

DIFFERENCES IN SITUATIONAL EFFICIENCY BETWEEN EUROLEAGUE AND ABA LEAGUE TEAMS IN THE REGULAR PART OF THE 2022/2023 SEASON

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Abstract: *This research was conducted with the aim of determining the differences between Euroleague and ABA League teams in the 2022/2023 season, in eleven standard indicators of situational efficiency in basketball game. Situational efficiency was assessed with eleven variables: three-point shooting percentage, number of three-point shots made, two-point shooting percentage, number of two-point shots made, offensive jumps, defensive jumps, total number of jumps, assists, balls won, errors and free throw percentage. Discriminant analysis and student's T-test gave results that indicate a statistical difference between Euroleague and ABA League teams in four out of eleven tested variables in favor of Euroleague teams. Teams from the Euroleague league achieved better results in the variables three-point shooting percentage (.029), offensive jump (.013), total jumps (.004) and free throw shooting percentage (.006), at the level of $p < 0.05$. The fact that the players playing in the Euroleague in the 2022/23 season have a higher level of accuracy in shooting the ball from a distance of three points and free throws compared to basketball players who play in the ABA League was expected. The same can be stated for the variables jump attack and total number of jumps, key indicators of situational efficiency essential for competitive success.*

Key words: *Basketball game, standard indicators of situational efficiency, Aba, Euroleague*

INTRODUCTION

Basketball game can be seen as an organized series of activities that each player should perform with regard to the place and role in the team within a certain concept of the game. For the purpose of monitoring events at a basketball game, FIBA has standardized 13 indicators of situational efficiency that are monitored at every official game. The suggested indicators of situational efficiency are: the number of two-point field goals, the number of three-point field goal attempts, the number of field goals behind the free throw line (one, two, and three), the percentage of two-point field goal throws, three-point field goal percentage, free throw percentage, defensive jumps, offensive jumps, total number of jumps, assists, fouls, lost ball, steals and blocked shots. In this paper, we analyzed eleven out of thirteen indicators of situational efficiency in the game (percentage of shots for 1, 2 and 3 points, number of attempts to throw the ball in for 2 and 3 points, jump in offense and defense, total jumps, assists, won balls and lost balls).

METHODS

By applying the discriminant analysis of variance, we tried to determine whether there is a statistically significant difference between the teams that play in the ABA League and the teams from the Euroleague based on eleven standard indicators of situational efficiency in the basketball game. Further statistical processing, which included the application of the t-test, determined which variables individually manage to significantly differentiate teams from the Euroleague and the ABA League. In the framework of the mentioned methods, the following were calculated:

- values of discrimination coefficient (Eigenvalue), canonical correlation coefficient, Bartlett's test (Wilks' Lambda), Chi-square test, degree of freedom (df) and statistical significance (Sig), based on which the significance of the multivariate difference between teams from the Euroleague and the ABA League is determined.
- t-tests determined the significance of the differences between the teams from the Euroleague and the ABA League in each variable separately.

Examinee sample

The research was conducted on a sample of twenty-eight basketball teams (16 teams from the Euroleague and 12 teams from the ABA League). The data was collected on matches within the regular part of the ABA League season and the regular part of the Euroleague League 2022/2023 season. The period of the regular part of the season was analyzed.

Variable sample

The data was taken from the official website of the ABA League and the Euroleague. On the analyzed sample, 11 variables for assessing the situational efficiency of basketball players, determined by FIBA, were observed (<http://www.aba.com/> and <http://www.euroleague.net/>). The sample of variables consists of 11 standard indicators of situational efficiency in the basketball game: percentage of shots from outside the area bounded by the 6.75-meter line, percentage of shots in the basket for two points, percentage of shots in the basket from the free throw line, number of attempts to throw the ball in for 2 and 3 points, offensive and defensive jumps, total jumps, assists, balls won and lost balls. The collected data represents the official statistics that are kept at each match. Data registration was carried out by statisticians specially trained for this job on computer programs for keeping statistics on basketball matches.

RESULTS AND DISCUSSION

In order to determine the differences in situational efficiency between the EURO and ABA League teams, discriminant analysis and t-test were applied. Discriminant analysis was used to calculate the values of the discrimination coefficient (Eigenvalue), canonical correlation coefficient, Bartlett's test (Wilks' Lambda), Chi-square test, degrees of freedom (df) and statistical significance (Sig).

