

# DIFFERENCES IN SITUATION-RELATED INDICATORS OF THE HANDBALL GAME IN RELATION TO THE ACHIEVED COMPETITIVE RESULTS OF TEAMS AT 1999 WORLD CHAMPIONSHIP IN EGYPT

Nenad Rogulj

*Faculty of Natural Sciences, Mathematics and Education,  
University of Split, Croatia*

Original scientific paper  
UDC 796.092:167.2:796.322

## Abstract:

The purpose of the research was to determine the differences in the situation-related parameters of the game in relation to the results achieved or the performance of the teams in top quality handball for men. The differences in 27 situation-related indicators of the game, both on defence and on attack, have been analysed by means of the multivariate analysis of the variance. The sample consisted of 80 matches from the 1999 Men's World Championship in Egypt. These 27 performance indicators have been analysed in relation to the level of success or competitive successfulness which was determined by two classification factors: the first one was named general championship performance (general achievement in competition) and was defined by the teams' final ranking at the championship. The second one was named the performance in a match and was defined by a victory or defeat in a match.

It has been established that the successful teams are predominantly efficient in: the efficient completion of the set attacks against an organized defence, the collective counter-attacks, the number of assistances, the penalty (seven meters) shots, and in individual actions of the break-through (on attack), while on defence they are more efficient in executing the non-contact elements of the defence and in the goalkeeper's situation-related successfulness on defence in the back court or long range shots saves. Less successful teams are predominant in turnovers, in attacks against the set defence and in shots taken from the back positions.

**Key-words:** handball, situation-related efficiency indicators, performance, results achieved, successfulness

## UNTERSCHIEDE IN DEN SITUATIONSBEZOGENEN PARAMETERN DES HANDBALLSPIELES IM BEZUG AUF DIE WETTKAMPFERGEBNISSE DER MANNSCHAFTEN AUF DER WELTMEISTERSCHAFT IN ÄGYPTEN IM JAHRE 1999

### Zusammenfassung:

Das Ziel der Untersuchung war, die Unterschiede in den situationsbezogenen Parametern des Spieles im Bezug auf die Ergebnisse oder die Leistung der Spitzenhandballmannschaften festzustellen. Die Unterschiede in 27 situationsbezogenen Spielparametern, beim Angriff sowie in der Verteidigung, wurden mittels der multivariaten Varianzanalyse bearbeitet. Die Stichprobe schließt 80 Spiele der Männerweltmeisterschaft in Ägypten im Jahre 1999 ein. Die 27 Leistungsparameter wurden im Bezug auf die durch 2 Einordnungsfaktore bestimmte Aufführungsleistung analysiert, wobei die erste "allgemeine Wettkampfsleistung" genannt und durch die Endtabellenposition einer Mannschaft auf der WM definiert wurde. Der zweite wurde "situationsbezogene Leistung" genannt und durch den Sieg oder die Niederlage im Spiel bestimmt. Es wurde festgestellt, dass erfolgreiche Teams vorwiegend in den folgenden Elementen wirksam waren: erfolgreiche Vollendung des Angriffs gegenüber organisierter Verteidigung, gemeinsame Gegenangriffe, Zahl der Assistenzen, Strafwürfe (7-Meter-Würfe) und individuelle Durchbrüche auf die 6-Meter-Linie (beim Angriff). In der Verteidigungsphase waren sie im kontaktlosen Spiel besser und ihre Torwarte hatten mehrere Außenwürfabwäre. Die Mannschaften mit niedrigerer Leistung hatten mehrere verlorenen Bälle in der Angriffsphase, mehr Angriffe gegenüber aufgestellter Verteidigung sowie mehrere Außenwürfe aufs Tor.

**Schlüsselwörter:** Handball, situationsbezogene Leistung, Wettbewerbsergebnis, Erfolgssamkeit

## Introduction

Games, and the sport games in particular, in which a great number of players participate and confront each other in constant movement at, simultaneously, the individual, group and collective level, present unique phenomenon not simple to analyse. A

comprehensive amount of objects, the complexity of the movement structures, the variety of positions and game situations, and the almost unlimited variability of strategic solutions require a qualitative approach to the sport game analysis and its decomposition into smaller segments.

