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COMPETITIVE VOLLEYBALL ACTION EFFICIENCY DEPENDING ON THE OPPONENTS' LEVEL

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Abstract

Achievement of superior performance in volleyball can be reached by analyzing the efficiency of the game actions according to the level of the opponent teams. Thus, based on the efficiency indices achieved in the official competitions, we will be able to develop a model of training based on the level of opponents. The *purpose* of this study is to determine whether the efficiency indices of the game actions are influenced by the opponents' level. The study verifies the *hypothesis* according to which the efficiency of the game actions depends on the level of the opponent team in volleyball. We used as research methods the following: the bibliographic method, the pedagogical observation method, the modelling method, the statistical-mathematical method and the graphical method. The subjects of the research were represented by the 14 players of the women's volleyball team from Stiinta Bacau Sports Club in the 2016-2017 season. The research ran from October 2016 to February 2017. The results of the study highlighted that there are statistically significant differences between the efficiency of the opponents' game actions for: over pass, attack, block and dig. The efficiency of the serve seems to be an invariant in the context of our analysis, which can be explained by the fact that this action does not depend in any way on the opponent. The conclusion highlights the fact that the level of the opponent teams influences the efficiency indices of the game actions, so that the model of training should be designed according to them.

Keywords: Efficiency, volleyball, competition, level, opponent .

1. Introduction

Volleyball is a sports game consisting of game actions which have the following succession: serve, over pass, pass, attack/spike, block and dig. In order to provide us a glimpse of the importance of these game actions in the match economy of official competitions, we need to analyze the efficiency of these volleyball components. The analysis of the efficiency of the actions of the competitive volleyball is carried out using the standards developed by F.I.V.B. (Cojocaru & Cojocaru, 2017) by scaling them to levels. Thus, 4 points are awarded for actions with a game point (won), 3 points for the actions where the opponent's ball is favourable to its own team, 2 points for the actions in which the opponent's ball continues to play through undecided actions (neutral), 1 point for the actions in which the playing of the opponent's ball is unfavourable to its own team and 0 points for the wrong actions (direct point for the opponent). The efficiency of the game actions in competitive volleyball has also been analyzed by many field specialists (Palao, Santos, & Ureña, 2004; Palao, Manzanares, & Ortega, 2009; Monteiro, Mesquita, & Marcelino, 2009; Nikos & Elissavet, 2011). Palao et al. (2004) analyzed the effect of the level of the teams on the performance of the game activities in the elite volleyball, where it showed that the efficiency of the attack differentiates the first level teams from the level 2 and 3 teams in women's volleyball, and that there is a relationship between the opponents and over pass, attack, block, dig game actions. On the basis of this analysis of the efficiency indices of the volleyball game, the training models are developed, depending on the opponent, which can improve their efficiency and contribute to the achievement of superior performances in the official competitions.

2. Problem Statement

This research aims to highlight the importance of analyzing the participation in the competition of Volleyball Players from Stiinta Bacau Sports Club, the importance of knowing the performance of volleyball players from other teams, as well as the efficiency of training for the participation in the competition depending on the opponent. Its importance is justified by the special attention with which the training of the team must be treated for the official matches in the A1 Division Competition Calendar. The purpose of this study is to determine whether the efficiency indices of the game are influenced by the level of the opponent teams.

3. Research Questions

The hereby research is based on the following questions: Will the participation of the volleyball players in the competition improve if they work on a model based on the game characteristics of the opponent team? Are the efficiency indices of the game actions influenced by the level of the opponent players?

4. Purpose of the Study

The study verifies the hypothesis according to which the efficiency of the game actions depends on the level of the opponent teams in the performance volleyball.

5. Research Methods

5.1. Types of research methods.

In order to conduct this study, we used the following research methods: the bibliographic method, the pedagogical observation method, the modelling method, the statistical-mathematical method and the graphical method.

5.2. Research subjects.

The subjects of this study were represented by the 14 component players of the women's volleyball team from Stiinta Bacau Sports Club in the 2016-2017 season of the A1 Division - National Championship.

5.3. Research development.

The study took place between October 2016 and February 2017, when the team from Stiinta Bacau Sports Club participated in the 1st round of the A1 Division - National Women's Volleyball Championship.

The efficiency indices of the game action were calculated using the data recorded by the 2007 Data Volley Professional (Stiinta Bacau Sports Club License) in the 22 official matches played by the Stiinta Bacau Sports C in the 1st round of the 2016-2017 season. The information gathered during the official matches with the programme was processed in SPSS Statistics 17.0, where we used a six-level scaling for the game actions (serve, over pass and dig) for calculating the game action indices, a five-level scaling for the game actions (attack and block).

