WOMEN'S HANDBALL WORLD CHAMPIONSHIP 2017 CASE STUDY: EUROPEAN TEAMS VERSUS REST OF THE PARTICIPATING TEAMS' EFFICIENCY

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Abstract

In this study we quantified data collected from the Women's Handball World Championship 2017, held by Germany and in which 24 national teams (15 teams from Europe and 3 teams each from Asia, America and Africa) participated. The researchers analyze the game actions in handball in many ways in order to find solutions to improve performance. The aim of the study is to determine if there is any statistical significance between the European participating teams (15) and the rest of the World teams (9) in terms of efficiency during the competition. The data used in this article have been taken directly from the official statistics of the International Handball Federation. When we compare the efficiency of the European teams to the benchmark, for 6 out of 7 indicators the minimum requirements were achieved; for the rest of the participating teams at all indicators the values were below minimum recommendations. Regarding ANOVA univariate analysis for 7 out of 9 indicators there was obtained statistical significance (4 indicators for $p < 0.05$, 2 for < 0.01 and one for < 0.001) and this fact is confirmed by other studies. We can conclude that there is a statistical significance between the European teams and the rest of the participanting teams in term of efficiency at Women's Handball World Championship 2017. These findings could be useful for individuals involved in handball activities and help them to find a proper manner to approach this kind of situations.

Key words*: action games, competition, significance, analysis*

Introduction

Indoor Women's Handball World Championships, in the current period, are organized every two years (since 1993) and the first edition took place in 1957. The competition format has undergone some changes concerning the number of participating teams, the number and structure of the group, number of games played by the participating teams. Between 1957 and 1993 the number of participating teams varied between 8 and 16, there was a group phase, then main groups (since 1993) and placement matches to establish the final hierarchy. Since 1995 the number of teams increased to 20, and from 1997 to 24, which is kept constant the number so far. The teams go through qualifiers to be present in the final phase (Leuciuc, 2016b).

In this study we quantified data collected from the Women's Handball World Championship 2017, held by Germany and in which 24 national teams (15 teams from Europe and 3 teams each from Asia, America and Africa) participated.

The researchers analyze the game actions in handball in many ways in order to find solutions to improve performance: related to the relation of the playing positions (Gruic et al., 2006; Ohnjec et al., 2008), the shooting areas (Rogulj, 2000; Pokrajac, 2008), the connections between shots' efficiency and team's efficiency (Apitzs & Liu, 1997; Taborsky, 2008), the relations between team tactics and shots' efficiency (Srhoj et al., 2001; Rogulj et al., 2004; Rogulj & Srhoj, 2009), the relationship between the location, direction, effect of the finalisation and the position of the attacker (Costa et al., 2017) and a comprehensive one that combines different situations of shots' efficiency (Foretic & Papic, 2013).

When there are analyzed indicators between successful and less successful teams, the results showed statistically significant difference for successful teams for more than half of the indicators (Bajgoric et al., 2016), but also there is a relationship between the location, direction, effect of the finalisation and the position of the attacker in order to score (Costa et al., 2017).

There are studies in which even the analysis of the best teams showed statistically significant difference and that confirms that, in order to obtain performance and efficiency in handball competitions it is necessary to prepare very well the defence and offence situations (Bubalo & Ohnjec, 2017); but also the analysis of the situational efficiency indicators of shots showed no statistical significant differences between top teams and we could conclude that there are very small differences in terms of efficiency regarding the best teams and few mistreated situations could show differences between medals and a middle ranking (Varzaru & Cojocaru, 2014; Uzelac-Sciran, 2017).

There are significant differences between the first eight teams in the top handball competitions and

other participating teams (European Championships, World Championships, and Olympic Games) in terms of efficiency on several indicators (Wang et al., 2010; Bilge, 2013; Leuciuc & Pricop, 2016b; Leuciuc, Pricop, Grosu, & Păcuraru, 2016c; Leuciuc, 2017a; Leuciuc & Pricop, 2017b).

The winning teams scored significantly higher in the following shots situations: fast break, backcourt, 6m-line and in defence - blocked shots more efficient, whereas the defeated teams scored higher in the breakthrough shot and from backcourt; analysing these differences we could say that they contributed significantly to the match final outcome (Vuleta et al., 2017).

Team performance indicators and situational efficiency in handball influence the goal-difference in the match's final score, and for the group stage this is an important factor which could provide an easier path in the knockout stage (Ohnjec et al., 2008).

