

2012

Proposal of an Observation Sheet for Basketball Players' Performance Assessment

Andrzej Szwarc

Gdansk University of Physical Education and Sport in Gdansk, Poland, andrzej.szwarc@awf.gda.pl

Izabela Lekner

Gdansk University of Physical Education and Sport in Gdansk, Poland

Follow this and additional works at: <https://www.balticsportscience.com/journal>



Part of the [Health and Physical Education Commons](#), [Sports Medicine Commons](#), [Sports Sciences Commons](#), and the [Sports Studies Commons](#)

Recommended Citation

Szwarc A, Lekner I. Proposal of an Observation Sheet for Basketball Players' Performance Assessment. *Balt J Health Phys Act.* 2012; 4(4): 258-276. doi: 10.2478/v10131-012-0026-8

This Article is brought to you for free and open access by Baltic Journal of Health and Physical Activity. It has been accepted for inclusion in Baltic Journal of Health and Physical Activity by an authorized editor of Baltic Journal of Health and Physical Activity.

Proposal of an Observation Sheet for Basketball Players' Performance Assessment

Abstract

Background: The aim of this study was to develop a research tool used for an assessment of basketball players' performance. **Material/Methods:** First, research of the subject literature was made and a preliminary outline of an assessment sheet for basketball players was developed. Next, after causing test observation, the final model of the observation sheet was prepared, and its reliability was evaluated. To measure the inter-observer agreement three experts independently viewed the same game, where they had to assess different components of game performance using the newly developed instrument. The inter- and intra-observer agreement was calculated by means of the kappa-values. **Results:** In their study, the experienced observers exhibited 98% of intra-observer reliability. For inter-observer reliability three inexperienced observers registered relatively low (3%) and high (1%) levels of observational errors. **Conclusions:** An observation sheet for basketball players' performance assessment (Basketball Performance Assessment Instrument – BPAI) meets scientific requirements.

Keywords

basketball, observation sheet, validity and reliability, verification

Creative Commons License



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivative Works 4.0 License](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Proposal of an Observation Sheet for Basketball Players' Performance Assessment

Andrzej Szwarc^(A, B, C, D, E, F), Izabela Lekner^(A, B, C, D, E, F)

Gdansk University of Physical Education and Sport in Gdansk, Poland

Key words: *basketball, observation sheet, validity and reliability, verification*

Authors' Contribution:
 A – Study Design
 B – Data Collection
 C – Statistical Analysis
 D – Data Interpretation
 E – Manuscript Preparation
 F – Literature Search
 G – Funds Collection

Abstract

Background: *The aim of this study was to develop a research tool used for an assessment of basketball players' performance.*

Material/Methods: *First, research of the subject literature was made and a preliminary outline of an assessment sheet for basketball players was developed. Next, after causing test observation, the final model of the observation sheet was prepared, and its reliability was evaluated. To measure the inter-observer agreement three experts independently viewed the same game, where they had to assess different components of game performance using the newly developed instrument. The inter- and intra-observer agreement was calculated by means of the kappa-values.*

Results: *In their study, the experienced observers exhibited 98% of intra-observer reliability. For inter-observer reliability three inexperienced observers registered relatively low (3%) and high (1%) levels of observational errors.*

Conclusions: *An observation sheet for basketball players' performance assessment (Basketball Performance Assessment Instrument – BPAI) meets scientific requirements.*

Word count: 9 076

Tables: 11

Figures: 2

References: 34

Received: September 2012

Accepted: November 2012

Published: December 2012

Corresponding author:

Prof. nadzw. dr hab. Andrzej Szwarc
 Gdansk University of Physical Education and Sport, Chair of Sports Games
 80-336 Gdańsk, Poland, ul. K. Górskiego 1
 Phone: +4858 554-71-88
 E-mail: szwarc@awf.gda.pl

Introduction

A correct assessment of performance of team sports players causes many problems, since one cannot directly interfere in the course of the game and in its participants' behaviors. Thus experiments are impossible, and testing in simulated conditions of the real game proves useless, because competitors' actions in match situations are often diverse from behaviors revealed in conditions of simulated performance. *Ex post facto* procedures, i.e. observations of a real game, are those that remain [1].

Observation of players, as an authoritative way of their performance assessment, must meet the conditions of objectivity, reliability and accuracy. It should be conducted systematically and in conditions of competition with an opponent of a similar sports level, because only then is it possible to draw conclusions concerning the effectiveness of the players' game.

An analysis of competing, based on observation meeting these criteria, constitutes the basis of creating training programs, and more precisely, of giving competitors specific assignments insofar as their knowledge and playing skills. Thus a key to recognizing the players' potential lies in observation of the game, and its systematic conduct is a condition for effective steering of the training.

Activity, effectiveness and reliability of action are the most significant advantages of a player's skillful action. The additional ones are rationality as well as the value and economy of action [2, 3].

Activities whose result is in accordance with the aim of action are regarded as efficient ones. It should be added that not every effective action must be simultaneously efficient. Effectiveness refers to achieving a positive result as such, e.g. we recognize passing a ball as effective when a player was going to pass the ball to one partner, and it, deflected from a defensive player, hit another teammate. The action was inefficient (the intended purpose was not achieved), but it was effective. The relationship between effective and efficient actions and all actions taken by a competitor is considered as a measure of reliability.

On the other hand, activity is understood, in general, as the sum of all actions taken by a player and, in particular, as the ability to take specific actions, e.g. shooting, passing, stealing the ball, etc.

Moreover, secondary fitness criteria are mentioned, i.e. a rationality (compliance of action with the theoretical base - knowledge of rules of the game, one's own, partners', opponents', etc. potential), economy (in relation to sports rivalry in a broader sense) and value (estimating benefits from actions in view of realizing aims of the game).

Observation sheets are a research tool applied during both direct observation and when made from an audio-visual recording. In observation sheets one should register the number and the type of actions appearing in the game (relatively and absolutely dependent on partners' behaviors) and their result in the context of aims accomplished by a player. Thanks to such proceedings, it becomes possible to create models reflecting the efficiency of performance of both the competitor and the team.

Models contribute to rationalizing actions in the game by relating these actions to their cognitively objectified models in order to increase the efficiency of action in the game by copying the performance of actions recognized as efficient and to economize players' actions by limiting the use of inefficient actions [2].

