

Analysis of the Effectiveness of Management by the Chief Coach of Professional Volleyball Team during Competitions

Oleksandr Mozolev^{1,*}, Roman Kovalcuk², Oleksandr Gnydiuk², Ihor Tomkiv³, Oleksandr Binkovskiy³, Volodimir Melnikov⁴, Oleksandr Tatarin⁴

¹Department of Tourism, Theory and Methods of Physical Culture and Valeology of Khmelnytskyi Humanitarian-Pedagogical Academy, Ukraine

²Department of Physical Training and Personal Safety, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

³Department of Managerial Personnel Training, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

⁴Department Sports Committee of the State Border Service of Ukraine, Ukraine

Received May 6, 2023; Revised August 17, 2023; Accepted September 14, 2023

Cite This Paper in the Following Citation Styles

(a): [1] Oleksandr Mozolev, Roman Kovalcuk, Oleksandr Gnydiuk, Ihor Tomkiv, Oleksandr Binkovskiy, Volodimir Melnikov, Oleksandr Tatarin, "Analysis of the Effectiveness of Management by the Chief Coach of Professional Volleyball Team during Competitions," *International Journal of Human Movement and Sports Sciences*, Vol. 11, No. 6, pp. 1227 - 1237, 2023. DOI: 10.13189/saj.2023.110606.

(b): Oleksandr Mozolev, Roman Kovalcuk, Oleksandr Gnydiuk, Ihor Tomkiv, Oleksandr Binkovskiy, Volodimir Melnikov, Oleksandr Tatarin (2023). *Analysis of the Effectiveness of Management by the Chief Coach of Professional Volleyball Team during Competitions*. *International Journal of Human Movement and Sports Sciences*, 11(6), 1227 – 1237. DOI: 10.13189/saj.2023.110606.

Copyright©2023 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Abstract The article analyzes games of the best volleyball teams in the national championships of Italy, Poland, the Czech Republic and Ukraine. Total number of the games is 46 (n=46). An expert assessment of the content of time-outs (n=571); effectiveness of player substitution (n=1397); use of video replays (n=753) has been provided. The objective is to analyze the content and effectiveness of the management of the chief coach on the tactical actions of professional volleyball team during competitions. Methods include analysis of scientific, methodical, sports sources; monitoring the performance of volleyball teams in national championships, statistical data of competition protocols and video surveillance results; survey; factor analysis of the effectiveness of the team's tactical actions; method of expert assessment, methods of mathematical statistics. The results show that the use of timeouts in professional volleyball has been found to be one of the most effective team management tools. It was determined that 58.1% of the attention of coaches is focused on the specifics of the organization of defensive actions, and 39.4% - on the effective completion of attacking actions.

Chief coaches of volleyball teams during time-outs focus the attention of players on the following tactical and technical actions: determining the features of the location of players when receiving complex innings of an opponent; informing the players about the specifics of the organization of defensive actions; organizing the interaction of blocking players. Most often, players are replaced for the simultaneous replacement of connecting and diagonal players in order to change the tactical scheme of the game, for strengthening the innings, it's diversifying, and for strengthening the block on the front line. It concludes that the modern coach of a professional volleyball team is an active participant in the game. It is thanks to the active actions of the chief coach that in 32 sets (17.4%) the players of the professional volleyball team managed to turn the tide of the game in their favor.

Keywords Chief Coach, Professional Volleyball Team, Tactical Actions, Operational Management, Competition

1. Introduction

Volleyball is one of the most attractive and mass game sports. Professional volleyball is distinguished by the level of physical and technical training of athletes, tactical diversity in their actions, and mutual understanding of players which gives it spectacle and emotionality [1, 2]. Creating a professional volleyball team is the task of the coaching staff, in which the head chief coach is the main management link. He or she organizes the training process, develops the tactical schemes of the team's game, corrects the players' actions during the competition and is responsible for the sports result [3].

Under the conditions of equalization of the class of many teams, those ones, in which the problems of mutual understanding between the players and the coach are better solved win. The task of the chief coach is to find balance between team discipline, the implementation of the tactical approach to the game and manifestation of the individual capabilities of the players during the competition. In the struggle of two teams of equal class, the success of the team's performance depends on the skillful coaching of the team [4, 5]. The skill of managing the game is subjective, so each chief coach perceives the situation on the playground in their own way. If several trainers are in the position of a coach, then all of them will manage the actions of their team in different ways. Each of the coaches will probably use all available opportunities to achieve a positive sports result.

To correct the tactical actions of the team in each set, the coach has the right to use time-outs, substitute players, and request a video replay of disputed episodes of the game. Time-outs in the game are necessary to seize the tactical initiative and change the course of the game in favor of one of the teams. The chief coach uses his or her experience to determine the weak links in the technical and tactical actions of the opponent, which appeared during the competition, and determines the need for operative intervention to correct the team's actions [6-8]. In the games of professional volleyball teams, often there are cases when at the end of the game (after the score is 20) the teams are tied. A few lucky draws can decide the outcome of the game. Therefore, coaches try to save time-outs for the end of the game, in order to explain to the team how to effectively conduct the final decisive draws [9, 10].

Technical and tactical mistakes detected during team actions can be eliminated by substituting players. Skillful use of substitution has a positive effect on the course of the game. The main requirement for the substitution is its timeliness. All players of a professional volleyball team need to know the system of substitutions, to understand which player can appear on the court to substitute which player. They have to clearly understand the purpose of each substitution of players [11, 12]. Experienced coaches often use substitutions to create artificial pauses in the game in order to reduce the activity in the attacking actions of the opponent and to give operational instructions to the players

of their team [13-15].

All tactical pauses lead to a delay of the game, which the chief coach uses to make adjustments to the tactical actions of the team, create psychological discomfort for the opponent's players and intercept the tactical initiative [16, 17]. With the successful actions of the team, the role of the chief coach is hardly noticeable, and his or her intervention in the game process occurs in extreme cases. The need for active actions of the chief coach arises during tense games or in the games that do not go well for the team [18, 19].

