THE EFFICIENCY OF DEFENSIVE GAME OF FOOTBALL TEAMS DURING THE EUROPEAN CHAMPIONSHIPS IN 2012

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Introduction

Evaluations occurring in football game imply the need to recognize and record systematically players' actions on the football pitch. The aim of conducted analyses is to define the game characteristics, as well as determine and predict the future results on the basis of the current ones. The conducted observations usually refer to the analysis of the distance covered during the match¹, however, equally important role is attributed to the analysis of technical actions, especially tactical ones².

The important aspect in predicting the future results is to determine the pattern of behavior efficiency, especially those considered to be close to the ideal³. That is why studies, where actions of the best players representing the strongest football clubs and national teams are analyzed, gain so much importance⁴.

While studying game efficiency, there are analyzed not only the length of distance covered, but also ranges of intensity⁵, as well as are monitored the basic activities which include shots at goal⁶, ball passes⁷, set pieces, ⁸ and ball possession⁹.

What is more there are studies which aim at determining the effective game methods which can ensure the ultimate success in direct competition¹⁰, determining the values of activity, efficiency and reliability indicators¹¹.

Aim was at defining selected aspects of the action as well as determining trends occurring in the world football. While combining those indicators, game efficiency indexes

¹ M. Di Mascio, P. S. Bradley, Evaluation of the most intense high intensity running periods in English FA Premier League soccer matches, J. Strenght. Cond. Res., No. 27/2013, s. 909.

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² P. S. Bradley, W. Sheldon, B. Wooster, P. Olsen, P. Boanas, P. Krustrup, *High-intensity running in English FA Premier League soccer matches*, J. Sports Sci., Vol. 27, No. 2/2009, s. 163.

³ C. Lago-Peñas, J. Lago-Ballesteros, *Game location and team quality effects on performance profiles in professional soccer*, J. Sports Sci. Med. Vol. 10, No. 3/2011, s, 469.

⁴ C. Carling C. Interpreting Physical Performance in Professional Soccer Match-Play: Should We be More Pragmatic in Our Approach? Sports Med., Vol. 43, No. 8/2013, s. 660.

⁵ V. Di Salvo, F. Pigozzi, C. Gonzalez-Haro, M. S. Laughlin, J. K. De Witt, *Match performance comparison in top English soccer leagues*, Int. J. Sports Med., Vol. 34, No. 6/2013, s. 529.

⁶ J. Pratas, A. Volossovitch, A. P. Ferreira. *The effect of situational variables on teams' performance in offensive sequences ending in a shot on goal, A case Studs, Open Sports Sci. J., No. 5/2012, s. 197.*

⁷ C. Lago-Peñas, A. Dellal, *Ball possession strategies in elite soccer according to the evolution of the match-score: the influence of situational variables*, J. Hum. Kinet., No. 25/2010, s. 97.

⁸ C. Lago, R. Martín, Determinants of possession of the ball in soccer, J. Sports Sci., Vol. 25, No 9/2007, 971.

⁹ V. Correia, D. Araujo, L. Vilar, K. Davids, From recording discrete actions to studying continuous goal-directed behaviours in team sports, J. Sports Sci., No. 31/2013, s. 549.

¹⁰ A.Tenga, L. Ronglan, R. Bahr. Measuring the effectiveness of offensive match-play in professional soccer, Eur. J. Sport Sci., Vol. 10, No. 4/2010, s. 274.

¹¹ G. Vigne, C. Gaudino, I. Rogowski, G. Alloatti, C. Hautier, *Activity profile in Elite Italian Soccer Team*, Int. J. Sports Med., Vol. 13, No. 5/2010, s. 308.

are created, which even with a greater strength than indicators, highlight and materialize the observed phenomena¹².

It is suggested that the analyses of individual matches should not be treated as the interpretation or efficiency model, since the information obtained in such way do not reflect the proper potential of players or a team, as they are marked by a high degree of randomness. The analysis of a greater number of meetings, especially all those held during the championship tournament, allows for treating the game efficiency indicators as the norms which specify model actions. Thus formed can be regarded as the reliable assessment of the action ¹³.

In order to enhance the value of test results, there should also be used multidimensional statistical analyses which allow for making more precise comparisons and identifying factors which have the greatest influence on the team's success. Such interpretation, to the great extent, enhances the possibility of accurate prediction of the final outcome of the meeting ¹⁴.

The aim of this paper was to determine the efficiency of shots, passes, ball possessions, and defensive actions which are ball recoveries, tackles, clearances and ball interception. Moreover, the authors of this paper have decided to analyze defensive actions as this area of study is not yet explored by researches involved in the analyses of game efficiency. Through the use of multidimensional discriminant analysis, efforts were made to define which of defensive actions studied are the most relevant and important in the game of the best European football teams.

