BASIC CHARACTERISTICS OF OFFENSIVE MODALITIES IN THE EUROLEAGUE AND THE NBA

Aleksandar Selmanović[1], Dario Škegro[2] and Dragan Milanović[2]

[1] University of Dubrovnik, Croatia
[2] Faculty of Kinesiology University of Zagreb, Croatia

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Abstract
This paper presents fundamental structural features of basketball offense in professional basketball. Offensive categories were classified on strict operational definitions and evaluated according to their type, duration, a method of its beginning and finishing action. The analysis was done separately for Euroleague and the NBA offensive models. Using a sample of 5718 entities, the results showed many similarities between the European and American basketball among which should be emphasized the equal pace and dynamics of the game. The differences between the two analyzed models can be seen in unbalanced distribution of basic types of offenses, their particular beginning and tactical variants of their finish.

Key words: *basketball offense, notational analysis, professional basketball*

Introduction

The study of structural characteristics of certain activities presents a vital part of sport kinesiology. The results of structural analysis contribute to determination of current top performance model. It also provides the connection between the sports activity parameters with the success in the competition (Milanović, 1999). A research review in the field of basketball shows vast possibility of explicit objectives, purposes and methodological approach to evaluating the phase of offense in basketball game (Cruz and Tavares, 1998; Tavares and Gomez, 2003; Bazanov, Haljand and Vohandu, 2005; Bazanov, Vohandu and Haljand 2006; Ortega et al., 2007; Refoyo, Romaris and Sampedro, 2009; Mavridis et al., 2009; Theoharopoulos et al. 2010). Considering the different operational definitions of applied variables used among these studies, it is evident that offensive types in basketball are not unified which creates an obstacle for general systematization of offensive stage in the game. Offensive features are determined and analyzed through their dynamic characteristics, particular type of their beginning and finishing modalities, standardly present elements of techniques and tactics, and the measures of their productivity. From the kinematic point of view, Trninić, Perica, and Pavičić (1994) provided a formal mathematical model for desricption of "basketball game". The model describes two basic states which are defined and categorised as: position and transition.

Problem and aim

This study evaluates the three basic types of offense recognized in the game of basketball: set offense, transition offense and *other* (remaining) offenses, including their respective modalities. Set offenses are operationally defined as offensive attacks which contain only the set (positional) phase or the ones consisted of transition and position but in that case the phase of position has a longer duration than transition phase (SO > TO).

The division of set offense is determined according to attacked defensive setup: *set offense on "man to man" defense* (SO-MM) and *set offense on the zone defense* (SO-ZD). Transition offenses are defined as offenses consisted of a transition state or combination of transition and positional phase, however, the duration of positional phase is generally shorter than the duration of the transition state (SO < TO). According to their structure, in this study it is classified three different types of transition offenses: primary, secondary and early offense. Since the restrictions of offensive phase are defined in accordance with the game rules, there are types of offenses that, according to their structure, cannot be classified as any of the above types therefore they fall into category *Other offenses.*

These are usually offenses resulting in a quick turnover, offenses finished with a *put-back* after offensive rebounds without setting positional offense or offenses that are initiated by inbounding the ball followed by a quick shot (within 3 seconds of the play). The aim of this research is to determine the incidence and main characteristics of offensive modalities and certain technical and tactical characteristics expressed in absolute and relative values, as well as to assess whether the European and NBA basketball display significant differences according to the aforementioned setups.

Methods

Sample of entities
The entity in this study represents offensive phase and its limitations are not defined by the change of ball possession, but by the rules of the game of basketball. A total sample of 5718 entities was collected via complete evaluation of 30 randomly selected games of playoff basketball in 2010 / 2011 season, 15 of which were played in the Euroleague (n = 2604) and 15 in the American NBA (n = 3114).

Sample variables
Offense types - frequency of set offense, transition and other offenses and their modalities (1. Type of beginning of offense; 2. Type of finish - final technical and tactical players' maneuver, 3) Offense duration - time in seconds which the team spends in the offensive phase

Data processing
Methodological processing based on the descriptive parameters of relative value involve comparison of the European and American models of play. Within qualitative variables, χ^2 test was applied, while for determining the differences in quantitative variables we used t-test for independent samples. Analysis of the variables was performed using Match Analysis System (MAS) software which supports video analysis and an adequate tool for notating target characteristics and it has proven to meet the strict reliability requirements (Skegro, 2013). The data was analyzed using Statistica 8.0 statistical package.

Results and discussion

Analysis of the distribution of the basic types of offense in the European and American basketball (table 1) revealed that approximately 2/3 of offenses in basketball (68.4% in the Euroleague; 65.5% in the NBA) is consisted of set offenses. The dominant presence of set offense underlines the relevance of this segment in the situational team preparation because the quality of implementation of this type of offense will ultimately have the most significant effect on the final result of the match. The structure of set offense allows organized and pre-planned technical/ tactical game elements.

