DIFFERENCES BETWEEN SUCCESSFUL AND UNSUCCESSFUL BASKETBALL TEAMS ON THE FINAL OLYMPIC TOURNAMENT

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Abstract

The aim of the study was to find out global quantitative differences between successful and unsuccessful teams, which had played on the Olympic basketball tournament, in twenty two standard and derived statistical indicators of situational efficiency. The research was performed on the sample of 37 matches, so that 74 different statistical samples have been included in analysis. Data were collected by means of statistics patterns provided by official FIBA web site www.fiba.com. A discriminative analysis has been conducted in order to track down possible differences between two groups of the teams. One statistically significant discriminative function has been obtained. The values of canonical correlation are pretty high, which is to say that the 22 statistical parameters make very good difference between successful and unsuccessful teams, but also that there were big differences between the groups. The obtained results show that assists, parameters of shooters' field goal efficiency, defensive rebound and number of points made by bench players are variables that make the most significant difference between victorious and defeated teams. The reason for big differences between the victorious and defeated national teams that participated on the final Olympic basketball tournament in Beijing is probably because they highly differentiated in technical, tactical and physical conditioning, what is conditioned by participation of various quality national teams that come from different continents and countries, where basketball leagues are not so good.

Key words: *FIBA statistics, discriminative analysis, team efficiency*

Introduction

Basketball maybe is not the most popular sport in the world, but for sure is one of the most dynamic. It attracts attention, not only of ordinary public and funs, but also scientists and sport experts. During the game, as a result of 24 second rule, there are a lot of defensive and offensive actions that make basketball teams and players to be physically, technically, psychologically and tactically well prepared. Very often a winner is not known till last second of a match, but sometimes, in the other hand, it is very easy to see which team will be more successful only after few minutes of a match.

What makes difference between successful and unsuccessful teams was the subject of many studies on different level of competition; from the best basketball league in the world, American NBA, to the countries' basketball leagues. Previous researches, conducted on elite basketball games by Gómez et al., 2008; Đurković et al., 2005; Ibáñez et al., 2008; Karipidis et al., 2001; Pojskić, 2006, 2007; Šeparović et al., 2007, 2008; Trninić et al. 2002, tried to determine which game-related statistical parameters discriminate winning from defeated basketball teams. The other studies carried out in order to find out correlation between some game related parameters and win-loss record.

Melnick (2001) tried to find, based on five NBA seasons, a relationship between team assists and team success. The aim of our research was to; based on 22 game-related parameters, determine differences between successful and unsuccessful basketball teams on Olympic tournament in Beijing. We consider the Olympic tournament the best place to see the world top national teams, and therefore the best basketball performance, but also there are some national teams which are usually not good enough and cannot properly resist to other teams. Those teams typically come from Africa and Asia and their participation on Olympic Games aims to promote basketball in their countries, but very often at the expense of low quality matches with domination of one team over other. We wanted to determine are there really big differences between the national teams. That is the reason we chose the game-related statistics from the tournament to find out what discriminate winning from defeated teams on high level basketball matches.

Methods

The research has been conducted on the sample of 37 matches, so that 74 different statistical samples (the tournament official box scores) have been included in analyzing. Twenty two variables of standard and "derived" statistical indicators of situational efficiency have been analyzed.

Data were collected by means of statistics patterns provided by official FIBA web site www.fiba.com. Dependent (criterion) variable was win-loss record. The other examined variables consisted of 22 independents; 17 standard indicators of game-related statistical parameters and 5 derived (parameters that can be calculated or seen from the official games statistics). The standard variables included: A-FT-PTS – a number of free throw attempts, M-FT-PTS – a number of made free throws, FT % - a percentage of realized free throws, A-2-PTS - a number of two points attempts, M-2-PTS - a number of made two points shoot, 2P-% - a percentage of realized two points shoot, A-3-PTS - a number of three points attempts, M-3-PTS - a number of made three points shoot, 3P-% - a percentage of realized three points shoot, AS – a number of assists made by a team, ST – a number of steals made by a team, TO – a number of turnovers, BS – a number of shoot blocks made by a team, PF – a number personal fouls made by a team, DEF-REB – a number of defensive rebounds made by a team, OFF-REB – a number of offensive rebounds made by a team, REB-TOT – a number of total made rebounds. The derived variables included FORCED-F – a number of personal fouls made by an opponent team, START-PTS – a number of scored points by starters, BENCH-PTS – a number of scored points by non-starters, SCORERS – a number of scorers during a match, NUMB-PLY – a number of players who played in a match.