Action in a game "is a series of conscious behaviors of a player consisting in the choice of aims and ways of their realization suitable for the situation. Aims of the game, understood as tasks assigned to the competitor, are part of the collectively accomplished team purpose" [4, p. 19]. In a basketball game the following tasks are distinguished aims of the game pursued by competitors in a situation of ball possession [2]:

- for a player with the ball: score points, create a situation to score them for yourself or for the partner, gain the play field with the ball, keep the ball in the game;
- for a player without the ball: enable the partner with the ball to cooperate, facilitate partners' actions.

In a situation of ball possession by the opposing team, there are following tasks:

- for the player acting against the competitor with the ball: take away the ball, stop moving the ball by an opponent, disturb the rival in moving the ball;

- for the player acting against a competitor without the ball: prevent cooperation with the partner with the ball, disturb actions of a rival without the ball.

For over 50 years there have been attempts to develop an authoritative method of assessment of basketball players' game. Many authors dealt with this issue both in Poland [5-21] and in other countries [22-33]. Due to the development of the discipline and changes in rules of the game, many of these ways of assessment of the players' game have been modified and improved, but they are all linked by authors' aspiration to present an overall evaluation of the sports fight in the form of mathematical formulas.

Considering the fact that "players' cooperation in view of aims of a sports fight, and their game efficiency depends on the level of organizing the team's action" [2, p. 47] is a basic feature of a team game, then an assessment of the game by means of even most excellent models does not seem accurate. Moreover, the ways of assessment proposed by researchers focus on quantifying actions without taking into account their efficiency in the aspect of accomplished purposes of the game.

Hence the aim of this study was to develop a research tool used for an assessment of basketball players' performance on the basis of praxeological theoretical interpretation, taking into account estimating the player's efficiency from the point of view of accomplished aims of the game and situational determinants of competition.

Methods

The Methodology of Constructing an Observation Sheet

The study was conducted in a few stages. In the first one, a research tool was chosen and validated. First, research of the subject literature was made, and then, using also one's own player's and coaching experience, a preliminary outline of an assessment sheet for basketball players was developed (observation sheets created by Szwarc [3] for the needs of football were modified, and the praxeological structure of a model of a sports game, drawn up by Panfil [2], was used).

Next, observation of the game of Greek basketball players in the match for the third place with the representation of Slovenia during the European Championships in 2009 was made. An audio-visual recording of the game was followed by means of the "freeze-frame" function; details about individual competitors' performance were recorded on the created observation sheet. Activity, efficiency and reliability of particular offensive and defensive actions aiming at realization of purposes of the game were assessed. In offence, the efficiency of actions aimed at scoring points, creating a situation to score them, preparing a situation to score points (positioning the game) and gaining the play field with the ball were estimated, whereas in defense the efficiency of counteracting against: scoring points, creating situations to score them, preparing situations to score points (positioning the game) and gaining the play field with reference to the assigned aims of the game, places of action and the passing time of the game.

In the next stage of the study, after implementing necessary corrections, the final model of the observation sheet was prepared, and evaluation of reliability and accuracy of so formulated a research tool began.

In order to evaluate reliability, an analysis of the efficiency of action of basketball players from the Lithuanian national team in the match for the third place against Serbia during the 2010 World Championships was carried out twice (with an interval of one month, in identical conditions and by the same observer). The percentage of accurate readings concerning the activity of all offensive actions altogether amounted to 98%, in the case of defensive ones to 98.2%, whereas of all actions performed effectively: 98.87% and 98.5%, respectively. Detailed results concerning the evaluation of reliability of particular offensive and defensive actions are presented in Tables 1 and 2.

Tab. 1. Results of the evaluation of reliability of offensive actions

OFFENSIVE ACTIONS				I vs II	
Actions gaining the play field with a ball	Term I	A	71	97.26%	A
		E	69		
	Term II	A	73	97.18%	E
		E	71		
Actions preparing a situation to score points	Term I	A	113	97.34%	A
		E	107		
	Term II	A	110	97.19%	E
		E	104		
Actions creating a situation to score points	Term I	A	71	97.18%	A
		E	65		
	Term II	A	69	96.92%	E
		E	63		
Actions scoring points	Term I	A	57	96.49%	A
		E	26		
	Term II	A	55	100%	E
		E	26		
Total offensive actions	Term I	A	312	98%	A
		E	267		
	Term II	A	307	98.87%	E
		E	264		

A- activity, E – effectiveness

Tab. 2. Results of the evaluation of reliability of defensive actions

DEFENSIVE ACTIONS				I vs II	
Actions against gaining the play field with the ball	Term I	A	12	100%	A
		E	12		
	Term II	A	12	100%	E
		E	12		
Actions against preparing a situations to score points	Term I	A	77	97.46%	A
		E	65		
	Term II	A	79	97.01%	E
		E	67		
Actions against creating a situations to score points	Term I	A	69	97.18%	A
		E	14		
	Term II	A	71	100%	E
		E	14		
Actions against scoring points	Term I	A	61	96.82%	A
		E	40		
	Term II	A	63	97.56%	E
		E	41		
Total defensive actions	Term I	A	219	98.2%	A
		E	223		
	Term II	A	132	98.5%	E
		E	134		

A- activity, E – effectiveness

To evaluate the accuracy of the studied tool, a method of independent judge-experts was used. Three coaches of the first basketball class were asked to make independently of one another an assessment of Lithuanian players' actions in the match against Serbia during the 2010 World Championships. Before the study, judge-experts were instructed, the defined actions were explained to them, and situations of the game in which they appear were discussed.

The conformity of assessing the activity of all offensive and defensive actions detailed in the observation sheet by particular experts amounted to: experts 1vs2 – 97.57%, 1vs3 – 98.67%, 2vs3 – 98.87%, whereas of all effective actions: 97.02%, 98.24% and 98.75%, respectively (Table 3).

Tab. 3. Expert assessment of offensive and defensive actions

TYPES OF ACTIONS	EXPERTS		I vs II	I vs III	II vs III		
Offensive actions	Expert I	A	303	97.42%	98.69%	98.71%	A
		E	260				
	Expert II	A	311	97.01%	98.11%	98.88%	E
		E	268				
	Expert III	A	307	97.76%	98.64%	99.10%	A
		E	265				
Defensive actions	Expert I	A	219	97.03%	98.49%	98.51%	E
		E	131				
	Expert II	A	224	97.57%	98.67%	98.87%	A
		E	135				
	Expert III	A	222	97.02%	98.24%	98.75%	E
		E	133				
Offensive and defensive actions	Expert I	A	522	97.57%	98.67%	98.87%	A
		E	391				
	Expert II	A	535	97.02%	98.24%	98.75%	E
		E	403				
	Expert III	A	529	97.02%	98.24%	98.75%	E
		E	398				

A- activity, E – effectiveness

Description of the Observation Sheet for Basketball Players' Performance Assessment

The observation sheet was constructed in such a way that it considers aims of the game, ways and types of action of competitors playing on particular positions as well as the time, place and result of taken actions. Activities (frequency of actions) and their result (efficiency of actions) in a specific period of the match (quarter) is recorded on the sheet. On this basis a reliability of action is calculated, which is a quotient of efficient and effective actions for all actions of a given type (efficient, inefficient and counter-efficient).