Table 1 Significance of isolated discriminative function

	Eigen-value	Canonicl-R	Wilk's-Lambda	Chi-Sqr.	df	p-value
0	3,921	0,892	,203	35,85	11	.000

Legend: Eigenvalue – characteristic root of the discriminant function; Canonical Correlation – canonical correlation; Wilks' Lambda - Wilks' Lambda test; Chi-square – Hi kvadrat test; df – degrees of freedom; Sig. – signifikantnost

In Table 1, based on the presented results, it can be seen that a significant discriminative function was isolated which separates the results of the two groups. The value of the canonical correlation coefficient shows that the discriminativeness of the function is explained with 89%, so the system of eleven standard indicators of situational efficiency in the basketball game highly defines the differences between teams from the Euroleague and the ABA League. The discriminative strength is .203 and indicates the difference between the results of the two groups in eleven standard indicators of situational efficiency in the basketball game. The significance of the differences is high (Sig = .000), because the Chi-square test value is high (Chi-square = 35.85).

The results of the t-test (table 2) clearly show that there is a statistically significant difference between teams from two different leagues in four variables, in favor of Euroleague teams. Teams from the Euroleague have a better percentage in the three-point shooting variable, higher number of offensive jumps, more total jumps and a better shooting percentage from the free throw line.

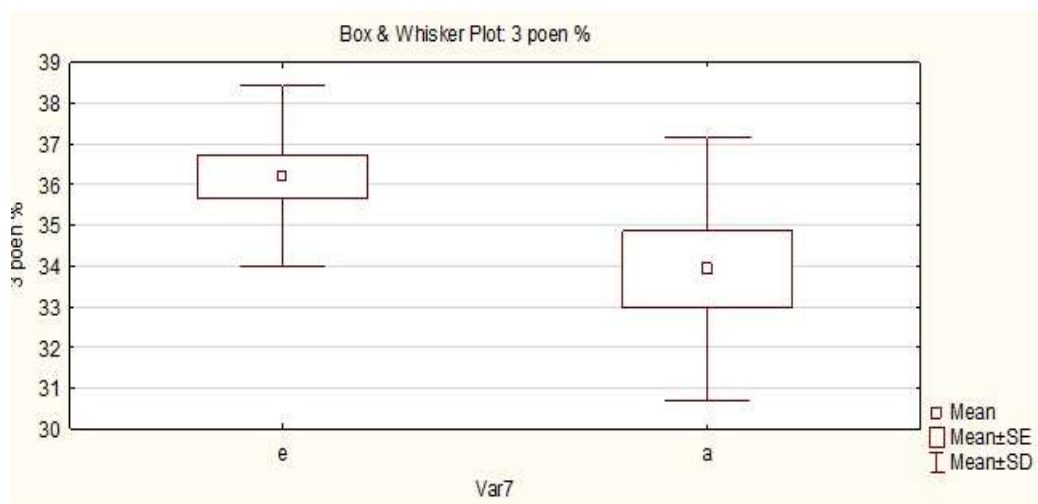
Table 2 Differences of arithmetic means between EUROLIGAE and ABA League teams-Student's T-test

	Mean - EL	Mean- ABA	t-value	p	F-ratio Varia	p Varian
2 poen %	54,727	55,483	-0,730	.471	1.303	.666
3 poen %	36,211	33,922	2.298	.029	2.102	.163
FT%	78,400	75,158	2,932	.006	1.204	.770
SKOKOF	10.227	9.000	2.639	.013	1.693	.377
SKOKDF	22.972	21.958	1.754	.090	1.651	.341
SKOKUK	33.200	31.000	3.125	.004	1.028	.990
ASIST	17.100	17.391	-0.387	.701	4.915	.010
STOLEN	6.572	6.391	0.684	.499	3.523	.019
2 P UKU	35,850	37,091	-1,320	.197	1.229	.679
3 P UKU	25,116	25.700	-0.580	.566	1.593	.375
TORN	12.388	12.733	-0.796	.432	1.093	.904

Legend: F -; Mean - arithmetic mean; t -T test; Sig. - signifikanost. test for analyzing the significance of difference between centroid of groups p - significance coefficient.

