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Analysis of the Influence of Factors Affecting Offensive Rebounds in Elite Basketball

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Abstract. *The aim of the study was to analyze the influencing factors of efficiency increase due to observation of the position, activity and number of players fighting for rebounds. Rating situations were noted in all the games of the top eight teams in Euroleague 2015/16. The Kruskal-Wallis and Mann-Whitney tests were used to demonstrate the differences between variables and logistic regression in order to find the most influential factor that definitely determined whether the rebound was captured by an attack or defender. The effectiveness of offensive actions from the actions started with offensive rebounds was higher than from offenses after change of possession. The higher the efficiency, the higher the efficiency of shooting and the greater number of forced free throws. The number of attacking players who participated in the rebound was identified as the most important factor that affected the effectiveness of offensive recovery. However, the most optimal offensive recovery was found for the active participation of three players. The lack of boxing in the defense was often mentioned for the observed teams, which contributed to an effective offensive rebound of guards and forwards. Current research results support a better understanding of effective offensive recovery and allow the development of a theoretically developed strategy for an abusive recovery strategy.*

Keywords: Logistic regression, insulting recovery tactics, increasing efficiency, effectiveness of shooting.

Introduction

Bounce is one of the most important elements of basketball. Receiving offensive rebounds creates more opportunities for clogging and, therefore, helps to increase the effectiveness of using the ball. However, defensive recovery is also an important component of successful work, because it prevents the opponent from retrying the shot. Previous studies using archival data have shown that an effective defensive rebound has a positive effect on team success. In addition to the defensive recovery, Csataljay et al.[1] also showed the significance of the offensive rebound. The rebound from several authors led to the requirement of a more detailed video analysis of the situation rebounds. For example, Ribas et al.[2] rated the rebounds using video analysis after the events to help players anticipate the direction of the ball after missed shots.

According to Krause et al.[3], every basketball coach must create his own rebound philosophy, especially in crime, to increase effectiveness. Coaches must determine which players should take part in the offensive rebound and which

[1] G. Csataljay, N. James, M. Hughes, et al., "Performance differences between winning and losing basketball teams during close, balanced and unbalanced quarters," in *J Hum Sport Exerc,* VI (2012), p. 356–364.
[2] R. L. Ribas, R. Navarro, F. Tavaresm F, et al., "An analysis of the side of rebound in high level basketball games," in *Int J Perform Anal Sport,* XI (2011), p. 220–226.
[3] J. V. Krause, D. Meyer, J. Meyer, *Basketball skills and drills,* Leeds, Human Kinetics, 2008.

players must return to the security position. Trninic and Dizdar[4] analyzed the criteria for different game positions and determined the increased role of centers and power ahead and the average role for forwards in insulting rebound. Protective goggles and shooting were less important for offensive rebounds. Additional information on developing an offensive team rebound strategy and cooperation between players can also be found in various training textbooks that discuss the transition from crime to defense. Some coaches offer a commonly used abusive rebound concept in which three attacking players move to a restricted area forming a triangle and the other player turns to a shallow security position between a free throw and three points, while the fifth player returns to deep security on semi-trailers. Finding a balance between players in recovery and security is an important aspect insulting recovery strategies. Therefore, it is reasonable to consider two players in deep safety positions against sports and fast teams, who often try to conduct quick breaks. However, the analysis of frequencies or the success of tactics of abusive recovery and its potential for improving the rebound are unexplored areas of performance analysis in basketball.

The overall objective of this study was to determine the factors that contributed to a successful offensive recovery, and to find the differences between winning and losing teams during the matches of the best European club teams in 2015/16.

Observing the position, activity and number of players active for a rebound can help to understand the reasons for successful performance. Moreover, the consequences obtained from the results can become the basis for developing a theoretically grounded, rational strategy of the team, which increases the chances of selection.

Material & methods

The data was collected by the Focus X2 performance analysis software by monitoring the viewing of events and designations from all 20 games in which the top eight teams participated in the men's Euroleague competition in 2011/12. The teams qualified for "Top-8" were divided into four pairs based on their final position in the previous round. In the quarterfinals, the play-off method was used from the five best games (CSKA - Bilbao Basket 3-1, Montepaschi Siena - Olympiakos Piraeus 1-3, Panathinaikos Athens - Maccabi Tel Aviv 3-2, FC Barcelona - UNICS Kazan 3-0). Teams that reached three wins won the series and ended up in the "Final Four" tournament, which was organized with two semi-finals, a bronze match and a finale. Game videos were downloaded from the official website of the Euroleague (www.euroleague.tv). The recording of data was limited solely to the crimes against organized protection that ended with attempts to shoot, and to restore the situation after the missed free throws. Observation of 20 games allowed including 2336 shots and 1223 rebound situations. Based on the starting point of the offenses, the shots were classified as crimes after changing