Results

Table 1 and 2 show standard and derived game-related descriptive parameters of defeated and winning teams (mean, standard deviation, minimum and maximum values). As it obvious successful teams have higher values of almost all "positive" variables. Especially they have higher number of realized shoots for one, two and three points; more defensive rebounds and assists, as well as, lower number of steals, turnovers and personal fouls. Also, successful teams are better in all "derived" statistical parameters, i.e. winning teams have used more players in the matches, they have more players that scored during the games, also starters and rest team are more efficient and they forced opponent teams to commit more fouls then defeated teams.

To find out possible differences between the defeated and winning teams, we conducted canonical discriminative analysis. The analysis is usually used to investigate differences between groups and to determine the most parsimonious way to distinguish between groups, as well as to discard variables which are little related to group distinctions. It is more superior then some other analyses because it doesn't have any limitations regarding number of variables and groups, and also it deals with global differences (all variables) and in same time takes care of variables' inter correlations.

Table 1. Standard FIBA statistical parameters (descriptive statistics)

DEFEATED TEAMS						SUCCESSFUL TEAMS					
Variables	N	Mean	Std.d.	Min	Max	Variables	N	Mean	Std.d.	Min	Max
M-2-PTS	37	**17.62**	4.76	7	30	M-2-PTS	37	**23.41**	5.58	15	33
A-2-PTS	37	37.86	6.93	24	57	A-2-PTS	37	40.57	7.41	26	57
2P-%	37	**46.43**	8.06	29	60	2P-%	37	**57.84**	9.35	37	81
M-3-PTS	37	7.51	2.97	2	16	M-3-PTS	37	9.16	2.74	4	14
A-3-PTS	37	22.7	4.85	13	31	A-3-PTS	37	22.41	4.78	14	32
3P-%	37	32.92	10.99	12	64	3P-%	37	41.14	11.07	24	75
M-FT-PTS	37	14.32	6.11	1	28	M-FT-PTS	37	16.05	6.32	3	35
A-FT-PTS	37	19.3	7.41	4	37	A-FT-PTS	37	21.84	8.01	3	44
FT-%	37	72.65	16.20	25	100	FT-%	37	73.46	13.87	25	100
OFF-REB	37	10.24	2.98	4	16	OFF-REB	37	10.51	3.93	6	20
DEF-REB	37	**21.46**	4.44	13	35	DEF-REB	37	**26.24**	5.06	19	38
REB-Tot	37	31.7	5.88	19	47	REB-Tot	37	36.51	7.24	26	57
AS	37	**10.7**	3.64	4	21	AS	37	**15.97**	4.03	8	24
PF	37	21.16	5.10	12	34	PF	37	20.32	4.69	10	31
TO	37	16.49	4.96	9	28	TO	37	13.41	3.71	6	25
ST	37	6.84	2.94	2	13	ST	37	9.59	4.11	3	19
BS	37	2.03	1.54	0	6	BS	37	3.22	1.67	0	7

Table 2. Derived FIBA statistical parameters (descriptive statistics)

DEFEATED TEAMS						SUCCESSFUL TEAMS					
Variables	N	Mean	Std.d.	Min	Max	Variables	N	Mean	Std.d.	Min	Max
NUMB-PLY	37	10.78	0.947	9	12	NUMB-PLY	37	11.3	0.968	9	12
FORCED-F	37	20.35	4.832	10	31	FORCED-F	37	21.05	4.994	12	34
BENCH-PTS	37	24.76	11.524	4	57	BENCH-PTS	37	36.59	15.653	8	62
START-PTS	37	47.35	11.134	27	67	START-PTS	37	53.22	12.942	21	83
SCORERS	37	8.78	1.828	4	12	SCORERS	37	9.59	1.499	6	12