Research methodology

The research material was conducted by analyzing the game of 277 football players taking part in 31 football matches played during the European Championships in 2012. The research material was obtained on the basis of a computerized game tracking system, Prozone, thanks to which the profiles of players' physical activity were characterized. Prozone technology facilitates a complete and objective assessment of all aspects of game efficiency. It allows for using information on the players' technical and motor efficiency in order to understand every aspect of the team's game.

Prozone system is applied to track players' behaviors using semi-automatic cameras installed over the football pitch. This tracking takes place at the frequency of 25.0 Hz providing approximately 2.5 million points in a match¹⁵. Additionally, each technical action with the ball of a player is encoded by a trained operator. Prozone system has gained the approval for precision and reliability of recording¹⁶.

¹⁵ C. Carling, A. Williams, T. Reilly, *The handbook of soccer match analysis*, London: Routledge 2005, s. 89.

¹² A. Soroka, Trends of European football players, Bal. J. Health Phys., Act. Vol. 6, No. 4/2014, s. 270.

¹³ C. Lago, The influence of match location, quality of opposition, and match status on possession strategies in professional association football, J. Sports Sci., Vol. 27, No. 13/2009, s. 1467.

¹⁴ A. Tenga, L. Ronglan, R. Bahr, *Measuring*... op. cit., s. 276.

¹⁶ V. Di Salvo, R. Baron R, González-Haro, C. Gormasz, F. Pigozzi, N. Bachl, *Sprinting analysis of elite soccer players during European Champions League and UEFA Cup matches*, J. Sports Sci., Vol. 28, No. 14/2010, s. 1492.

Using the recording from the Prozone system, there were conducted analysis determining the physical activity and technical actions of Brazilian league players 17 , professional players of Italian Serie A^{18} , Spanish teams of Primera Division 19 and English Premier League 20 .

The PL. 10 Statistica program was used while comparing the values of indicators of two groups of teams: winning and losing ones. The arithmetic means and standard deviations were defined. When the assumptions of variables were fulfilled, the t – Student test for independent groups was used in order to define differences between mean values of activity, efficiency, and reliability for individual actions. The mean differences that were defined as statistically significant were those with probability of chance less than p<0.05.

Results

The attempt to analyze the efficiency of basic game elements implemented by winning and losing teams aimed at showing the dynamics of ongoing changes in the efficiency of individual elements of the game with particular reference to defensive activities.

The similar activity of shots appeared in both groups of teams. However, the efficiency of shots was significantly higher (p<0.001) in the case of winning teams. The much higher efficiency indictor of winning teams determined higher value of reliability indicator which was significantly higher (at p<0.001) in this group of teams.

The value of ball possession indicator among players of winning teams was significantly higher (at p=0.047) in direct meetings. The significant differences in activity at p=0.047 and efficiency at p=0.045 also appeared among the players of winning teams. The only indicator which did not reveal any significant differences between these two groups of teams was the indicator of passes reliability (Table 1).

Table 1. Efficiency of performing basic elements of the game by winning and losing teams during the European Championships in 2012

Type of action	Winning teams		Losing teams		t test	n volue
	_± <i>SD</i>	n	_± <i>SD</i>	n	value	p value
Shots activity	14.30±6.14	24	14.00±7.10	24	0.215	0.830
Shots efficiency	2.00±1.14	24	0.70±0.68	24	6.608	0.001*
Shots reliability	14.00±6.38	24	6.00±7.33	24	5.693	0.001*
Ball possession	53.43±12.44	24	46.6±11.98	24	2.662	0.047*

¹⁷ R. Barros, M. Misuta, R. Menezes, P. Figueroa, F. Moura, S. Cunha, R. Anido, N. Leite, *Analysis of the Distances Covered by First Division Brazilian Soccer Players Obtained with an Automatic Tracking Method*, J. Sports Sci. Med., Vol. 6, No. 2/2007, 238.

¹⁸ M. Mohr, P. Krustrup. J. Bangsbo, *Match performance of high-standard soccer players with special reference to development of fatigue*, J. Sport Sci., Vol. 21, No. 7/2003, s. 525.

¹⁹ V. Di Salvo, R. Baron, H. Tschan, F. Calderon Montero, N. Bachl, F. Pigozzi, *Performance characteristics according to playing position in elite soccer*, Int. J. Sports Med., Vol. 28, 3/2007, 225.