[4] S. Trninic, D. Dizdar, " System of the performance evaluation criteria weighted per positions in the basketball game," *Coll Antropol,* XXIV (2000), p. 217–234.

possession of the ball between teams and offenses after offensive rebounds. The distance and the results of the shots were observed for each shot. Also, such process variables as the use of an abusive recovery triangle, the number of active attackers, the superiority of defenders, the position of the defector and previous boxing activities were noted.

Results

Effectiveness of offenses after offensive rebounds and after change of possession

It was found that shooting from crimes that began with an offensive rebound (n = 294) was more effective (Table 1) and was conducted more often with close shots from the 3 restricted area than from crimes after change of possession of the ball (n = 1935) Almost two thirds (65%) of attempts to shoot due to offenses after an offensive rebound were carried out at close range, in contrast to 45.3% of the crimes that began after the change of possession of the ball (U = 564100,5, z= 3, p <0.001), Higher effectiveness of shot attempts due to insults after rebounds (U = 228107,5, z = 3,3, p <0,01) can be determined by higher-speed distribution of successful shots, successful attacks followed by further forced free throw and free throws, taking into account the total number of shots other than free throws (n = 2163), 54.92% for successful shots from offenses after offensive rebounds, and for other cases - only 41.92%. This difference was found statistically significant by the Mann-Whitney test (U = 542072.5, z = 4.0, p <0.001). Use tactics of abusive recovery. Observation of 20 games allowed to fix 1223 rebound situation. Table 2 shows that the organized cooperation of players based on the offensive recovery triangle was recognized only for 211 cases (17.2%). The offensive rebound of the triangle was formed at 14.2%, and the triangle was widened with a shallow and deep security position in only 3.0% of the rebound cases. Two observed tactics led to similar successes (p = 0.925). The appearance of an offensive recovery triangle in the game significantly increased the effectiveness of offensive rebound compared to other player positioning (U = 92917,0, z = 3.7, p <0.001).

Table 1. Distribution of variables for offences after getting offensive rebounds and after possession change.

	Category	Offence after offensive rebound (%)	Offence after possession change (%)
Distance of shots	2 pt close	65.0	45.3
	2 pt mid-range	10.5	19.6
	3 pt	24.5	35.0
Result of shots	Successful	46.6	37.0
	Successful þ free throw	2.7	1.9
	Free throws	10.2 7	.0
	Offensive rebound	15.3 1	6.1
	Defensive rebound	25.2	38.0

Table 2. Distribution of observed tactics and offensive rebounding efficiency.

	Category	Distribution within variables (%)	Offensive rebounding efficiency (%)

Offensive	Other	82.8	28.3
rebounding	Triangle	14.2	40.5
tactics	Triangle-1-1	3.0 4	1. 4

Number of players participating in the rebound

The most frequently used number of attackers actively participating in the rebound was two (44.9%), while three players participated in 27.4% of cases (Table 3). Testing the influence of the number of attacking players who tried to bounce off the Kruskal-Wallis criterion showed significant differences (24 = 37.08, p <0.001). Mann-Whitney Manchester tests did not reveal any differences in the effectiveness of the attack when the number of players increased from 1 to 2 (p = 0.088), but a significant increase was found between two and three participating attacking players (U = 83240.0, z = 2.9 ; p <0.01). The increase in the number of players above three did not lead to a statistically significant increase in attack efficiency (p = 0.606). Teams in the defense could organize 87.6% of recovery situations in the superiority of players. Increased superiority significantly influenced the effectiveness of the rebound (2 4 = 27,27, p <0,001). The effectiveness of the defensive rebound was significantly higher when the number of defenders was increased from equality to one player (U = 24244.0, z = 2.0, p <0.05) and from two to three players (U = 48808.0; z = 2.0, p <0.05).

Offensive effectiveness of the rebound after shots from different distances

The highest level of attack efficiency (34.3%) was achieved after attempts within the restricted access zone, and the lowest speed was detected after medium-range shots (28.6%). However, the offensive effectiveness of the rebound after the free throws was significantly lower than after the close (U = 17670.5, z = 3.5, p <0.01), the two-point average range (U = 11371.0, z = 2.3, p <0.05) or three-point shots (U = 21716.0; z = 3.0; p <0.01). In Table 3 only the images from the field for the distribution of the shot distances were shown, since only the missed ones allowed to scan from free throws.