Handball is one of the most complex ball

games characterized by the goal being precisely defined, the richness of the natural movement forms, the diversity of motion structures, the conspicuous situation-related confrontations (the contact sport), and by the need for a creative and organized execution of the technical-tactical elements in the authentic game conditions.

The match outcome is a product of interactive activities performed by the confronting teams and the external, environmental influences. From the aspect of kinesiological practice, the external influences are irrelevant because they are not included in the training process as its components. The influence of the confrontation of factors is manifested through the situation-related game elements conditioned by numerous dimensions of the system called the **handball subject** or the player. Situation-related game elements are presented by indicators of technical-tactical activities performed under the authentic game or competition conditions. These indicators are precisely described by the rules of the handball game and they are also suitable for visual registration and statistic documentation.

The decomposition of the game to the level of the situation-related indicators and the differences in their manifestation, determined between them in relation to different categories of criteria, should contribute to a better understanding of the content and the structure of the handball game

### Previous research

Previous research studies can be classified in several groups, with regard to a methodological approach implemented.

Investigations from the first group are focused on the analysis of particular statistical indicators of the handball game and on the assessment of their efficient performance under the authentic, the real-life competitive conditions. This efficiency is expressed as the ratio between the elements successfully and elements unsuccessfully performed (efficacy percentage) (Gajić, 1972; Rogulj, 1985; Taborsky, 1996; Seco, 1998; Czerwinski, 1998).

The second group of investigations deals with the analysis of technical elements in relation to the space, positional, time and other parameters of the handball game (Šimenc and associates, 1996; Vuleta, 1997).

Vuleta (1997) investigated the top handball experts' opinions and carried out a factor analysis of 134 technical-tactical elements of the handball game in relation to the 26 variables in order to analyse them, classify them in homogeneous groups, and to determine any differences among the obtained groups.

The results of the investigation show that a variety of the technical-tactical handball elements can be homogenized into three basic groups:

- the factor of success or performance in the attack phase of the handball game
- the factor of success or performance in the defence phase of the handball game
- the goalkeeper's efficiency factor.

Further, the hierarchical order relation among the particular technical-tactical elements has been established according to their contribution to the successfulness or efficiency of play both on attack and on defence. Hence, the basic technical-tactical structures, that are specific for the particular playing positions, have been established as well.

The third group of investigations is directed at analysing the situation-related game elements' influence of the match final results (Rogulj, 1990; Czerwinski, 1995).

On the sample of 30 top quality handball matches played by men and 30 played by women Rogulj (1990) revealed that the match outcomes have been generally significantly influenced by the performance of the total of the game elements. The significant contribution to the sample of the matches played by men was registered for the variables regarding the efficiency of the attack completion executed by the back court attackers or from fastbreaks. As for the sample of played by women matches, two variables excelled themselves for their predictive value and their positive influence on the match outcome: the variable regarding efficiency from the pivot position and the variable "2 minutes suspension". The variable of the goalkeeper's save efficiency excelled in the space of the situation-related elements of the handball game on defence in both samples.

Czerwinski (1995) analysed the technical-tactical game elements in relation to the match result on the sample of 70 top quality handball matches. The author has established that the following variables have a significant contribution to the success achieved: efficiency on defence, the number of counter-attacks and the number of set (positional) attacks.

The last group of investigations, to which also the submitted research belongs, is directed at determining the differences in the situation-related efficiency or the game elements indicators in relation to different categories of criteria (Kampomann, Sassenberg and Westphal, 1975; Kovač, 1980; Trošt, 1983; Praznik, 1991; Brčić et al., 1997; Viskić-Štalec et al, 1997). Brčić and associates (1997) analysed the differences in the manifestation of the technical-tactical elements of the handball game in relation to: the quality of teams, the quality of opposing teams, and the matches played at home or away. Forty - three technical-tactical handball elements in the attack phase of the game were analysed on the sample of 91 matches of the first national female league. The twelve teams were divided into three quality categories according to the final league ranking position. The significant differences in the technical-tactical elements performance were established by means of the multifactorial analysis of variance in relation to the three discriminative factors: the appartenance of a team to the quality group, the appartenance of an opposing team to the quality group and the host/visitor game. However, no difference was proved on the level of the 2<sup>nd</sup> rank factor, that is in the play of the teams appartaining to different quality groups with the opposing teams of different quality categories, as well as in the play of the teams appartaining to different quality groups when playing at home or away nor in the play of the opponents appartaining to different quality groups when playing home or away. Also, there was no interaction between the three classification variables on the level of the 3<sup>rd</sup> rank factor.