Table 1. The representation of basic types of offenses in the European and American basketball

	Euroleague (freq.)	NBA (freq.)	Euroleague%	NBA %
SO	1780	2041	68.36%	65.54%
TO	392	630	15.05%	20.23%
OO	432	443	16.59%	14.23%
	Chi square 28.128; df = 2; p = 0.000			

SO - set offense, TO - transition offense, OO - other offenses

On the other hand, the share of transition offense is much lower, however, such attacks have the highest efficiency (Tsamourtzis et al., 2005), which indicates a tendency towards creating a larger number of transitions. Due to its structure, characterized by unpredictable and spontaneous circumstances, transition offenses are less susceptible for preparation thus concentration should be directed to its initiation with high intensity defense whose primary objective is to ensure defensive rebound or a steal, and in accordance with situational circumstances, its proper and auspicious start. The difference in the frequency of transition offense between the European and American models (15.1% in the Euroleague; 20.2% in the NBA) mostly contributed to a statistically significant difference *(chi square 28.128, p = 0.00)* in the representation of basic offense types.

According to the results, American style of basketball can be characterized as a game with a higher tendency of fast-beaks, and such tendency has a positive effect on overall efficiency. Using a general overview of the distribution of basic offense types we can conclude that these results are to some extent different from those in previous researches *(Fotinakis et al., 2002; Tavares and Gomez, 2003),* which may primarily be explained by different offense classification. However, referent studies did not include *other offenses* category, and such offenses were integrated in two basic offense types (set and transition offenses).

Table 2. The differences in positional offense types between the European and NBA

Positional offense	Euroleague (freq.)	NBA (freq.)	Euroleague %	NBA %
S-MM	1 714	2 029	96.29	99.27
S-ZD	66	15	ožu.71	0.73
	Chi2 = 40.588 df = 1 p = 0.000			

S-MM - set offense on *man to man* defense; S-ZD - set offense on zone defense

According to the frequency percentage of set offense modalities we can clearly see the central representation of set offense on *man to man* defense (table 2). More than 96% of offenses in the European and 99% of offenses in American basketball fall into this category. Negligible presentation of zone defense in American professional basketball is justified by the restrictions in the rules - *defensive 3-second violation.* The consequence of such a situation causes statistically different presentation of positional offenses between the two types of basketball ($\chi^2 = 40.588$, $p = 0.000$). Nevertheless, even European model proves that defensive strategies in playoff matches are primarily focused on defending individual offensive players rather than defending a particular area collectively. Zone defense often proves to be risky because it opens up more space for the offensive team and gives it the opportunity to take open shots from the outside and grab offensive rebounds, which quality teams, like those researched in this study, know how to use to their advantage and this may explain the low representation of zone defense.

Table 3. Distribution and differences in transition offensive types between the European and American professional basketball

Transition offense	Euroleague (freq.)	NBA (freq.)	Euroleague %	NBA %
Primary	116	174	29.59	27.62
Secondary	122	195	31,12	30.95
Early	154	261	39.29	41.43
	Chi2 = 0.607 df = 2 p = 0.7383			

Chi square - Chi-square test value; df - degrees of freedom; p - level of significance

Using relative indicators of representation modalities of the transition offense it has been established that there are no significant differences in the distribution of primary, secondary and early counter-attacks between the observed basketball models *(chi square 0.61, p = 0.74).*

The distribution of transition offense subtypes is much more balanced than in the case of set offense while the comparison of their frequencies in the NBA and the Euroleague show proportional values. Primary and secondary fast-breaks represent approximately 30% of all transitions each.

The most common type of transition offense is *early offense* (approximately 40%). Unlike primary and secondary transitions, early offense may include a set phase element including its own tactical component, which can be initially treated as a separate category of basic offense. Although the typical finishing formation of early offense is 5 : 5, prompt realization of these attacks is mainly caused by inadequately set (established) defense. High frequency and efficiency coefficient of the early offense creates a tendency to take advantage of opportunities given by inadequately set defensive formation to achieve quick and easy points (Selmanović, 2015).