The coach of a professional volleyball team, while preparing players for a game against a specific opponent, builds a model of the team's actions with the aim of maximally using own advantages and leveling the advantages of the opponent team. Before the start of the competition, the chief coach gets in the mood for the game, where he or she provides recommendations on the collective actions of the team and advice to each player individually. At the same time, the coach of the rival team does the same work. As a result, during the competition, two teams meet, trying to implement the tactical ideas of the coaches and build a model of their game to effectively oppose the opponent's team and win [20-22]. That is why in competitive games it happens that the initial model of the team's game, which was proved by the coach before the start of the competition, does not give the desired result. As a result, in order to correct the tactical actions of the team, the chief coach must intervene in the course of the game [23-25]. According to the current rules of volleyball competitions, in each set the chief coach can use only two time-outs, carry out six substitutions of players, and invite a video replay of disputed episodes of the game. Therefore, our research deals with the analysis of the actions of the chief coach of the volleyball team, using the opportunities given to him or her to intervene in the course of the game and promptly react to tactical changes in the actions of the teams, establishing the effectiveness of coaching management on the final result of the competition.

The objective of the article is to analyze the content and effectiveness of the management of the chief coach on the tactical actions of professional volleyball team during competitions.

2. Materials & Methods

To obtain the necessary information, we used the following research methods: analysis of scientific, methodical, sports sources; monitoring the performance of volleyball teams in the national championships of the previous season, statistical data of competition protocols and video surveillance results; survey; factor analysis of the effectiveness of the team's tactical actions; method of expert assessment, methods of mathematical statistics.

We used the analysis of scientific, sports and methodical sources to study the current state of views of experts, scientists and leading coaches on the problem of operative intervention of the chief coach in the tactical actions of the

volleyball team during competitions and establishing their effectiveness. We monitored the performance of volleyball teams in the national championships of the previous season to determine the key games of the best teams for their further analysis. We used the statistical data of competition protocols and the results of video surveillance to study in detail the results of the chief coach's operative intervention on the tactical actions of the volleyball team and establish their effectiveness. The survey was conducted to study the opinions of experts on controversial episodes and their interpretation: the goals of player substitutions, the effectiveness of substitutions, and the need for requested video replays taken by the chief coach of the volleyball team. The method of expert assessment was carried out for the qualified study of the content of the instructions of the chief coach of the team during time-outs, substitution of players, and tactical pauses in the game. The experts were qualified specialists (n=12), including 6 active team coaches and 6 former experienced players who participated in the Championships of Italy, Poland, the Czech Republic, and Ukraine. Methods of mathematical statistics were used to reliably determine the obtained results.

We studied the performances of the best volleyball teams in the national championships of Italy, Poland, the Czech Republic and Ukraine in the 2022-2023 season. The analysis was carried out only of those games, in which teams participated, which, according to the results of the previous season, won places from first to sixth. The total number of analyzed games (n=46): in the Italian

championship (n=10); in the Polish championship (n=12); in the championship of the Czech Republic (n=10); in the championship of Ukraine (n=14). Experts analyzed the content of the operative intervention of the chief coach during time-outs (n=571); the effectiveness of player substitutions was determined (n=1397); the need to use video replays for tactical pauses in the game was established (n=753).

3. Results

The analysis of time-outs taken by head chief coaches of volleyball teams in the Championships of Italy, Poland, the Czech Republic, and Ukraine showed that in 69.7% cases, coaches took a time-out when the team did not successfully complete several preliminary draws; 57.3% of the time-outs taken were spent at the end of the games, after the count of 20.

Expert analysis allowed us to group the main tactical instructions of the chief coach, in accordance with the course of the game. During the break, the chief coach of the volleyball team focuses the players' attention, as a rule, on no more than 2-3 key episodes of the game, which correct the technical and tactical actions of the team's players. The results of the expert analysis of the operational intervention of the chief coach in the tactical actions of the volleyball team during time-outs are given in Table 1.

Table 1. The results of the expert analysis of the operational intervention of the chief coach in the tactical actions of the volleyball team during time-outs (n = 571).

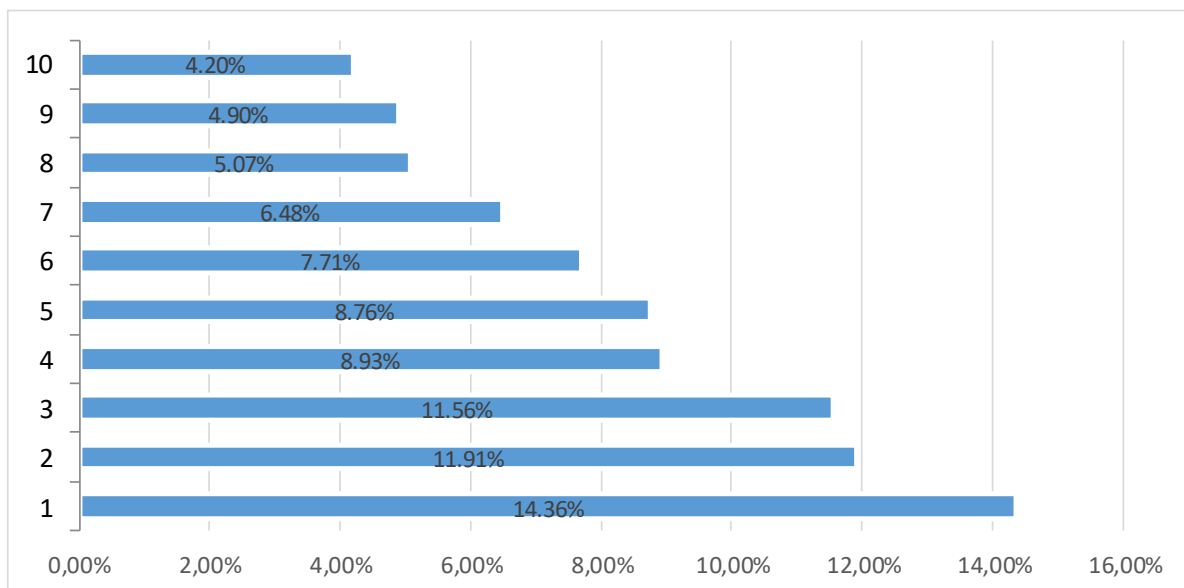
No	Grouped tactical instructions of chief coaches of volleyball teams	number (n)	Significance %
1.	Determines the specifics of the location of the players during difficult innings of the opponent	82	14.36
2.	Establishes the specifics of the organization of defensive actions in the game situation indicated by the coach	68	11.91
3.	Draws attention to the actions of blocking players in a defined playing area	66	11.56
4.	Focuses on visual control of the actions of the opponent's players (especially the actions of the connecting player)	51	8.93
5.	Focuses attention on the player's execution of the innings (permission to take a risk in the execution of the innings or its directed tactical execution in the designated zone)	50	8.76
6.	Determines the need to change the tempo of the down game depending on the game situation	44	7.71
7.	Determines the possible direction of the opponent's attack in the next draw	37	6.48
8.	Determines the player who must complete the offensive actions of the team with a high-quality reception of the ball	29	5.07
9.	Determines the peculiarities of the position of the defensive line players during the opponent's attack	28	4.90
10.	Determines the player who must complete the attack in the event of a negative reception	24	4.20
11.	Defines the playing zone of the team's attacking actions	23	4.03
12.	Focuses attention on the area where the opponent's weakest blocking player is located	22	3.85
13.	Defines the area where the decoy shot should be directed	18	3.16
14.	Determines what conditions must be created for the attacking player when receiving a "free ball"	15	2.63
15.	Others	14	2.45