Basketball players on particular offensive positions take actions aiming at: scoring points, creating situations to score them, preparing situations to score points (so-called actions positioning the game – gaining the play field with the ball and keeping the ball), gaining the play field with the ball (taking the ball into the frontcourt). In defense these are actions against: scoring points, creating situations to score them, preparing situations to score points (gaining the play field with the ball and keeping the ball), gaining the play field with the ball (counteracting against taking the ball to the frontcourt). These aims are attained in a way relatively (individual action) or absolutely (cooperation) dependent on partners' actions. In the proposed observations sheets such a distinction is highlighted (Tables 4-11).

The following actions defined by Szwarc [3], which are relatively dependent on partners' actions performed in a 1x1 game situation, have been modified for the purposes of basketball:

a) **gaining the play field with the ball** – action of a player with the ball against a rival being within the so-called reach of play (the opponent is directly opposite a player with the ball one or two steps away – [34]), as a result of which the competitor moves with the ball towards the opponents' basket from the backcourt to the frontcourt;

b) **preparing a situation to score points** (so-called positioning the game) – action of a player with the ball in the frontcourt against a rival within reach of play as a result of which the competitor gains the play field and/or keeps the ball in order to enable creating situations to score a point or passing the ball to enable a partner to create a situation to score a point;

c) **creating a situation to score points** – action of a player with the ball against a rival within reach of play as a result of which the competitor gains a possibility of shooting;

d) **scoring points** – action of a player with the ball against a rival within reach of play whose aim is to shoot or to gain temporary freedom to do it;

e) **counteracting against gaining the play field with the ball** – action of a player without the ball within reach of play of a rival with the ball (aspiring to gain the play field) as a result of which the competitor gains control of the ball and proceeds to offensive actions (stealing from the dribbler, talking away the ball, ball possession gained, forcing an offensive foul (charge), forcing an opponent's violation), stops an opponent's action (putting the ball, holding the ball) or hinders the ball moving (pushing the dribbler towards sidelines);

f) **counteracting against preparing a situation to score points** (positioning the game) – action of a player without the ball, being within reach of play of a rival with the ball (gaining play fields and/or keeping the ball to gain an opportunity to create situations to score a point), as a result of which the competitor gains control of the ball and proceeds to offensive actions, stops an opponent's action or hinders the ball moving (counteracting actions of an opponent with the ball: with the back towards the basket and who is facing the basket, rebound after an opponents' shot);

g) **counteracting against creating situations to score points** – action of a player without the ball, being within reach of play of a rival with the ball (aspiring to create a situation to score points) as a result of which the competitor gains control of the ball and proceeds to offensive actions, stops an opponent's action or hinders the ball moving (counteracting actions of an opponent with the ball: who is facing the basket and with the back towards the basket, rebound after an opponents' shot);

h) **counteracting against scoring points** – action of a player without the ball, being within reach of play of a rival with the ball (aspiring to score points), as a result of which the competitor gains possession of the ball and proceeds to offensive actions (gaining control of the ball after blocking the shot, forcing an opponent's violation), stops an opponent's action (putting the ball out-of-bounds after a block) or by aggressive on ball coverage forces the rival to throw from an inconvenient position (forcing an ineffective shot).

In particular, actions relatively dependent on partners' behaviors which enable a competitor to achieve offensive aims of the game comprise the following individual actions with a ball:

1) Actions gaining the play field with a ball:

a) dribbling the ball in order to move from the backcourt to the frontcourt by a player with the ball (with or without the opponent) with a use of: fakes before and while dribbling, pivots with the ball to change the direction of dribbling and to pass an opponent, changes in the pace of dribbling.

2) Actions preparing a situation to score points and creating a situation to score them:

a) offensive actions with the ball while facing the basket – they consist in moving of a player with the ball in the frontcourt towards the basket with or without an opponent in order to score points or to prepare situations to score them with a use of manners of action indicated in point 1a,

b) offensive actions with the ball with the back towards the basket – they consist in moving of a player with the ball who is positioned with the back towards the basket in the direction of the basket with or without an opponent in order to score points or to prepare situations to score them with a use of manners of action indicated in point 1a,

c) rebound after a shot for a field goal, after a free throw, after an unsuccessful tap – it consists in gaining control of the ball by an offensive player after an unsuccessful shot at the basket (one's own or partner's one).

3) Actions scoring points:

a) jumpshot (from a place, after moving into position, after dribbling),

b) running shot (after a pass, after dribbling),

c) back-up shot preceded by fakes and pivots,

d) tap – hitting or pushing the ball with a hand (hands) into the opponents' basket.

Individual actions relatively dependent on partners' behaviors which enable a competitor to achieve defensive aims of the game comprise the following individual counteractions:

1) Counteracting against gaining the play field with a ball:

a) winning the ball:

- gaining control of the ball (stealing from the dribbler, taking away the ball, ball possession gained),
- taking a legal guarding position in an offensive player's way – forcing an offensive foul (charge) [34],
- forcing an opponent's violation (travelling, double dribble, carrying the ball, crossing the line, 5 or 8 seconds) [34],

b) interrupting action:

- putting the ball out-of-bounds,
- holding the ball – takes place when one player (or more) from each of the opposed teams holds hands on the ball in such a way that none of them can gain its control [34],

c) hindering the ball movement:

- pushing the dribbler towards sidelines – a defensive player takes a legal guarding position, next moves in order to guard his opponent pushing him to the sideline of the court within rules of the game (he is not allowed to extend arms, protrude shoulders, hips or legs in order to prevent the dribbler from passing him).

2) Counteracting the preparation of a situation to score points or creating a situation to score them:

a) counteracting actions of an opponent with the ball who is facing the basket – a defensive player takes a legal guarding position, next moves along with a player with the ball to gain control of the ball, tap it or hinder its movement – defense on the dribbler [34],

b) counteracting actions of an opponent with the ball with the back towards the basket – a defensive player takes a legal guarding position, next moves along with a player with the ball positioned with the back towards the basket within the restricted area or on its borderline to gain control of the ball, tap it or hinder its movement – defense on the dribbler [34],

c) rebound after a shot for a field goal, after a free throw, after an opponent's unsuccessful tap (gaining control of the ball after an unsuccessful shot at the basket with or without screening the opponent).