Table 4. The difference in the types of offense beginnings between the European and American top basketball

Types of offense beginnings	Euroleague (freq.)	NBA (freq)	Euroleague%	NBA %
TP	1,062	1,387	40.78	44,54
IB	1,542	1,727	59.22	55,46
	Chi2 = 8.177 df = 1 p = 0.0042			

TP – beginning by regaining ball possession on court; IB – beginning by inbounding the ball;

Table 5. The difference in offense beginnings modalities between the European and NBA

Offense beginnings modality	Euroleague (freq.)	NBA (freq)	Euroleague%	NBA %
OL-SO-SI	532	722	20.43	23.19
OL-SN-SI	191	232	7.33	7.45
OL-UL	229	303	8.79	9.73
OL-SO-EN	67	73	2.57	2.34
OL-PL	15	16	0.58	0.51
OL-ISB	13	34	0.50	1.09
OL-SN-SL	15	7	0.58	0.22
UL CL-AR	1 013	1 312	38,90	42,13
UL BL-PN	197	215	7.57	6.90
UL-BL-PO	163	175	6.26	5.62
UL CL-PN	120	22	4.61	0.71
UL BL-NE	49	3	1.88	0.10
	Chi2 = 159.407 df = 11 p = 0.0000			

Chi square - the value of Chi-square test; df - degrees of freedom; p - level of significance

The analysis of offense initiation in professional basketball (table 4) showed that most offenses start by inbounding the ball (59.2% in the Euroleague; 55.5% in the NBA), and that is primarily the case from behind the base line (UL CL-AR - 38.9% in the Euroleague; 42.1% in the NBA), then behind the sidelines on the offensive part of the court (UL BL-PN - 7.6% in the Euroleague, 6.9% in the NBA) and the sidelines on the defensive part of the court (UL-BL-PO - 6.3% in the Euroleague, 5.6% in the NBA). Beginning of offense by regaining the ball possession on court occurs in 40.7% of instances in the Euroleague and 44.5% in the NBA.

A review of related modalities shows that it is mainly actualized by defensive rebound after an unsuccessful field goal attempt (OL-SO-SI - 20.4% in the Euroleague; 23.2% in the NBA), followed by steals (OL-UL - 8.8% in the Euroleague; 9.7% NBA) and offensive rebound after an unsuccessful field goal attempt (OL-SN-SI - 7.3% in the Euroleague, 7.5% in the NBA). Although the value of 12 set modalities of offensive beginnings in the European and American professional basketball is highly correlated, recorded deviations generate statistically significant differences *($\chi^2 = 8.177$; $p = 0.004$).* Regaining ball possession by a defensive rebound or a steal have a clearer characteristic in the NBA basketball, with results in the creation of a higher number of fast-breaks, and consequently the greater representation of inbounds behind the base line, as a result of a received basket. Intentional technical and tactical actions prior to offensive execution are evident in set offenses, but also present in *early* offenses, therefore those types created a category for revising the finishing actions. Results show that 73% - 78% of offenses contain planned and constructive finish. However, the rest (22% - 28%) show no intentional action primarily due to atypical situational circumstances *(other offenses).* Out of total of eight defined finishing actions and two belonging to the category of *Other offenses,* the results showed that 57 - 63% of the finishes in basketball is accomplished via one of the following actions: playing *1 : 1 facing the basket, pick and roll*, *cut* or *spot-up*.

Table 6. The difference in offense finish type between the European and NBA

Finish	Euroleague (Freq.)	NBA (freq.)	Euroleague %	NBA %
1: 1 FB	320	532	13,55	19,37
1: 1 BB	186	162	7.87	5.90
P & R	393	419	16.64	15.25
P & P	22	48	0.93	1.75
SWOB	129	152	5.46	5.53
SU	363	449	15.37	16.35
PB	102	104	4,32	3.79
HO	34	42	1,44	1.53
CUT	282	337	11,94	12.27
OF	531	502	22,48	18.27
	Chi2 = 53.742 df = 9 p = 0.0000			

1: 1 FB - Playing 1: 1 facing the basket; 1: 1 BB - playing 1: 1 back to the basket; P & R - *Pick and roll; P&*P - Pick & Pop; SWOB – screening the player without the ball; SU – spot-up; PB – Put-back after offensive rebound; HO - handoff; CUT – cut towards or away from the basket; OF - Other finishes

The comparison of applied finishing actions between the European and American basketball models proves significant differences. American professional basketball demonstrates significantly greater implementation of *1 : 1 facing the basket,* and slightly higher representation of *spot-ups*, *cuts, screening the player without the ball, pick & pop*s and *handoffs.* Although it is obvious the high frequency of *pick and roll* plays in this model*,* such playa are slightly more prevalent in the European basketball what proves a high orientation of screen plays in this model. Looking in general, the European basketball recorded similar distribution regarding the share of finishes.

