STUDY ON BASKETBALL STATISTICAL PARAMETERS FOR MEN UNDER 16

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Abstract: In this paper we proposed an analysis of performances at junior men's basketball team – Steaua CSM referring to the statistical parameter values recorded during official games of the National Championship under 16 years of age. The team of subjects composed of 15 legitimate athletes with an average age of 15 and 8 months and averaging high 1.87 m. In this study were used 22 statistical parameters classic in basketball game, during 19 official games in the semi-finals and the final tournament. The data obtained from the individual game statistics records made by the technical staff were centralized by us, in order to achieve a basketball team performance pattern at this age category. The game and performance model obtained is of great relevance useful and validated by the sports performance achieved by Steaua CSM team namely, the first place in the 2016-2017 edition of the National Championship which can be used by specialists in the field of programming and planning of sports performance training.
***Key words**: basketball, team, game statistics*

Introduction

One of the most common methods of monitoring sports performance is using game-related statistics to evaluate technical and tactical behavior, as well as the efficiency of players and teams throughout the season. [1]. The importance of quantitative analysis in sports using objective data such as game statistics is prominent in the last years. In the specific field of basketball, the significance of this topic is outstanding, and has been a matter of subject of articles in academic journals.[2]

The quantitative analysis of sports is a growing branch of science and, in many ways one that has developed through non-academic and non-traditionally peer-reviewed work.[3]

Defining possessions as a the starting point of basketball statistics a possession starts when one team gains control (or possession) of the basketball and ends when that team gives up control of the basketball. Teams can give up possession of the basketball in several ways, including (1) made field goals or free throws that lead to the other team taking the ball out of bounds, (2) defensive rebounds, and (3) turnovers. Note that under this definition of a possession, an offensive rebound does not start a new possession; an offensive rebound starts a new play.

In this article want to introduce the basic variables of basketball analysis, we use a variety of available data sources to describe the distributions of these variables. Because the concept of "possessions" plays such a central role in analyzing basketball, we undertake an extensive analysis of possessions [4] using statistical data recorded in the competitive year 2016-2017. And finally, we provide a detailed listing of the sources of data for analyzing basketball statistics, which we hope will help jump start more research on basketball. The purpose of the research is to develop a qualitative and quantitative assessment of the game for the under 16 men's basketball teams that participated in the Romania National Champioship and to propose a model of sport performance for this age.

Material and methods

To obtain a more accurate study we used a number of research methods specific for physical education and sports, which together with the statistical and

mathematical methods, constituted the basis of our article. An important role in our study was the documentation method and the study of the available literature in the field. The large volume of information have been collected by the coaching staff of which one of the author was part of.

Results

The team of subjects composed of 15 legitimate athletes with an average age of 15 and 8 months and averaging high 1.87 m. In this study were used 22 statistical parameters classic in basketball game, during 19 official games in the semi-finals and the final tournament.

This complex palette of statistics that characterizes the game (the abovementioned 22 parameters) has a big importance and is necessary to be taken in consideration in optimizing the strategy of training regardless the competition levels of the teams. The game parameters and patterns, which will be analyzed in this study are represented by the following tables.

Table no 1: Statistical and performance representation of basketball attack actions for under 16 team

Etape	FTA/FTM	FT %	2PA/PM	2Pt %	3PA/PM	3Pt %	FGA/FGM	FG %	EFG %	TPPG
ES 1	36/18	50	71/29	40,84	12/4	33,33	83/33	39,76	42,17	88
ES 2	17/13	76,47	67/33	49,25	18/6	33,33	85/39	45,88	49,41	99
ES 3	23/13	56,52	64/34	53,12	20/3	15	84/37	44	45,83	92
ES 4	30/18	60	58/24	41,37	10/3	30	68/27	39,71	41,91	75
ES 5	8/3	37,5	55/22	40	25/6	24	80/28	35	38,75	65
ES 6	13/5	38,4	43/15	34,8	25/7	28	68/22	32,35	37,50	56
ES 7	27/14	51,85	53/22	41,5	21/9	42,85	74/31	41,89	47,97	85
ES 8	17/11	64,7	61/31	50,81	21/5	23,8	82/36	43,9	46,95	85
ES 9	13/10	76,92	59/25	42,37	21/5	23,8	80/30	37,5	40,63	76
ES 10	7/4	57,14	64/32	50	23/5	21,73	87/37	42,53	45,40	83
ES 11	32/19	59,37	62/24	38,7	17/2	11,76	79/26	32,91	34,18	72
ES 12	10/6	60	56/24	42,8	31/10	32,2	87/34	39,08	44,83	86
ES 13	23/12	52	44/17	38	17/1	5,8	61/18	29,51	30,33	48
ES 14	16/9	56,2	56/38	67,8	24/8	33,3	80/46	57,5	62,50	106
ETf 1	20/15	75	58/26	45	13/2	15	71/28	39,44	40,85	73
ETf 2	18/8	44	62/32	52	16/2	12	78/34	43,59	44,87	78
ETf 3	31/16	52	57/28	53	13/2	15	70/30	42,86	44,29	72
ETf 4	11/5	45	47/23	49	22/6	27	69/29	42,03	46,38	69
ETf	21/9	43	62/23	37	16/9	56	78/32	41,03	46,79	82