The results of previous research studies have suggested that teams can significantly differ in the technical-tactical and situation-related indicators, especially when the achieved sports results or successfulness in a match and the quality of a team criteria are concerned.

#### **Aim of the study**

The aim of the research study has been to analyse the differences in situation-related indicators of the handball game on attack and on defence on a relevant sample of top quality matches in relation to sport achievements or competitive successfulness of teams. Establishing the significance of a particular indicator of the technical-tactical activity in relation to the success that a team achieved in competition should contribute to a better comprehension of the competitive value of the game element in question. It should also enable its optimal application in the training process or in a match.

#### **Materials and methods**

##### **Sample of entities**

The investigation has been conducted on a sample of 80 matches from the 1999 Men's World Handball Championship in Egypt, which means that the sample of entities contains 160 total indicators or protocols of the situation-related activity for each of the mutually confronted opponents<sup>1</sup>.

##### **Sample of variables**

Predictive variables have been presented by 22 situation-related technical-tactical activity indicators collected by the official game statistics surveillance, or better to say, by the analysis executed on the match course computer protocols from this competition<sup>2</sup>.

The analysis includes the following predictive variables:

- **NAPPOS** - number of attacks executed against the set, organized defence

<sup>1</sup>The number of entities for the criterion of the situation-related efficiency in a match has been diminished for the number of matches finished with a draw.

<sup>2</sup> Original data can be found in the official statistic bulletins from the XVI. Men's World Handball Championship held in 1999 in Egypt- MIC Informationssysteme GmbH.

- **POGPOS** - number of goals the team scored from the attack against the set defence
- **NAPIPR** - number of individual primary fastbreaks executed (performed by only one attacker)
- **POGIPR** - number of goals scored from the individual primary fastbreaks
- **NAPSPR** - number of group fastbreaks executed (performed by a group of attackers)
- **POGSPR** - number of goals scored from the group fastbreaks
- **UDAKRN** - number of shots taken from the middle court lane in the vicinity of the goalkeeper's area line (mostly from the pivot position, the wing positions excluded)
- **POGKRN** - number of goals scored from the 6 metre centre position, i.e. the pivot or circle runner position
- **UDAKRI** - number of shots taken from the wing positions (both the left and the right wing position)
- **POGKRI** - number of goals scored from both the wing positions
- **UDAVAN** - number of the back court or long range shots attempted
- **POGVAN** - number of goals scored from the back court positions
- **UDASED** - number of penalty shots taken from the 7m line
- **POGSED** - number of goals scored from the 7m line
- **UDAINA** - number of shots attempted from a break-through after the individual, deceptive action of an attacker
- **POGINA** - number of goals scored from an individual deceptive action and a break-through
- **ASISTE** - number of passes that enable a team-mate to immediately score from a clear chance (assistance)
- **IZGLOP** - number of turn-overs due to technical mistakes on the attack (catching faults, passing faults, dribbling faults, offensive fouls, violations of the goalkeeper's area, or walking)
- **ISKLJU2** - number of 2 minutes suspensions provoked by rough play or unsportsmanlike conduct
- **ODULOP** - number of steals by intercepting the passing lane or by knocking the ball out
- **BLOKUD** - number of the opponent's shots being blocked by the defenders
- **OBRKRN** - number of shots taken from the 6-meter line (from the pivot position) saved by the goalkeeper
- **OBRKRI** - number of shots taken from both the wing positions saved by the goalkeeper
- **OBRVAN** - number of shots taken from the back court positions saved by the goalkeeper
- **OBRSED** - number of the 7m shots saved by the goalkeeper
- **OBRPRO** - number of shots taken from fast-breaks saved by the goalkeeper
- **OBRINA** - number of shots taken from break-throughs to the 6m line saved by the goalkeeper

