), Denmark (497), Portugal (507) who finished the tournament as the four best-placed teams had a no different concept. A number of opportunities for shooting also support the conclusion that the tactics of the game based on the aggressive approach and aim to achieve a goal. With the frequency of technical-tactical elements in handball has been dealing Guić et al. (2006), Bilge (2013) and Vuleta, Sporiš & Milanović, (2015), and also Vuleta, Milanović, & Jerak, (2016) in which they also confirm relatively high percentages of efficiency in the attack.

The coefficient of efficiency (KE) in research provides an opportunity to measure the level of efficiency and the realization of the technical-tactical idea by elements. According to these values, the team of Egypt had 458 attempts to make a shot on goal, France 452, Portugal 444, and Iceland 432 attempts. According to the coefficient of efficiency, the best realization in the tournament, in terms of goals scored, had the team from Egypt (0.672), followed by Germany (0.666), Hungary (0.645) and Denmark (0.641). For comparison, Vuleta and Štimac, (1989) are received a similar data from the World Youth Championship in Rijeka in 1987, according to which the national team of Yugoslavia achieved 35.1 shot per match, with an average shooting efficiency of 61.1%, or Vicha (1981), who recorded an average shot efficiency of 55.24% in 11 matches, at the Olympic Games in Moscow, 1980. The winning teams achieved 60.6% efficiency. Rokavec (2012) analyzed some indicators of the situational efficiency of the Croatian handball team at the European Championship in Serbia, 2012. The Croatian national team had 60% efficiency against the opponent's goal, 38% from the outside positions of attackers, 62.5% from wing positions of attackers and 63% from the pivot position of attackers.

In a further review of this research, the realization from wing positions was best for the Egypt team (**0.730**), followed by Spain (**0.689**), France (**0.686**) and Hungary (**0.675**). From the 7m line, the most efficient performance had Germans (**0.892**), Danes (**0.800**), Icelanders (**0.761**), and Egyptians (**0.750**). From the 9m field, the most

efficient was the handball players of Denmark (**0.562**), followed by Egypt (**0.557**), then Portugal, (**0.529**) and Germany (**0.519**). The most effective pivot position players on the 6m line were in the team of France (**0.833**), then Spain (**0.802**), Hungary (**0.777**) and Germany (**0.739**). From the "breakthrough", the most effective in the tournament were Danes (**0.809**), Spaniards (**0.807**), Portuguese (**0.805**) and Hungarians (**0.781**). The counterattacks were best realized by Hungarians (**0.864**), Portuguese (**0.838**), then French (**0.833**) and the Spaniards (**0.800**).

Even after the analysis by the criterion of efficiency coefficient (KE), The winning teams (group 1) are, more or less, retained positions at the top of the table with a tolerance of ± 1 . The teams of Egypt and Iceland have confirmed your placement, while the team of Portugal in fact, made the most benefited when it comes to the relationship between wins and losses because, if the efficiency parameter were the realization of technical and tactical elements in the game, the Portugal national team would only take 7th place. A similar check was conducted by Vuleta, et al. (2003) and attempted to determine the relationship between the variables of shooting on goal with the final result of the handball match.

The results showed that of the total number of realization, about 45% done with outside positions. The winning teams have shown significantly greater efficiency from outside positions (43.20%) than losers (32.52%), as well as greater efficiency of 7m shooting (76.53%) in relation to the losers (65.76%). The differences between winning and losing teams have also explored Saavedra, J. M. Þorgeirsson S., Kristjánssdóttir, H., Chang, M. & Halldórsson, H. (2017) with the desire to compare handball statistics to the final result of the match. A similar issue was addressed by Čeleš, et al. (2014) who analyzed the differences in the efficiency of shooting performance between winning and losing teams at the 2012 European Handball Championship and they found statistically significant differences in the four variables (UBG, PROC, ŠUTKRUS, and Š9MNE). As in this study, the results have shown that the difference between the winning and losing team appeared in the number of goals per match, and the authors have also noted the differences in the realization of goals from a 9m field. Babić (2017) was exploring differences between the situational efficiency male handball teams in the first part of the competition of the Croatian Premier League season 2016/2017. and found a statistically significant difference between the placed and unplaced teams in the variables: 6m shot successfully (ŠUT6M-US), 9m shot successfully (ŠUT9M-US), shot from the half-fastbreak unsuccessfully (ŠUTPKT-NE), 6m shot unsuccessfully (ŠUT6M-NE) and technical faults (TEH). So, the results in terms of finding differences between two entities based on standard attack variables are clearly different, which can be

"justified" by many factors such as the level of competition or the quality of teams in a physical, technical, tactical and psychological sense. In our opinion, because of its specificity, these are domains that leave us enough space to explore and find answers to the question of why is one team more successful and the other less successful in a handball game.

CONCLUSION

Based on the results of the research, it came to some conclusions. Specifically, the coefficient of efficiency of the technical-tactical elements, in numerical terms, clearly determines the success of most handball teams in this World Cup U19, 2019.

The idea of this research was to check whether there is a statistically significant difference in the criterion of success of the realization of these parameters. And, in that part of the research the statistical significance was confirmed for the two variables, (KE_GK) $p=0.033$ and (KE_G7M) $p = 0.044$, while the differences in arithmetic mean in the other analyzed variables were such values, that they were not statistically significant at this level of inference.

It also imposes the conclusion that the obtained results confirm the fact that all analyzed variables (actions) are not equally represented in the game of observed teams, and that the achieved team rankings are influenced by a number of different factors at the same time.

The general conclusion is that there are significant differences in the realization of competitive activity in successful and less successful men's cadet handball teams at this championship.

With this kind of research, in addition, to create the conditions for improving training technology handball game and to contribute of the development of research which, unfortunately, has been unjustifiably neglected in our country, should affect to all actors, to coaches, players, and referees, to start looking at handball more responsibly and above all, much more detailed, more thorough, professional and scientific. Being aware of the fact that handball is not just a technical and tactical activity in the attack, it leaves space for researchers to focus their "efforts" on other parts of the handball game. In this way, they will make a significant contribution to the healing of a sport where we once were world and European champions and Olympic winners. (Valdevit, 2009).

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