Table 7. Descriptive parameters and analysis of the difference in offense duration within the European and American basketball

Offense duration	Euroleague (freq.)	NBA (freq.)	Euroleague AM	NBA AM	Euroleague SD	NBA SD	t-value	df	p
S-MM	1 713	2 027	15,02	14.82	4.6599	4.5443	1.15	3738	.2471
S-ZD	66	15	14.71	15,34	4.3085	3.8110	-0.48	79	.6261
T-P	115	174	4.12	3.97	1.5405	1.4179	1.18	287	.2384
T-S	122	195	6.27	6.23	1.9919	1.7470	0,21	315	.8333
T-E	154	261	9.16	9.28	1.9452	1.9436	-0.57	413	.5658

S-MM - set offense on *man to man* defense; S-ZD - set offense on zone defense; T-P - primary transition offense; T-S - secondary transition attack; T-E - early offense; AM – arithmetic mean, SD - standard deviation, t-value - t-test value, df - degrees of freedom, p – signif. level

However, along with *pick and roll,* this model demonstrates a slightly higher representation of *1: 1 back to the basket* variant while the remaining deficit is compensated by the modality *Other finishes,* which is majorly comprised of *Put-backs after offensive rebounds* and *Other finishes*. Evaluation of offense duration is often taken into account in order to determine the pace of the game and serves as a criterion in the analysis of quantitative and qualitative performance of technical and tactical elements in offensive actions. The analysis of relative indicators of the total number of entities shows that the average duration of offense in the Euroleague is 11.98 seconds, i.e. 4.3 attacks per minute which is almost equivalent to 11.73 seconds, i.e. 4.3 attacks per minute in the NBA. This proves that the difference in transition between offense and defense is not statistically significant *(t-value = 1.52, p = 0.13).*Set offense demonstrates the longest duration in basketball featuring tactical solutions against set defense.

According to the values of arithmetic means and standard deviations (table 7) there is no significant difference between the European and American basketball. According to the structure of the transition offense (mode of initiation, progress and content elements and realization) differences in the duration of a particular modality were expected. However, as in the case of set offense, *t-test* results confirmed that the duration of the transition does not constitute a factor by which the European and American professional basketball differ significantly. Since slight variations in the duration have no practical significance, the orientation towards any differences should be oriented more on constitutive factors of set offenses, such as details and the finesse of game tasks, evaluation of team and individual tactics and evaluation of the elements of basketball technique with respect to realization timeline.

Conclusion

This research contributes to clearer understanding of structural characteristics of the European and American basketball models. It allows experts a more precise insight into the complexities of certain types of basketball offenses based on variables *beginning, type and finish.* Result synthesis identifies many similarities between the American and European professional basketball. Among them, especially needs to be emphasized the equal dynamics in changing the ball possession, statistically equal duration of all observed offense types, high dominance of set offenses on man to man defense and proportional internal distribution of transition offenses which claims that there is no tendency towards specific fast-break type within observed models. American professional basketball is comparatively characterized by: higher representation of transition offenses; higher frequency of regaining possession on court; higher frequencies of finishes by: 1 to 1 facing the basket, spot-up, and slightly greater representation of the following forms: "pick-and-pop", cut, after received screen and after handoff. European professional basketball is characterized by more set offenses and offenses that belong in the category of *other offenses,* furthermore, more set offenses on zone defense; greater representation of offense beginnings by inbounding the ball; greater representation of the following finishing actions: *pick and roll,* 1 to 1 back to the basket and put-backs. Results present products of specific situational characteristics of the European and American basketball models which are affected by a combination of objective factors. First of all, there is no doubt that the characteristics of each model are to a large extent the consequences of differences in the rules of the game, and they are mainly caused by socio-economic aspects which aim at maximizing the attractiveness of the game.

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TEMELJNE ZAČAJKE NAPADAČKIH MODALITETA U EUROPSKOJ LIGI I NBA LIGI

Sažetak

Rad prezentira određena strukturna obilježja košarkaškog napada u vrhunskoj košarci. Napadi su kategorizirani na temelju striktno postavljenih operacionalnih definicija, te analizirani prema svojoj vrsti, trajanju, načinu početka i vrsti završne akcije te je sukladno tome napravljena usporedba Eurolige i NBA lige. Na uzorku od 5718 entiteta, rezultati su pokazali mnoge sličnosti između dva analizirana sustava među kojima treba izdvojiti podjednaku dinamičnost igre. Razlike u europskoj i američkoj košarci mogu se očitovati u neujednačenosti raspodjele osnovnih vrsta napada te načinima na koji su inicirani kao i taktičkim varijantama njihovog završetka.

***Ključne riječi**: napad u košarci, notacijska analiza, profesionalna košarka*

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Correspondence to:
Dario Škegro, PhD.
Faculty of kinesiology
University of Zagreb
10000 Zagreb, Horaćanski zavoj 15, Croatia
Phone: +385 (1) 3658 656
Email: dario.skegro@kif.hr