The analysis of the content of the operational intervention of the chief coach in the tactical actions of the volleyball team during time-outs showed that 58.1% the attention of the players is focused on the peculiarities of the organization of actions in defense (items 1-4, 7, 9); 39.4% on effective completion of attacking actions (items 5, 6, 8, 10-14); 2.5% on other tactical actions of the players. Comparative analysis of the content of operative intervention of chief coaches in the tactical actions of volleyball teams during time-outs in the championships of Italy, Poland, the Czech Republic and Ukraine proved that the statistical deviation of the studied indicators does not exceed 2.82%.

Experts have established that the main attention of the chief coaches of professional volleyball teams during time-outs is focused on the following tactical and technical actions of the players: determining the specifics of the location of the players during difficult innings of the opponent - 14.36%; informing the players about the

peculiarities of the organization of defensive actions in the game situation specified by the coach - 11.91%; organization of the interaction of blocking players in the game zone specified by the coach - 11.56%. The distribution of tactical instructions of chief coaches of professional volleyball teams according to their importance is presented in Figure 1.

The conducted research established that chief coaches of professional volleyball teams in the Championships of Italy, Poland and Ukraine in order to effectively solve competitive tasks in $56.4\% \pm 3.1\%$ ($p < 0.05$) cases leave the opportunity to take a time-out at the end of the set (after the count of 20). In the Czech Championship, this indicator was higher and amounted to $65.2\% \pm 4.2\%$ ($p < 0.05$), which is due to the lack of opportunity for the chief coach of the team to request a video replay of controversial episodes of the game and, as a result, limiting his or her opportunities to take tactical breaks in the game.



Where: 1 - determines the specifics of the location of the players during difficult innings of the opponent; 2 - establishes the specifics of the organization of defensive actions in the indicated coach-game situation; 3 - draws attention to the actions of blocking players in a defined playing area; 4 - focuses on visual control of the actions of the opponent's players (especially the actions of the connecting player); 5 - focuses attention on the player's execution of the innings (permission to take a risk in the execution of the innings or its directed tactical execution in the designated zone); 6 - determines the need to change the tempo of the game depending on the game situation; 7 - determines the possible direction of the opponent's attack in the next draw; 8 - determines the player who must complete the offensive actions of the team with a high-quality reception of the ball; 9 - determines the peculiarities of the position of the defensive line players during the opponent's attack; 10 - determines the player who must complete the attack in the event of a negative reception.

Figure 1. Distribution of tactical instructions of chief coaches of professional volleyball teams according to their importance

Expert analysis of player substitutions carried out by chief coaches of volleyball teams in the Italian, Polish, Czech and Ukrainian championships established the main reasons for their tactical necessity. We investigated and analyzed their effectiveness in Table 2.

It was established that the chief coaches of volleyball teams in the championships of Italy, Poland, the Czech Republic and Ukraine most often substituted players to

solve the following tactical tasks: simultaneous substitution of connecting and diagonal players in order to change the tactical scheme of the game - 23.05%; substitution a player to strengthen the innings, diversifying them - 16.97%; substitution of the frontline player to strengthen the block - 10.59%. The game significance of the tactical necessity of substitutions of players of the volleyball team is shown in Figure 2.

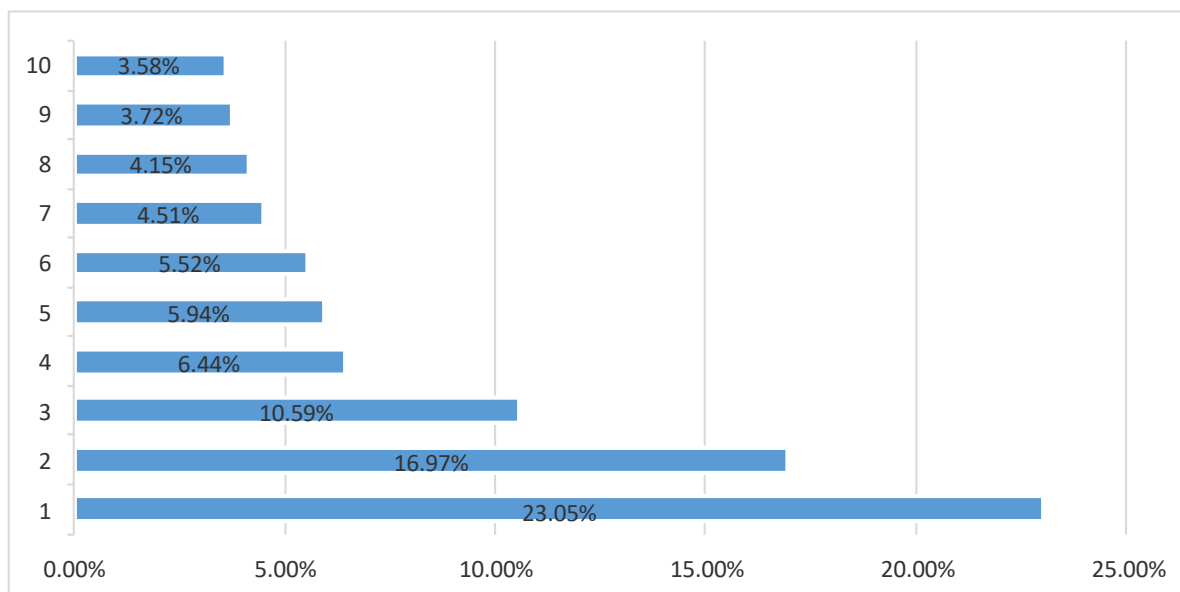
Table 2. The results of substitutions of players by chief coaches of volleyball teams in the Championships of Italy, Poland, the Czech Republic and Ukraine (n = 1397)

