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SHOOTING DISTRIBUTION AND EFFICIENCY BETWEEN BASKETBALL ABA LEAGUE AND EUROLEAGUE IN SEASON 2018/2019

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ABSTRACT
The aim of this research was to determine whether there are differences in the shooting distribution and efficiency between the ABA basketball league and the Euroleague within the 2018/2019 regular part of the season. The research sample was represented by the teams participating in the ABA League (12 teams) and the Euroleague (16 teams) in the 2018/2019 season. The regular part of the season was organized in a two-round league system for both leagues, where 264 games were played within the ABA league, and 480 games in the Euroleague. Based on the results obtained using the T-test for independent samples, it was noticed that there are statistically significant differences in 3 point shots from the central position ($p<0.000$), 2 point shots from the central position ($p<0.000$), and within the key ($p=0.002$), and when it comes to the shooting efficiency, significant differences appear in the 3 point position on the left side ($p=0.010$) and the right corner ($p=0.041$), as well as for 2 points inside the key ($p=0.001$). Analyzing the percentage of shooting efficiency, it is clear that Euroleague teams have a higher quality compared to teams from the ABA league, which is in line with previous research where it is indicated that 2-point shots are one of the most important factors for a team's success in competition. Euroleague teams take most of the shots from the key in relation to other positions, as well as ABA teams, while the level of efficiency is reversed. Considering that in both leagues, the largest number of shots was taken from the key, it can be concluded that the number of shot attempts is a more important factor than efficiency when it comes to success in competition.

Keywords: SHOOTING EFFICIENCY / EUROLEAGUE / SUCCESS IN COMPETITION / SHOOTING ANALYSIS

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INTRODUCTION

Shooting is one of the basic elements in basketball, on which the success of the team in competitions largely depends. The shot type differs in value, so there are 1, 2- and 3-point shots. Also, the shot can be classified in relation to the position on the court from which it was taken, and the distance from the basket. In this classification, shots are taken from a short distance (up to 3 meters), from a medium distance (3 - 6.75 meters), which are often called both medium-distance shots, and long-distance shots (over 6.75 meters), which are called and shots from a distance (Karalejić & Jakovljević, 2008). In modern basketball, it is very easy to collect this kind of data, taking into account that all official matches are recorded and monitored via the Internet (Schumaker et al., 2010). When the data is classified after the collection, a complete analysis of the shooting distribution of a certain team is obtained. This classification is very important for coaches and scouts when preparing matches, based on which the entire tactic is often based.

When it comes to the shooting distribution, it depends on several factors such as: type of game, player quality, team quality, group, and team tactical tasks, etc. (Karalejić & Jakovljević, 2008). Depending on the importance of the competition, some of the above factors also vary. Thus, it is possible to identify specific types of players and teams in Europe based on the way of training and development that is nurtured in some countries. Particularly prominent are: Lithuania, Spain, and Serbia (Božović & Mandić, 2020; Erčulj & Štrumbelj, 2015; Puente et al., 2017; Valinskaitė et al., 2018), while outside Europe the American NBA league is certainly the most representative (Mandić et al. al., 2019). In addition to national championships, there are also regional and continental championships, with the most famous continental championship being the Euroleague basketball. On the other hand, within the Balkan countries, which are members of the former Yugoslavia, a regional league called the Adriatic Basketball League (ABA) has been organized for many years. The best teams from the former Yugoslavia are participating in this league, qualifying for participation within domestic championships.

It is known that throughout history, Yugoslavia has been a five-time world champion and that a large number of exceptionally high-quality players come from this area. Therefore, it could be important to examine what are the factors that teams from the former Yugoslavia (in this case the ABA League) that affect the success of teams and players' development. When it comes to the shooting distribution, numerous studies have analyzed various factors that affect the team success, as well as analyzing certain trends between different leagues (García et al., 2013; Lorenzo et al., 2010; Mandić et al., 2019; Puente et al., 2017; Strumbelj et al., 2013).

