

STATISTICAL ANALYSIS OF THE BASKETBALL TOURNAMENT SYDNEY' 2000

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The statistical analysis of the statistical material of the basketball matches was performed considering the analysis of both groups, between groups and sports achievements of the basketball teams competing in the tournament. Besides formal statistical methods relating to the description of the sample also statistical inference was used with the application of F-Fisher's and t-Student's test and analysis of variance.

Basketball games in groups were played using "everyone with everyone" system. Together, in each group took place 15 games, so in the qualifying round $m_g = 2 \cdot 15 = 30$ matches were played. The fragment of prepared data base for the leading team USA is given in table 1.

Table 1. USA data base of team

No.	No. country	Surname and name	Position	Body height	Age	No.	No. country	Surname and name	Position	Body height	Age
1	1	Abdur-Rahim S.	2	206	24	7	7	Houston Allan	1	198	29
2	2	Allen Ray	1	196	25	8	8	Kidd Jason	1	193	27
3	3	Baker Vin	2	211	29	9	9	McDyess Antonio	2	206	26
4	4	Carter Vince	2	198	23	10	10	Mourning Alonzo	3	208	30
5	5	Garnett Kevin	2	211	25	11	11	Payton Gary	1	193	32
6	6	Hardaway Tim	1	183	34	12	12	Smith Steve	1	203	31

Revising the final results of played games it is interesting to note that only two teams from America (USA and CAN) achieve above 100 points, respectively three times and once. It occurred in the elimination groups. In games for positions 1-8 all of teams didn't achieve results above 90 points. Particularly, the final results of two games USA – LIT 85 : 83 and CAN – RUS 86 :83 are very interesting. The following teams had the low level of won points: ITA – LIT 50 :48 (98 pkt), AUS – ITA 65 : 62 (127 pkt), SPA – ANG 64 :45 (109 pkt). Then the most of all points achieved: USA – FRA 106 : 94 (200 pkt), USA – CHI 119 : 72 (191 pkt) and CAN – AUS 101 : 90 (191 pkt). No one teams didn't achieve more than twice as large point's domination. The highest dominations took place in the following games: USA – NZEL 58 :32 (26 pkt, 181,2 %), CAN – ANG 50 :29 (21 pkt, 172,4 %) oraz USA – CHI 60 :38 (22 pkt, 157,9 %). Point leaders for the mentioned teams are of frequent occurrence, eg. Carter (USA), Gaze (AUS), Sciarra (FRA), Zhizhi (CHI), or Einikis (LIT). The point participation of leaders are contained in class between 10 pkt. (Gaze, AUS) and 29 pkt. (Rigaudeau, FRA), and the point participation in comparison with number of won points by team is contained between 13,9 % (Carter, USA) and 41,5 % (Gaze, AUS).

The statistical analysis in the elimination round is realized in three variants:

- analysis of game results in group A,
- analysis of game results in group B,
- comparison of results between groups A and B.

To the statistical description the following statistics are used: Σ - sum of won points, \bar{x} - means, s - standard deviation, v - variance coefficient expressed in %, $\bar{x} - s$ - lower limit of the typical range of variable and $\bar{x} + s$ - upper limit of the typical range of variable (tab.2). USA team had a very high average number of points per match –101, which means that the team scored every 24 seconds, including free throws. In the studied group only two teams USA and LIT had a positive

difference W-L, 146 and 33, respectively. This shows also great dominance of USA team over other teams in group A.

Table 2. Final classification of group A

No	Country	W	L	Pkt	Pkt W	Pkt L	Mean W	Mean L	Pkt W - L	Pkt W/L
1	USA	5	0	10	505	359	101	71,8	146	1,41
2	ITA	3	2	8	332	349	66,4	69,8	-17	0,95
3	LIT	3	2	8	372	339	74,4	67,8	33	1,10
4	FRA	2	3	7	372	374	74,4	74,8	-2	0,99
5	CHI	2	3	7	368	419	73,6	83,8	-51	0,88
6	NZEL	0	5	5	307	416	61,4	83,2	-109	0,74
Sum		15	15	X	2256	2256	X	X	X	X

The two-factor analysis of variance *countries x parts of match* (5) (table 5) permits to answer three null hypotheses ($\alpha = 0,05$):

H_0^A : are there differences in the averages of points scored by teams in group A,

H_0^B : are there differences in the averages of points scored for I-H and II-H,

H_0^{AB} : is there interaction between teams and parts of matches for averages in sub-classes (tab.3).

Table 3. Analysis of variance *teams ~ part of games* for group A

Source of Variation	SS	df	MS	F _{cal}	F _{tab}
Teams	2343,4	5	468,7	7,661	2,408
Parts of game	166,7	1	166,7	2,724	4,043
Interaction	265,9	5	53,2	0,869	2,409
Error	2936,4	48	61,2		
Total	5712,4	59			

The interaction is not significantly different, because $F_{AB} = 0,869 < 2,409 = F_{0,05;5,48}$, so we accept hypothesis H_0^{AB} for a level $\alpha = 0,05$. Hypothesis H_0^A is reject, because $F_A = 7,661 > 2,409 = F_{0,05;5,48}$, and we declare that the underlying group means are not the same. This is the influence of very high mean for USA - 50,5 which is distinctly different from others - 30,7 (NZEL), 33,2 (W£O), 36,8 (CHRL), 37,2 (LIT) i 37,2 (FRA). We also accept hypothesis H_0^B , because $F_B = 2,724 < 4,043 = F_{0,05;1,48}$. So, we can not ascertain the significantly different between means: 39,7 (I-H) i 35,9 (II-H).

A useful method of presentation of multi-stage activities in a developed form is a graph. For the purpose of the description of the states of transition in the number of won matches graphs called trees can be used. On the edges of the graph there are names of countries which played for positions 1-4. On the path from knot 0 to the final knot 8 there is only USA team which means the team won all its matches. Each set of knots expresses a number of won games in which levels 1 to 5 express matches of the qualification round, and levels 6-8 knockout games second in the tournament, is interesting. This team entered knockout games with only two wins, then won next two matches to lose the final with USA.

Thus LIT team which won as many as 6 matches was only 3rd in the tournament. It seems that the knockout competition, although it is particularly interesting in the sport aspect, does not reflect the sport contribution of individual basketball teams. It seems to, that better tournament system is:

place 1-4 (A1, B2), (A2, B1), place 5-8 (A3, B4), (A4, B3),
 place 9-10 (A5, B5), place 11-12 (A6, B6),

which will exclude the unexpected situation, like FRA team and will rise the dignity of elimination games in groups.

REFERENCES

Wagner W. (2001): *The basis of comprehensive statistical analysis of the Sydney' 2000*

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