The scaling and coding on the six levels used by the programme for serve game action is as follows:

- 0 = "=" = Wrong (in the net, outside the court, on the end line);
- 1 = "-" = Negative (the over pass of the opponent is "#" or "+" and can attack with all options);
- 2 = "!" = Neutral (the over pass of the opponent is "!" and the ball is taken over on the 3-meter line);
- 3 = "+" = Positive (the opponent's over pass is "-" and can only be attacked from a high pass);
- 4 = "/" = Semias (the over pass of the opponent is poor, the ball is sent directly to the opponent court);
- 5 = "#" = Direct point (the over pass of the opponent is wrong "=").

In order to calculate the efficiency index of the serve game action, the following formula was used:

$$E = \frac{A+B*0.8+C*0.6+D*0.4+E*0.2}{A+B+C+D+E+F}, \text{ where:}$$

- A - represents a point serve of 5 points - whose value is 1;
- B - represents semias-serve of 4 points - whose value is 0.80;
- C - represents a positive serve, 3 points - whose value is 0.60;
- D - represents neutral serve, 2 points - whose value is 0.40;
- E - represents a negative serve, 1 point - whose value is 0.20;
- F - represents the wrong serve, of 0 points - no value.

The scaling and coding on the six levels used by the program for the over pass and dig game actions is as follows:

- 0 = "=" = Wrong (direct point for the opponent);

984

- 1 = "/" = Semi-error (the over pass and dig are directly on the opponent's field and cannot be attacked);
- 2 = "- "= Negative (after the over pass and dig, it can only be attacked from a high jump);
- 3 = "!" = Neutral (the over pass and dig are in the 3-meter line);
- 4 = "+" = Positive (the over pass and dig can be attacked but not from all combinations);
- 5 = "#" = Perfect (the over pass and dig can be attacked from all combinations).

The following formula was used to calculate the efficiency of the over pass and dig game actions:

$$E = \frac{A + B*0.8 + C*0.6 + D*0.4 + E*0.2}{A+B+C+D+E+F}, \text{ where:}$$

- A - represents perfect game actions of 5 points - whose value is 1;
- B - represents positive game actions of 4 points - whose value is 0.80;
- C - represent neutral game actions of 3 points - whose value is 0.60;
- D - represents negative game actions of 2 points - whose value is 0.40;
- E - are semi-error game actions of 1point - whose value is 0.20;
- F - represents lost game actions of 0 points - no value.

The scaling and coding on the six levels used by the program for the attack and block game actions is as follows:

- 0 ="= and /" = Wrong (direct point for the opponent);
- 1 = "-" = Negative (playing the bad ball to their own team);
- 2 = "!" = Neutral (continuation of the ball through undecided actions);
- 3 = "+" = Positive (playing the ball in favour of their own team);
- 4 ="#" = Point (attack or winning block).

The following formula was used to calculate the efficiency of the attack and block game actions:

$$E = \frac{A + B*0.75 + C*0.50 + D*0.25}{A+B+C+D+E}, \text{ where:}$$

- A - represents the finalized winning action of 4 points - whose value is 1;
- B - represents positive game actions of 3 points - whose value is 0.75;
- C - represents neutral game actions of 2 points - whose value is 0.50;
- D - represents negative game actions of 1 point - whose value is 0.25;
- E - represents lost game actions of 0 points - no value.

The data collected through Data Volley 2007 Professional have been processed in order to unify the recorded values and eliminate as far as possible the statistically atypical values. In this respect, for each played match, only the sets of 25 points were selected and the values recorded were expressed as a mean / match. In order to verify the hypothesis we performed the Student Test for independent samples (with equal or uneven variation, as the case may be). For this, the teams were divided into two categories, labeled as Level 1 and Level 2, depending on the ranking at the end of the season 2016-2017 (the first 6 teams in the ranking were included in Level 1, respectively the last 6 teams in the ranking were included in Level 2).

6. Findings

By analyzing the 22 official matches of the first round of the A1 Division - National Championship of the Women's Volleyball Team from Stiinta Bacau Sports Club in the season 2016-2017, depending on

the opponent's level, we obtained the following descriptive indicators of the efficiency of the game actions in the tables 1, 2 and 3, where we presented the minimum value (Min), maximum (Max), arithmetic mean (M), and standard deviation (SD).