Puente (2017) identified several very important factors for the success of teams in competition in longitudinal research within the Spanish league. It was determined that the efficiency of shooting represents as much as a quarter of the total variance of success, while it was determined that the 2-point shot was the most frequent. In addition, it was pointed out that increasing the shooting efficiency can be crucial for competition success, especially in matches where the outcome is uncertain (García et al., 2014). Another study looked at the indicators of official competition statistics. Gardašević et al. (2019) examined the differences between domestic and foreign players within the ABA league, where it was determined that foreign players have a significantly higher number of shot attempts and a significantly higher shooting efficiency for 2 points.

In addition to research in domestic competitions, analyzes were also performed within the Euroleague. Štrumbelj et al. (2013) state that shooting selection significantly influenced shooting efficiency in the last decade. The coaches gave their players an extra tactical briefing during the break, and after that, players had solid organization. An increase in the number of passes in the game was noticed, as well as the number of screens for offensive players without a ball (off-ball screen), and all this indirectly affected the increase in shooting efficiency (Strumbelj et al., 2013). The selection of shots largely depends on the team tactics. Marmarinos et al. (2016) state that screen for the player with a ball (eng. On-ball screen) was one of the most common types of cooperation in offense within the Euroleague in the 2012/2013 season, where the league winner (KK Olympiakos) applied this type of game in even 41% attack completion!

Although previous studies have conducted research in this field, as far as the authors know, no research has been found that compares leagues of different levels of quality, i.e. territorial coverage, regional (ABA), and continental (Euroleague) when it comes to shooting distribution and efficiency. Therefore, this comparison could explain whether there are differences between different league levels, which can provide a better insight into different tactical aspects concerning competition and provide a basis for future research.

METHODS

Sample

The research sample was represented by the teams participating in the ABA League (12 teams) and the Euroleague (16 teams) in the 2018/2019 season. The regular part of the season was organized in a two-round league system for both leagues, where 264 games were played in 22 rounds within the ABA league, and 480 games in 30 rounds in the Euroleague. The total sample was 744 matches within both leagues. The 2018/2019 season was taken as the last season played in the full format before the outbreak of the Covid-19 viral pandemic.

Measurement methods and variables

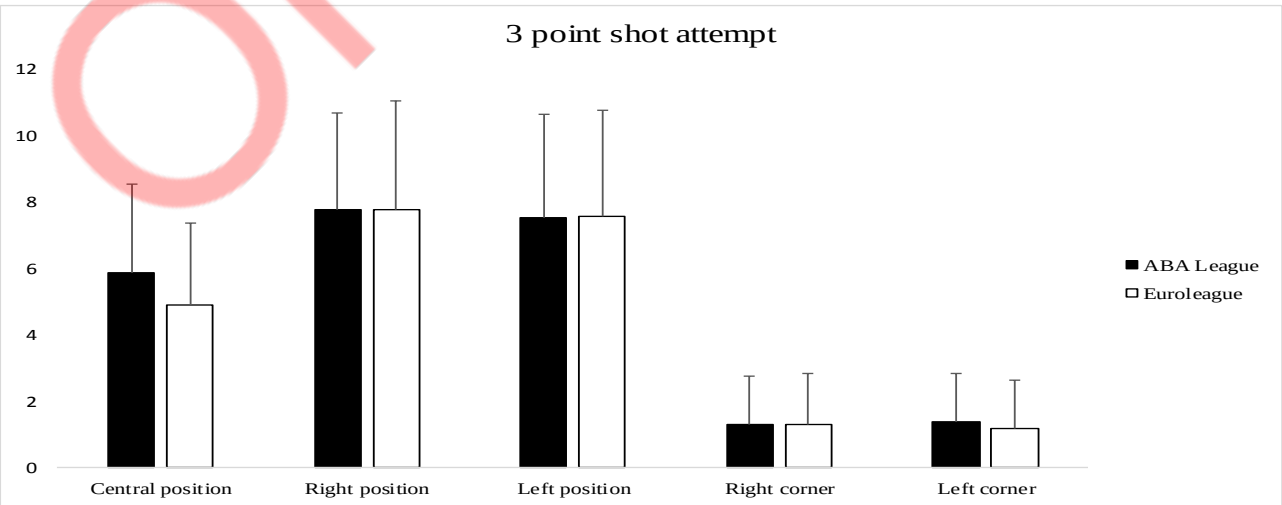
Data on shooting positions and shooting efficiency were collected from shooting charts, available on the official websites of both competitions. Data were collected by notational analysis (García et al., 2013) of two independent observers (ICC=0.984), taking into account data on a shot attempt and shot made for 2 and 3 points after which the percentage efficiency was calculated for each individual position. Shot positions for 3 points are divided into 5 individual spaces: Central position, Right position, Left position, Right corner, and Left corner. This division has been adjusted in relation to the work of Hie and Gao (2016). In addition to that division, the position of shots for 2 points was divided similarly, but in 4 individual spaces: Central position outside the key, Right position outside the key, Left position outside the key, and shots inside the key.

