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Experts Opinion about System of the Performance Evaluation Criteria Weighted per Positons in the Water Polo Game

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A B S T R A C T

The goal of the research was to define experts opinion about adequate criteria for water polo players' actual quality evaluation and to determine experts opinion about weight coefficients (ponders) of the here defined criteria across the playing positions in the game of water polo. Based upon the expertise performed by ten water polo professionals, the relative importance coefficients with regard to playing positions in the game were determined for twenty seven performance evaluation criteria. High degreee of interobserves' agreement was obtained regarding all positions (from 0.93 to 0.96). In concordance with the obtained results the particular playing positions were explicitly described, as well as the similarities and the differences between them were determined from the aspect of the single criteria importance. The research results could be usefully applied by the water polo practitioners for the selection and follow-up of players during training programme implementation, and for programming, controll and evaluation of transformational effects.

Key words: *performance, water polo experts, criteria, elite water polo players*

Introduction

In about last sixty years a series of research studies was published that discussed issues of athletes' performance evaluation in team sport games[1–6]. Most of them investigated the issue of players' actual quality assessment in basketball[1–3,6], whereas in other sport games this research issue was addressed rarely[4,5]. The authors found no published study that deals with the construction and evaluation of methods of actual quality assessment for elite water polo players'.

The assessment of players' potential and actual quality (overall performance quality) within the framework of training planning and programming on the levels of clubs and national team alike is a crucial prerequisite of systematic sport preparation design. One should differntrate betwen the potential quality, on the basis of which we can predict performance of water polo players, and actual quality[5]. The concept of actual quality of players in team sports games means a level of performance quality demonstrated in competition (competition profeciency), that is, the level of actual competition value of a player[6,7]. The potential quality implies the (diagnosed) developmental level of players' basic and sport-specific abilities and of other relevant characteristics, skills, motor knowledge and habits[7], that are preconditions of high perforance in a game. It is utilised for the preliminary selecion for sport in general, for the selection in the process of gradual water polo training of young players aged 10–17 years, and for the training effects control. Besides the differentiation between the potential and actual quality, one may differentiate between two manifestation of actual quality of athletes: overall actual quality (overall performance quality) and overall situation-related effiiency of players. Overall actual quality (overall performance quality) embraces all factors of actual quality as assessed by experts, whereas overall situation-related efficiency of players includes only a part of overall perforance in a game (overall actual quality) which is objecively measured by means of the official game statistics, therefore it represents only the partial performance[7].

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National associations or European and world federations (LEN and FINA) have not yet standardized game statistics (like it has been done in basketball, for example). Water polo coaches nevertheless use certain game statistics data such as: total number of shots taken and number of goals scored, number of fastbreaks and shot efficiency, turnovers (lost balls), steals, and others. Some researches used objectivity measured idicators of water polo players performance efficiency[8–12]. Limitation with indicators of situation efficiency and negligence of interactive processes in the flow of a game is not acceptable way of explaining facts[13]. In previous research studies the subjective estimation by independent water polo experts was used. They usually used grades of a measurement scale to evaluate players' performance on the basis of a group of criteria[14,15]. However, the existent criteria do not allow an informative and comprehensive yet detailed analysis of overall performance of each water polo player. There is a lack of criteria by means of which experts would be able to evaluate the actual quality of water polo player. Therefore, it is necessary to define precisely those criteria and to determine the importance coefficients (weights, ponders) of each and every criterion in relation to playing positions in the water polo. The system of evaluation criteria has to take into the differences in anthropological characteristics[16], and also in roles, duties and tasks which are allocated to particular player who primarily play on different playing positions within a certain system of play. The recognition and understanding of the position-related criterion relative importance ensures higher reliability and predictive power of player selection and expert decision-making process. The present study had two principal goals: (1) to define experts opinion about adequate criteria for water polo players' actual quality evaluation, and (2) to determine experts opinion about importance coefficients (weights, ponders) for the criteria defined in relation to the playing positions in water polo.

Materials and Methods

The criteria for the assessment of water polo players' actual quality – a proposition

A proposition of the criteria for the assessment of water polo players' actual quality is based on autors empirical experiences, gathered through observing, teaching, coaching, analyzing courses of water polo play and previos researches in team sports[6,14,15].

Figure 1 shows the proposed criteria for the assessment of actual quality of water polo field players, primarily playing the following positions: wing, center defender, center forward and outside, and goalkeeper: (1) six criteria for the assessment of actual quality of top-level water polo players on transition and set (positional) defense; (2) thirteen criteria for the assessment of actual quality of top-level water polo players on transition and set (positional) offense; (3) eight criteria for the assessment of actual quality of top-level water polo goalkeepers.

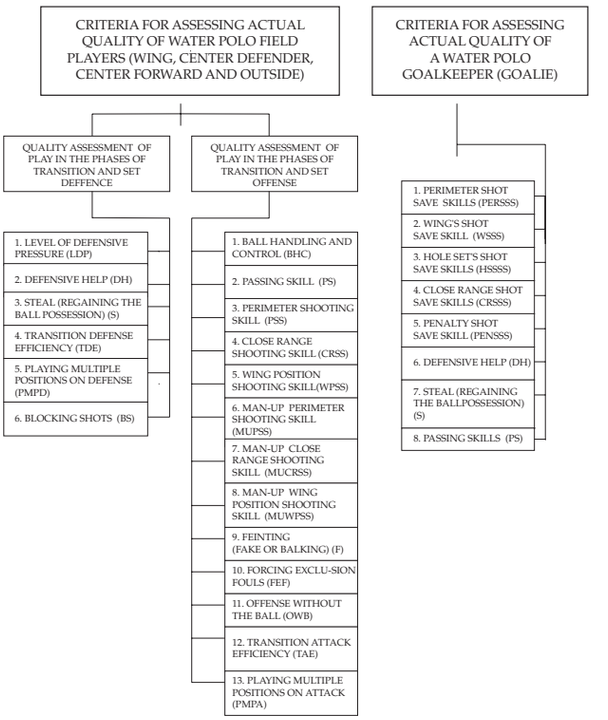

Fig. 1. The expert evaluation criteria for actual quality of elite water polo players.

