ORGINAL SCIENTIFIC PAPER

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PARAMETERS OF A SITUATION ACHIEVEMENT AS INDICATORS OF SHOOTER EFFICIENCY IN A BASKETBALL

SUMMARY:

In the research, which subject was the situation indicators of basketball efficiency, regression analysis was applied in order to determine the impact of the predictor system of 18 variables of situational efficiency on the criterion variable of the total percentage of shots in the match. The sample in this research was 29 basketball matches, KK Budućnost from Podgorica (Montenegro) played in the ABA League for the 2017/18 season. The obtained results have determined that the predictor system with almost 100% of success predicts the outcome of the overall efficiency of the percentage of shots at the match. Individually speaking, it was concluded that the effectiveness of the shots in the match will solely depend on the parameters of the situational efficiency of one, two and three points shot. Also, it was concluded that other parameters for monitoring the situational efficiency in basketball, provided by FIBA, have no impact on the analyzed criterion variable. In general, it could be concluded that for KK Buducnost from Podgorica, in the season 2017/18 the offense was the best defense.

Key words: *Situational efficiency, basketball, shot, regression analysis*

1. INTRODUCTION

Basketball is a team game in which a player can help his team primarily by improving his own technique and abilities. It requires unselfish integrations of individual qualities in a team game with the inalienable importance of technically correct performance of the basic elements of basketball technique that, once mastered, connect in complex movement structures during training and matching (Wissel, 2004).

As in all sports disciplines, in basketball, the goal of the game is to win the opponent respecting the rules of fair play. In order for the final result of the game to be favorable, ie to win, it is necessary that the whole range of factors, both individuals and the team as a whole, be best aimed at achieving that result. Most of the factors, especially those endogenous (anthropological abilities and characteristics), can be successfully controlled and possibly predicted through sporting achievement, while exogenous factors that influence the result in top sport (the importance of the game, fans, climatic factors, time, etc.) in the smaller measures can be predicted. The coordination of these factors, or the very performance of a basketball team, can be seen through the team's situational efficiency within the framework of the statistics of the match. Thanks to modern technology, as well as improving the monitoring of situational efficiency parameters, both the individual and the team as a whole, it is possible to see which parameters most influenced the final results to be favorable in terms of winning or unfavorable in terms of defeat. The standard indicators of situational basketball efficiency, prescribed by FIBA, are the subject of research in this paper. The problem of work is reflected in determining the influence of particular situational indicators on the criterion variable that makes up the final percentage of the total shooter efficiency. Researches with similar issues are increasingly present in the scientific community, because the obtained results can contribute in the direction of emphasis on

particular segments in the training process. Ćeremidžić and Delić (2016) determined differences in situational efficiency between the teams in the Euroleague and NBA league and concluded that the quality of NBA league teams was best seen through the performance of the defense jump, the total jumps and the number of attempts to throw the ball into the basket for two points, while teams from Euroleague were best characterized by three points shot. Korjenic, Varešlija, Vučić and Spahalić (2013) came to similar results, and found that representations participants of the 2012 Olympic Games in London, which had a better percentage of two-point shots, more jumps accomplishments in the defense phase, more assists, more steal balls and more personal fouls, also had better placement on the Olympic Games. Šeparović, Pojskić and Užičanin (2010) found that the statistically significant impact on the final result of the matches at the European Championship for Cadets (B Division) have three variables; the number balls for two points thrown into the basket in the game, the number field goals for three points, and the number of attempts to throw the ball into the basket from the free-throw line.In accordance with the above mentioned problematic and the subject of research, the aim of this research was to determine the influence of the predictive system of situational efficiency variables on the criterion variable of the total percentage of the shooter efficiency in the match.

2. METHOD OF THE WORK

2.1. Sample of examinee

The sample in this survey presents 29 basketball matches, KK Budućnost from Podgorica, Montenegro. All KK Budućnost matches were played in the ABA League in the 2017/18 season. In the mentioned season, KK Budućnost was the champion of the competition for the first time since the founding of the ABA League. In a total score of 29 games, in 22 matches KK Budućnost was a winner, while in 7 matches it was defeated.

2.2. Sample of variables

The situation or action efficiency, according to Trninić (1996), comes from registration of events during the basketball game, thus gaining performance indicators during the game, as well as the parameters belonging to the tactical responsibility, engagement, behavior of the players and the team and other parameters interesting for the analysis of basketball game.

In the analyzed sample of 29 games, the influence of 18 variables (indicators) of situational efficiency as a set of predictor variables, on the criterion variation total, percentage of the effectiveness of the shots in the match was analyzed, as a criterion variable (TOTALS).

The predictor set consisted of the following variables: a successful shot from the free throw line (SLBACA), a total of attempts of shot from the free throw line (SLBACP), a percentage of the success of shot from the free throw line (SUT1PO), a successful two-point shot (SUT2PU), a total of attempts of two-point shot (SUT2PP), a percentage of the success of two-point shot (SUT2PO), a successful three-point shot (SUT3PU), total attempts of three-point shot (SUT3PU), a percentage of the success of three-point shot (SUT3PO),defense jump (SKOODB), offense jump (SKONAP), assists (ASISTE), steal balls (UKRADL),lost balls (turnovers) (IZGUBL), personal fouls (LICNEG), fouls by the opponent (FAULPR), blocks (BLOKAD), opponents blocks (BLOKPR).