Statistical analysis

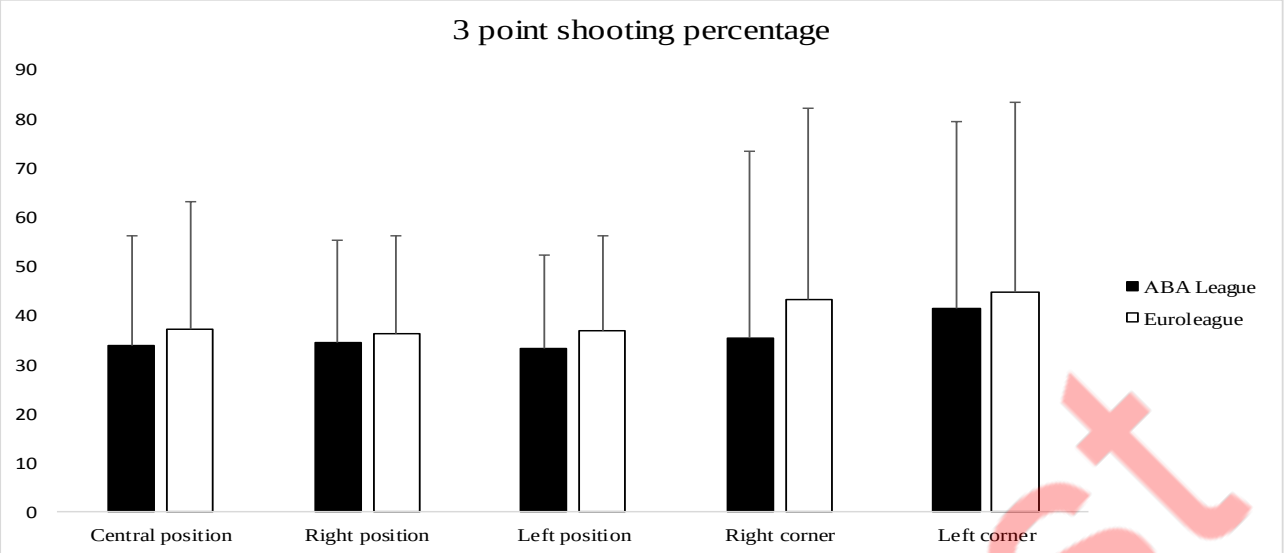
The collected data were analyzed by the descriptive statistics method and examination of differences. To examine the differences, a T-test for independent samples was applied for each individual variable, with the limit for determining differences set to 95% ($p<0.05$). Excel 2016 and SPSS v.26 were used for data collection and analysis.

RESULTS

The results of descriptive statistics of shot attempts and 3-point shooting efficiency are shown in Graphs 1 and 2.