Actual quality assessment criteria of water polo field players on playing positions: wing, center defender, center forward and outside on transition and set/positional defense

1. Level of defensive pressure – the ability to develop and maintain maximal attention and engagement in all lines of defense. Defensive pressure is primarily related to the individual tasks, roles, responsibility, mental concentration, movement speed and aggressiveness of each defender. It is manifested as: defensive pressure on an immediate ball carrier and as consistent defensive pressure on attackers without the ball.

Defensive pressure on an immediate ball carrier implies the ability to guard constantly and aggressively the ball carrier in one-to-one play without defensive help from teammates. It includes: (1) Forcing the attacker to passively advance and handle the ball before he/she has managed to find optimal attacking solutions (hindering attacker's overview of the playing area and players' locations); deflecting dribbling lanes; forcing the attacker into poor angle passes; denying open shots; interfering with ball control and protection; interfering with timely and accurate passes; consuming time of the ball carrier by denying him/her passing opportunities; keeping the ball carrier out of the shot zone. The mentioned defensive ball pressure actions decrease the number of oppo-

nent's preferable opportunities. (2) Covering all paths to the own goal after the opponent's goal shot, thus denying inside water to the attackers for rebounding (the ball bounced off the goal posts or a goalkeeper).

Consistent defensive pressure on attackers without the ball represents the ability of defenders to aggressively guard the attackers positioned one pass away from the ball. It is manifested as: interfering with the timing and accuracy of the ball flow; hindering easy receiving ball; deflecting the passed ball in order to steal it or to interrupt the opponent's attack; closing gross movement lanes (thus reducing the number of preferable attacking variants); forcing fouls on attack by intercepting the movement lane; fighting for the space and position between the ball and guarding attacker in the most dangerous playing area zones (the attacking area up to 8 meters from the goal line).

2. Defensive help – the ability of a player to be helpful to a teammate on defense with no deterioration of his/hers own defensive performance. Due to a vast variety of possible opponents' actions on attack, the constant defensive cooperation and »overlapping of actions« in guarding the neighboring attackers is indispensable part in performance on defense.

3. Steal (regaining the ball possession) – the ability of a defender to perform an action the aim of which is to force the opponent to lose the ball, thus allowing the defenders to regain the ball possession with low risk for his/her own team. The ball possession may be regained through one of the following ways: (1) a pass intercepted; (2) the dribbled ball won; (3) the held ball won by means of batting it out of the opponent's hand; (4) winning the ball held priory hitting on the attacker's arm holding the ball; (5) winning the ball by sinking the attacker's arm that controls it; (6) winning »nobody's« balls; (7) winning the face-off (neutral throw) balls by swimming or jumping out of the water; (8) forcing the opponent's personal foul or the game rule infringement.

Note: This criterion does not include the blocked shots after which the ball possession is gained.

4. Transition defense efficiency – the ability to transform, shift play quickly and in an organized and balanced manner switch from offense to defense over the length of playing area in order to prevent the opponent from gaining area and/or numbers advantage. It depends on tactical discipline of one's own attack and on the respect of previously assigned lanes of gross movements over the length of playing area when returning to defense. It is manifested in the following: (1) gaining area advantage in time, which is a prerequisite for preventing and impeding an opponent player in his/her action, for intercepting passing lanes and for slowing down the opponents' actions on fast break; (2) impeding the opponent players in ball reception, control of ball and advancing with the ball, driving to the goal or in any other gross movement without the ball; (3) taking timely the control over a certain area and/or an attacker; (4) forcing the opponent to play the set, positional attack six-to-six players.

5. Playing multiple positions on defense – the ability of a player to guard and mark the direct opponent who plays on multiple inside and perimeter playing positions on attack. The players who are able to play on multiple defensive positions enable numerous successful play solutions and application of various defensive systems.

6. Blocking shots – the skill of a player to directly mark the opponent's arm with the ball; the action is performed so that the part of the body which is to block the shot is set on the imaginary shot lane in order to prevent the opponent from shooting at all, or to block the already released ball. Defenders usually try to cover either the immediate or the farther goal corner in accordance with the previous agreement with the goalkeeper. In the analysis of blocking shots one should differentiate between the individual (blocking the ball of the immediate attacker) and the team (blocking the shot from the background) aspect of blocking shots. The element of blocking shots is used more often on zone defense and on the man-down static defense.

Actual quality assessment criteria of water polo field players on playing positions: wing, center defender, center forward and outside on transition and set/positional offense

1. Ball handling and control – the skill of a player to handle effectively the ball in place and on the move; it is manifested as consistently safe advancing, dribbling, reception, holding and keeping (securing) the ball.

2. Passing skill – the skill of a player to transfer successfully the ball to a teammate on attack. The following factors determine successful passing performance: proper technical execution, adequacy of a pass in terms of game situation, suddenness of execution, accuracy and ball velocity; the trajectory of the ball passed should be away from the defender and to the teammate's throwing arm.

3. Perimeter shooting skill – the ability of a player to score from outside position in a game situation where both teams are being at equal strength. Performance of this shot is determined by a game situation (it is usually executed as an open shot from a clear chance and may be performed under time pressure) and by the momentary score. A shooter is responsible to provide optimal conditions for shot performance, meaning he/she will try to come closer to the goal and ensure an optimal shooting angle, and then will try to ensure maximal throw accuracy and optimal ball velocity and execution mode in accordance with the game situation. To create an open shooting chance, the attacker should first apply adequate gross movements, various feints, and using sudden movements himself/herself would try to free from any defender's impeding action.

4. Close range shooting skill – the ability of a player to gain advantage which enables him/her to receive a pass and score from or inside the four-meter line in a game situation where both teams are being at equal strength.