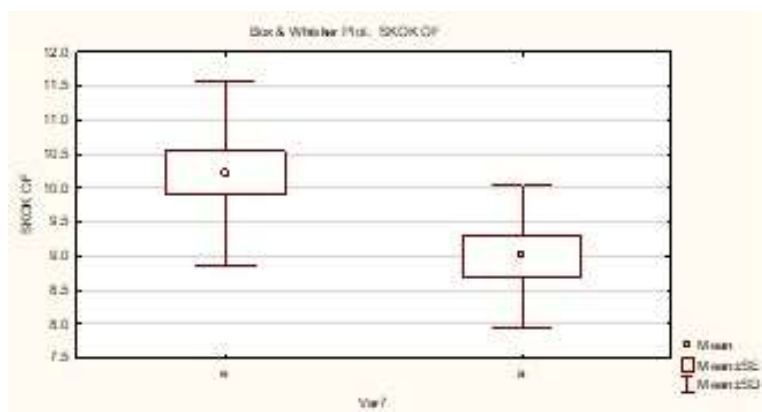
The graph of average values for three-point shooting shows us that Euroleague teams are three percent more successful in three-point shooting than ABA League teams. This percentage of success in favor of teams from the Euroleague league is expected due to the difference in the quality of the players. For example, the results in the paper Ćeremiđić, D. *Differences in situational efficiency between NLB and NBA teams in the regular part of the season* from 2010, when the three-point line distance was 6.25 meters, indicate that the teams from the then NLB league had worse three-point shooting percentage 35.73% compared to today's Euroleague teams 36.21%. Unlike basketball from earlier times, when it was played on 60-70 possessions, modern basketball is characterized by a greater number of possessions per match. The increase in the trend of the 3-point shot follows the increase in the number of possessions and is constantly growing from competition to competition and will undoubtedly overtake it in the coming period due to the fact that it is worked on it so much during the training process and that it in itself brings a completely new tactical dimension to basketball with maximum "spacing" and more open paths to the basket for 1-on-1 and 2-on-2 play. From the statistical data, we can see that the 2-point shooting percentages are still quite high at 55%, while the 3-point shooting percentages are quite variable and are in the range of 34 to 36%, in our research.

Graph 1 Three-point shooting percentage



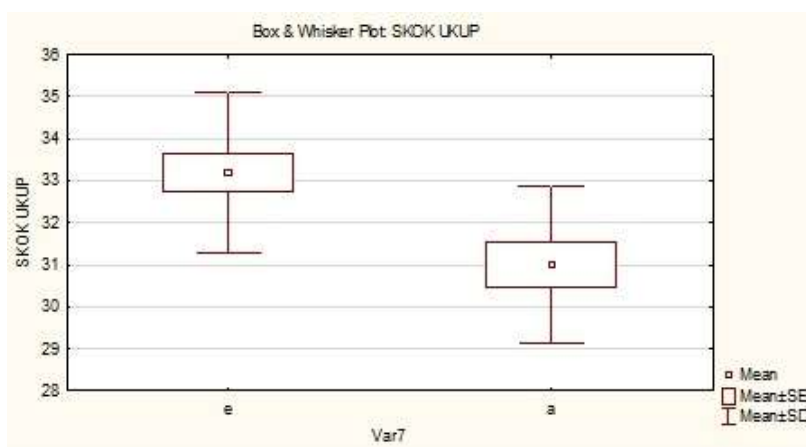
When we talk about the offensive jump, it is clear that it has a great influence on the outcome of the specific match by the very fact that each jump brings with it possession of the ball and a new opportunity to score points, a so called second chance. Every 2 to 3 possessions, a team grabs a jump, whether offensive or defensive, and between them, the ratio is extremely inconsistent and varies a lot from team to team and from game to game. The jump variable in the attack is very important, coaches demand maximum activity from the players when it comes to this segment of the game. Often even four players take part in the jump in the attack, except for the playmaker, and such game philosophy leaves a lot of risk for the opposing team's counterattack. The results we reached in our research when it comes to offensive jumps are an average of 10.22 jumps per game in the Euroleague, in contrast to the ABA League where teams had an average of 9 offensive jumps, which leads to the conclusion that players in the Euroleague are more active from players in the ABA league in this segment of tactics.