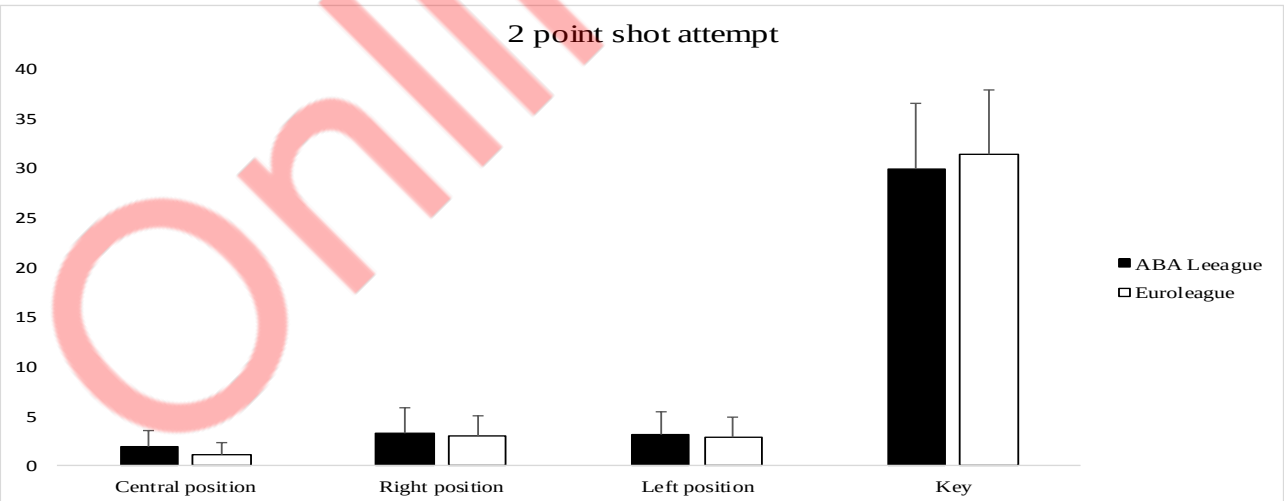
Graph 1. Descriptive statistics of 3-point shot attempts within the ABA League and Euroleague



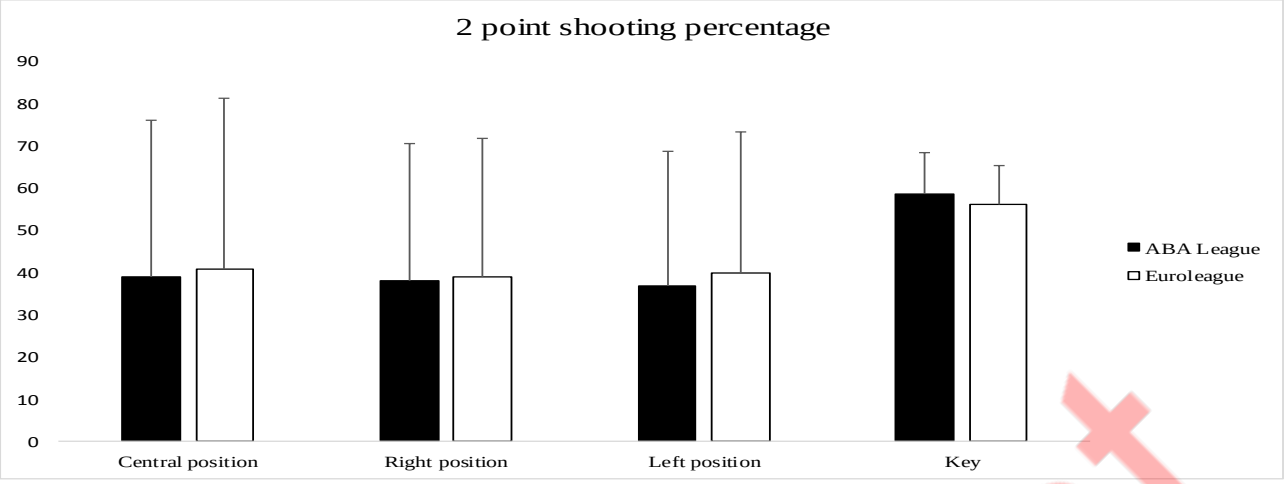
Graph 2. Descriptive statistics of 3-point shooting percentage within the ABA league and Euroleague

The results show that in both observed leagues, the largest number of 3-point shots is performed from the right and left position, and the least number of shots from the right and left corners of the court (Graph 1). Additional analysis showed that there are statistically significant differences between the observed positions, except between the right and left positions and the positions of the right and left corners (ABA league, F=590.762, p<0.000; Euroleague F=783.648, p<0.000). A larger number of 3-point attempts can be noticed from the central and left corner positions of the teams from the ABA league, while approximately the same number of shots were sent from the other 3 positions. When it comes to the efficiency of the 3-point shots, on graph 2 it can be seen that there is the greater efficiency of the Euroleague teams from all observed positions.