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Total	373/208	1056,07	1099/502	867,37	365/95	483,9	1464/597	770,47	831,54	1490
Mean	**19,6 /10,9**	**55,58**	**57,8/26,4**	**45,65**	**19,2 /5**	**25,46**	**77 /31,4**	**40,55**	**43,76**	**78,42**

Here are some explanations of various abbreviations and statistics that we track in our study (table no1): FTA – the number of free throw attempts ; FTM – the number of free throws made ; FT% – the percentage of free throws made, FT% = (FT / FTA) x 100; 2PM – the number of 2 point shots made; 2PA - the number of 2 point shot attempts; 2Pt% – the percentage of 2 point shots made, 2Pt% = (2Pt / 2PtA) x 100; 3PM – the number of 3 point shots made; 3PA – the number of 3 point shot attempts ; 3Pt% – the percentage of 3 point shots made, 3Pt% = (3Pt / 3PtA) x 100; FGM – the total number of field goals made, FG = 2Pt + 3Pt; FGA – the total number of field goals attempted, FGA = 2PtA + 3PtA; FG% – the percentage of field point shot made, FG% = (FG / FGA) x 100; EFG - effective field goal percentage EFG% = (2Pt + 1.5 x 3Pt) / FGA; TPPG – the total number of point made in game.

Table no 2: Defensive statistics and performance for under 16 team

Etape	R Def	R Off	RPG	STLPG	ToPG	APG	PFMPG	PFRPG	TRPPG	POSS
ES 1	37	16	53	7	18	6	22	25	76	100,84
ES 2	31	13	44	11	18	13	21	19	95	90
ES 3	21	19	40	20	17	14	8	17	68	82
ES 4	30	12	42	8	26	8	24	20	72	82
ES 5	28	17	45	16	16	9	14	10	41	79
ES 6	22	14	36	13	17	8	22	14	53	71
ES 7	23	16	39	17	34	14	23	22	78	92
ES 8	35	19	54	10	17	14	14	14	60	80
ES 9	34	18	52	10	28	12	28	12	85	90
ES 10	37	13	50	13	12	11	17	9	69	86
ES 11	27	18	45	16	20	4	23	18	71	81
ES 12	25	17	42	24	15	16	17	8	71	85
ES 13	27	17	44	10	21	4	24	17	56	65
ES 14	32	10	42	26	20	26	15	12	76	90
ETf 1	26	12	38	13	11	21	19	19	63	70
ETf 2	41	24	65	6	19	20	22	19	53	73
ETf 3	28	11	39	3	15	11	24	25	79	74
ETf 4	27	11	38	11	13	20	23	18	63	71
ETf 5	31	20	51	5	17	13	21	19	79	75
Total	562	297	859	239	354	244	381	317	1308	1536,84
Mean	**29,57**	**15,63**	**45,21**	**12,57**	**18,63**	**12,84**	**20,05**	**16,68**	**68,84**	**80,89**

In table no 2 we used the following abbreviations for statistical parameters: the number of defensive rebounds - R def; the number of offensive rebounds - R of; the number of rebounds per game – RPG; the number of steals per game – STLPG; the number of turnovers per game – ToPG; the number of assists per game – APG; the number of fouls made per game – PFMPG; the number of fouls received per game – PFRPG; the number of total points received per game – TRPPG; POSS – number of possesion per game.

Basketball performance depends primarily on shooting 2-point field-goals and on securing defensive rebounds [5–7]. In close contested games, however, fouls and free-throws exhibit increased importance for determining game outcome than for lesser contested games [7, 8]. Other remaining game statistics such as offensive rebounds, turnovers, steals and assists are not reported consistently as discriminating performance variables for winning and losing. When contrasting the best and worst teams, the best performance variables for long term success are related to assists, steals and blocks, denoting the importance of passing skills and of defensive skills along outside and inside court positions [9].

To win, teams and individuals try to score more points per possession than their opponents, in this case we nead to estabilish the number of possession which a team of this level have. A general formula to estimate possessions for team is[3]:

POSS = FGA + 0.44 × FTA – Rof + TO

Oliver (2004), Hollinger (2003, 2004, and 2005), all use possessions as the foundation for their analyses of basketball statistics.