The set of predictor variables is defined by FIBA, as a set of indicators of the situational efficiency of the basketball team. The values of the statistical parameters of situational success were taken from the official ABA League website, for KK Budućnost from Podgorica (http://www.aba-liga.com/KK.php?id=12).

2.3. Data processing methods

In order to obtain the basic statistical parameters of the set, the data collected were first processed at the level of descriptive statistics, where the arithmetic mean, Minimum and Maximum Result (Min./Max.), Standard Deviation (Standard Dev.), Standard Error of arithmetic mean (Std. Error) and variance (Variance) were determined.

In order to determine the influence of the predictor set of variables on the criterion variable, the total percentage of the efficiency of the shot at the match (TOTALS), regression analysis was applied. All data is processed in the statistical program Statistics SPSS 20.0.

3. THE RESULTS AND DISCUSSION

The table chart no. 1 shows the results of descriptive statistics for the criterion and predictor set of variables. Based on the results of the arithmetic mean for the criterion variable, the total percentage of the efficiency of the shot at the match (TOTALS), it is concluded that the efficiency of the shot was 46.96%. The highest score was for two-point shot with a percentage of 53.71%. It can be noted that high efficiency in two-point shot was achieved and slightly higher compared to similar studies where the performance of two-point shot was 45.9% on the sample of representations participants of the 2012 Olympic Games (Varešlija, 2014) and 50.85% on the sample of representation participants of the European Championship 2017(Subotić and Ćeremidžić, 2017). The smallest percentage of the efficiency was of three-point shot, with a percentage of 37%, which is almost identical to the percentage with teams from Euroleague for half-season 2016/17, where the percentage for three-point shot was 37.22 (Ćeremidžić and Delić, 2016). The percentage of shots from the free throw line was 55.60% and is the smallest compared to similar researches where the percentage was 58.22% (Varešlija, 2014) or even 68.70% (Korjenic et al., 2013).

Table chart 1. Descriptive statistical parameters of analyzed variables

Variables	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
TOTALS (dependent)	29	33.90	59.10	46.9621	1.08914	5.86518	34.400
SLBACA	29	5.00	27.00	18.2759	1.05734	5.69396	32.421
SLBACP	29	9.00	36.00	23.9310	1.29125	6.95358	48.352
SUT1PO	29	55.60	90.50	75.9069	1.60771	8.65778	74.957
SUT2PU	29	9.00	29.00	18.6897	.80348	4.32686	18.722
SUT2PP	29	26.00	47.00	34.7586	1.06287	5.72373	32.761
SUT2PO	29	32.10	71.40	53.7138	1.68638	9.08145	82.473
SUT3PU	29	4.00	19.00	8.8966	.59626	3.21097	10.310
SUT3PP	29	15.00	37.00	23.9655	.85455	4.60188	21.177
SUT3PO	29	16.70	69.60	37.1828	2.08346	11.21979	125.884
SKOODB	29	15.00	30.00	22.8621	.78270	4.21497	17.766
SKONAP	29	2.00	15.00	7.5862	.62089	3.34362	11.180
ASISTE	29	7.00	30.00	14.6552	.91414	4.92280	24.234
UKRADL	29	2.00	12.00	6.5862	.50004	2.69281	7.251
IZGUBL	29	6.00	15.00	10.2069	.44217	2.38117	5.670
LICNEG	29	16.00	29.00	20.7931	.59840	3.22246	10.384
FAULPR	29	14.00	30.00	23.3448	.75148	4.04683	16.377
BLOKAD	29	.00	6.00	2.7931	.34161	1.83963	3.384
BLOKPR	29	.00	6.00	1.8276	.27214	1.46553	2.148

From table chart no. 1 it is characteristic to point out that KK Budućnost, on average per game, had similar number of personal fouls as the teams that played against it in relation to 20.79-23.34 personal fouls per match. The defense jump was on average much more dominant than the offense jump (22.86-7.58), which is mostly the case in all basketball matches. However, the values of efficiency of offensive and defensive jumps on average are considerably higher compared to a similar survey on a sample of basketball teams participating in the 2008 Olympic Games in London, where the average of jumps was 6.35-14.12 in favor of a defense jump (Džajić, Drljević and Kovačević2009).

Based on the analysis of the obtained data in Table charts 2 and 3, it was found that a high coefficient of determination was obtained (R Square .999) and that the determination coefficient is at a statistically significant level (Sig. .000) In accordance with the above results, it is noted that the predictive system of variables related to situational efficiency in basketball, with almost 100% explaining the criterion variable, the overall percentage of the efficiency of the shot at the match. Such a high level of determination is not surprising, since in the analyzed predictor variable of situational efficiency all the anthropological characteristics and abilities of each player are shown, as well as the technical tactical preparation of the players and the team as a whole. In other words, everything that is the subject of transformational processes through training is manifested through analyzed situational efficiency parameters. A high level of coefficient of determination (R Square .998) was also obtained in the research Šeparović et al. (2010), as well as in the research of Varešlija (2014), where the coefficient of determination was .927.