No	The tactical necessity of substituting players by the chief coach of the volleyball team	number (n)	Significance %	Effectiveness		
				+	-	V
1.	Simultaneous substitution of connecting and diagonal players in order to change the tactical scheme of the game	322	23.05	78	62	182
2.	Substitution of a player to strengthen the innings, diversify them	237	16.97	66	53	118
3.	Substituting a front-line player to strengthen the block	148	10.59	42	22	84
4.	Substitution of a player who commits tactical mistakes	90	6.44	19	23	48
5.	Substitution of a player to obtain an additional tactical pause in cases where all time-outs are used	83	5.94	43	18	22
6.	Substitution of a player in the front line to strengthen attacking actions	77	5.52	21	19	37
7.	Substitution of a player in the back line to strengthen the defensive actions of the team	63	4.51	17	14	32
8.	Substitution of a player of the main team in order to preserve his or her strength to go on the court in the decisive moments of the match	58	4.15	9	20	29
9.	Substitution of a player who does not follow the coach's instructions for the game	52	3.72	15	9	28
10.	Substitution to provide game practice to reserve team players	50	3.58	8	16	26
11.	Substitution of a player who commits technical errors	48	3.44	10	13	25
12.	Replacing a physically exhausted player	42	3.01	8	11	23
13.	Substituting a linking player to make changes to the team's tactical actions	40	2.86	5	4	31
14.	Entering the starting position of a player with an aggressive innings, his or her subsequent substitution and reverse substitution at the end of the game	32	2.29	6	8	18
15.	Substituting a player who shows signs of confusion	27	1.93	7	6	14
16.	Substitution of a player who wishes to be substituted	20	1.43	6	3	11
17.	Other	8	0.57	1	2	5
	Total	1397	100	361	303	733

Note: + a substitution that led to a positive result with the participation of a player who entered the court;

- a substitution that led to a negative result involving a player who entered the court;

V substitution in which the player who entered the court did not take part in the draw of the ball, or whose actions did not affect the subsequent draw of the ball.



Where: 1 - simultaneous substitution of connecting and diagonal players in order to change the tactical scheme of the game; 2 - substitution of a player to strengthen the innings, and diversify them; 3 - substituting a front line player to strengthen the block; 4 - substitution of a player who commits tactical errors; 5 - substitution of a player to obtain additional tactical pause in cases where all time-outs are used; 6 - substitution of a player in the front line to strengthen attacking actions; 7 - substitution of a player in the back line to strengthen the defensive actions of the team; 8 - substitution of a player of the main team in order to preserve his or her strength to go on the court in the decisive moments of the match; 9 - substitution of a player who does not follow the coach's instructions for the game; 10 - substitution to provide game practice to reserve team players.

Figure 2. Game significance of the tactical necessity of player substitutions

The statistical analysis of substitutions of players of volleyball teams during the competition established that only 25.84% of substitutions produced a positive result, 21.69% led to a negative result, and 52.47% ($p < 0.01$) were neutral. The relatively small percentage of positive changes is explained by the fact that volleyball is a team game and substitution of one player does not always affect the result. The tactical actions of a professional volleyball team are structured in such a way that a player can be inactive in individual ball plays. Therefore, the team chief coach's hopes for a successful solution to the game episode by the player who came in as a substitute are small. The main emphasis is placed on diversifying the tactical actions of the team, which will ultimately allow to achieve the desired result.

Experts note that 15.67% ($p < 0.05$) of player substitutions had characteristic signs of substitutions made to provide an additional tactical pause. Such substitutions were carried out at a slow pace with a maximum time delay, but within the limits allowed by the rules of the competition. This fact indicates that chief coaches of volleyball teams try to use all possible methods of operational intervention in the course of the game to intercept the tactical initiative in favor of their team.

It was established that the use of the video replay system of individual episodes of the game in the championships of Italy, Poland, the Czech Republic and Ukraine in the 2022-2023 season has its own characteristics. Most fully, the video replay system is used in the Italian and Polish Championships, where the chief coach of the volleyball team can request a replay of any episode of the game. In

the Championship of Ukraine, the video replay system has its limitations, where the chief coach of the volleyball team can invite only the final episodes of the draw. There is no possibility of video replays of the game in the Czech Championship. That is why we analyzed video replays of games in the Italian, Polish and Ukrainian championships ($n = 753$).

The conducted expert analysis established the main controversial episodes of the game, which, at the request of the chief coach, require video viewing in Table 3.