The results of descriptive statistics of shot attempts and the percentage of shot efficiency for 2 points are shown in Graphs 3 and 4.



Graph 3. Descriptive statistics of 2-point shot attempts within the ABA League and Euroleague



Graph 4. Descriptive statistics of 2-point shooting percentage within the ABA league and Euroleague

When it comes to the 2-point shot attempts, it is clear that the largest number of shots was taken from the key in both leagues (Graph 3). Additional analysis showed that there are significant differences between all observed positions, except between the right and left positions (ABA league, F=4180.624, p<0.000; Euroleague, F=7759.101, p<0.000) On the same graph, a slightly larger number of shots was taken from the central position by the ABA league teams, while the Euroleague teams took a greater number of shots from the key. The values of the standard deviation are lower within the Euroleague in all positions, which may indicate greater consistency when it comes to the number of 2-point shots.

When it comes to the 2-point shooting efficiency, it can be seen that there is greater efficiency of Euroleague teams from the central, right, and left positions, while teams from the ABA League are more efficient in 2-point shooting from the key (ABA League, F=64.639, p<0.000; Euroleague F=49.765, p<0.000) (Graph 4).

The results of the analysis of differences, obtained by applying the T-test for independent samples are shown in Tables 1 and 2.

Table 1. T-test results for independent samples for shot attempts between the ABA League and the Euroleague

T-test for independent samples

Dependent variable: shot attempt					
3 point	Sum of Squares	df	Mean Square	F	Sig.
Central position	158.970	1	158.970	24.893	0.000
Right position	0.013	1	0.013	0.001	0.971
Left position	0.565	1	0.565	0.056	0.813
Right corner	0.037	1	0.037	0.016	0.900
Left corner	8.178	1	8.178	3.853	0.050
2 point					
Central position	113.596	1	113.596	58.539	0.000
Right position	12.215	1	12.215	2.525	0.113
Left position	8.292	1	8.292	1.805	0.179
Key	418.249	1	418.249	9.775	0.002

Based on the results obtained by applying the T-test, it was noticed that ABA league teams take more 3-point shots from the central position (p<0.000) and 2-point shots from the central position (p<0.000), while Euroleague teams shoot more from the position of the key (p=0.002). Regardless of the fact that the ABA league teams take a greater number of 3-point shots from the left corner, this difference is not statistically significant (p=0.050).

Table 2. Results of the T-test for independent samples for the percentage of shot efficiency between the ABA league and the Euroleague

T-test for independent samples

Dependent variable: Shooting efficiency					
3 point	Sum of Squares	df	Mean Square	F	Sig.
Central position	1871,581	1	1871,581	3,077	0,080
Right position	539,092	1	539,092	1,316	0,252
Left position	2481,470	1	2481,470	6,657	0,010
Right corner	6285,597	1	6285,597	4,203	0,041
Left corner	1079,057	1	1079,057	0,728	0,394
2 point					
Central position	385,648	1	385,648	0,252	0,616
Right position	139,815	1	139,815	0,129	0,719
Left position	1642,168	1	1642,168	1,526	0,217
Key	1073,955	1	1073,955	11,616	0,001

Although Euroleague teams are more efficient in 3-point shooting from all positions and most positions by 2 points compared to ABA league teams, this difference is significant only from the 3-point left position (p = 0.010) and the 3-point position from the right corner (p=0.041) (Table 2). The only position from which the ABA league teams are more efficient is the shot for 2 points from the key and that difference is statistically significant (p=0.001).