3) Counteracting against scoring points:

a) winning the ball – gaining control of the ball after blocking the shot, forcing the shooter's violation (travelling, 5 or 24 seconds);

b) interrupting action – putting the ball out-of-bounds after a block,

c) forcing an ineffective shot (aggressive guarding of the shooter) – a defensive player takes a legal guarding position, disturbs the opponent in a shot at the basket, among others, by raising arms above the head, vertical jumps, and in consequence forces the opponent to shoot from an inconvenient position.

The following actions performed in conditions of cooperation and absolutely dependent on partners' behaviors have been defined:

a) **gaining the play field with the ball** – passing the ball among offensive players to possess it in a situation of counteracting or discontinuing this action by an opponent/opponents (playing the ball with passes with or without dribbling) as a result of which the ball is transferred from the backcourt to the frontcourt;

b) **preparing a situation to score points (positioning the game)** – cooperation between two offensive players (offensive actions: without the ball and without screens, with the ball while facing the basket and passing the ball, with the ball with the back to the basket and passing the ball, two-on-two (2x2) with the pick and roll) or between three or more offensive players (offensive actions without the ball with screens, playing the ball with passes) in a situation of counteracting or discontinuing this action by an opponent/opponents, as a result of which, by gaining the play field and/or possessing the ball (positioning of the game), competitors aspire to create a situation to score points or to pass the ball to enable a partner to create a situation to score a point;

- c) **creating a situation to score points** – cooperation between two offensive players (offensive actions: without the ball and without screens, with the ball while facing the basket and passing the ball, with the ball with the back to the basket and passing the ball, two-on-two (2x2) with the pick and roll) or between three or more offensive players (offensive actions without the ball with screens, playing the ball with passes) in a situation of an opponent's counteracting or in a situation when the opponent is not within reach of play, as a result of which the competitor gains a possibility to shoot;
- d) **counteracting against gaining the play field with the ball** – actions of players without the ball, being within reach of play of the rival with the ball (trying to gain the play field), as a result of which competitors prevent the opponent from effectively gaining the play field (doubling) or hinder transferring of the ball from the frontcourt to the backcourt (switching defense, "help and recover");
- e) **counteracting against preparing a situation to score points (positioning the game)** – cooperation between two players without the ball (cooperation of two players against an offensive opponent: playing without the ball and without screens, with the ball playing with the face and the back to the basket and passing the ball to a partner, cooperation in a two-on-two situation (2x2) with the pick and roll) or between three or more players without the ball (cooperation of three players against an opponent playing without the ball and with a screen, cooperation of three or more players against playing the ball with passes) being within reach of play of the rival with the ball (trying to create a situation to score a point by positioning the game), as a result of which competitors make it impossible to pass the ball to the competitor who can create a situation to score points or who can pass the ball thus enabling a partner to create a situation to score a point;
- f) **counteracting against creating situations to score points** – cooperation between two players without the ball (cooperation of two players against an offensive opponent: playing without the ball and without screens, with the ball playing with the face and the back to the basket and passing the ball to a partner, cooperation in a two-on-two situation (2x2) with the pick and roll) or between three or more players without the ball (cooperation of three players against an opponent playing without the ball and with a screen, cooperation of three or more players against playing the ball with passes) being within reach of play of the rival with the ball (trying to create a situation to score a point), as a result of which competitors make it impossible to pass the ball to the competitor who is in a situation that makes it possible to score a point;
- g) **counteracting against scoring points** – cooperation of players without the ball, being within reach of play of the rival with the ball (trying to score points), as a result of which competitors make it impossible for the opponent to shoot effectively (doubling, tripling).

In cooperation the following actions absolutely dependent on partners' behaviors (with and without the ball) have been indicated:

- 1) Actions gaining the play field with the ball:
 - a) playing the ball with passes with or without dribbling – passing the ball among offensive players without dribbling or passing combined with dribbling in order to transfer the ball from the backcourt to the frontcourt.
- 2) Actions preparing a situation to score points and creating a situation to score them:
 - a) offensive actions without the ball and without screens – they consist in a competitor's getting free from a defensive player through maneuvers of spiking, running around, walking away and moving into position in order to receive the ball; as a result, the competitor gains a possibility of shooting or passing the ball to a partner enabling him to shoot (creating a situation) or to further position the game (preparing a situation),
 - b) offensive actions without the ball with screens – they consist in a competitor's getting free from a defensive player thanks to screening a partner/partners, moving into position and receiving the ball from a partner; as a result, the competitor gains a possibility of shooting or passing the ball to a partner enabling him to shoot (creating a situation) or to further position offensive game (preparing a situation),

- c) offensive actions with the ball while facing the basket and passing the ball – they consist in moving of the competitor with the ball in the frontcourt towards the basket (the restricted area) and, in a situation of an opponent's counteracting (after "drawing a defensive player on oneself"), passing to a free partner so that he scores points (creating a situation) or prepares a situation to score them,
- d) offensive actions with the ball with the back to the basket and passing the ball – they consist moving of a player with the ball positioned with his back to the basket within the restricted area or on its borderline and, in a situation of an opponent's counteracting (after "drawing a defensive player on oneself"), passing to a partner so that he scores points (creating a situation) or prepares a situation to score them,
- e) offensive actions two-on-two (2x2) with the pick and roll – a shared action of a player with the ball and a player without the ball who performs the pick and roll, i.e. positions himself at his partner's defensive player in order to block the opponent's action; as a result, the competitor with the ball gains an opportunity to shoot or to pass the ball to partners (the one doing the pick and roll or another partner in a favorable position to shoot) thus enabling them to shoot (creating a situation) or to position offensive game (preparing a situation),
- f) playing the ball with passes - passing the ball among offensive players, as a result of which a competitor gains a possibility to shoot (creating a situation) or to position the game (preparing a situation).