Graph 2 Offensive rebound



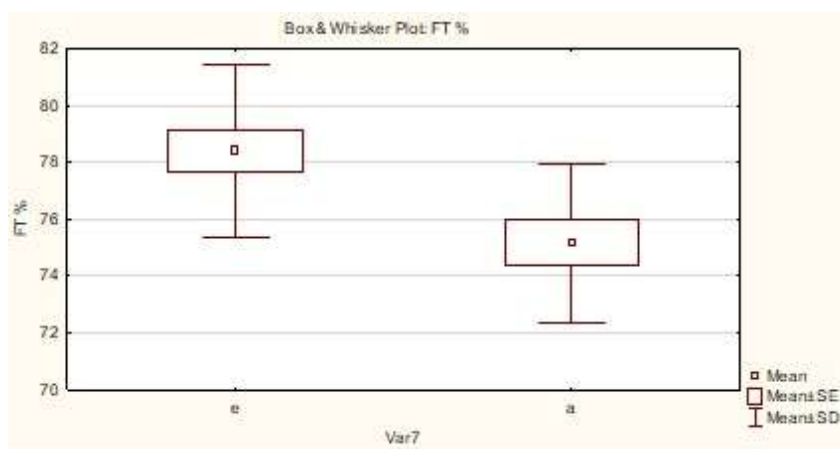
The graph showing the number of total jumps indicates a high control of the racket, ie. attention to this aspect of the game by teams from the Euroleague. According to this statement, we should also take into account the desire of the teams for an offensive jump, which in the regular part of the season in the ABA League is at a slightly lower level, in contrast to the play-off phase of the League, when all teams colloquially said "get serious" in all phases of the game. The results we achieved in terms of total rebounds are an average of 33 jumps per game in the Euroleague and 31 jumps per game in the ABA League. The difference of 2 jumps in favor of teams from the Euroleague is significant and can be a key factor for the final outcome of the game.

Graph 3 Total jump



Considering that we are talking about the top level of basketball, it is unnecessary to talk too much about shooting from the free throw line and all the tested teams had percentages of around 70% shooting realization for 1 point, (the worst result was achieved by the Igokea team 68%) while some reached a value of around 82%, (the best result was achieved by the Partizan team 82.7%), while the European champion Real had 80.1% from the free throw line and was among the best in that segment, which speaks volumes about the importance of the percentage of free throws.

Graph 4 Free throw percentage



CONCLUSION

The aim of this research was to determine whether teams from the Euroleague and ABA League differ in eleven standard indicators of situational efficiency in the basketball game. Differences between teams in the space of standard indicators of situational efficiency in the basketball game were analyzed by discriminant analysis and t-test. The obtained Wilks' Lambda function and the value of the canonical correlation coefficient show that the teams from the Euroleague are significantly different from the teams from the ABA League. Differences that are statistically significant were obtained in the variables three-point shooting percentage, free throw shooting percentage, offensive jumps and total jumps in favor of teams from the Euroleague. The data that players playing in teams from the Euroleague were more successful in three-point shooting percentage is expected if we take into account the quality of the players. All top basketball players strive for the unwritten rule of 40-50-90 when it comes to shooting success percentages. In our research basketball players who perform in the Euroleague are closer to this unwritten rule, which was expected considering the quality of the players who perform at the highest European level when it comes to basketball.

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RAZLIKE U SITUACIONOJ EFIKASNOSTI IZMEĐU EKIPA EVROLIGE I ABA LIGE U REDOVNOM DELU SEZONE 2022/2023.

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Sažetak: Ovo istraživanje je sprovedeno sa ciljem da se utvrde razlike između timova Evrolige i ABA lige u sezoni 2022/2023, u jedanaest standardnih pokazatelja situacione efikasnosti u košarkaškoj igri. Situaciona efikasnost je procenjivana sa jedanaest varijabli: procenat šuta za trojku, broj ostvarenih šuteva za tri poena, procenat šuta za dva poena, broj ostvarenih šuteva za dva poena, skokovi u napadu, odbrambeni skokovi, ukupan broj skokova, asistencija, osvojene lopte, broj grešaka i procenat slobodnih bacanja. Diskriminantna analiza i studentski T-test dali su rezultate koji ukazuju na statističku razliku između timova Evrolige i ABA lige u četiri od jedanaest testiranih varijabli u korist evroligaških timova. Ekipe iz Evrolige ostvarile su bolje rezultate u varijablama procenat šuta trojki (.029), ofanzivni skok (.013), ukupni skokovi (.004) i procenat šuta slobodnih bacanja (.006), na nivou $p < 0,05$. Očekivala se činjenica da igrači Evrolige u sezoni 2022/23 imaju veći nivo preciznosti u šutiranju lopte sa udaljenosti od tri poena i slobodnih bacanja u odnosu na košarkaše koji igraju u ABA ligi. Isto se može reći i za varijable napad skokom i ukupan broj skokova, ključne indikatore situacione efikasnosti bitne za takmičarski uspeh.

Ključne reči: košarkaška utakmica, standardni pokazatelji situacione efikasnosti, ABA, Evroliga