## Data processing methods

The basic central and dispersive parameters have been calculated. As for the differences in the variables, they have been determined by the multivariate one-way factor analysis of variance (ANOVA) by means of the software package Statistica 4.5. The analysis has been accomplished separately for each of the two classification factors defined as the match situation-related successfulness or performance in a match and the general achievement in competition or general championship performance. Hence the teams have been classified according to the appartenance to a winning group or to a group of defeated teams in individual matches and to the successful (16 teams that qualified for the finals) or to the unsuccessful teams (8 teams that did not qualified for the finals), respectively.

## Results and discussion

The basic descriptive parameters of the analysed variables are presented in Table 1. It can be seen that the teams used positional attacks against the set defence more often than fastbreaks. Both the individual and group forms of the fastbreak were relatively rarely

Table 1: The basic central and dispersive statistical parameters

VARIABLE	XA	MIN	MAX	SIG
NAPPOS	47.01	28	64	5.59
POGPOS	20.57	10	35	4.61
NAPIPR	1.77	0	12	2.05
POGIPR	1.50	0	10	1.76
NAPSPR	6.04	0	19	3.67
POGSPR	3.14	0	13	2.45
UDAKRN	5.27	1	19	2.58
POGKRN	3.65	0	13	2.12
UDAKRI	8.07	1	17	3.78
POGKRI	4.41	0	12	2.64
UDAVAN	20.96	7	44	6.79
POGVAN	7.83	2	19	2.99
UDASED	3.90	0	9	1.89
POGSED	2.71	0	8	1.67
UDAINA	2.63	0	13	2.21
POGINA	2.03	0	8	1.75
ASISTE	11.28	1	29	5.45
IZGLOP	13.60	1	26	4.41
ISKLJU2	4.43	0	9	1.81
ODULOP	6.78	0	19	3.38
BLOKUD	3.30	0	14	2.67
OBRKRN	1.20	0	5	1.19
OBRKRI	2.58	0	9	1.68
OBRVAN	6.65	0	20	3.56
OBRSED	0.92	0	3	0.92
OBRPRO	1.12	0	4	1.11
OBRINA	0.47	0	9	1.01

executed. It is probably the consequence of the general team orientation to slow down the rhythm of attacking activities that is more appropriate to the extremely physically demanding conditions of the championship (a great number of successive matches).

The teams predominantly directed the positional attack realization to the back court and wing players. The general consideration is that the back court players were in favourable positions for the attack completion execution: favourable shooting angles, good view of the game, the possibility of co-operating with the wing players and the pivot, and the portion of the ball possession (the ball was in their possession for most of the match time). The attack completion realized from the wing positions was mostly the consequence of the group and/or collective co-operation on the positional attack. However, the fact is that these quantitatively most employed modes of the attack completion produced a relatively low efficiency (the number of goals scored in

relation to the number of shots attempted). This is probably mostly due to the big throwing distance and to the unfavourable shooting angles for the back court and the wing players, respectively. This indicator suggests that the attack realization should have been directed towards the middle lane positions in the vicinity of the goal-area line (the pivot attacker), for which position the greater scoring efficiency was registered.

The parameters relating to the game on defence are within the expected limits and previously registered values at great international championships. Relatively poor contribution of the shot blocks in relation to the relatively great number of shots taken from the back court positions can be seen, although the shot blocking is a very efficient element of the non-contact play on defence. Therefore greater attention should be paid to the application of this element under the situation-related conditions.