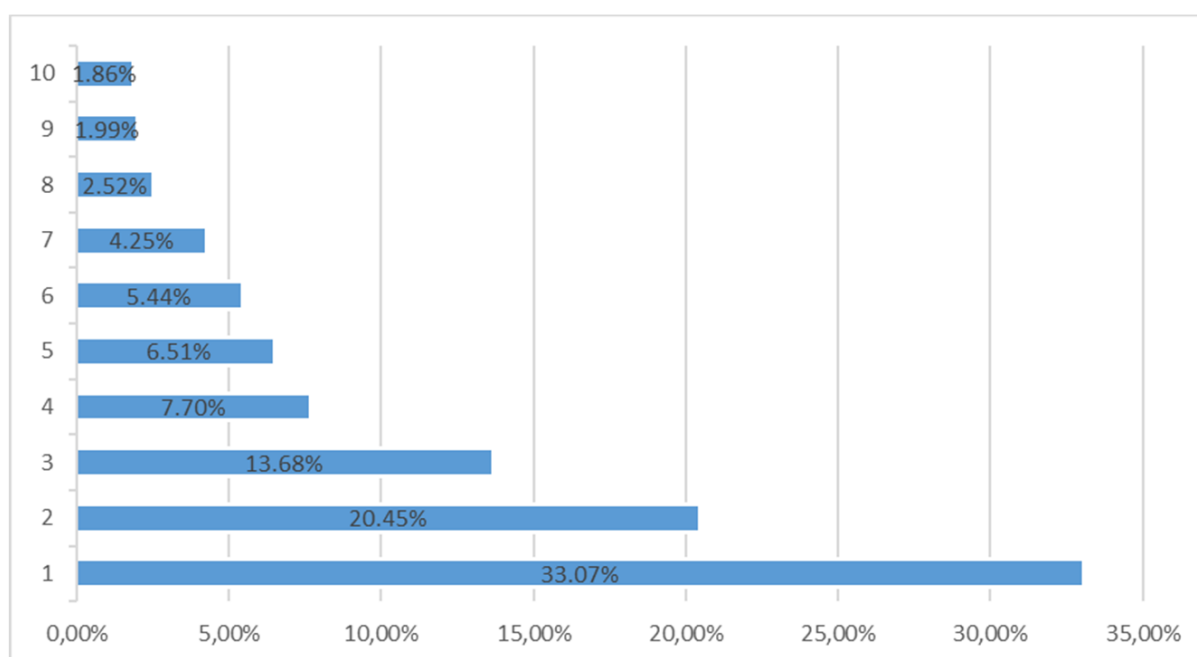
The results of expert analysis of video replays, at the request of chief coaches of volleyball teams in the Championships of Italy, Poland and Ukraine, showed that the following controversial episodes of the game most often need to be watched: getting the ball into the court or out after an attack or inning - 33.07%; ball touching the block during attack - 20.45%; touching the net by the blocking player - 13.68%. The frequency of invited video replays of controversial episodes of the game, at the request of the chief coaches of the volleyball teams in the Championships of Italy, Poland and Ukraine, is shown in Figure 3.

The conducted expert analysis proved that only 31.74% of video views from all requested video replays, which were conducted at the request of chief coaches of volleyball teams, have a positive solution (Table 3). Experts note that chief coaches of volleyball teams make requests not only for the purpose of watching a game episode to change the referee's decision, but also to get a tactical pause. In such cases, they most often require video viewing, which is specified in points 5-12. The intervention of the chief coach

of the volleyball team in the course of the game with the requirement to watch individual game episodes to obtain a tactical pause usually occurs at the end of the sets (after the score of 20).

Table 3. The results of expert analysis of video replays, as requested by chief coaches of volleyball teams in the Italian, Polish and Ukrainian Championships (n=753)

No	The chief coach's request for a video replay	Number of Requests (n)	%	The number of satisfied requests (n +)	%
1.	getting the ball into the court or out after an attack (inning)	249	33.07	91	12.08
2.	touching the ball to the block when attacking	154	20.45	53	7.04
3.	touching the net by a blocking player	103	13.68	38	5.05
4.	touching the net by an attacking player	58	7.70	7	0.93
5.	outpost during an attack from the rear line	49	6.51	7	0.93
6.	touching the court with the ball while defending	41	5.44	14	1.86
7.	playing above the net (under the net) in the plane of the opponent's court	32	4.25	13	1.73
8.	outpost when performing inning	19	2.52	5	0.66
9.	crossing of a middle line by a player	15	1.99	4	0.53
10.	player (ball) touching the antenna	14	1.86	4	0.53
11.	the last touch of the ball when fighting on the net	11	1.46	2	0,27
12.	playing outside the playing area above the net	6	0.80	1	0.13
13.	other	2	0.27	0	0
	Total	753	100	239	31.74



Where: 1 - getting the ball into the court or out after an attack (inning); 2 - touching the ball to the block when attacking; 3 - touching the net by a blocking player; 4 - touching the net by an attacking player; 5 - outpost during an attack from the rear line; 6 - touching the court with the ball while defending; 7 - playing above the net (under the net) in the plane of the opponent's court; 8 - outpost when performing inning; 9 - crossing of a middle line by a player; 10 - player (ball) touching the antenna.

Figure 3. The rate of invited video replays of controversial episodes of the game, at the request of the chief coaches of the volleyball teams in the Championships of Italy, Poland and Ukraine

4. Discussion

The higher the level of professional training of the teams participating in the competition, the more intense the sports competition, the higher the demands on the tactical and technical training of the players [2, 16, 26]. The ability of the chief coach of the volleyball team to see and quickly intervene in the course of the game gives a significant advantage in competitions. Team discipline, understanding of the game situation, creative thinking, and flexibility in making operational decisions are necessary conditions for effective coaching [3, 4, 27].

Competitive activity requires high sports results from the team and the coaching staff. Everyone wants to win. There is no team that would agree to defeat even before the game. If the game did not go according to the previously defined plan or the opponent's plan, if the players make a series of mistakes, if the mood of the players needs to be changed, a time-out is indispensable. The use of time-outs is one of the most effective means of operational team management [5]. When to take a break at the beginning, in the middle or at the end of the game, is the decision the chief coach. He or she should decide when the team needs help. In the researches of Fernández-Echeverría, C., et al. [7] and Abreu, A., et al. [9], it is noted that the coaches of volleyball teams do not always exercise their right to a time-out during the competition, because they understand that the opponents also contribute adjustments to their game, and their own team may lose momentum. The need for a time-out arises when a team makes several mistakes in a row that lead to the loss of points, or when the opposing team begins to actively close the gap in the score [28].

Our research expanded the data [4, 7, 9] regarding the content of tactical instructions of chief coaches of professional volleyball teams, and established their significance for further successful actions of athletes during competitions.

Tactical and technical mistakes of players, which are committed during team actions, can be eliminated with the help of substitution. As noted by López-Serrano, C., et al. [17] and Afonso, J. et al. [29], the game system of the volleyball team in defense and attack, the tactical scheme of building the team's actions, can sometimes be rebuilt by one substitution. The skillful use of player substitutions has a positive effect on the course of the game, but not all substitutions are successful and can even lead to a negative result [16]. Substitutions of players carried out by the chief coach of the volleyball team must be justified and understandable for the players. Unreasonable substitutions of players can unbalance the actions of the team [11].

Our research supplemented the data [16] regarding the effectiveness of technical actions when making substitutions at crucial moments of the game with the possibility of winning or losing a set in professional volleyball of European countries. We analyzed and established the tactical expediency of player substitutions in the games of elite teams in the championships of Italy,

Poland, the Czech Republic, and Ukraine, and determined their effectiveness. It was found that chief coaches use player substitutions for the purpose of: solving game episodes in their favor; diversifying the tactical actions of the team; getting extra pauses in the game [27].