In handball the effort is different according to the playing position and during the competitions, pivots and wings showing the highest levels of effort, followed by backcourts and then by goalkeepers; so it is important to substitute players in different position in order to keep the same playing efficiency (Karpan et al., 2015); an important role had backcourts players shots (as efficiency and number) on the final result successfulness, defined as the goal-difference at the end of the match, but we can't forget that handball is a collective sport and teammates contribute in order to create a favourable shot situation (Gruic et al., 2005).

The perception of coach behaviours in training and competition environments) and athlete collective efficacy highlight this relationship and their combined impact on performance in elite female handball (Hoigaard et al., 2015).

The aim of the study is to determine if there is any statistical significance between the European participating teams (15) and the rest of the World teams (9 in number from America, Asia, Africa) in terms of efficiency during the competition.

Methods

Regarding the 24 national teams participating at Women's Handball World Championship 2017 in Germany, in order to determine if there is any statistical significance, there were analyzed 8 indicators (5 from offence and 3 from defense): shots efficiency (6m, wings, 9m, 7m, fast break), goalkeepers efficiency, interception and blocked shots.

The data used in this article have been taken directly from the official statistics of the International Handball Federation (IHF) (available at http://ihf.info/en-us/ihfcompetitions/worldchampionships/womensworldchampionships/ihfwomen%E2%80%99sworldchampionshipingermany2017/statistics.aspx) and include all the matches played during the Women's World Handball Championships 2017 held in Germany and we analyzed statistically the 8 indicators, between the European teams and the rest of the participating teams.

Descriptive statistics were calculated based on the collected data, while ANOVA analysis was used for the purpose of determining the significances.

Results and discussion

The game actions that provided the statistical analysis are: shots efficiency (6m, wings, 9m, 7m, fast break), goalkeepers efficiency, interception and blocked shots for the European teams and the rest of the participating teams (table 1).

Table 1. Game actions efficiency averages and ANOVA analysis for teams participating at Women's Handball World Championship 2017 (the European teams versus the rest of the World teams)

Statistical parameters / Game actions	Shots efficiency (%)			7m shots efficiency (%)	Fast break efficiency (%)	Shots efficiency (%)	Goalkeepers' efficiency (%)	Interceptions (no.)	Blocked shots (no.)
	6m	wing	backcourt						
X±SD (Europe)	64.13±5.32	56.27±6.56	41.13±4.87	76.20±6.09	75.20±5.47	59.20±3.59	32.32±3.87	21.93±7.93	21.33±14.17
X±SD (rest of the World)	58.67±6.00	48.78±8.97	34.44±8.20	69.11±9.88	69.67±10.76	53.00±6.60	26.56±3.50	18.56±10.05	10.44±5.59
F (1, 22)	5.409	6.568	6.634	4.786	2.818	9.002	13.432	0.836	4.795
p	0.029*	0.028*	0.019*	0.039*	0.107	0.007**	0.0001***	0.370	0.0039**

X – mean; SD – standard deviation; (*P < 0.05; **P < 0.01;***P < 0.001); F - MS factor/MS residual; p - statistical significance.

Data obtained from the research were compared with the recommendations of scientific literature on the minimum efficiency of game actions (table 2) (Taborsky, 2001).

Table 2 Game actions efficiency in our study compared with those in scientific literature

Game actions efficiency	Benchmark efficiency (Taborsky F., 2001)	Efficiency for European teams	Efficiency for rest of the World teams
backcourt shots	40 – 45%	41.13%	34.44%
wing shots	55 – 60%	56.27%	48.78%
6 m shots	60 – 65%	64.13%	58.67%
fast break shots	70 – 75%	75.20%	69.67%
7 m shots	75 – 80%	76.20%	69.11%
goalkeepers	35 – 40%	32.32%	26.56%

When we compare the efficiency of the European teams to the benchmark (Taborski, 2001) for 6 out of 7 indicators the minimum requirements were achieved; for the rest of the participating teams at all indicators the values were below minimum recommendations.

Regarding ANOVA univariate analysis for 7 out of 9 indicators there was obtained statistical significance (4 indicators for $p < 0.05$, 2 for < 0.01 and one for < 0.001) and this fact is confirmed by other studies (Rogulj, 2000; Gruic et al., 2006; Pokrajac, 2008; Meletakos et al., 2011; Bilge M., 2013; Gomez et al., 2014; Aguilar et al., 2015).