Amongst group defensive actions, absolutely dependent on partners' behaviors the following counteractions have been distinguished:

- 1) Counteracting against gaining the play field with the ball:
 - a) doubling (simultaneous or consequent) – actions of two defensive players taken in order to take away the ball from an opponent, force him to commit a violation or delay his offensive actions,
 - b) creating a temporary advantage in defense – assistance in partner's actions (running up to a player with the ball who has passed a defensive player until the partner's return to his position, and then return to one's own on-ball defense – the so-called "help and recover"),
 - c) switching defense – actions of two or more defensive players who replace each other in guarding offensive players.
- 2) Counteracting the preparation of a situation to score points and creation of a situation to score them:
 - a) cooperation of two players against an opponent with the ball playing with the face to the basket and passing the ball to a partner, when one of the defensive players guards the dribbler, makes it difficult for him to move into the restricted area, and the other one simultaneously assists his actions ("help and recover") and guards a player without the ball to hinder passing the ball to him that would enable him to shoot (creating a situation) or to further position the game (preparing a situation),
 - b) cooperation of two players against an opponent with the ball playing with the back to the basket and passing the ball to a partner, when one of the defensive players guards the player positioned with the back towards the basket within the restricted area or on its borderline, makes it difficult for him to drive to basket, and the other one simultaneously assists his actions ("help and recover") and guards a player without the ball to hinder passing the ball to him that would enable him to shoot (creating a situation) or to further position the game (preparing a situation),
 - c) cooperation of two players against an offensive opponent playing without the ball and without screens when one of the defensive players prevents the opponent without the ball from moving into position (he guards the player without the ball), and the other one disturbs the opponent with the ball in passing to a partner who is moving into position that would enable him to shoot (creating a situation) or to further position the game (preparing a situation),

- d) cooperation of three players against an opponent playing without the ball and with a screen when two defensive players cooperate against the opponent's screen ("help and recover," switching defense) to prevent the player without the ball from moving into position, and the third defensive player disturbs the opponent with the ball in passing to a partner who is moving into position that would enable him to shoot (creating a situation) or to further position the game (preparing a situation),
 - e) cooperation in a two-on-two situation (2x2) with the pick and roll – two defensive players cooperate against the opponent's screen ("help and recover," switching defense) to prevent the player without the ball from gaining an opportunity to shoot (creating a situation) or to pass the ball to partners (the screening one or another one) that would enable them to shoot (creating a situation) or to further position the game (preparing a situation),
 - f) cooperation of two or more players against playing the ball with passes (gaining control of the ball, interrupting actions or disturbing the ball moving) to make it impossible for the player with the ball to gain an opportunity to shoot (creating a situation) or to position the game (preparing a situation).
- 3) Counteracting against scoring points:
- a) doubling or tripling (simultaneous or consequent) – cooperation of two or three players against a shooter.

In team sports games players' actions are of a distributive character. Each players is entrusted with distinct functions and tasks to perform to achieve a common purpose. Primary functions are commissioned to these players who contribute to the realization of the purpose of the game to the greatest degree and the secondary ones to those players who support their actions. Thus competitors fill different positions in the game which result from the imposed functions and which are also determined by their individual predispositions. Using the suggested by Trninić and Dizdar [27] characterization of essential objectives of competitors playing on particular positions in the game of basketball, the following play positions have been distinguished (Fig. 1):

"Position 1" – play maker or point guard, a player often in possession of the ball, managing the team's game, making decisions about the way of playing an offensive attack and about the way of defending.

"Position 2" – shooting guard, a player whose main task is to score points and assist the point guard; this player can take over tasks of the player in position 1.

"Position 3" – forward or small forward, a versatile player, whose main task is to score points and to create situations to score them; this player can take over tasks of the player in position 2.

"Position 4" – power or big forward, a player with outstanding constitutional and motor dispositions, whose main task is to score points (the so-called inside and underneath shots) and to create situations for partners to score them; this player can take over tasks of the player in position 5.

"Position 5" – center, as a rule, the tallest player with the greatest reach of arms, most often playing with the back to the basket, mainly operating in the semi-circle zone.

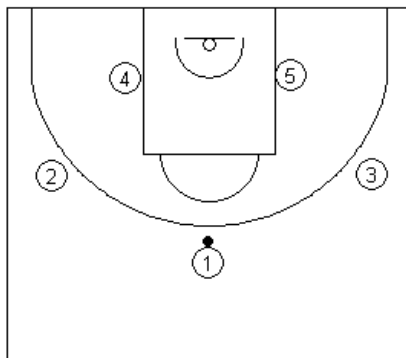


Fig.1. Players' positions in basketball

In the observation sheet each player is assigned a number in accordance with the protocol of the match. Additionally, players can be recorded on the basis of their position, which makes it possible to recognize the strategy and the tactics of the game. On the other hand, in order to distinguish the competitors' place of action, the court has been divided into conventional play fields, sectors and zones of action. The court is divided into the frontcourt and the backcourt, and these into zones and sectors (Fig. 2).

The frontcourt (FC – see Tables A3 and A4 in the Appendix) has been divided into three zones (starting from the basket): zone A – the restricted area, zone B – the space between lines of the restricted area and the three-point line, and zone C – the area between sidelines, the centre line and the three-point line.

Then zone A has been divided into two sectors: sector A1 – the area between the (right) sideline of the restricted area, the axis of the court – an imaginary line running parallel to the court sideline in a distance of 7.5 m, and the free-throw line; sector A2 – the space between the (left) sideline of the restricted area, the axis of the court – an imaginary line running parallel to the court sideline in a distance of 7.5 m, and the free-throw line.

Zone B has been divided into three sectors: sector B1 – the area between the (right) sideline of the restricted area, an imaginary line being an extension of the restricted area line to the three-point line, and the three-point line; sector B2 – the area between the free-throw line, the three-point line, and imaginary lines being extensions of the restricted area to the three-point line; sector B3 – the area between the (left) sideline of the restricted area, the imaginary line being an extension of the restricted area to the three-point line, and the three-point line.

Zone C has been divided into three sectors: sector C1 – the right area of the court defined by the court sideline, the centre line, the free-point line, and the imaginary line being an extension of the restricted area lines running from the three-point line to the centre line of the court; sector C2 – the central area of the court defined by the three-point line, the centre line and imaginary lines being extensions of two lines of the restricted area running from the three-point line to the centre line; sector C3 – the left area of the court defined by the court sideline, the centre line, the free-point line, and the imaginary line being an extension of the restricted area lines running from the three-point line to the centre line of the court.

The backcourt (BC – see Tables A7 and A8 in the Appendix) has been divided into three zones (starting from the basket): zone F – the restricted area zone, zone E – the zone between lines of the restricted area and the three-point line, and zone D – the area between sidelines, the centre line and the three-point line.

Zone F has been divided into two sectors: sector F1 – the right area between the sideline of the restricted area, the axis of the court – an imaginary line running parallel to the court sideline in a distance of 7.5 m, and the free-throw line; sector F2 – the left area between the sideline of the restricted area, the axis of the court – an imaginary line running parallel to the court sideline in a distance of 7.5 m, and the free-throw line.