The appearance of the video replay system had a positive impact on the development of volleyball. It quickly became an integral part of modern matches of professional teams [30-32]. At the same time, its high cost limits its implementation in all European Championships, in particular, it is not used in the regular championship of the Czech Republic. It should be noted that the ability of the chief coach of the volleyball team to request a video replay has a positive effect on the objectivity of the game result and disciplines the referees and prevents them from making biased decisions [33].

Our research has established the main controversial episodes of the game, which, at the request of the chief coach, require video viewing. It added data on the effectiveness of the use of video views for each episode of the game.

The study of the problem of the performance of professional volleyball teams at competitions and the importance of the chief coach of the team in achieving success is considered by most researchers in the area of solving the following problems: improving the tactical and technical training of athletes, developing the game thinking of players, their mutual understanding, the ability to perform the tasks of the chief coach of the team [2, 11, 19]; improvement of physical and technical abilities of volleyball players [34, 35, 36]; staffing the team with players of high sportsmanship in accordance with their playing positions [37-40]; selection of coaching staff in accordance with their professional competence, study of the experience of performances of the best teams, taking into account modern trends in the development of sports education in the world [41-43]; using modern technical means to analyze the game and identify tactical and technical errors in the players' actions [18, 44, 45].

The feature of our research was the study of the possibilities of operational intervention of the chief coach of a professional volleyball team during competitions and establishing their effectiveness. The complexity of this problem lies in the subjectivity of experts' views on the interpretation of various episodes of the game and the expediency of decisions made by the chief coach of the volleyball team. This problem is poorly researched and needs further study taking into account the dynamics of changes in the rules of volleyball competitions and the appearance of new opportunities for the chief coach of the team to influence the course of the game.

5. Conclusions

The modern coach of a professional volleyball team is an active participant in the game. He or she should not rely

only on the tactical actions of the team's players that were practiced in training. The general trend of modern professional volleyball shows that energetic, young coaches who actively lead the game of their team achieve significantly more success during competitions. The chief coach of a volleyball team, by substituting players, using time-outs and demanding video replays of difficult episodes of the game, affects the pace of the game, players' settings, uses pauses to provide tactical instructions and advice on player actions in certain episodes. It is thanks to the active actions of the chief coach that in 32 sets (17.4%) the players of the professional volleyball team managed to change the course of the game in their favor.

The use of time-outs in professional volleyball is one of the most effective means of operational team management. During time-outs, the chief coach adjusts the tactical actions of the players of the volleyball team. It is established that in 58.1% of cases attention is focused on the peculiarities of the organization of actions in defense, in 39.4% of cases on the effective completion of attacking actions. The main attention is focused on the following tactical and technical actions of the players: determination of the features of the location of the players during difficult innings of the opponent; informing the players about the peculiarities of the organization of defensive actions in the game situation specified by the coach; organization of interaction between blocking players in the game zone specified by the coach.

Chief coaches of professional volleyball teams use substitutions of players for the purpose of: solving game episodes in their favor; diversification of the team's tactical actions; getting extra pauses in the game. It is found that the chief coaches of volleyball teams in the championships of Italy, Poland, the Czech Republic and Ukraine most often substitute players for the simultaneous replacement of connecting and diagonal players in order to change the tactical scheme of the game; substitution of a player to strengthen the serve, diversifying it; replacement of the frontline player to strengthen the block.

The use of a video replay system has a positive effect on the objectivity of referees' decisions. It is established that 31.74% of video viewings, which were conducted at the request of chief coaches of volleyball teams, had a positive solution. Most often, controversial episodes of the game need to be watched: the ball entering the court or going out after an attack or serve; ball touching the block during attack; touching the net by a blocking player. Chief coaches of volleyball teams use requests for video viewing not only for the purpose of changing the referee's decision in controversial episodes of the game, but also for obtaining an additional tactical pause.

The conducted research showed that the coaches of volleyball teams need to pay more attention to working out reserve models of game organization. Such models must be used when the opponent successfully opposes the main variant of the construction of the team's game. The higher the level of sportsmanship of the team, the higher the

demands to the players to comply with the tactical models of the game, which were developed by the chief coach of the volleyball team. Substituting players must clearly follow the coach's instructions, reinforcing the team's actions. When recruiting professional volleyball teams, the managers should pay attention to the versatility and variability of actions of new players, which will allow coaches to build different tactical models of the team's game and act creatively at key moments of the competition.

Prospects for further research include the analysis of the actions of chief coaches of national volleyball teams during their performance in the League of Nations and Golden Euroleague, identification of the most successful coaching decisions that positively affected the course of the game, and generalization of the algorithm of actions of the world's leading coaches for solving difficult game situations.

Conflicts of Interest

The authors have no conflict of interest.

REFERENCES

- [1] Marcelino, R., Mesquita, I., & Sampaio, J. "Efficacy of the volleyball game actions related to the quality of opposition". *The Open Sports Sciences Journal*, Vol. 3, No. 1, pp. 34-35, 2010. DOI: 10.2174/1875399X010030100034.
- [2] Imas, Y., Borysova, O., Shlonska, O., et al. "Technical and tactical training of qualified Volleyball players by improving attacking actions of players in different roles". *Journal of Physical Education and Sport*, Vol. 17, No. 1, pp. 441 – 446, 2017. DOI: 10.7752/jpes.2017.01066.
- [3] Bloshchynsky, I., Kovalchuk, R., Balendr, A., et al. "Conceptual Basis of Organization of Volleyball Team Training". *International Journal of Applied Exercise Physiology*, Vol. 8, No. 2, pp. 1-12, 2019. <https://doi.org/10.30472/ijaep.v8i2.430>.
- [4] Rui, R., Hugo, S., William, F., et al. "Coach education in volleyball: a study in five countries". *Journal of Physical Education & Sport*, Vol. 14, No. 4, pp. 475-484, 2014. DOI: 10.7752/jpes.2014.04072.
- [5] Vargas-Tonsing, T. M., Warners, A. L., & Feltz, D. L. "The predictability of coaching efficacy on team efficacy and player efficacy in volleyball". *Journal of sport behavior*, Vol. 26, No. 4, pp. 396-407, 2003.
- [6] Zetou, E., Kourtesis, T., Giazitzi, K., & Michalopoulou, M. "Management and content analysis of timeout during volleyball games". *International Journal of Performance Analysis in Sport*, Vol. 8, No. 1, pp. 44-55, 2008. DOI: 10.1080/24748668.2008.11868421.
- [7] Fernández-Echeverría, C., González-Silva, J., Castro, I. T., & PerlaMoreno, M. "The Timeout in Sports: A Study of Its Effect on Volleyball". *Frontiers in Psychology*, Vol. 10, pp. 2437, 2019. <https://doi.org/10.3389/fpsyg.2019.02437>.