DISCUSSION

In this paper, the distribution and efficiency of shooting in the ABA basketball league and the Euroleague in the 2018/2019 season are analyzed. The distribution of shots in a large number of cases describes the offensive ideas of teams and most often varies depending on the quality of the players and the level of competition (Čaušević, 2015; García et al., 2013). Therefore, regardless of the league, the tendency for shots is to be taken either close to the basket, i.e. from the key, or to take 3-point shots, from the central, right, and left positions, and to a lesser extent from the right and left corners. A smaller number of 2-point shots outside the racket (central, right and left position) may indicate that attackers without the ball rarely stop in an open space, and attackers with the ball more often choose to penetrate to the basket or pass to a free teammate in position for 3 points or close to the basket. Additionally, this may indicate an offensive idea for teams to shoot more from a 3-point position than from a 2-point position outside the key because those points are worth more.

When it comes to the difference in the shooting distribution between the ABA League and the Euroleague, it can be seen that the ABA League teams took more shots from the central position, by 2 and 3 points, while the Euroleague teams took more shots from the key. These differences indicate different offensive strategies and may be the consequence of different types of defense. Additional video analysis of the competition activity could more precisely determine whether this is a consequence of the offensive strategies of the teams or simply the individual choice of players in relation to the current situation and their quality. Therefore, Euroleague teams most often apply the on-ball screen on the left and right side of the court outside the 3-point line, so that the player dribbling the ball directs the attack towards the middle of the court (Marmarinos et al., 2016). This leaves the possibility for the player using the screen to take a shot from the central position or to penetrate to the basket, whereby he can pass the ball to another player who opened towards the basket after the screen. In addition, he can pass the ball to other teammates who are usually behind the 3-point line. The largest number of shots from this type of cooperation is performed by the player for whom the screen is set, in 42.85% of cases, while the attacker who sets the screen performs the shot in 21.96% of cases (Marmarinos et al., 2016). It is important to emphasize that players in the Euroleague more often take shots from the key, which include penetrations to the baskets, so it can be assumed that players in

the Euroleague after on-ball screen more often penetrate to the basket than shoot for 2 points outside the key and shots for 3 points than ABA League players.

This may indicate there is a better defense in the key by Euroleague players compared to ABA League players. Considering that in both leagues, the largest number of shots was taken from the key, it can be concluded that the number of shot attempts is a more important factor than shooting efficiency when it comes to success in competition. It should be noted that certain changes in the rules also affected the variety and the shooting efficiency. Moving the 3-point line surprisingly affected the slight increase in the number of 3-point shots and their efficiency (Ibáñez et al., 2018). In addition, it is important to note that the relatively small number of 2-point shots from positions outside the key can be a consequence of new trends when it comes to the analysis of the shooting structure (Shortridge et al., 2014), as well as a consequence of greater team discipline. Greater team discipline is reflected in a better selection of shots as well as in the patience of the players in order to reach the best possible position for taking the shot (Strumbelj et al., 2013).

Although the statistical analysis in this paper indicates significant differences, real results, observed on the basis of descriptive statistics, do not indicate that these differences are significant in real conditions. However, the obtained data indicate a certain trend when it comes to the distribution of shots, both within the regional (ABA) and within the continental competitions (Euroleague).

The significance of this research would be reflected in the possibility of improving shooting from certain positions on the field. Modern requirements of the competition, especially of the top-quality leagues, such as the Euroleague and the ABA League, where teams play a great number of matches annually, leave little time for training. In this regard, improving shooting from the positions from which they are most often taking the shot during the game would greatly contribute to the efficiency of the training process and leave room for the development of other abilities. Of additional importance would be the impact on changing trends when it comes to the shooting distribution, with coaches focusing on those offensive actions in which players come into shooting positions inside the key or behind the 3-point line.

CONCLUSION

The aim of this research was to examine the shooting distribution and efficiency in the ABA basketball league and the Euroleague in the 2018/2019 season. For the purposes of this research, data were collected by notational analysis from the official websites of both leagues. Regardless of the league, the tendency is for shots to be taken either close to the basket, i.e. from the key, or to take 3-point shots, from the central, right, and left positions. Euroleague teams are more efficient in 3-point shooting from the left position and the position of the right corner, while ABA league teams are more efficient in shooting from the key. No difference in efficiency was noticed in the shot from other positions. Additional video analyzes are needed to more precisely explain the differences obtained, both in terms of distribution and in terms of shooting efficiency. The results of this research can be useful in optimizing the training process.

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