Table 3. Eigen value

Function	Eigen	%	Cum.%	Can.Corr.
1	1.899	100	100	0.809

Table 4. Wilk's lambda

Function	Wilks'	Chi-2	Df	Sig.
1	0.345	64.926	22	0

Table 5. Group centroids

GROUPS	Function 1
1 (defeated teams)	-1.359
2 (successful teams)	1.359

Table 6. Structure matrix

Teams	Variables	Function 1
SUCCESSFUL TEAMS	AS	.505*
	2P-%	.481*
	M-2-PTS	.410*
	DEF-REB	.370*
	BENCH-PTS	.317*
	ST	.284
	3P-%	.274
	BS	.273
	REB-Tot	.268
	M-3-PTS	.212
	NUMB-PLY	.197
	START-PTS	.179
	SCORERS	.178
	A-2-PTS	.139
	A-FT-PTS	.121
	M-FT-PTS	.102
	FORCED-F	.053
	FT-%	.043
	OFF-REB	.029
DEFEATED TEAMS	TO	-.259
	PF	-.063
	A-3-PTS	-.023

*Structure coefficients ≥ .30

Table 7. Classification matrix

	Succ.teams		Def.teams		Total
Succ.Teams	91, 9 %	34	8,1 %	33	37
Def.Teams	10, 8 %	4	89, 2 %	3	37

Thirty four, out of 37, successful teams were well classified, which is 91.9%, whereas thirty three, out of 37, defeated teams were well classified, which is 89.2%. The obtained classification percentages are higher than some obtained in previous researches that dealt just with standard parameters. These results confirm very high discriminative value of the chosen game-related parameters and it is recommended to be used in some similar future studies.

Discussion

The results from tables 3 and 4 show that there obtained one statistically significant (.00) discriminative function. The value of the canonical correlation of the function is pretty high (.809), so we can say that, based on twenty two basketball game-related variables we used in this research, we can discriminate the groups. The canonical correlation value is 0.809 so that 0.809 x 0.809 x 100 = 65 % of the variance in the discriminative function scores can be explained by groups' differences. The results from table 5 show the position of group centroids at the function of twenty two basketball situational efficiency variables. The positive pole is represented by successful (winning) teams and negative pole by unsuccessful (defeated) teams. The positive pole i.e. successful teams (table 6) is mostly defined by variables for offensive and shooting efficiency (AS, 2P-%, M-2-PTS, DEF-REB, BENCH-PTS), while negative pole is defined by variables number of turnovers, number of personal fouls, and number of three points attempts. We marked by stars the structure coefficients (SC) that are higher than .30. As it previous mentioned the obtained value of the canonical correlation (Rc) of the function is pretty high (.81), and it is higher than the canonical correlations obtained in similar studies conducted by Trninić, 2002 (Rc .71), Šeparović, 2007 (Rc .79), Pojskić, 2007 (Rc .79), so we can say that there are higher differences between successful and unsuccessful teams in this study i.e. between national teams from different continents, that participated in the final Olympic basketball tournament, than between teams that played in some national leagues or continental championships. This is understandable because in the final Olympic tournament participate the best national teams from different continents, but the fact is that some national teams from Africa or Asia are not as good as some national teams from other continents (Europe and South and North America) that had traditionally excellent basketball leagues and therefore very quality national teams. The game related variables that most contribute to groups' differences are situated on the positive pole of the function, i.e. belong to successful teams. The variable AS - a number of assists made by a team, is one that most contribute to groups' differences. The successful teams made more assists per game than unsuccessful teams. The defeated teams made 10, 7, while winning teams made 15, 97 assists per game, what is 33 % more assists made by successful teams. This fact we can explain by good team homogeneity, that is usually product of well done preparation period (sometimes it lasts for two months or more), which is extremely important for national teams' preparation where players come from different teams and need a time to adjust their way of play to rest of teammates. Also, a number of assists can be a product of aggressive offensive tactics with a lot of players penetrations that produce big number of open shots or "easy points" (slum dunks or lay ups). However, we consider that this dominant number of assists made by winning team is primarily a result of big