Zone E has been divided into three sectors: sector E1 – the right area between the sideline of the restricted area, an imaginary line being an extension of the restricted area lines to the three-point line, and the three-point line; sector E2 – the area between the free-throw line, the three-point line, and imaginary lines being an extension of the restricted area lines to the three-point line; sector E3 – the left area between the sideline of the restricted area, an imaginary line being an extension of the restricted area lines to the three-point line, and the three-point line.

Zone D has been divided into three sectors: sector D1 – the right area of the court defined by: the sideline of the court, the centre line, the three-point line and the imaginary line being an extension of the restricted area line running from the three-point line to the centre line of the court; sector D2 – the central area of the court defined by: the three-point line, the centre line and imaginary lines being an extension of two lines of the restricted area running from the three-point line to the centre line of the court; sector D3 – the left area of the court defined by: the court sideline, the centre line of the court, the three-point line and an imaginary line being an extension of the restricted area line running from the three-point line to the centre line of the court.

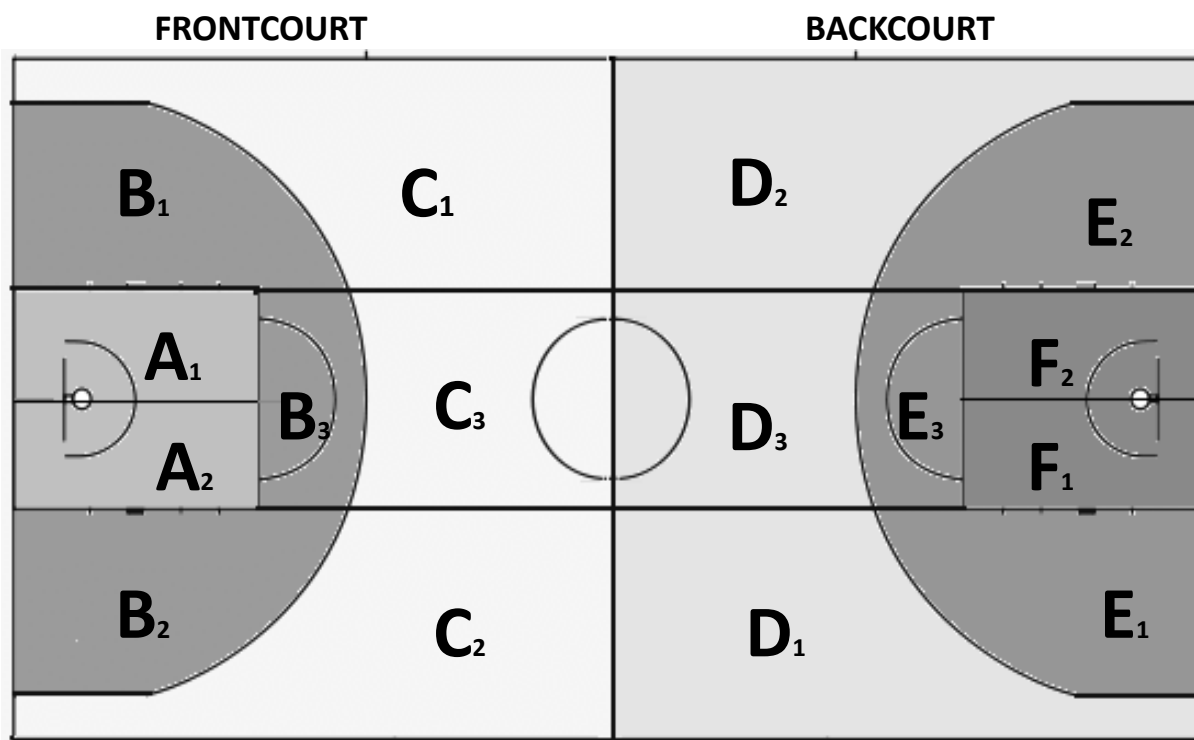


Fig. 2. Division of the court into the frontcourt and the backcourt, and these into zones and sectors

Tables A1-A7 (in the Appendix) present models of observation sheets for the assessment of offensive and defensive actions of competitors in particular positions with taking into account the pursued aims of offensive and defensive game, the type of performed action, the time of game (individual quarters of the match) and places of action (specific zones and sectors of fields of play). Players' effective, efficient and ineffective actions are recorded in the sheets by writing down the number of the player from a particular position. The total number of effective, efficient and ineffective actions defines the player's activity of action, and the ratio of effective and efficient actions to all actions of a given type – the player's reliability.

Conclusions

The suggested observation sheet is a tool to assess basketball players' skills of action, verified in terms of reliability and accuracy, which has been developed in consistence with a praxeological theoretical interpretation. Thanks to that, it is possible to assess basketball players' activity, effectiveness, and efficiency of action in view of the pursued aims of the game considering the position in which they play and the time and place of competition. It is particularly recommended for the evaluation of actions of basketball players of the highest sports level. Using so constructed a research tool for observation of the game enables creating real models of the efficiency of action of players of the highest basketball skills, and then such models can be used for planning the game of competitors of lower sports proficiency to improve efficiency of their game.

References

1. Szwarz A. Metody oceny techniczno-taktycznych działań piłkarzy nożnych [In Polish] [Methods of assessing the efficacy of soccer players' technical-tactical capabilities]. Gdańsk: AWFIS; 2003.
2. Panfil R. Prakseologia gier sportowych [In Polish] [Praxeology of sports games]. Wrocław: AWF; 2006.
3. Szwarz A. Modele poznawcze odwzorowujące sprawność działania w grach w piłkę nożną [In Polish] [Cognitive models mapping the efficiency in football games]. Gdańsk: AWFIS; 2008.
4. Szwarz A. Identyfikacja sprawności działania w grze piłkę nożną graczy i zespołów najwyższego poziomu sportowego [In Polish] [Identification of the efficiency of actions of elite soccer players and teams]. Olecko: WM; 2011.