²⁰ P. S. Bradley, M. Di Mascio, D. Peart, O. Olsen, B. Sheldon, *High-intensity activity profiles of elite soccer players at different performance levels*, J. Strenght. Cond. Res., Vol. 24, No. 9/2010, 2348.

Passes activity	467.35±147.53	24	424.2±102.4	24	2.666	0.047*
Passes efficiency	392.67±150.22	24	348.8±103.5	24	2.699	0.045*
Passes reliability	82.43±6.31	24	80.4±5.81	24	1.662	0.099

^{*} level of significance at p<0.05

Source: based on authors' own research.

While analyzing actions treated as defensive ones, no significant differences between two studied groups appeared. Slightly higher indicators of ball recoveries, ball clearances and ball interception were shown among losing teams (Table 2).

Table 2. **Efficiency of defensive actions of winning and losing teams during the European Championships in 2012**

Type of action	Winning teams		Losing teams		t test	n volue
	_± <i>SD</i>	n	_± <i>SD</i>	n	value	p value
Ball recovery activity	39.33±7.19	24	41.58±7.27	24	-1.077	0.286
Tackle activity	16.95±6.47	24	16.58±4.47	24	0.233	0.816
Ball clearance activity	20.29±8.63	24	23.08±8.64	24	-1.119	0.268
Ball interception activity	14.50±5.56	24	15.50±6.00	24	-0.599	0.552

^{*} level of significance at p<0.05

Source: based on authors' own research.

Discussion and conclusion

The aim of this paper was to determine the efficiency of defensive actions performed by players of winning and losing teams in the direct competition against the basic activities in football game, which are: shots, ball passes and ball possession.

Conducted analyzes confirmed the results of previous studies, which showed that players of winning teams obtained higher values of efficiency and shot reliability indicators²¹. The values of shot activity indicators which among players of both teams were comparable, did not correspond with earlier studies²².

Shots are part of the game of very offensive character, whereas ball passes are the basic technical elements which depending on the situation occurring on the football pitches, may become offensive or defensive.

The winning teams showed higher activity and efficiency of passes, which are usually treated as a tool to create convenient situation for taking a shot at goal. Therefore, this

²¹ G. , The effect of match status on attacking strategies in the English Championship, (In:) Research Methods and Performance Analysis, (Eds.) M. Hughes, H. Dancs, K. Nagyvaradi, T. N. J. Polgar, G. Sporis, G. Vuckovic. University of West Hungary, 2011, s. 176.

²² A. Dellal, K. Chamari, S. Ahmaidi, D. Keller, R. Barros, G. N. Bisciotti, C. H. Carling, *Physical and technical performance in European soccer match-play: FA Premier League and La Liga*, Eur. J. Sport Sci., Vol. 11, No. 2/2011, s. 57.

indicator, next to shots, is perceived as a reliable source in determining the winning team²³. It was also stated that teams winning their own meetings with greater activity directed passes into the penalty area, what contributed to their higher shot efficiency²⁴, whereas losing teams, to a greater extent, passed the ball within their own defensive zone²⁵, The aim of this study also confirmed the regularity which assumed that winning teams had significantly higher indicators of activity and passes efficiency, which was not observed in the case of their reliability.

The sports level of the losing team is defined as a factor having decisive influence on the team's game, on its coordination of tactical actions which are manifested in the game accuracy, the appropriate setting of players in relation to each other, to the players from the opposite team and to the ball²⁶.

Moreover, the value of the indicator of ball possession in the case of players from winning teams was significantly higher than among players of losing teams. Such value of indicator is a characteristic for teams with higher sports level and sometimes is regarded as a determinant of success²⁷. Additionally, football teams of higher sports class are characterized by the higher efficiency of shots and game running according to planned tactical assumptions²⁸.

The results of conducted studies as well as literature analysis point to a high dynamics of changes in the analyzed game elements among winning and losing teams. Such dynamics of change was not shown in the case of the analysis of defensive actions. The values of four indicators of defensive actions did not reveal any significant differences between the analyzed groups of teams. The players from losing teams had higher activities of ball interception, ball recoveries and clearances.

The lack of significant differences in the values of indicators of defensive actions between the players of winning and losing teams, may point to a greater tactical stability of defensive game in the case of these both groups of teams. It is characterized by a high tactical discipline and synchronized game between players of one team. Such tactic discipline was not shown in the situation of offensive actions which are characterized by the occurrence of various dynamic interactions as well as lower stability of actions. Such activities, often on the border of ball loss, aim to disrupt the structure of defensive game of the opposite team²⁹.