- [8] Lombard, G., & Cloes, M. "Analysis of the relevance of the information content given to the players during volleyball timeouts with a 3D device". *International Journal of Performance Analysis in Sport*, Vol. 21, No. 6, pp. 965-980, 2021. <https://doi.org/10.1080/24748668.2021.1968650>.
- [9] Abreu, A., Fernández-Echeverría, C., González-Silva, J., Claver, F., et al. "The use of timeouts in volleyball, depending on the team score". *Journal of Human Sport and Exercise*, Vol. 12, No. 3, pp. 813-820, 2017. <https://doi.org/10.14198/jhse.2017.12.Proc3.05>.
- [10] Akarcesme, C.; Sahin, M.; Varol, Y.K.; Colakoglu, F.F. "Examining the Attacks After the 20th Scores in Volleyball According to Nationality and Positions". *J. Educ. Learn.*, Vol. 7, No. 6, pp. 184-190, 2018. DOI: 10.5539/jel.v7n6p184.
- [11] Rabaz, F. C., Castuera, R. J., Arias, A. G., et al. "Relationship between performance in game actions and the match result. A study in volleyball training stages". *Journal of Human Sport and Exercise*, Vol. 8, No. 3, pp. 651-659, 2013. doi: 10.4100/jhse.2013.8.Proc3.11.
- [12] Castro, H. D. O., Praça, G. M., Costa, G. D. C. T., et al. "Visual behavior and the quality of decision-making on volleyball". *Revista Brasileira de Cineantropometria & Desempenho Humano*, Vol. 18, pp. 638-647, 2016. <https://doi.org/10.5007/1980-0037.2016v18n6p638>.
- [13] Cloes, M., Bavier, K., & Piéron, M. "Coaches' thinking process: Analysis of decisions related to tactics during sports games". *Innovation and application of physical education and sports science in the new millennium - An Asia-Pacific Perspective*. Hong Kong Institute of Education, Hong Kong, China, pp. 329-341, 2001. <https://hdl.handle.net/2268/28501>.
- [14] Fernandez-Echeverria, C., Mesquita, I., González-Silva, J., et al. "Match analysis within the coaching process: a critical tool to improve coach efficacy". *International Journal of Performance Analysis in Sport*, Vol. 17, No. 1-2, pp. 149-163, 2017. <https://doi.org/10.1080/24748668.2017.1304073>.
- [15] Lames M., McGarry T. "On the search for reliable performance indicators in game sports". *International Journal of Performance Analysis in Sport* Vol. 7, pp. 62-79, 2007. <https://doi.org/10.1080/24748668.2007.11868388>.
- [16] Rodriguez-Ruiz, D., Quiroga, M. E., Miralles, J. A., et al. "Study of the technical and tactical variables determining set win or loss in top-level European men's volleyball". *Journal of Quantitative Analysis in Sports*, Vol. 7, No. 1, pp. 1-15, 2011. <https://doi.org/10.2202/1559-0410.1281>.
- [17] López-Serrano, C., Moreno Arroyo, M. P., et al. "In the Opinion of Elite Volleyball Coaches, How Do Contextual Variables Influence Individual Volleyball Performance in Competitions?" *Sports*, Vol. 10, No. 10, pp. 156, 2022. <https://doi.org/10.3390/sports10100156>.
- [18] Junior, N. K. M. "Match Analysis for Elaborate the Volleyball Training: A Review". *Journal of Sports and Games*, Vol. 3, No. 1, pp. 1-7, 2021. DOI: <https://doi.org/10.22259/2642-8466.0301001>.
- [19] Drikos, S., Barzouka, K., Balasas, D. G., & Sotiropoulos, K. "Effect of quality of opposition on game performance indicators in elite male volleyball". *International Journal of Sports Science & Coaching*, Vol. 17, No. 1, pp. 169-177, 2022. <http://dx.doi.org/10.1177/17479541211013701>.
- [20] Palao, J. M., Garcá-de-Alcaraz, A., Hernández-Hernández, E., & Ortega, E. "A case study of applying collective technical-tactical performance goals in elite men's volleyball team". *International Journal of Applied Sports Sciences*, Vol. 28, No. 2, pp. 68-78, 2016.
- [21] Palao, J. M., Garcá-de-Alcaraz, A., Hernández-Hernández, E., Valadés, D., & Ortega-Toro, E. "Establishing technical and tactical performance goals for elite male volleyball players". *Central European Journal of Sport Sciences and Medicine*, Vol. 21, No. 1, pp. 5-12, 2018. DOI: 10.18276/cej.2018.1-01.
- [22] Ramos, A., Coutinho, P., Silva, P., Davids, K., Guimarães, E., & Mesquita, I. "Entropy measures reveal collective tactical behaviours in volleyball teams: how variability and regularity in game actions influence competitive rankings and match status". *International Journal of Performance Analysis in Sport*, Vol. 17, No. 6, pp. 848-862, 2017. <https://doi.org/10.1080/24748668.2017.1405611>
- [23] Garcá-de-Alcaraz, A., Marcelino, R. "Influence of match quality on men's volleyball performance at different competition levels". *Int. J. Perform. Anal. Sport*, Vol.17, No. 4, pp. 394-405, 2017. <https://doi.org/10.1080/24748668.2017.1348058>.
- [24] Keshtan, M. H., Ramzaninezhad, R., Kordshooli, S. S., & Panahi, P. M. "The relationship between collective efficacy and coaching behaviors in professional volleyball league of Iran clubs". *World Journal of Sport Sciences*, Vol. 3, No. 1, pp. 1-6, 2010.
- [25] Ramos, A., Coutinho, P., Ribeiro, J., Fernandes, O., Davids, K., & Mesquita, I. "Increasing tactical complexity to enhance the synchronisation of collective behaviours: An action-research study throughout a competitive volleyball season". *Journal of Sports Sciences*, Vol. 38, No. 22, pp. 2611-2619, 2020. <https://doi.org/10.1080/02640414.2020.1794265>.
- [26] Fellingham, G. W. "Evaluating the performance of elite level volleyball players". *Journal of Quantitative Analysis in Sports*, Vol. 18, No. 1, pp. 15-34, 2022. <https://doi.org/10.1515/jqas-2021-0056>.
- [27] Kovalcuk, R., Gnydiuk, O., Melnykov, A., Mozolev, O., Rybak, L., Melnikov, V., Tomkiv, I., Binkovskiy, O., Hnydiuk, O. "Tactical Team Training as a Component of Achieving Sports Results", *International Journal of Human Movement and Sports Sciences*, Vol. 11, No. 2, pp. 484-497, 2023. DOI: 10.13189/saj.2023.110228.
- [28] Garganta, J. "Trends of tactical performance analysis in team sports: bridging the gap between research, training and competition". *Revista Portuguesa de Ciências do desporto*, Vol. 9, No. 1, pp. 81-89, 2009. <https://doi.org/10.5628/rpc.d.09.01.81>.
- [29] Afonso, J., Esteves, F., Araújo, R., Thomas, L., & Mesquita, I. "Tactical determinants of setting zone in elite men's volleyball". *Journal of sports science & medicine*, Vol. 11, No. 1, pp. 64-70, 2012.
- [30] Seweryniak, T. "The application of computer and electronic tools during a sports spectacle in volleyball on the example of PlusLiga". *Informatyka Ekonomiczna*, Vol. 34, pp. 25-