5. Wing shooting skill –the ability of a player to score from wing position in a game situation where both teams

are being at equal strength, usually executed as an open shot from a clear chance, in accordance with the momentary score and time pressure. A shooter is responsible to provide optimal conditions for shot performance, meaning he/she will try to come closer to the goal and ensure an optimal shooting angle, and then will try to ensure maximal throw accuracy and optimal ball velocity and execution mode in accordance with the game situation. To create an open shooting chance, the attacker should first apply adequate gross movements, various feints, and using sudden movements himself/herself would try to free from any defender's impeding action.

6. Man-up perimeter shooting skill – the ability of a player to score from outside position in man-up game situations, usually executed as an open shot from a clear chance, in accordance with the momentary score and time pressure. A shooter is responsible to provide optimal conditions for shot performance, meaning he/she will try to come closer to the goal and ensure an optimal shooting angle, and then will try to ensure maximal throw accuracy and optimal ball velocity and execution mode in accordance with the game situation. To create an open shooting chance, the attacker should first apply adequate gross movements, various feints, and using sudden movements try to free him/her from any defender's impeding action.

7. Man-up close range shooting skill – the ability of a player to score from either of the posts in man-up game situations, usually executed as an open shot from a clear chance, in accordance with the momentary score and time pressure. A shooter is responsible to provide optimal conditions for shot performance, meaning he/she will try to come closer to the goal and ensure an optimal shooting angle, and then will try to ensure maximal throw accuracy and optimal ball velocity and execution mode in accordance with the game situation. To create an open shooting chance, the attacker should first apply adequate gross movements, various feints, and using sudden movements himself/herself would try to free from any defender's impeding action.

8. Man-up wing shooting skill – the ability of a player to score from wing position in man-up game situations, usually executed as an open shot from a clear chance, in accordance with the momentary score and time pressure. A shooter is responsible to provide optimal conditions for shot performance, meaning he/she will try to come closer to the goal and ensure an optimal shooting angle, and then will try to ensure maximal throw accuracy and optimal ball velocity and execution mode in accordance with the game situation. To create an open shooting chance, the attacker should first apply adequate gross movements, various feints, and using sudden movements himself/herself would try to free from any defender's impeding action.

9. Feinting (fake or balking) – the skill of a player to deceive a defender by applying a deceptive move of the body, arm and/or eye; the aim is to gain advantage over a defender to pass or shoot. Fakes should be applied when the opposing defender is not maximally physically engaged or focused on the activity of the attacker. It is also important to perform a feint at optimal distance from a defender, out of reach of his/her arms, but close enough to deceive him/her. Feints should be selected with regard to the adversary player's characteristics and location in the playing area.

10. Forcing exclusion fouls – the ability of a player to force an opponent to commit any major foul in order to win the man-up game situation (exclusion of the defender) and/or a penalty throw.

11. Offense without the ball – the ability of a player to move/swim skillfully and effectively without the ball; that gross movements, their direction and pace depend on the structure of game situations, particularly on the tactics of the adversary defense, and on the locations of the opposing players, teammates and the ball. The skill is manifested as: (1) player's getting open/free, that is, to occupy free space on offense for the ball reception or in order to overstretch the opposing defense; (2) a drive into the free space, that is, drawing defenders away to provide clear chance for realization of the attacking action, especially in the situations of the attack against zone defense, and when finishing the first line of fast break; (3) setting good screens (moving and stationary picks) to create an opening for a pass or shot; (4) drive in on the set, positional attack with the aim to outplay the positional defense and/or to exhaust the opponents; (5) any distraction of defenders' attention on the ball.

12. Transition attack efficiency – the ability of a player to transform, shift play quickly and in an organized and balanced manner change from defense to offense over the length of playing area (a goal to a goal direction) in order to gain space advantage, outnumber the defenders, and create clear shooting chance while the opposing defense is still unorganized (counterattack). It is manifested as: (1) a quick transition swimming or dribbling in fast break in an attempt to gain offensive area advantage over the immediate opposing defender; (2) opening passing lanes for outlet pass and/or dribbling; (3) organizing preconditions for realization/scoring in the phase of finishing either the primary or secondary counterattack in which attackers have managed to outnumber the defenders (game situations from 1-to-0 to 6-to-5), that is, before the defenders organize the positional defense; (4) organizing preconditions for quick »punishment« (creating and percepting clear scoring chance) of the opponents' poor positioning on defense (in relation to both the ball and the attackers), and in game situations of momentary confusion of the adversary defense when attackers may, but need not to outnumber them.

13. Playing multiple positions on attack – the ability of a player to play on various inside and/or perimeter playing positions. The players who are able to play multiple offensive positions enable numerous successful play combinations and application of various offensive systems.

The criteria for the assessment of actual quality of water polo goalkeepers

1. Perimeter shot saving skill – the skill of a goalie to prevent an opponent from scoring from perimeter playing positions. A goalkeeper anticipates precisely the potential impact point between his/her arm or any other part of the body and the ball on the basis of: the opponent's movement and activities he/she has performed in shot preparation, on the way in which his/her teammates on defense react to the attacker's actions, on the shot angle, shot direction, height of the ball release and the goal-ball distance from which a shot is taken.

2. Wing's shot saving skill – the skill of a goalie to prevent the opponent from scoring from wing playing positions. Tactics of saving wing shots imply a good prediction of shot characteristics and selection of adequate save positions and reactions the aim of which is to cover as great area of the goal as possible and to close shot lanes by optimally using the body as passive defensive area. A goalie puts his/her entire body vertically on the expected trajectory of the thrown ball thus closing, blocking the shot lane.

3. Hole set's shot saving skill – the skill of a goalie to prevent the hole set from scoring. Tactics of saving hole set's shots is based on the anticipation of the opponent's realization and on timely (or even beforehand) jumping out towards him/her in order to minimize the open goal area, simultaneously taking into account possible difficulties, like deteriorated balance or any kind of impediment, induced by the hole set guard.