Technological achievements in the registration of players' behaviors allow for significant improvement of information on players' physiological, physical, technical and tactical actions. All players' behaviors should be systematically monitored during the game,

²³ A. Janković, B. Leontijević, M. Pasic, V. Jelušić, *Influence of certain tactical attacking patterns on the result achieved by the teams participants of the 2010 FIFA World Cup in South Africa*, Physical Culture, No. 65/2010, s. 43.

²⁴ M. Z. Gomez, M. Gomez-Lopez, C. Lago-Peñas, J. Sampaio, *Effects of game location and final outcome on game-related statistics in each zone of the pitch in professional football*, Eur. J. Sport Sci., Vol. 12, No. 5/2012, s. 396.

²⁵ A. Scoulding, N. James, A. Taylor, *Passing in the soccer world cup 2002*, Int. J. Perform. Anal. Sport., No. 4/2004, s. 39.

²⁶ B. Travassos, D. Araujo, L. Vilar, T. McGarry, *Interpersonal coordination and ball dynamics in futsal (indoor football)*, Human Mov. Sci., No. 30/2011, 1253.

²⁷ J. Castellano, D. Casamichana, C. Lago-Peñas, *The Use of Match Statistics that Discriminate Between Successful and Unsuccessful Soccer Teams*, J. Hum. Kinet., No. 31/2012, 143.

²⁸ G. Rees, N. James, M. H , The effect ... op. cit., s. 176.

²⁹ J. Sampaio, V. Maçãs, *Measuring tactical behaviour in football*, Int. J. Sports Med., No. 33/2012, s. 399.

and not only in situations of teams' ball possession, which are the most often analyzed actions, as such actions are the easiest part to analyze. At the same time conducted analyses of actions without a ball perfectly complement the full assessment of players' actions. Systematically conducted studies of defensive actions, which do not make any difficulties in registering the game, will allow for the completeness of conducted analyses.

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SPRAWNOŚĆ GRY DEFENSYWNEJ ZESPOŁÓW PODCZAS MISTRZOSTW EUROPY W 2012

Streszczenie

Celem pracy było określenie efektywności wykonania działań o charakterze defensywnym, na tle podstawowych elementów gry w piłkę nożną, jakimi są strzały, podania i posiadanie piłki. Starano się również wyznaczyć indeksy efektywności gry, a wielowymiarowe analizy miały określić hierarchię ważności działań defensywnych. Materiał badawczy stanowiła analiza gry 277 piłkarzy biorący udział w 31 meczach rozegranych podczas Mistrzostw Europy w 2012. Materiał badawczy uzyskano w oparciu o skomputeryzowany system śledzenia gry Prozone. Wykazano, iż gracze zespołów zwycięskich posiadali wyższe wartości wskaźników skuteczności i niezawodności strzałów, wyższą aktywność i skuteczność podań oraz wyższą wartość wskaźnika posiadania piłki. Stwierdzono dużą dynamikę zmian w strzałach, podaniach piłki i posiadaniu piłki wśród zespołów zwycięskich i pokonanych. Takiej dynamiki nie wykazano w przypadku analizy działań o charakterze defensywnym. Wielkości czterech badanych wskaźników aktywności działań defensywnych, przedstawionych w postaci indeksów aktywności, nie rozpoznały istotnych różnic pomiędzy analizowanymi grupami zespołów, co wskazuje na wyższą taktyczną stabilność gry defensywnej. Obecna dostępność danych z obserwacji, pozwala na głębsze zrozumienie działań taktycznych i ich wykorzystanie w grze.

Slowa kluczowe: analiza gry, sprawność gry defensywnej, piłka nożna, Mistrzostwa Europy.

Summary

The aim of this paper was to determine the efficiency of defensive actions against basic elements of football game such as shots, passes and ball possession. Moreover, the purpose of this study was to define the game efficiency indexes. The multidimensional analyses, on the other hand, were to define the hierarchy of importance of defensive actions. The research material was conducted by analyzing the game of 277 football players taking part in 31 football matches played in the European Championships in 2012. The research material was obtained on the basis of a computerized game tracking system, Prozone. It was shown that players of winning teams had higher values of indicators of efficiency and shots reliability, higher activity and efficiency of passes as well as higher indicator of ball possession. A high dynamic for changes in shots, ball passes and ball possession was found among winning and losing teams. Such dynamic did not appear in the case of defensive actions' analysis. The values of four above-mentioned indicators for defensive actions, presented in the form of activity indexes, have not recognized any relevant differences between the analyzed groups of teams, what indicates higher tactical stability of defensive game. The current availability of data from the observation allows for deeper understanding of tactical actions and their use in the game.

Key words: efficiency of defensive game, analysis of the game, football, European Championships.