- 36, 2014. DOI: 10.15611/ie.2014.4.03.
- [31] Xu, Z. "Research on the Innovation of Volleyball Technology and Tactics". *International Core Journal of Engineering*, Vol. 6, No. 3, pp. 267-271, 2020. DOI: 10.6919/ICJE.202003_6(3).0045.
- [32] Khmara, M., Mozolev, O., Yashchuk, I., Aliksieiev, O., Kravchuk, V., Dolynnyi, Yu., Tomkiv, S., Binkovskyi, O., Pronenko, V. "Effectiveness of the Fitness Program «Way to a healthy life»". *International Journal of Human Movement and Sports Sciences*, Vol. 9, No. 5, pp. 833 – 840, 2021. DOI: 10.13189/saj.2021.090501.
- [33] Vangphumyai, M. H. *Referees Home Bias Before and After Challenge System: The Case Study of International Volleyball League* (Doctoral Dissertation, Thammasat University), 2016.
- [34] Zetou, E., Tsigilis, N., Moustakidis, A., & Komninakidou, A. "Playing characteristics of men's Olympic Volleyball teams in complex II". *International Journal of Performance Analysis in Sport*, Vol. 6, No. 1, No. 172-177, 2006. <https://doi.org/10.1080/24748668.2006.11868365>.
- [35] Asterios, P., Kostantinos, C., Athanasios, M., & Dimitrios, K. "Comparison of technical skills effectiveness of men's National Volleyball teams". *International Journal of Performance Analysis in Sport*, Vol. 9, No. 1, pp. 1-7, 2009. <https://doi.org/10.1080/24748668.2009.11868460>.
- [36] Silva, M., Lacerda, D., & João, P. V. "Game-related volleyball skills that influence victory". *Journal of human kinetics*, Vol. 41, 173-179, 2014. DOI: 10.2478/hukin-2014-0045.
- [37] Cojocar, A. M., & Cojocar, M. "Analysis of the efficiency of the attack from the second line, at the level of men senior, in the volleyball game". *Journal of Physical Education and Sport*, Vol. 19, No. 6, pp. 2106-2109, 2019. DOI:10.7752/jpes.2019.s6315.
- [38] Szabo, D. A., Neagu, N., Voidazan, S., et al. "Analyzing the attack players in volleyball through statistical methods". *Health, Sports & Rehabilitation Medicine*, Vol. 20, No. 4, pp. 154-158, 2019. DOI: 10.26659/pm3.2019.20.4.154
- [39] Oliinyk, I., Doroshenko, E., Melnyk, M., et al. "Modern approaches to analysis of technical and tactical actions of skilled volleyball players". *Teor iâ Ta Metodika Fizičnogo Vihovannâ* Vol. 21, No. 3, pp. 235-243, 2021. <https://tmfv.com.ua/journal/issue/view/163>.
- [40] Fiander, M. F., Stebbings, J., Coulson, M. C., & Phelan, S. "The information coaches use to make team selection decisions: A scoping review and future recommendations". *Sports Coaching Review*, Vol. 12, No. 2, pp. 187-208, 2023. <https://doi.org/10.1080/21640629.2021.1952812>.
- [41] Mozolev, O., Halus, O., Bloshchynskyi, I., & Kovalchuk, R. "Human resources management of educational development in sphere of physical culture and sports in Ukraine: comparative analysis (1992- 2016)". *Journal of Physical Education and Sport*, Vol. 19, No. 1, pp. 185-192, 2019. DOI: 10.7752/jpes.2019.s1028.
- [42] Khorram, M. H. "Goal orientation based relationship between coaching efficiency, athlete satisfaction, and team cohesion". *Scientific Journal of Sport and Performance*, Vol. 2, No. 1, pp. 70-82, 2023. <https://doi.org/10.55860/XAQQ9577>.
- [43] Ishak, A. W. "Communication in sports teams: A review". *Communication Research Trends*, Vol. 36, No. 4, pp. 4-38, 2017.
- [44] Gesbert, V., Carrel, J., Philippe, R. A., & Hauw, D. "Elite volleyball coaches' experience using a statistical information system". *International Journal of Performance Analysis in Sport*, Vol. 16, No. 2, pp. 612-632, 2016. <https://doi.org/10.1080/24748668.2016.11868913>.
- [45] Lombard, G., & Cloes, M. "Analysis of the relevance of the information content given to the players during volleyball timeouts with a 3D device". *International Journal of Performance Analysis in Sport*, Vol. 21, No. 6, pp. 965-980, 2021. <https://doi.org/10.1080/24748668.2021.1968650>.