4. Close range shot saving skill – the skill of a goalie to prevent the opponent from scoring from the vicinity of the goal. The skill is based predominantly on the accentuated movement and/or jumping towards an attacker in order to minimize the goal area to save. Then a goalkeeper should apply beforehand intervention, most often to cover a part of the goal to which he/she assumes the throw will be directed. It is important that the center of gravity or the trunk is in the ball trajectory lane so that the body-passive save area covers the middle part of the goal and provides the shortest possible way to the impact point with the ball.

5. Penalty shot saving skill – the skill of a goalie to prevent the opponent from scoring by a penalty shot. A goalkeeper should position himself/herself slightly in front of his/her goal in order to minimize the area to save. At the chosen location he/she assumes accentuated basic stance while waiting for the referee's whistle. He/she targets his/her saving actions towards a part of the goal to which he/she assumes the penalty throw will be directed. By his/her resolute and aggressive attitude and motions he/she will try to seemingly dominate over the penalty realizer, space and situation, thus provoking insecurity of the thrower.

6. Defensive help – the ability of a goalkeeper to be helpful to a teammate on defense with no deterioration of his/her own defensive performance. This skill is here manifested mainly as quick, sudden movement to cover area around the opposing hole set. In such manner he/she cooperates with the defense guards to mark the hole set and to deny any pass reception. This sudden goalie's move should perplex the opponent passer who is thus forced to make a mistake because no teammate of his/hers is open to receive the safe pass.

7. Steal (regaining the ball possession) – the ability of a goalkeeper to perform an action the aim of which is to gain possession of the ball. Steal may be realized through one of the following ways: (1) a pass intercepted; (2) the dribbled ball won; (3) winning the held ball by batting it out of the opponent's hand; (4) winning the held ball by priory hitting the attacker's arm with the ball; (5) winning the ball by sinking the attacker's arm that controls it; (6) »nobody's« balls won; (7) winning the face-off (neutral throw) balls by swimming or jumping out of the water; (8) forcing the opponent's personal foul or game rule infringement.

Note: This criterion does not include saves after which the ball possession is gained.

8. Passing skill – the ability of a goalie to transfer the ball successfully to field players on attack. As soon as the ball possession has been (re)gained, a goalkeeper must position himself/herself so that he/she has a good overview of the playing area to perceive positioning, arrangement and gross movements of his/her teammates and of the opponents as well. Then he/she has to decide either to try to score by applying a direct lob shot, or to perform a pass to any of his/her teammates. When passing, he/she also has to choose either to perform an outlet pass to the best positioned, open teammate, who has good chances to execute a quick counterattack and score, or, if it is not possible because no teammate has gained space advantage over the opponent or if a long set, positional attack is tactically needed, a goalkeeper will execute a safe pass to the nearest teammate who will advance the ball further.

Positions of players in the water polo game

The proposed criteria describe and define quality of play in water polo for all phases of the game. They regard all the playing positions and respective roles as competition performance activities during the game. In water polo we recognize five basic playing positions and their respective roles. It is common to refer to the following playing positions: 1 – goalkeeper, 2 – wing, 3 – center forward, 4 – center defender, and 5 – outside[16].

Water polo experts

Persons regarded as water polo experts (ten) in this research were expert players and expert coaches from a team (either national or club) that had won:

1. A medal at the European or World Championships or at the Olympic Games;
2. The first or the second place in one of the European club competitions (Club Championship Cup/ Champions League, Cup Winners Cup, or Cup LEN);
3. The first or the second place in the National Championship.

Data acquisition and processing methods

Coefficients of importance by positions in the game for the particular items within the defined set of criteria for the actual quality or overall performance of water polo players on defense, offense and of a goalkeeper were determined by means of the AHP (Analytic Hierarchy Process) method for the multicriterial decision-making[7,17]. Application of the AHP method was executed through the following four steps:

1. Every water polo expert numerically evaluated importance of each criterion by comparing it with the other ones in pairs and registrating the relative importance for a particular position in the game (thus each criterion was compared to all others in a group belonging to a given player position). For example, if the criterion »A« is twice as important as the criterion »B«, then in the matrix of pair wise comparisons value 2 was assigned at the position AB, while ½ was assigned at the position BA. Thus each water polo expert produced a square reciprocal matrix of grades for each position in the game;
2. From each matrix the criterion importance coefficient was completed by employing the geometric mean method (GMM). In that way one vector of the coefficient of importance for each criterion was obtained from every judge and the matrix of coefficients of importance was formed for each playing position in the game;
3. Vectors of the arithmetic means and standard deviations of the importance coefficients for each position in the game were then computed from the obtained matrices (4 vectors for defense, 4 vectors for offense and 1 vector for a goalkeeper).
4. Vectors of the arithmetic means of the coefficients of importance were then rescaled in the manner that their sum equaled one.

The reliability of the established importance coefficients (weights) of the performance criteria for each playing position in the game was determined by computing: correlation means of experts' (RMS – rank means scores) agreement (interobservers' agreement) and Cronbach's reliability coefficient (α).

Results and Discussion

Table 1 present arithmetic means (AS) and standard deviations (SD) of grades, obtained from the 10 water polo expert coaches and players, for the relative importance of 6 defensive play criteria, 13 offensive performance evaluation criteria with regard to the particular positions in the game, and 8 criteria assessing goalkeeper's actual quality. Cronbach's measure of reliability, or objectivity (α), ranged from 0.93 to 0.96, and indicated a high degree of interobservers' agreement.

Tables 1 and 2 show that the importance of the actual quality evaluation criteria across the playing positions in the transitional and positional defense is rather similar for the position 1 – wing and the position 2 – outside player, whereas this similarity is far less pronounced for the positions 3 – center forward and 4 – center defender. The largest differences of the criteria importance occurred between wings and center defenders in the criteria level of defensive pressure and steals in favor of center defenders, and in the criterion transition defense efficiency in favor of wings. The displayed results (Tables 1 & 2) allow for the evaluation of defensive performance for each water polo player position.