Presently presented results suggested that the use of an offensive rebound of the triangle and the use of an optimal number of attacking players will increase the probability of restoring offensive rebounds. On the other hand, an excellent number of defenders also increased the effectiveness of the defensive rebound.

Logistic regression using the input method was performed to evaluate the effect of three variables on the probability of whether the rebound was collected by an offensive or defensive player. Testing of multicollinearity did not reveal significant interrelations between predictor variables. Therefore, the variables were compared with the assumptions of logistic regression. The logistic regression model, which includes three independent variables (the use of the re-triangle tactics in the attack, the number of attackers participating in the rebound, the superiority of the defenders) was statistically significant (x^2_3 = 35.60, p <0.001). This meant that, based on three variables, the model was able to determine the distribution of offensive and defensive selections. The model correctly classified 69.4% of the results of the recovery situations with 1,223 shot attempts. Of the three

independent variables, only the number of active attackers contributed a statistically significant contribution to the model (Table 3). The odds ratio of the number of attackers was 1.36. This indicated that the participation of an additional striker in the rebound caused the team of the offensive team to return 1.36 times more chances.

Table 3. Results of logistic regression.

	B	SE	Wald	df	Sig.	Odds ratio	95% CI for odds ratio	
							Lower	Upper
No. of offensive players	.305	.112	7.378	1	.007	1.356	1.089	1.690
Superiority of defenders	.121	.092	1.747	1	.186	.886	.740	1.060
Strategy	.067	.190	.125	1	.723	1.070	.737	1.552
Constant	1.309	.350 T	13.989	1 .	000	.270		

The positions of the players and the use of boxing techniques in the rebound.

Table 4 shows that 62.7% of the 311 observed offensive rebounds were collected by attacking players who were not discarded by all defensive players. Offensive bounces collected by the centers and power forwards were obtained after quitting the game, and the wrestling accounted for 49.7% of the total, and forwards arriving from outside positions received 67.3% of their offensive rebounds without interfering with the activity of defenders. The most unexpected percentages were found for guards who were not burdened in 94.2% of cases, when they picked up rebounds in an attack.

Table 5. Crosstabulation of offensive rebounder's positions and previous defensive activity.

	After box out		Without box out		Total	
	Count	%	Count	%	Count	%
Position of rebounder						
1–2	4	5.8	65	94.2	69	100.0
3	16	32.7	33	67.3	49	100.0
4–5	96	49.7	97	50.3	193	100.0
Total	116	37.3	195	62.7	311	100.0

Differences between winning and losing scores

Discussion

The importance of winning an offensive selection is well known among basketball experts, because it means that the Tab offers one more opportunity to score, and defensive players with more physical and mental pressure because of the extra time spent on defense. One of the most important results of this study was the discovery that crimes after offensive rebounds were more effective than after the change of possession between the two opponents. The results of this analysis

showed that offensive rebounds had a positive impact on the team's performance. More effective completion of crimes started with offensive rebounds was revealed from higher interest rates of shooting and a higher number of cases of violent shooting. Significantly higher interest rates for firing performed after offensive rebounds are not consistent with the results of Tavares and Santos, 11 who determined lower interest rates for firing after offensive rebounds when six games of junior women's games were analyzed. Nevertheless, Tavares and Santos did not use statistical testing of differences between samples, only frequencies and percentages were used; so the statistical significance in their study was not reported. However, the more frequent emergence of shots from close range, perhaps, contributed to the achievement of a more successful team work after offensive rebounds.

Conclusions

The results of current research indicate the high importance of offensive selection. It was concluded that the offensive teams achieved significantly better shooting efficiency and suffered more fouls after offensive rebounds than offenses after change of possession.

Analysis of the aggressive strategies of the team's rebound, apparently, is a negligible area of effectiveness analysis in basketball. The current study showed that the use of tactics of the team significantly increased the effectiveness of offensive rebound, but the best European club teams rarely used offensive restoration of tactical cooperation during the observed matches. The number of offensive players participating in the rebound was identified as the most important factor that affected the effectiveness of offensive rebound. It was recognized that the participation of three active hitters is the best strategy for the rebound. The lack of boxing in the defense was often mentioned for the observed teams, which contributed to an effective offensive rebound of guards and forwards. The results can help to better understand the effective offensive rebound and enable the development of a theoretically developed attack strategy of the team.