5. Kłyszajko W. O wskaźnikach skuteczności gry w koszykówce kobiet [In Polish] [On indices of effectiveness of game in women's basketball]. *Kultura Fizyczna* 1972;1:6-11.
6. Ulatowski T. Próba obiektywnej oceny gry w koszykówce [In Polish] [An attempt at an objective assessment of basketball game]. *Kultura Fizyczna* 1972;1:5-7.
7. Klimontowicz W. Próba pomiaru wydajności gry zespołu koszykówki mężczyzn [In Polish] [An attempt at measuring the efficiency of game of a men's basketball team]. *Sport Wyczynowy* 1976;5:27-31.
8. Klimontowicz W. Charakterystyka przebiegu gry w piłkę koszykową w meczach wygranych i przegranych [In Polish] [A characteristic of the course of a basketball game in won and lost matches]. *Sport Wyczynowy* 1982;12:15-26.
9. Oszast H, Żak S. Próba analizy poziomu gry koszykarek I ligi w latach 1968-78 [In Polish] [An attempt at an analysis of the level of game of female basketball players of the first division in 1968-78]. *Sport Wyczynowy* 1980;6:35-37.
10. Sroka E. Metoda oceny gry zespołu koszykówki [In Polish] [Methods of game assessment for a basketball team]. *Sport Wyczynowy* 1991;1/2:50-56.
11. Mikołajec K, Zając A. Próba ilościowej i jakościowej oceny gry koszykarza [In Polish] [An attempt at a quantitative and qualitative evaluation of a basketball player's game]. *Trening* 1993;3:48-54.
12. Ważny Z, Kubań J, Kowalczyk K, Krupiński T. Basketball Expert – informatyczny „asystent” trenera [In Polish] [Basketball Expert – a coach's computer "assistant"] *Sport Wyczynowy* 1994;1/2:67-73.
13. Pluta B. Kategoryzacja i monitoring koszykarskich akcji meczowych i ich analiza statystycznymi testami serii dla profesjonalnego zespołu żeńskiego. Dysertacja doktorska [In Polish] [Categorization and monitoring of basketball match actions and their analysis with statistical tests of series for a professional female team. Doctoral dissertation]. Poznań: AWF; 1996.
14. Badora J. Wskaźnik aktywności startowej zawodników w koszykówce, jako próba całościowej oceny gry zawodnika [In Polish] [Basketball players' starting activity index as an attempt at a comprehensive assessment of a competitor's game]. *Trening* 2000;3:24-29.
15. Józwiak J, Wagner W. Wskaźnik kompleksowej efektywności gry koszykarzy [In Polish] [Index of comprehensive effectiveness of game of basketball players]. *Człowiek i Ruch* 2001;3:48-51.
16. Huciński T, Tymański R, Kocięda K. Próba weryfikacji arkuszy obserwacji gry w koszykówce [In Polish] [Index of comprehensive effectiveness of game of basketball players]. *Trening* 2001;2:92-103.
17. Huciński T, Tymański R. Efektywność zawodnika grającego na pozycji rozgrywającego w koszykówce [In Polish] [The effectiveness of a play maker position in basketball]. *Rocznik Naukowy* 2001;10:39-54.
18. Huciński T, Czerlonko M. Ocena efektywności walki sportowej zespołu w koszykówce [In Polish] [An assessment of the effectiveness of a sports fight of a basketball team]. *Rocznik Naukowy* 2001;10:27-37.
19. Dembiński J. Analiza działań w profesjonalnej koszykówce, na przykładzie ligi włoskiej i polskiej [In Polish] [An analysis of actions in professional basketball, on the example of the Italian and the Polish league]. In: Sozański H, Perkowski K, Śledziwski D, eds. *Kierunki doskonalenia treningu i walki sportowej*. [In Polish] [Directions of improving training and sports fight]. Warszawa: PTNKF; 2003, 55-59.
20. Dembiński J. Modelowanie działań koszykarzy na podstawie oceny ich indywidualnej skuteczności w grze [In Polish] [Modeling of basketball players' actions based on an assessment of their individual effectiveness in game]. In: Dembiński J, Naglak Z, eds. *Sprawność działania zawodników w grach sportowych*. [In Polish] [The efficiency of competitors' action in sports games]. Wrocław: WTN; 2003, 17-22.
21. Pluta B. Metody zobiektywizowanego identyfikowania liderów w zespołowych grach sportowych na przykładzie koszykówki [In Polish] [Methods of objectified identification of leaders in team sports games on the example of basketball]. Poznań: AWF; 2008.
22. Furokawa M. A study of the characteristics of basketball games seemed from players fight at the Tokyo and Mexico Olympic Games. *Research of Physical Education* 1974;6:351-356.
23. Smith D. Basketball, multiple offense and defense by Dean Smith with a special section on the Shuffle Offense by Bob Spear. New Jersey: ENJC; 1982.
24. Valensky M. Pocatcovy monitorovaci system pro basketball [In Czech] [Computer monitoring system for basketball]. *Trener* 1990;9:534-536.
25. Peterson D, Hruby G. The European Basketball Register – 1998 Edition. Milan: Libreria Dello Sport/Jumpo Julius Scouting; 1998.
26. Oliver D. Basketball on Paper, Rules and Tools for Performance Analysis. Virginia: Potomac Books. Inc. Dulles; 1999.
27. Trninić S, Dizdar D. System of the performance evaluation criteria weighted per positions in the basketball game. *International Journal Collegium Antropologicum* 2000;24:217-234.
28. Stonkus S. The retrospective attack structure analysis of top basketball teams. *Physical Education and Sport* 2002;1:65-71.
29. Losin BE. Ocenka sorevnovatelnoj dejatelnosti baskietbolistov [In Russian] [An assessment of the efficiency basketball players']. Sankt-Petersburg: ST; 2003.

30. Ibanez SJ, Perez MA, Macias M. Software for the basketball player's evaluation in real time. *International Journal of Performance Analysis in Sport* 2003; 3(2):145-155.
31. Perez MA, Macias M, Ibanez SJ, Feu S. Software for planning sport training: basketball application. *International Journal of Performance Analysis in Sport* 2003; 3(2):79-89.
32. Balciunas M, et al. Computer software for the evaluation player's performance during basketball game in real time. In: Bergier J, editor. *Obserwacja i ocena działań zawodników w zespołowych grach sportowych*. Wrocław: MTNGS; 2004, 5:21-26.
33. Sampaio J, Janeira M, Ibanez S, Lorenzo A. Discriminant analysis of game-related between basketball guards, forwards and centres in three professional leagues. *Eur J Sport Sci* 2006;6:173-178.
34. Międzynarodowa Federacja Koszykówki – FIBA. Oficjalne przepisy gry w koszykówkę [In Polish] [Official Rules of Basketball by FIBA]. Warszawa: WOGRAF; 2010.