number of fast breaks that produce a bigger number of offensive players in particular action what leads to "easy points". Melnick (2001) in his research corroborated a relationship between team assists and win-loss record in the NBA. His results suggest how a basketball team scores points ("assisted team points") are more important than the number of points it scores. The fast breaks are mostly a result of successful defensive rebounds as a parameter of a good and well organized team defense. The results show that defensive rebound (DEF-REB) highly contributed to teams' discrimination with SC .37. The winning teams made 26, 24 defensive rebounds per game, opposite of 21, 46 rebounds made by the defeated teams, what is approximately 20 % less. In addition, an efficient team defense and defensive rebounds provide an excellent foundation for setting team offence, especially fast breaks which provide a lot of opportunities for "easy points" or open shots, without proper defense. A higher number of defensive rebounds, made by successful teams, made them available to have a greater two points percentage (2P-%; SC .481) and a bigger number of made two point shoots (M-2-PTS; SC .410). The successful teams had for 20 % better two points shoot, as well as, they scored for 26 % more two point shots. Our assumption is that this greater number of two point shoots percentage is mainly determined by bigger number of realized primary fast breaks. This is probably consequences of a huge technical, tactical and physical conditioning differences between teams played on the tournament. In addition to this statement are results obtained by Trninić et al. (2002). They documented no differences in number of assists and made two point shoots among top quality basketball teams in final tournaments of European club championship. Đurković et al. (2005) found no contribution of number of made field goals and assists on discrimination of highly ranked teams in first Croatian basketball league. Gómez et al. (2008) on sample of 306 games from the 2004-2005 regular season of the Spanish Men's Professional League found that variables that best differentiate winning and losing teams in unbalanced games (final score differences above 12 points) were number of made two point shoots, number of defensive rebounds and number of assists, while variable defensive rebounds is one that best discriminate teams in balanced games (final score differences equal or below 12 points). What is more interesting Simović & Komić (2008) on sample of 204 matches from three different World basketball championship established regressive model to find out game related variables that influence the final result at the matches. They concluded that the most obvious parameters that influenced the final results are the efficiency of two and three point shots and free throws.

Also, number of points scored by players from bench (nonstarters) was a good parameter for discriminating two groups. Namely, the winning teams' nonstarters scored more points than nonstarters from the defeated teams. This confirms thesis that successful teams had a bigger number of quality players i.e. they had "a longer bench". These results are compatible with work conducted by Sampaio, J. Et al. (2006) who found that, in best teams, the nonstarters' performance was worse in the games that the team lost, whereas in worst teams, it was the starters' performance that was worse in the games that the team lost.

Conclusion

Twenty two chosen basketball game-related statistical parameters (standard and derived) were good predictor for discriminating successful and unsuccessful teams that played on final Olympic basketball tournament in Beijing. The obtained differences are higher than differences got in previous studies. The biggest contribution to the teams' discrimination had variables: defensive rebound, two point percentage, a number of made two point shoots, a number of assists and nonstarters' points. On the basis of the obtained results: the high discriminative correlation value, the variables that contributed to teams' differences and the previous researches, we concluded that the reason for big differences between the victorious and defeated national teams that participated on final Olympic basketball tournament in Beijing is probably because they highly differentiated in technical, tactical and physical conditioning, what resulted with strong defense of successful teams, and therefore a bigger number of defensive rebounds, as a precondition for realization of high number of fast breaks, assists and "easy points" (lay ups, slum dunks, open shots).

These kinds of basketball matches, where some teams dominate over others, result with a big number of attractive actions, but there is not any uncertainty for audience i.e. they finished with big result's differences, very often the victorious teams scored for twenty or thirty points more than the defeated teams. An importance of a good team defense and defensive rebound on the highest level of basketball performance has been confirmed by this paper as a main condition for brilliant offensive transition. According to this study and the previous studies, it can be concluded that among diverse quality basketball teams exists differences in a number of made two point shoots, two point percentage and a number of assists, but among quite equal teams (that play in national leagues, clubs championships, or intercontinental competitions) some other game-related statistic parameters differentiate them.

Literature

Đurković, T., Gjergja, D., Marelić, N., Antekolović, Lj., & Rešetar, T. (2005) The analysis of two groups of basketball teams based on the situational parameters of the game. *Proceedings of 4th International Scientific Conference on Kinesiology*, Opatija, pp. 466-469.

Gómez, M.A., Lorenzo, A., Sampaio, J., Ibáñez, S.J., & Ortega E. (2008) Game-related statistics that discriminated winning and losing teams from the Spanish men's professional basketball teams. *Coll. Antropologicum, 32*(2): 451-456.