Table 2: Analysis of variance

Performance in a match					
FACTOR	Wilks'	Rao'R	df1	df2	p-level
1	.39	7.21	27	122	.00
General championship performance					
FACTOR	Wilks'	Rao'R	df1	df2	p-level
1	.51	4.73	27	132	.00

VAR	PERFORMANCE IN A MATCH				GENERAL CHAMPIONSHIP PERFORMANCE			
	XA1	XA2	F	P	XA1	XA2	F	P
NAPPOZ	48.77	45.37	14.27	.00	51.70	45.46	48.54	.00
POGPOZ	18.40	23.05	48.94	.00	18.40	21.29	12.67	.00
NAPIPR	1.36	2.29	7.86	.00	1.58	1.83	.48	.49
POGIPIR	1.07	2.03	11.50	.00	1.28	1.58	.87	.35
NAPSPR	4.83	7.39	19.70	.00	6.48	4.73	7.07	.01
POGSPR	2.20	4.19	27.89	.00	1.85	3.57	16.16	.00
UDAKRN	4.67	6.00	10.38	.00	5.28	5.27	.00	.99
POGKRN	3.08	4.36	14.41	.00	3.38	3.74	.90	.35
UDAKRI	6.85	9.24	15.80	.00	7.95	8.11	.05	.82
POGKRI	3.20	5.54	36.19	.00	3.80	4.61	2.85	.09
UDAVAN	24.89	17.31	63.85	.00	25.2	19.55	23.78	.00
POGVAN	8.23	7.58	1.68	.20	7.80	7.84	.00	.94
UDASED	3.49	4.23	5.74	.02	3.23	4.13	7.08	.02
POGSED	2.33	3.11	8.22	.00	2.10	2.92	7.44	.01
UDAINA	2.36	3.00	3.23	.07	1.88	2.88	6.47	.01
POGINA	1.64	2.45	8.62	.00	1.35	2.25	8.31	.00
ASISTE	8.36	14.51	66.31	.00	8.38	12.24	16.59	.00
IZGLOP	14.84	12.23	14.06	.00	12.58	16.65	30.19	.00
ISKLJU2	4.41	4.37	.02	.89	4.48	4.42	.03	.86
ODULOP	5.93	7.81	12.41	.00	5.45	7.23	8.66	.00
BLOKUD	2.20	4.45	30.74	.00	2.18	3.67	9.67	.00
OBRKRN	1.17	1.20	.02	.89	.98	1.28	1.91	.17
OBRKRI	2.43	2.71	1.00	.32	2.82	2.50	1.13	.29
OBRVAN	4.92	8.52	49.12	.00	5.00	7.20	12.27	.00
OBRSED	.88	.96	.29	.59	.93	.96	.04	.84
OBRPRO	1.19	1.07	.41	.52	1.25	1.08	.75	.39
OBRINA	.47	.51	.06	.81	.43	.48	.10	.76

Among the indicators of the goalkeeper's efficiency, the greatest number of successful interventions was registered for the long range shot saves and for the wing positions shot saves. The fact is that the shots taken from the back positions are relatively easy to catch for the goalkeeper because of the relatively long shooting distance. As for the shots from the wing positions, they are easy to reach because of the unfavourably sharp shooting angle.

From Table 2, where the results of the analysis of variance are presented, it is evident that the selected performance indicators

statistically significantly differ among the teams in relation to both classification factors.

In relation to the classification factor of the performance in a match, the differences are present in the majority of variables. Such a result is probably due to the specificity of the sample of matches in which the teams were markedly polarized according to their quality, the direct reflection of which was traceable in the outcomes of matches. The winning teams are superior in all the variables that describe the situation-related efficiency on attack and on defence, except for the variables: the

number of positional attacks, the number of shots attempted and the goals scored from the back court positions and the number of the saved fastbreak shots. As had been expected, the teams of a lower quality were predominant in all the variables by which unsuccessfulness or inefficiency both on attack and on defence had been defined, with the exception of the variable 2 minutes suspension.

The winning teams performed fewer positional attacks on average, but the efficiency of that kind of attack, expressed by the number of scores, was significantly greater than in the defeated teams. Evidently, the winning teams based their play upon the fast attacks against the unorganized defence of their opponents. On the contrary, the defeated teams were forced to play longer positional attacks with the purpose of keeping the ball in their possession as long as possible. One of the reasons for the larger number of attacks executed and goals scored from both the individual and group fastbreaks in favour of the winning teams probably lies in their higher quality of play on defence, as well as in the technical-tactical and physical inferiority of the defeated teams. The latter performed a relatively great number of technical mistakes, which presented the initial basis for, on the other side, the successful fast attacks of the winners.