Table 01. Descriptive efficiency indices in all matches

Variable	Number of cases	Min	Max	M	SD
Serve	22	.356	.595	.442	.051
Over pass	22	.477	.672	.586	.051
Attack	22	.510	.754	.616	.063
Block	22	.300	.676	.454	.089
Dig	22	.120	.529	.376	.092

The average efficiency index in all the matches for the serve variable was .442 ± .051, with a minimum value of .356 and a maximum of .595, for the over pass variable, it was .586 ± .051, with a minimum value of .477 and a maximum value of .672. The attack variable was .616 ± .063, with a minimum value of .510 and a maximum value of .754, for the block variable was .454 .089, with a minimum value of .300, and a maximum value of .676 , and for the dig variable it was .376 ± .092, with a minimum value of .120 and a maximum value of .529.

Further on, in Tables no. 2 and 3, we presented the descriptive efficiency indices of the game actions for the matches with the level 1 and level 2 opponents.

Table 02. Descriptive efficiency indices in the matches with the Level 1 opponents

Variable	Number of cases	Min	Max	M	SD
Serve	10	.388	.465	.420	.025
Over pass	10	.533	.672	.610	.043
Attack	10	.510	.687	.578	.050
Block	10	.360	.481	.415	.041
Dig	10	.120	.462	.325	.094

Table 03. Descriptive efficiency indices in the matches with the Level 2 opponents

Variable	Number of cases	Min	Max	M	SD
Serve	12	.356	.595	.460	.061
Over pass	12	.477	.655	.566	.049
Attack	12	.550	.754	.647	.057
Block	12	.300	.676	.487	.106
Dig	12	.318	.529	.418	.068

In order to validate the results obtained (Table no. 4), we used the Student Test (for independent samples) with equal or uneven variation depending on the significance of the Fisher test.

986

Table 04. Comparative analysis between the matches with the Level 1 and Level 2 opponents

Variable	p Fisher	df	t	p
Serve	.014	15	-2.076	.055
Over pass	.750	20	2.227	**.038**
Attack	.717	20	-2.972	**.008**
Block	.007	15	-2.154	**.048**
Dig	.229	20	-2.697	**.014**

From the results presented in table no. 4, it can be noticed that there are statistically significant differences between the efficiency of the game actions according to the opponent's level for 4 of the 5 analyzed coefficients. Significant differences were obtained between the efficiency indices for over pass (p = .038), attack (p = .008), block (p = .048) and dig (p = .014). The serve efficiency indices do not differ significantly depending on the opponent's level. Comparing the means of the efficiency indices, statistically significant differences were obtained between the two groups for the over pass game action (p = .038), with a higher mean of efficiency in the matches with the Level 1 opponents (.610) compared to the Level 2 opponents (.0566) and confirms the hypothesis of our study according to which there are differences between the efficiency indices of the game actions according to the opponent's level. This demonstrates that in the matches with the Level 1 opponents the players of the women's volleyball team from Ştiinţa Bacau Sports Club were more focused on the execution of this game action compared with the matches with Level 2 teams considered weaker.

The differences in the means for the attack efficiency indices (p = .008) showed that they are statistically significant between the two groups, with a higher average of efficiency in matches with Level 2 opponents (.647) against their Level 1 opponents (.578) and shows that this action depends on the defence game of the opponents, where the Level 1 teams have better players and more efficient defence systems due to this. By analyzing the means of the efficiency indices between the two groups, there are statistically significant differences in the block game action (p = .048), where the team from Stiinta Bacau Sports Club achieved a higher average in the matches with the Level 2 opponents (.487) compared to the Level 1 opponents (.415), showing that the attack of the Level 1 opponents is better than that of the Level 2 opponents. Statistically significant differences are observed between the means of the two groups and for the means of the dig efficiency indices (p = .014) with an average of higher efficiency in the matches with the Level 2 opponents (.418) compared with the matches with the Level 1 opponents (.325), demonstrating that the attack force of the Level 1 opponents is higher than that of the Level 2 opponents. Our team's block game action was more effective in the matches with Level 2 opponents than with the Level 1 opponents and proves that in order to have a higher efficiency index in the dig game actions, the block game action must be more efficient.

7. Conclusion

Our study attempted to demonstrate that there were differences between the efficiency of the game actions according to the level of the opponents for the women's volleyball team from Stiinta Bacau Sports Club Bacau in the 2016-2017 season in the first round of the A1 Division - National Championship.

Following this study we can conclude the following:

- The level of the opponent teams influences the efficiency of the game actions, such as: over pass, attack, block and dig;
- The efficiency of the serve seems to be invariant in the context of our analysis, which can be explained by the fact that this action does not depend in any way on the opponent;
- The results obtained in this study should be used in modelling the training of the women's volleyball team from Stiinta Bacau Sports Club Bacau in the following season in order to increase the efficiency indices of the game actions.

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