Position 1 – wing – transition defense efficiency has high importance (AS 0,214), level of defensive pressure, defensive help, playing multiple positions on defense and blocking shots have medium importance (AS 0,178; AS 0,151; AS 0,179; AS 0,144), and steal (regaining the ball possession) has low to medium importance (AS 0,134). Based on the results obtained, it can be concluded that the main performance determinant of actual quality of players primarily playing position 1-wing is transition defense efficiency. Players on wings' positions realize their performance roles and tasks by playing in the first attack line, about 2–3 meters from the opponent goal.

TABLE 1
ARITHMETIC MEANS (AS), STANDARD DEVIATIONS (SD) THE RELATIVE IMPORTANCE COEFFICIENTS OF THE GRADES GIVEN BY TEN EXPERT JUDGES GAVE FOR THE RELATIVE IMPORTANCE OF 6 DEFENSIVE PERFORMANCE EVALUATION CRITERIA PER EACH POSITION IN THE GAME, AS WELL AS THE CORRELATION MEANS OF JUDGES (RMS) AND CRONBACH'S ALPHA (α)

Criteria	AS_1	SD_1	AS_2	SD_2	AS_3	SD_3	AS_4	SD_4
LDP	0.178	0.062	0.176	0.047	0.219	0.065	0.242	0.042
DH	0.151	0.031	0.167	0.032	0.182	0.050	0.133	0.041
S	0.134	0.066	0.167	0.078	0.140	0.064	0.210	0.075
TDE	0.214	0.066	0.154	0.055	0.171	0.056	0.145	0.051
PMPD	0.179	0.077	0.176	0.073	0.153	0.073	0.121	0.054
BS	0.144	0.065	0.160	0.045	0.136	0.046	0.150	0.041
RMS	0.615		0.633		0.682		0.710	
α	0.931		0.936		0.949		0.955	

LDP – level of defensive pressure, DH – defensive help, S – steal, TDE – transition defence efficiency, PMPD – playing multiple positions on defence, BS – blocking shots

TABLE 2
COMPARABLE SIMILARITIES AND DIFFERENCES BETWEEN THE RELATIVE IMPORTANCE COEFFICIENTS PER POSITIONS FOR THE DEFENSIVE PERFORMANCE EVALUTION CRITERIA OF PLAY

Criteria	Position 1 – wing	Position 2 – outside	Position 3 – center forward	Position 4 – center defender
LDP	Medium importance	Medium importance	High importance	Very high importance
DH	Medium importance	Medium importance	Medium to high importance	Low to medium importance
S	Low to medium importance	Medium importance	Low to medium importance	High importance
TDE	High importance	Medium importance	Medium importance	Medium importance
PMPD	Medium importance	Medium importance	Medium importance	Low to medium importance
BS	Medium importance	Medium importance	Low to medium importance	Medium importance

LDP – level of defensive pressure, DH – defensive help, S – steal, TDE – transition defence efficiency, PMPD – playing multiple positions on defence, BS – blocking shots
Legend: very high importance from 0.232, high importance from 0.206 to 0.231, medium to high importance from 0.180 to 0.205, medium importance from 0.144 to 0.179, low to medium importance from 0.118 to 0.143

Therefore, their prime task on defense is to anticipate the conclusion of their own collective attack and assume timely space advantage over the opponent in order to interfere with, or even to deny the development of the opponent's fast break actions.

Position 2 – outside – levels of defensive pressure, defensive help, steal (regaining the ball possessions), transition defense efficiency, playing multiple positions on defense and blocking shots have medium importance (AS 0,176; AS 0,167; AS 0,167; AS 0,154; AS 0,176; AS 0,160). The obtained medium importance of all the criteria for the assessment of performance on both the transition and positional defense indicates that the outside player is a universal, most versatile defensive player, meaning he/she must be able to perform well all tasks on defense.

Position 3 – center forward – the level of defensive pressure has high importance (AS 0,219), defensive help has medium to high importance (AS 0,182), transition defense efficiency and playing multiple positions on defense have medium importance (AS 0,171; AS 0,153), and blocking shots and steal (regaining the ball possessions) have low to medium importance (AS 0,136; AS 0,140). The results showed that the principal performance determinant of the players who primarily played position 3 – center forward was his/her successful and consistent high attention in maintain in his/her line of defense, as well as his/her help to a teammate. The center forward plays as a rule the most advanced post of defense. One of his/her tasks on both the transition and positional defense is to mark the opposing outside player who is usually a playmaker and the first ball distributor of the opposing positional attack. A modern center forward on defense also stands out for his/her ability to timely follow the drive through of offensive player. He/she also cuts out the passing lane to the opponent's center forward. The center defender also cooperates with his/her neighboring defensive players in defensive task performance.

Position 4 – center defender – the level of defensive pressure has very high importance (AS 0,242), steal (regaining the ball possessions) has high importance (AS 0,210), transition defense efficiency and blocking shot have medium importance (AS 0,145; AS 0,150), defensive help and playing multiple positions on defense have low to medium importance (AS 0,133; AS 0,121). The players playing position 4 – center defenders are the most responsible for the team aspect of defense, that is, for the control of the area in front of his/her goal, because they primarily mark the opposing center forward. Due to their position in the back defensive line, they are directors of their defense because they direct their teammates' play. It is manifested in their denying access to inside water to the opposing center, where he/she will have an open lane to receive the ball. All the described depicts high level of defense pressure on the center defender position. A good defensive pressure on the center forward usually results in successful steals of the balls passed to the center forward (the ball intercepted), then in forcing the opposing player to commit a personal foul or the game rule infringement, in winning the ball held priory hitting on the attacker's arm holding the ball, winning the ball by sinking the attacker's arm that controls it, and winning the ball by batting it out of the opponent's hand.

On the basis of the results obtained (Tables 3 & 4) it is possible to describe particular water polo types of players from the aspect of actual quality assessment criteria for performance on transition and positional offense.