It can be seen that the winning teams on average performed slightly more throws to the goal from different positions, but they were significantly more efficient in all kinds of attack closings, or in the goals scored, except for the shots from the back court positions. That means that the competitive success or result achievement is not conditioned by the quantity, but by the quality (mostly accuracy) of shots executed.

The defeated teams scored slightly more goals from the back court positions, but they needed significantly more attempted shots to accomplish that. Therefore, the relative successfulness of this kind of attack realization is greater in the winning teams. Certainly, the greater number of shots attempted and goals scored from the back court positions is also a consequence of the proportionally greater number of attacks against the set defence performed by the defeated teams.

The presumption is that the successful teams

consisted of players of a higher quality with a better technical-tactical knowledge and highly developed skills. These qualities made them able to, under the conditions of the game confrontations, win much more easily, the opportunity for the attack realization by scoring, consequently to overpower the resistance of the opposing player(s) and the goalkeeper so as to perform more adequate, accurate and powerful throws at the goal.

The significant difference between the groups is particularly expressed in the variable assistance, which describes the number of successful passes for scoring a goal. It confirms the previous inference about the successful teams having a higher quality of game organization in the phase of the attack conclusion, which is based the collective and group co-operation, while the less successful teams base their game more on the individual activity of particular players.

As expected, the significant differences among the teams were determined also in relation to the indicators describing the efficiency on defence. It is understandable, because these variables are related to the non-contact ways of play on defence, which influence directly, as hindering factors, the outcome of the opponents' attack realization, thus most often enabling a team to regain the possession of the ball (the ball steals, blocking the shot, the goalkeeper's save). The non-contact defence, although technically more demanding and more risky, is more purposeful and more efficient than, e.g., the body contact stopping or checking performed by the defender. Namely, when the non-contact defence is successfully applied, the ball possession is directly won, while in the contact defence the opponent is mostly left in possession of the ball because of a foul assigned (for restraining, holding, pushing or hitting) or, even worse, because of the 7m-penalty throw awarded to the rival.

Among the indicators describing the performance of the goalkeeper on defence, the statistically significant difference was established only in the variable "the number of the back court shots saved". It can be presumed that the goalkeeper's efficiency on the back court shot saves significantly differentiate between the winning and defeated teams because this way of the attack realization is the most utilized one. The

goalkeeper's efficiency is also sustained by the efficient activity of co-players in the play-field and by the fact that the supposed lower quality of the attackers of the less successful teams, as the hindering factor, becomes particularly evident in this way of the attack realization, the performance of which is technically, tactically and motor demanding.

Goalkeepers both of the winning and defeated teams are almost even in their save efficiency and they do not statistically significantly differ among themselves in saves concerning other ways of the attack realization. Shots from the positions closer to the goal area are quantitatively less attempted than the long range shots. Also, because of the shorter shooting distances and the absence of the defenders' interference, goalkeepers are on average less successful in saving shots from the seven-meters line, from fastbreaks or from the usual pivot position (6m-middle-court-lane). In that way, the differences in the analysed variables are between the qualitative groups proportionally less manifested. Further, because of the lesser efficiency in saving the short range shots and the greater chances for the ball to bounce back in possession of the opposing team, the smaller are the chances for a team to execute a fastbreak. This indirectly diminishes the general situation-related efficiency and, eventually, the resulting or competitive successfulness of the particular team.

It is interesting that there is no statistically significant difference between the winning and defeated teams in the variable "2 minutes suspension". Since there were no significant differences, this variable should not only be considered as the measure of the mistake of play on defence (as the consequence of an improper performance of the defensive movement structures or of exaggerated aggressiveness), but it should also be considered the indicator of the efficient performance of defensive activities. Namely, the numerical handicap or minority play was evidently successfully compensated by the intensified engagement and efficient play of the remaining defenders. In this way, the mentioned variable leaves no significant negative mark on successfulness or the results achieved.