Ibáñez, S., Sampaio, J., Feu, S., Lorenzo, A., Gomez, M., & Ortega, E. (2008) Basketball game-related statistics that discriminate between teams' season-long success. *Eur J Sport Science, 8*(6): 369-372.

Karipidis, A., Fotinakis, P., Taxildaris, K., & Fatouros, J. (2001) Factors characterizing a successful performance in basketball, *J of Human Movement Studies, 41*(5): 385-397.

Melnick, M.J. (2001) Relationship between team assists and win-loss record in the national basketball association. *Perceptual and Motor Skills, 92*(2): 595-602.

Pojskić, H. (2007) Šta je razlikovalo pobjedničke od poraženih ekipa na evropskom košarkaškom prvenstvu u Španiji 2007? /In Bosnian/. *FIS komunikacije XIII,* Niš:FFK.

Pojskić, H. (2006) Razlike učinka igrača U.K.K. Student u određenim statističkim pokazateljima u prvom i drugom dijelu sezone /In Bosnian/. *Sport, 2*(3): 46-50.

Sampaio, J., Godoy, S.I., & Feu, S. (2004). Discriminative power of basketball game-related statistics by level of competition and sex. *Perceptual and Motor Skills, 99*(3): 1231-1238.

Sampaio, J., Ibáñez S., Lorenzo. A., & Gómez, M. (2006) Discriminative game-related statistics between basketball starters and nonstarters when related to team quality and game outcome and game outcome. *Perceptual and Motor Skills, 103*(2):486-494.

Simović, S., & Komić, J. (2008) Analysis of influence of certain elements of basketball game on finalresult based on differetiant at the XIII, XIV and XV World Championship. *Acta Kinesiologica, 2*(2): 57-65.

Šeparović, V. (2007) *Uspješnost košarkaških ekipa u prostoru situacionih pokazatelja primarnog tranzicijskog i pozicionog napada* /In Bosnian/. (Dissertation). Tuzla: Fakultet za tjelesni odgoj i sport.

Šeparović, V., & Nuhanović, A. (2008) Latent structure of standard indicators of situational effectiveness in basketball in Bosnian league 6. *Sport Scientific And Practical Aspects, 5*(1-2): 13-18.

Šeparović, V., & Nuhanović, A. (2008) Nonstandard indicators of the offensive effectiveness in basketball and successfulness of basketball teams. *Sport Science, 1*(2) 7-11.

Trninić, S., Dizdar, D., & Lukšić, E. (2002) Differences between winning and defeated top quality basketball teams in final tournaments of European club championship. *Coll. Antropologicum, 26*(2): 521-531.

RAZLIKE IZMEĐU USPJEŠNIH I NEUSPJEŠNIH KOŠARKAŠKIH MOMČADI NA ZAVRŠNOM OLIMPIJSKOM TURNIRU

Sažetak

Cilj istraživanja je bio da se na osnovu dvadeset dva standardna i izvedena statistička parametra situacijske učinkovitosti otkriju globalne kvantitativne razlike između uspješnih i neuspješnih timova koji su igrali na završnom olimpijskom turniru za košarkaše u Pekingu. Istraživanje je sprovedeno na uzorku od 37 utakmica, tako da su 74 različita statistička rasporeda uključena u analizu. Podaci su prikupljeni pomoću službenog FIBA internet sajta 'www.fiba.com'. Kanonička diskriminativna analiza je korištena kako bi se detektirale potencijalne razlike među timovima. Dobivena je jedna statistički značajna diskriminativna funkcija s vrlo visokim vrijednostima kanoničke korelacije, što govori da se na temelju dvadeset dva statistička parametra može izvršiti diskriminacija pobjedničkih i poraženih timova, ali isto tako i da su te razlike naglašene. Dobiveni rezultati pokazuju da asistencije, parametri efikasnosti šuta za dva poena, obrambeni skokovi i broj poena postignutih od igrača koji su ulazili s klupe najviše doprinose spomenutim razlikama. Ovako velike razlike su vjerojatno posljedica velikih razlika u tehničkoj, taktičkoj i fizičkoj pripremljenosti timova, a što je uvjetovano učešćem nacionalnih timova različite košarkaške kvalitete, a koji dolaze sa različitih kontinenata gdje košarkaške lige nisu jednako dobre i kvalitetne.

Ključne riječi: FIBA statistika, diskriminativna analiza, timska učinkovitost

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