Position 1 – wing – man-up wing position shooting skill has very high importance (AS 0,137), wing position shooting skill has high importance (AS 0,108), transition attack efficiency, man-up perimeter shooting skill and passing skill have medium to high importance (AS 0,093; AS 0,091; AS 0,088), playing multiple positions on attack, offense without the ball, perimeter shooting skill, ball handling and control and man-up close range shooting skill have low to medium importance (AS 0,065; AS 0,064; AS 0,072; AS 0,063; AS 0,062), forcing exclusion fouls, feinting (fake or balking) and close range shooting skill have low importance (AS 0,054; AS 0,053; AS 0,050). A wing must be a proficient scorer from his/her playing position in the player-up situations as well as in positional attack. He/she should also be characterized by or-

TABLE 3
ARITHMETIC MEANS (AS), STANDARD DEVIATIONS (SD) THE RELATIVE IMPORTANCE COEFFICIENTS OF THE GRADES GIVEN BY TEN EXPERT JUDGES FOR THE RELATIVE IMPORTANCE OF 13 OFFENSIVE PERFORMANCE EVALUATION CRITERIA PER EACH POSITION IN THE GAME, AS WELL AS THE CORRELATION MEANS OF JUDGES (RMS) AND CRONBACH'S ALPHA (α)

Criteria	AS_1	SD_1	AS_2	SD_2	AS_3	SD_3	AS_4	SD_4
BHC	0.063	0.033	0.063	0.033	0.092	0.026	0.065	0.034
PS	0.088	0.032	0.075	0.026	0.078	0.020	0.091	0.028
PSS	0.072	0.017	0.124	0.022	0.042	0.006	0.128	0.022
CRSS	0.050	0.011	0.050	0.021	0.128	0.018	0.065	0.028
WPSS	0.108	0.031	0.070	0.025	0.041	0.011	0.058	0.026
MUPSS	0.091	0.024	0.136	0.020	0.050	0.014	0.132	0.030
MUCRSS	0.062	0.022	0.062	0.024	0.111	0.018	0.081	0.032
MUWPSS	0.137	0.026	0.093	0.027	0.053	0.020	0.069	0.029
F	0.053	0.010	0.055	0.017	0.067	0.017	0.047	0.009
FEF	0.054	0.021	0.059	0.020	0.143	0.021	0.052	0.012
OWB	0.064	0.017	0.066	0.013	0.085	0.022	0.063	0.012
TAE	0.093	0.031	0.080	0.023	0.063	0.020	0.086	0.011
PMPA	0.065	0.018	0.066	0.020	0.048	0.011	0.063	0.014
RMS	0.615		0.633		0.682		0.710	
α	0.931		0.936		0.949		0.955	

BHC – ball handling and control, PS – passing skill, PSS – perimeter shooting skill, CRSS – close range shooting skill, WPSS – wing position shooting skill, MUPSS – man-up perimeter shooting skill, MUCRSS – man-up close range shooting skill, MUWPSS – man-up wing position shooting skill, F – feinting, FEF – forcing exclusion fouls, OWB – offense without the ball, TAE – transition attack efficiency, PMPA – playing multiple positions on attack

ganized and quick transformation ability from defense to offense in order to achieve space and/or numeral advantage. He/she must also be able to execute precise and timely passes to the open best positioned player. To sum up, the biggest responsibility of wings is to score from the wing positions and to perform good passes as well as to participate in fast breaks.

Position 2 – outside – the following variables: man-up perimeter shooting skill and perimeter shooting skill have very high importance (AS 0,136; AS 0,124), man-up wing position shooting skill has medium to high importance (AS 0,093), transition attack efficiency and passing skill have medium importance (AS 0,080; AS 0,075), playing multiple positions on attack, offense without the ball, wing position shooting skill, ball handling and control and man-up close range shooting skill have low to medium importance (AS 0,066; AS 0,066; AS 0,070; AS 0,63; AS 0,062), forcing exclusion fouls, feinting (fake or balking) and close range shooting skill have low importance (AS 0,059; AS 0,055; AS 0,050). The outside player is characterized by successful shooting performance (a good scorer) from perimeter and wing positions in player-up situations and from perimeter positions on positional attack with equal number of opposed players. Therefore, he/she is the principal scorer of his/her team. To be successful he/she must be skillful in opening him/herself for pass reception and open scoring chances.

Position 3 – center forward – close range shooting skill and forcing exclusion fouls have very high importance (AS 0,128; AS 0,143), man-up close range shooting skill has high importance (AS 0,111), ball handling and control has medium to high importance (AS 0,092), passing skill and offense without the ball have medium importance (AS 0,078; AS 0,085), feinting (fake or balking) and transition attack efficiency have low to medium importance (AS 0,067; AS 0,063), man-up wing shooting skill and man-up perimeter position shooting skill have low importance (AS 0,053; AS 0,050), and perimeter shooting skill, wing position shooting skill and playing multiple positions on attack have very low importance (AS 0,042; AS 0,041; AS 0,048). The role of a center forward on positional attack in water polo is considered the hardest playing role because the player must be powerful and yet skillful and quick to force penalty foul and thus winning the man-up situation (the opponent exclusion), and to close-range realization. His/her role is also to score from close range in the man-up situations. Due to the fact that the center forward receives ball under hard conditions with only a small space and time advantage, he/she must be an excellent ball handler, both on the move and in place. The center forward's role thus appears to be the most important on offense since he/she determines the whole team attack performance with his/her close-range scores and abilities to win man-up situations.