Teams differ among themselves according to the criterion of the performance in a match,

and they also differ significantly in the game indicators when the criterion of the general championship performance is regarded. The structure of these differences is very similar to the structure of the previous factor, except for the variables concerning the number of shots made and goals scored from the pivot position or from the both wing positions. In these variables no statistically significant differences between the two qualitative categories of teams have been determined, which is distinct from the variables of the realization from the back court back positions, from fastbreaks, and from individual action of breaking through. The results obtained suggest that these forms of the attack closings significantly determine the quality of a team, since they are, due to their physical and technical-tactical demands, determined to a great extent by the specific characteristics of the motor and morphological space of players. And the quality of a player is mostly generated by these characteristics.

Variables that significantly differ between teams in relation to both factors of successfulness are: the number of goals scored against the set defence, the number of the group fastbreaks performed and the goals scored from them, the number of shots attempted and the goals scored from the 7m-line and from the individual break-through action, the number of assistances, the number of steals, the number of blocks and the number of the saved shots taken from the back court positions, on behalf of the successful teams, or the number of attacks executed against the set defence, the number of shots attempted from the back court positions and the number of turnovers, on behalf of the less successful teams. The obtained results suggest that the competitive successfulness could be described in the best way by the efficiency of the group fastbreak, the well performed positional attack against the set defence with efficient realization, especially from the seven meters penalty throw which is won and from individual break-through actions, and the few technical mistakes in the attack phase, on the one hand, and by the efficient implementation of the elements of the non-contact defence, as well as by the goalkeeper's situation-related successfulness in saving the long range shots from the back court positions on the other.

## Conclusion

The differences in the situation-related indicators of the handball game on attack and on defence have been analysed on the sample of 80 top quality matches from the 1999 Men's World Handball Championship that took place in Egypt. The entities have been classified into two qualitative groups by means of the analysis of variance (ANOVA), according to the classification factor of the situation-related successfulness in individual matches as the winning and the defeated teams. In relation to the factor of the general achievement in competition or the general championship performance, they have been classified as the successful and the unsuccessful teams. Situation-related game indicators have been presented by the 27 variables of technical-tactical activities on attack and on defence, as registered in the official statistics of the game protocol.

Statistically significant and similar differences in the situation-related game indicators have been obtained in relation to both classification factors. These differences have been manifested in a large number of indicators. Evidently, the applied system of variables explains well the differences between the groups of criteria and polarizes the entities in relation to the successfulness (performance) or results achieved. The analysis of the differences in relation to particular factors reveals that the successful teams are predominant in the variables that define

efficiency on attack, such as the successful completion of the attack conclusions (goals scored) and the co-operation in a game situations (variables concerning attack efficiency), as well as in the indicators of the efficiency of the players on defence and in the goalkeeper's situation-related successfulness in saving the back court shots.

In relation to both factors, the successful teams excel in the following variables: the number of goals scored from the attack against the set defence, the number of group fastbreaks performed and the goals scored from them, the number of shots made and the number of goals scored from the 7m-line and from the individual action of break-throughs, the number of assistances, the number of steals, the number of shot blocks and the number of the long range shots saved. Less successful teams excel in: the number of attacks against the set defence, the number of shots taken from the back court positions, and in the number of turnovers due to the technical mistakes on attack.

The results obtained, being substantiated also by some previous investigations<sup>3</sup>, are directly applicable to the training process. Namely, the training process should be directed at improving those situation-related game elements that significantly differentiate between the successful and the less successful teams or sport achievements: The results are also applicable in the competitive conditions in the selection of proper technical-tactical actions.

## References:

1. Brčić, B., N. Viskić-Štalec, Ž. Jaklinović-Fressl (1997). Prediktivna vrijednost varijabli za procjenu tehničko-taktičkih elemenata rukometne igre. *Kineziologija*, 29 (1), 55-64. [Available in English, too, as: The predictive value of variables for the evaluation of technical-tactical elements in handball, *Kinesiology*, 29(1),60-70.]
2. Czerwinski, J. (1995). The influence of technical abilities of players on the tactical selection in the handball game. *EHF periodical Handball*, (2),16-19.
3. Czerwinski, J. (1998). Statistical analysis of the Men's European Championship held in Italy in 1998. *EHF periodical Handball*, (2),10-18.
4. Gajić, V. (1972). Prilog proučavanju vrste kretanja u rukometu. [Contribution to the types of movement structures investigations in team handball]. *Sportska praksa*, (3-4),4-9.