Table chart 2. Coefficient of determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999[a]	**.999**	.997	.33119

Table chart 3. Statistical significance of the model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	962.111	18	53.451	487.291	**.000[b]**
	Residual	1.097	10	.110		
	Total	963.208	28			

By analyzing the individual determinations of the predictor variables on the TOTALS criterion variable, it was found that the 7 predictor variables had a statistically significant impact. The largest standardized Beta coefficient (Beta .668), or the greatest single impact on the TOTALS criterion variable, made the variable a successful shot for two points SUT2PU. Positively and at statistically significant level (Sig. .004), the effect of the percentage variable of the success rate of the 2-point SUT2PO score (Beta .384) as well as the percentage of the success of the shot from the free throw SUT1PO (Beta .178) is achieved. The variable of the total attempt of 2-point SUT2PP score also had a statistically significant effect (Sig. .001) on the dependent variable TOTALS, however, it is a negative sign (Beta = - .326). We can conclude that all attempts to score 2 points which were not successful influenced the negative sign of the standardized Beta coefficient. This can be especially noted if it is already defined that successful 2-point shots positively and to a large extent determine the criterion variable (Beta .668). All variables related to the 3-point shot parameters have made a statistically significant impact on the dependent variable TOTALS. The positive effect on the dependent variable TOTALS had the variables of a successful shot for 3 points SUT3PU (Beta .529) and the total percentage of the shot for 3 points SUT3PO (Beta .348), while the variable of total attempts of the 3-point SUT3PP shot had a negative impact Beta -.390), so here and in the case of variables of total attempts of 2-point SUT2PP points, it can be concluded that all unsuccessful attempts of 3-point shots influenced negatively on the TOTALS criterion variable.

All variables, which were not related to the efficiency of the shot (SKOODB, SKONAP, ASISTE, UKRADL, IZGUBL, LICNEG, FAULPR, BLOCK and BLOKPR), as well as the free throw line shot variables SLBAC and the total attempt of the shot from the free throw line SLBACP, did not have statistically significant influence on the dependent, ie the criterion variable the total percentage of the efficiency of the shot at the match (TOTALS).

Table chart 4. Beta coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	17.451	6.334		2.755	.020
SLBACA	-.427	.213	-.415	-2.003	.073
SLBACP	.332	.161	.393	2.065	.066
SUT1PO	**.121**	**.043**	**.178**	**2.787**	**.019**
SUT2PU	**.905**	**.214**	**.668**	**4.229**	**.002**
SUT2PP	**-.334**	**.122**	**-.326**	**-2.739**	**.021**
SUT2PO	**.248**	**.068**	**.384**	**3.647**	**.004**
SUT3PU	**.966**	**.258**	**.529**	**3.745**	**.004**
SUT3PP	**-.498**	**.115**	**-.390**	**-4.335**	**.001**
SUT3PO	**.182**	**.051**	**.348**	**3.568**	**.005**
SKOODB	-.014	.027	-.010	-.501	.628
SKONAP	-.062	.052	-.036	-1.190	.261
ASISTE	.020	.039	.016	.497	.630
UKRADL	-.018	.030	-.008	-.613	.554
IZGUBL	.014	.049	.006	.282	.784
LICNEG	-.059	.038	-.032	-1.529	.157
FAULPR	-.010	.053	-.007	-.193	.851
BLOKAD	-.006	.051	-.002	-.118	.909
BLOKPR	.053	.060	.013	.886	.396

4. CONCLUSION

By applying regression analysis the influence of the predictor system of the situational efficiency variables on the criterion variable the total percentage of the effectiveness of the shot at the match TOTALS has been determined, which was the aim of this research. Based on the obtained results, it was established that the predictive system of 18 variables at a statistically significant level influences the dependent, ie the criterion variable TOTALS with almost 100% impact (R Square .999).The obtained results suggest that with a high percentage of security it is possible to predict the overall shooter efficiency in the game, analyzing the applied variables of situational efficiency as predictor variables. Individually, 5 variables (SUT1PO, SUT2PU, SUT2PO, SUT3PU, SUT3PO) achieved statistically significant and positive influence on the criterion of the variable, while the variables SUT2PP and SUT3PP had a negative impact. All other variables of situational efficiency did not have a statistically significant effect on the TOTALS variable. Based on the individual analysis of the influence of the predictor system of the variables of the situational success on the criterion variable, the total percentage of the efficiency of the shot at the game TOTALS, it can be concluded that the efficiency of the shot for three and two points largely determines the result of the match, or the overall efficiency of the percentage of shots. According to the obtained results and the fact that no prediction variable except for variables directly related to the shot, did not affect the criterion variable TOTALS, it can be generally concluded that for the KK Budućnost from Podgorica, the offense was the best defense in the 2017/18 season.

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