Position 4 – center defender – perimeter shooting skill and man-up perimeter shooting skill have very high importance (AS 0,128; AS 0,132), passing skill has medium to high importance (AS 0,091), man-up close range shooting skill and transition attack efficiency have medium

TABLE 4
COMPARABLE SIMILARITIES AND DIFFERENCES BETWEEN THE RELATIVE IMPORTANCE COEFFICIENTS PER POSITIONS FOR THE OFFENSIVE PERFORMANCE EVALUTION CRITERIA OF PLAY

Criteria	Position 1 – wing	Position 2 – outside	Position 3 – center forward	Position 4 – center defender
BHC	Low to medium importance	Low to medium importance	Medium to high importance	Low to medium importance
PS	Medium to high importance	Medium importance	Medium importance	Medium to high importance
PSS	Low to medium importance	Very high importance	Very low importance	Very high importance
CRSS	Low importance	Low importance	Very high importance	Low to medium importance
WPSS	High importance	Low to medium importance	Very low importance	Low importance
MUPSS	Medium to high importance	Very high importance	Low importance	Very high importance
MUCRSS	Low to medium importance	Low to medium importance	High importance	Medium importance
MUWPSS	Very high importance	Medium to high importance	Low importance	Low to medium importance
F	Low importance	Low importance	Low to medium importance	Very low importance
FEF	Low importance	Low importance	Very high importance	Low importance
OWB	Low to medium importance	Low to medium importance	Medium importance	Low to medium importance
TAE	Medium to high importance	Medium importance	Low to medium importance	Medium importance
PMPA	Low to medium importance	Low to medium importance	Very low importance	Low to medium importance

BHC – ball handling and control, PS – passing skill, PSS – perimeter shooting skill, CRSS – close range shooting skill, WPSS – wing position shooting skill, MUPSS – man-up perimeter shooting skill, MUCRSS – man-up close range shooting skill, MUWPSS – man-up wing position shooting skill, F – feinting, FEF – forcing exclusion fouls, OWB – offense without the ball, TAE – transition attack efficiency, PMPA – playing multiple positions on attack
Legend: very high importance from 0.114, high importance from 0.101 to 0.113, medium to high importance from 0.088 to 0.100, medium importance from 0.075 to 0.087, low to medium importance from 0.062 to 0.074, low importance from 0.049 to 0.061, very low importance less of 0.048

importance (AS 0,081; AS 0,086), ball handling and control, close range shooting skill, man-up wing position shooting skill, playing multiple positions on attack and offense without the ball have low to medium importance (AS 0,065; AS 0,065; AS 0,069; AS 0,063; AS 0,063), wing position shooting skill and forcing exclusion fouls have low importance (AS 0,058; AS 0,052), and feinting (fake or balking) has very low importance (AS 0,047). The center defender is characterized by high scoring perimeter performance in man-up situations and in positional attack with equal number of players. To sum-up, he/she is, together with the outside player, the principal perimeter scorer and must execute good passes to his/her teammates.

TABLE 5
ARITHMETIC MEANS (AS), STANDARD DEVIATIONS (SD), THE RELATIVE IMPORTANCE COEFFICIENTS OF THE GRADES GIVEN BY TEN EXPERT JUDGES FOR THE RELATIVE IMPORTANCE OF 8 EVALUATION CRITERIA FOR THE GOALKEEPER PERFORMANCE ASSESSMENT, AS WELL AS THE CORRELATION MEANS OF JUDGES (RMS) AND CRONBACH'S ALPHA (α). COMPARABLE SIMILARITIES AND DIFFERENCES BETWEEN THE RELATIVE IMPORTANCE COEFFICIENTS FOR THE GOALKEEPER PERFORMANCE EVALUTION CRITERIA OF PLAY

Criteria	AS_5	SD_5	Importance weight
PERSSS	0.222	0.038	Very high importance
WSSS	0.147	0.045	Medium to high importance
HSSSS	0.124	0.023	Medium importance
CRSSS	0.126	0.038	Medium importance
PENSSS	0.072	0.021	Very low importance
DH	0.101	0.026	Low to medium importance
S	0.087	0.020	Low importance
PS	0.121	0.038	Medium importance
RMS	0.704		
α	0.943		

PERSSS – perimeter shot save skills, WSSS – wing shot save skills, HSSSS – hole set's shot save skills, CRSSS close range shot save skills, PENSSS – penalty shot save skills, DH – defensive help, S – steals; PS – passing skills
Legend: very high importance from 0.166, medium to high importance from 0.132 to 0.148, medium importance from 0.115 to 0.131, low to medium importance from 0.098 to 0.114, low importance from 0.081 to 0.097, very low importance less of 0.080

In Table 5 the results are shown on the basis of which we can determine importance weights of individual criteria for the assessment of actual quality of water polo goalkeepers. Although the goalie is an integral part of the team, due to his/her specific play role and tasks we have decided to present the criteria for his/her performance separately. Perimeter shot save skills (AS 0,222) has very high important, wing shot save skills (AS 0,147) has medium to high important, hole set's shot save skills, close range shot save skills and passing skills (AS 0,124; AS 0,126; AS 0,121) have medium important, has low to medium important defensive help (AS 0,101) has low to medium important, steal (regaining the ball possession) has low important (AS 0,087), and penalty shot save skills (AS 0,072) has very low important. For a goalkeeper's overall performance, the most important actual quality determinant is his/her skill to save perimeter and wing shots. It is quite understandable since most shots are usually taken from these playing positions. The goalkeeper's efficiency is usually expressed as the ration between the number of shots saved and shots directed towards the goal.