<sup>3</sup> The significant prognostic validity of the indicators of efficiency in the attack completion and indicators of efficiency of the goalkeeper's saves were also confirmed in earlier investigations, e.g. the ones by Czerwinski (1996) and Rogulj (1990).

5. Kampomann, K, K. Sassenberg, G. Westphal (1975). Učinkovitost zaključivanja napadalnih akcij glede na čas trajanja napada (translation : F. Kalan from *Lehrhilfen für den Sportunterricht*, 10/74). *Trener: Rokomet 2*, 11 (17/356), 3-12.
6. Kovač, J., M. Đukić (1980). Tehničko-taktički elementi napada i rezultatski uspjeh u rukometu. [Technical-tactical elements on attack and the competitive success/ performance in team handball] *Fizička kultura*, (2), 140-141.
7. Müller, M., H. Stein, I. Konzag (1992). *Handball spielend trainieren*. Berlin: Sportverlag GmbH.
8. Praznik, A. (1991). Analiza igre glede na čas trajanja in učinkovitost zaključivanja napadov na Svetovnom članskom prvenstvu rokometošev leta 1990. na Čehoslovačkem. [Game analysis in relation to the time duration and efficiency of the attack completion actions at the 1990 Men's World Handball Championship in Czechoslovakia] (Graduation thesis), Ljubljana: Fakulteta za šport.
9. Rogulj, N. (1985). *Struktura psihomotoričkog prostora vratara u rukometu*. [Structure of the psychomotor space in the handball goalkeeper] (Graduation thesis), Split: Filozofski fakultet u Zadru-Studiji odgojnih područja u Splitu.
10. Rogulj, N. (1990). *Utjecaj situacijskih struktura kretanja na konačni rezultat rukometne utakmice*. [Influence of the situational movement structures on the final match outcome]. (Master thesis), Sarajevo: Fakultet za fizičku kulturu.
11. Seco, J. (1998). 1998 Men's Junior European Championship. EHF periodical *European Handball*, (2), 35-46.
12. Šimenc, Z., D. Vuleta, M. Butorac, S. Jerković, M. Blašković (1996). Analiza efikasnosti igre u rukometu. [Analysis of the game efficacy or performance in handball.] In: D. Milanović (Ed.) *Dijagnostika u sportu: zbornik radova treće konferencije o sportu Alpe-Jadran*, Rovinj, September 26-29, 1996, pp 136-140. Zagreb: Fakultet za fizičku kulturu
13. Taborsky, F. (1996). The 1995 Women's Junior World Championship. *EHF periodical European Handball*, (2), 7-11.
14. Trošt, L. (1983). Nekateri primerjave med rezultatsko uspešnim in rezultatsko neuspešnim ekipami v rokometu. *Trener: Rokomet 1*, 19(6/494), 3-40.
15. Viskić-Štalec, N., B. Brčić, Ž. Jaklinović-Fressl (1997). Analiza pogrešaka u rukometnoj igri. [Analysis of technical faults in the handball game]. In: V. Tomljanović (Ed.) *Zbornik radova XXI seminara trenera Hrvatskog rukometnog saveza*, Pula, January 3-8, 1997, (pp 21-31). Zagreb: Hrvatski rukometni savez .
16. Vuleta, D. (1997). *Kineziološka analiza tehničko-taktičkih sadržaja rukometne igre*. [Kinesiological analysis of technical-tactical contents of the handball game]. (Dissertation), Zagreb: Fakultet za fizičku kulturu.

Received: January 13, 2000

Accepted: October 17, 2000

Correspondence to:

Nenad Rogulj  
Stepinčeva 53,  
21 000 Split, Croatia  
Tel.: +385 021 51 34 27  
E-mail:nrogulj@hotmail.com