For 15 European teams, there was high group homogeneity for 6 indicators; while for the rest of the participating teams (9 in number), just for one indicator the homogeneity was high and for the rest was moderate and low. These findings suggest that the European handball is dominant and there are the best teams and players (Meletakos et al., 2011; Bilge, 2013; Milanovic et al., 2017).

The team and individual efficiency could be influenced by tactical plans, ability to collaborate with teammates, anthropometric parameters, personal specific skills, (Taborski, 2008; Meletakos et al., 2011).

It is needed to reconsider the margins of efficiency for some indicators, especially for goalkeeper's efficiency because there must be a balance between offence and defense indicators and very good averages of offensive actions influence the goalkeepers efficiency (Gruic et al., 2006; Taborski, 2008; Espina-Agullo et al., 2016; Vuleta et al., 2017).

Regarding the game performance, there is needed a very good efficiency in all indicators for offence and defence because there is a direct and strong correlation between the level of efficiency and the place in the final ranking (Gutierrez and Ruiz, 2013).

This gap between top teams and the lowest ranked teams had as common cause the efficiency of offence and defence actions, but also the individual contributions to the final results (Yamada, 2014; Leuciuc, 2016a).

At this edition of the World Championship the first 12 teams in the final ranking were from Europe; the best positioned team outside Europe was Korea (13rd place). Other 3 European teams were Slovenia (14th), Hungary (15th) and Poland (17th). After Europe, the best ranked continent was Asia (Korea – 13rd, Japan – 16th, China – 22nd) followed by America (Brazil – 18th, Paraguay – 21st, Argentina – 23rd) and Africa (Angola – 19th, Cameroon – 20th, Tunisia – 24th).

Conclusion

World Championship is representative by the number of the participating teams (24) and diversity (teams for 4 or 5 continents), but the most powerful competition for national teams is the European Championship and this fact was demonstrated by the analysis that we made and also by other researches (Aguilar et al., 2015; Gomez et al., 2014). In Europe there are the most important and representative national championships and European competitions (EHF Champions League, EHF Cup, Challenge Cup) and these are the main competitions for club teams. In these club teams, the most important palyers of Europe and from all over the world play.

We can conclude there is a statistical significance between the European and the rest of the participanting teams in term of efficiency at Women's Handball World Championship 2017.

There is needed to do periodically this kind of studies to observe the evolution of these differences (maintain, increase or decrease), but for the good of the handball it is better that they decrease.

These findings could be useful for individuals involved in handball activities and help them to find o proper manner to approach this kind of situations.

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SVJETSKO PRVENSTO U RUKOMETU ZA ŽENE 2017 STUDIJA SLUČAJA: UČINKOVITOST EUROPSKIH TIMOVA NASPRAM OSTALIH

Sažetak

U ovoj studiji smo kvantificirali podatke prikupljene na Svjetskom prvenstvu u rukometu 2017., koje je održano u Njemačka i na kojem su sudjelovale 24 reprezentacije (15 ekipe iz Europe i 3 ekipa iz Azije, Amerike i Afrike). Istraživači analiziraju igre u rukometu na mnoge načine kako bi pronašli rješenja za poboljšanje performansi. Cilj istraživanja je utvrditi postoji li statistički značaj između europskih timova (15) i ostalih svjetskih timova (9) u smislu učinkovitosti tijekom natjecanja. Međunarodna rukometna federacija dobila je podatke službene statistike. Kada uspoređujemo učinkovitost europskih timova s referentnom vrijednošću, za 6 od 7 pokazatelja postignuti su minimalni zahtjevi; za ostatak timova koji sudjeluju u svim pokazateljima vrijednosti su bile ispod minimalnih preporuka. Što se tiče ANOVA univarijntna analiza za 7 od 9 pokazatelja, dobivena je statistička značajnost (4 pokazatelja za p <0,05, 2 za <0,01 i jedan za <0,001), a ta činjenica potvrđuje i druga istraživanja. Možemo zaključiti da postoji statistički značaj između europskih momčadi i ostalih timova koji sudjeluju u učinkovitosti na Svjetskom prvenstvu u rukometu 2017. Ovi rezultati bi mogli biti korisni za pojedince uključene u rukometne aktivnosti i pomoći im da pronađu pravi način pristupa ovakvoj situaciji.

Ključne riječi: *timske igre, natjecanje, značenje, analiza*

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