Conclusions

The first step in establishing and evaluating the assessment criteria for the real competitive ability of the elite water polo players must be directed toward providing precise definitions. That was one of the aims of the presented study. The past attepmts to constuct the procedures for the objective assessment of the actual quality of players in team sports proved to be insufficient mainly because the objectively measurable indicators of situational efficiency of players that determine the actual player quality in team sports cannot be encompassed, and the date collection and their processing is very complex[8–12,19,20]. In one research[13] empirically tested the weighted system of criteria for evaluating the actual quality of basketball players was proposed by Trninic and Dizdar[18]. According to water polo experts opinion the proposed criteria from this paper describe and define play of water polo players in all game phases and concerns all playing positions (1 – wing, 2 – outside player, 3 – center forward, 4 – center defender, 5 – goalkeeper)[16]. The actual quality assessment criteria for water polo players implicitly embrace: their motor knowledge and skills, assessment of individual and team play, as well as responsibilities and tasks for each playing position and role on a team. The results revealed the high inter-observers' agreement of water polo experts about the importance of each and every criterion for actual quality assessment of all types of water polo players. Based on the established importance weights of the criteria we gave theoretically described basic characteristics according to water polo experts' opinion, crucial for top-level performance, of these water polo players' types. So, for the wing we can say he/she is the best scorer from the wing positions. His/her play on attack is determined by his/her passing skills as well as by his/her ability to perform all tasks on transition defense and offense. The outside player must be a versatile defense player who is able to perform well in all defensive tasks, whereas on offense he/she is primarily responsible for perimeter scoring. The center forward has a very important role on attack because the overall performance of his/her team mostly depends on his/her success in realization and in forcing opponent's heavy personal fouls resulting in exclusions of the defenders. From the aspect of defense, the center forward must be successful in helping to his/her teammate on defense and in maintaining defensive pressure. The center defender must be the best defensive player which should be obvious in high level of defensive pressure and steals, whereas on attack this player is a playmaker and successful scorer from perimeter. It is obvious that the criterion level of defensive pressure is an above average important for all playing positions in water polo. The goalkeeper is expected to be successful primarily in saving perimeter and wing shots. The assessment of actual quality of water polo players based on performance in competition gives an opportunity for economic, rational and organized selection of team and players, for the selection of adequate play concept, and for designing integrated training programs primarily aimed at, developing top-level water polo players. We belive that the system of the performance evaluation criteria weighted per positions in the water polo game proposed in this paper could empirically be tested in further researches and could represent the instrument for evaluation of the elite water polo players actual quality.

REFERENCES

1. ELBELL ER, ALLEN F, Res Q Exercise Sport, 12 (1941) 538. — 2. SWALGIN K, The Basketball Evaluation System: a Scientific Approach to Player Evaluation. In: KRAUSSE J (Ed) Coaching Basketball (Master Press, Indianapolis, 1994). — 3. SWALGIN K, Kinesiology, 30 (1998) 31. — 4. GREHAIGNE JF, GODBOUT P, Quest, 47 (1995) 490. — 5. GREHAIGNE JF, BOUTHIER D, GODBOUT P, J Teach Phys Educ, 16 (1997) 500. — 6. TRNINIĆ S, PERICA A, DIZDAR D, Coll Antropol, 23 (1999) 707. — 7. DIZDAR D, Evaluation of various methods for assessing actual quality of basketball players. PhD thesis. In Croat (University of Zagreb, Faculty of Kinesiology, Zagreb, 2002). — 8. TAKAGI H, NISHIJIMA T, ENOMOTO I, STEWART AM, J Hum Movenent Stud, 49 (2005) 333. — 9. GUSIĆ Ž, LOZOVINA V, LOZOVINA M, Naše More 5–6 (2006) 251. — 10. PLATANOU T, J Hum Movenent Stud, 46 (2004) 319. — 11. DOPSAJ M, MATKOVIĆ I, The structure of tehnical and tactical activities of water polo players in the first yugoslav league during the game. In: Proceedings (Biomechanics and medicine in swimming VIII, Jyvaskula, 1999). — 12. SMITH HK, Sports Med, 26 (1998) 317. — 13. TRNINIĆ S, DIZDAR D, DEŽMAN B, Coll Antropol, 24 (2000) 443. — 14. LOZOVINA V, Influence of morphological characteristics and certain swimming motor abilities on performance in water polo. PhD thesis. In Croat (University of Zagreb, Faculty of Kinesiology, Zagreb, 1983). — 15. ŠIMENC Z, Kineziologija, 25 (1993) 99. — 16. ŠIMENC Z, VULETA D, DIZDAR D, KURJAKOVIĆ K, Structural analysis of playing positions in water polo based on the assessment of certain anthropological characteristics. In Proceedings (2nd International Scientific Conference of Kinesiology, 1999). — 17. SAATY TL, VARGAS LG, The Analytic Hierarchy Process.

(Kluwer, Pittsburg, London, 1996). — 18. TRNINIĆ S, DIZDAR D, Coll Antropol, 24 (2000) 217. — 19. TRNINIĆ S, VISKIĆ-ŠTALEC N, ŠTALEC J, DIZDAR D, BIRKIĆ Z, Kineziologija, 27 (1995) 27. — 20. DIZDAR D, TRNINIĆ S, MILANOVIĆ D, Kinesiology, 29 (1997) 49.

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PONDERIRANI SUSTAV KRITERIJA ZA PROCJENU STVARNE KVALITETE VATERPOLISTA PO POZICIJAMA U VATERPOLU NA TEMELJU EKSPERTNOG MIŠLJENJA

S A Ž E T A K

Cilj ovog istraživanja je definirati na temelju ekspertnog mišljenja adekvatne kriterije za procjenu stvarne kvalitete vaterpolista i utvrditi koeficijente važnosti (pondere) za definirane kriterije prema pozicijama u vaterpolskoj igri. Na temelju ekspertne procjene deset eminentnih vaterpolskih stručnjaka, utvrđeni su koeficijenti važnosti predloženih dvadeset i sedam kriterija za procjenu situacijske uspješnosti (stvarne kvalitete) u procjeni važnosti kriterija na svim pozicijama u vaterpolu. Eksperti su pokazali visok stupanj slaganja (od 0,93 do 0,96) u procjeni važnosti kriterija u svim pozicijama u vaterpolu. U skladu s dobivenim rezultatima eksplicitno su opisane pojedine pozicije u igri, kao i sličnosti i razlike između njih s aspekta važnosti pojedinih kriterija. Dobiveni rezultati mogu značajno pomoći vaterpolskim stručnjacima u selekciji i praćenju igrača tijekom provedbe trenažnog programa, u programiranju i kontroli treninga, te u vrednovanju trenažnih učinaka.