Appendix

Tab. A1. An observation sheet to assess the activity and the effectiveness of actions gaining the play field with the ball considering the time and the place of a player's action

The aim of the game	Type of action		The situation in the game	Effective actions			Inefficient actions		
				Time bracket					
				1'-10'			1'-10'		
				Field zone					
				F-D	F-E	D	F-D	F-E	D
Gaining the play field with the ball	individually	without an opponent	dribbling the ball						
		with an opponent	dribbling the ball						
	cooperation	without an opponent	playing the ball with passes						
			playing the ball with passes and with dribbling						
		with an opponent	playing the ball with passes						
			playing the ball with passes and with dribbling						

Tab. A2. An observation sheet to assess the activity and the effectiveness of actions preparing a situation to score a point (positioning the game) considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game	Effective actions						Inefficient actions											
			Time bracket																	
			1'-10'						1'-10'											
			Field zone																	
			A1	A2	B1	B2	B3	C1	C2	C3	A1	A2	B1	B2	B3	C1	C2	C3		
Preparing a situation to score points	individually	without opponent	offensive actions with the ball while facing the basket																	
		without opponent	offensive actions with the ball with the back towards the basket																	
		without opponent	offensive rebound																	
	with opponent	with opponent	offensive actions with the ball while facing the basket																	
		with opponent	offensive actions with the ball with the back towards the basket																	
		with opponent	offensive rebound																	
	cooperation	with opponent	offensive actions without the ball and without screens																	
			offensive action without the ball with screens																	
			offensive actions with the ball while facing the basket and passing the ball																	
			offensive actions with the ball with the back to the basket and passing the ball																	
			offensive actions two-on-two (2x2) with the pick and roll (a dribbler has the ball)																	
			offensive actions two-on-two (2x2) with the pick and roll (passing the ball to the screener)																	
			offensive actions two-on-two (2x2) with the pick and roll (passing the ball to others)																	
			playing the ball with passes																	

Tab. A3. An observation sheet to assess the activity and the effectiveness of actions creating a situation to score a point considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game	Effective actions										Inefficient actions										
			Time bracket																				
			1'-10'										1'-10'										
			Field zone																				
			A1	A2	B1	B2	B3	C1	C2	C3	BC	A1	A2	B1	B2	B3	C1	C2	C3	BC			
Creating a situation to score points	individually	with an opponent	offensive actions with the ball while facing the basket																				
			offensive actions with the ball with the back towards the basket																				
			offensive rebound																				
		without an opponent	offensive actions with the ball while facing the basket																				
			offensive actions with the ball with the back towards the basket																				
			offensive rebound																				
	cooperation	with an opponent	offensive actions without the ball and without screens																				
			offensive action without the ball with screens																				
			offensive actions with the ball while facing the basket and passing the ball																				
			offensive actions with the ball with the back to the basket and passing the ball																				
			offensive actions two-on-two (2x2) with the pick and roll	a dribbler throws																			
				a screener throws																			
				others throw																			
	playing the ball with passes																						

Tab. A4. An observation sheet to assess the activity and the effectiveness of scoring actions considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game		Effective actions								Inefficient actions									
				Time bracket																	
				1'-10'								1'-10'									
				Field zone																	
				A1	A2	B1	B2	B3	C1	C2	C3	BC	A1	A2	B1	B2	B3	C1	C2	C3	BC
Scoring points	individually	without an opponent	jumpshot after a pass	from a place																	
				after moving into position																	
		jumpshot after dribbling																			
		running shot after a pass																			
		running shot after dribbling																			
		back-up shot preceded by fakes and pivots																			
		tap																			
	with an opponent	jumpshot after a pass	from a place																		
			after moving into position																		
		jumpshot after dribbling																			
		running shot after a pass																			
		running shot after dribbling																			
		back-up shot preceded by fakes and pivots																			
		tap																			
free throw		1				2				3											
4								5													

Tab. A5. An observation sheet to assess the activity and the effectiveness of actions against gaining the play field with the ball considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game		Effective actions			Inefficient actions		
				Time bracket					
				1'-10'			1'-10'		
				Field zone					
				A-C	A-B	C	A-C	A-B	C
Against gaining the play field with the ball	individually	winning the ball	gaining control of the ball						
			forcing an offensive foul						
			forcing an opponent's violation						
	interrupting action	putting the ball							
		holding the ball (jump ball)							
	hindering the ball movement	pushing the dribbler							
	cooperation	switching defense							
		"help and recover"							
		doubling							

Tab. A6. An observation sheet to assess the activity and the effectiveness of actions against preparing a situation to score a point (positioning the game) considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game		Effective actions									Inefficient actions								
				Time bracket																	
				1'-10'									1'-10'								
				Field zone																	
				F1	F2	E1	E2	E3	D1	D2	D3	F1	F2	E1	E2	E3	D1	D2	D3		
Against preparing situations to score points	individually	counteracting actions with the ball while facing the basket																			
		counteracting actions with the ball with the back towards the basket																			
		counteracting offensive rebound																			
	cooperation	counteracting actions without the ball and without screens																			
		counteracting actions without the ball with screens																			
		counteracting actions with the ball with the face to the basket and with passing																			
		counteracting the actions with the ball with the back to the basket and passing																			
		counteracting actions two-on-two (2x2) with the pick and roll	the screener has the ball																		
			passing the ball to the screener																		
			passing the ball to others																		
	counteracting playing the ball with passes																				

Tab. A7. An observation sheet to assess the activity and the effectiveness of actions against creating a situation to score a point considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game	Effective actions										Inefficient actions									
			Time bracket																			
			1'-10'										1'-10'									
			Field zone																			
			F1	F2	E1	E2	E3	D1	D2	D3	FC	F1	F2	E1	E2	E3	D1	D2	D3	FC		
Against creating situations to score points	individually	counteracting actions with the ball while facing the basket																				
		counteracting actions with the ball with the back towards the basket																				
		counteracting offensive rebound																				
	cooperation	counteracting actions without the ball and without screens																				
		counteracting action without the ball with screens																				
		counteracting the actions with the ball with the face to the basket and passing																				
		counteracting the actions with the ball with the back to the basket and passing																				
		counteracting actions two-on-two (2x2) with the pick and roll	when a dribbler throws																			
			when a screener throws																			
			when others throw																			
counteracting playing the ball with passes																						

Tab. A8. An observation sheet to assess the activity and the effectiveness of actions against scoring considering the time and the place of a player's action

The aim of the game	Type of action	The situation in the game	Effective actions										Inefficient actions									
			Time bracket																			
			1'-10'										1'-10'									
			Field zone																			
			F1	F2	E1	E2	E3	D1	D2	D3	FC	F1	F2	E1	E2	E3	D1	D2	D3	FC		
Against scoring points	individually	winning the ball	gaining control of the ball after blocking the shot																			
			forcing the shooter's violation																			
		interrupting action	putting the ball out-of-bounds after a block																			
	forcing an ineffective shot (aggressive guarding of the shooter)																					
	cooperation	doubling																				
		tripling																				