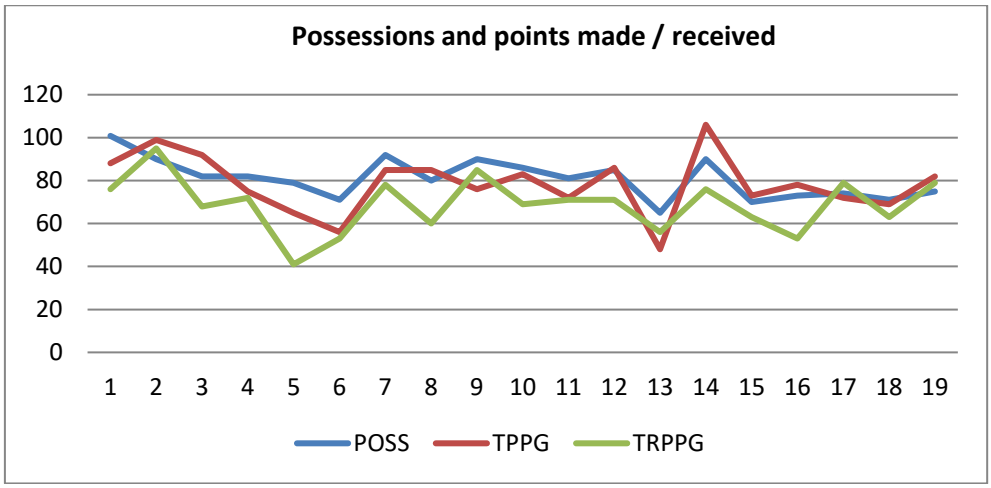

Fig no 1 The evolution of the relationship between possessions, points scored and points received

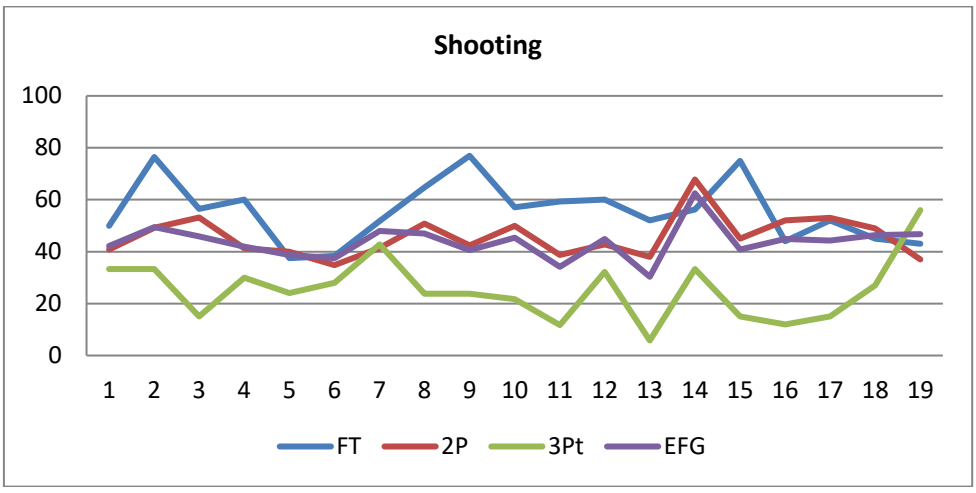

Fig. no 2 : Te evolution of percentage efficiency of throws to the basket

Discussions and conclusions

In addition, basketball specialist argue that there is typically a tradeoff between possession usage and efficiency. In reality, many analysts would motivate that this is the central optimization problem for a basketball team[10] Oliver (2004) provides an empirical example of such an optimization. Players use up their easy opportunities to score on dunks, lay-ups, and wide open shots. However, as they increase their possession usage beyond those shots (and assists), the quality of the opportunities fall. But they fall at different rates for different players. Furthermore, teams adjust their defensive strategies to reduce the efficiency of the players most likely to be able to shoulder a higher possession rate. All of these factors have resulted in it being difficult to obtain conclusive evidence on the negative relationship between possession usage and efficiency. What is necessary is a credible instrument (something related to possession usage, but with no independent effect on efficiency) to isolate the relationship between possession usage and efficiency.

Following the analysis of the game statistics parameters presented in tables 1 and 2, we can propose to the specialists in the field the following sports performance model, which can be used as a benchmark in planning and the proces of training in under-16 athletes in the men's basketball.

- Free throw: 20-22 per game out of which at least 11-13 scored, resulting in a minimum efficiency percentage 55-57 %;
- 2 point shots: 58-60 of attempts per game, out of which a minimum 27-29 have to be successful, maintaining a higher percentage then 45-47 % , to this category of throws;
- 3 point shots: 19-22 of attempts per game, out of which a minimum 5-7 have to be made, witch reprezantes 26-28 %;
- Field goals: 77-80 attempts per game, out of whith 32-34 made witch is a 41- 43 field goals procentaje;
- Total points: 78-80 total points per game;
- Rebounds: 45-47 per game out of whith 29-31 defensive and 15-17 offensive;
- Steals: 12-14 per game;
- Turnovers: maximum 18 per game;
- Assists: 12-14 per game;
- Fouls: 20 made and 16 received;
- Total points received per game: 65-68
- Effective Field Goal percentage: 43,76 %;
- Team posseseion: 80 – 82

The the following statistical parameters: FGA, EFG, FTA, FT provides specialists in the field an instant snapshot of what's happening in the game. If your team have beter results beat in all four stats, you will always win. Basketball is really simple, to

win you either need to shoot a higher percentage or take more shots than your opponent. That's all you can do. That's the only way to win a game.

In conclusion knowing basketball statistics of performance especially at juniors, are absolutely necessary thus realizing real feedback on the effectiveness is planned and the sport periodization made by coaches.

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