



COMPARISON OF BASKETBALL PERFORMANCE AND EFFICIENCY SCORES BETWEEN TURKISH BASKETBALL LEAGUE PLAYERS WHO ARE TURKISH, AMERICAN AND OTHER NATIONS ORIGIN

Yahya Gökhan Yalçın¹, Mehmet Altın¹, Hayri Demir¹ⁱ

¹Selçuk University, Faculty of Sport Sciences, Konya, Turkey

Abstract:

The purpose of the present research is defining the changes between performance values and efficiency rates of basketball players of Turkish, American and other nation's origin who played basketball in Spor Toto Turkish Basketball League in 2015-2016 seasons. The universe and the sample of the research consist of the total of 237 basketball players who played in Spor Toto Turkish Basketball League in 2015-2016 seasons. Of these players, 121 were from Turkey, 85 were from the United States of America and 51 were from other countries. Data related to players were obtained from Turkish Basketball Federation Spor Toto Basketball League website (www.bsl.org.tr). Efficiency scores of the players were calculated according to the formula developed by John Hollinger. The variation in performance and efficiency scores were tested with "Independent Samples t test" and "One-way ANOVA", the source of the variation was found with Tukey test. According to the findings on the performance values, there aren't any significant differences between American and other nation's players, while there is a significant difference between foreign and Turkish players ($p < 0.05$). Accordingly, efficiency scores of Turkish players (51.88 ± 6.41) were lower than players from the United States of America (201.82 ± 12.45) and other countries (199.14 ± 18.61), and the difference between the scores was statistically significant ($p < 0.05$). Considering the performance and efficiency scores of basketball players who played in Spor Toto Basketball League in 2015-2016 season, it can be reported that players from the USA and other countries were more effective than Turkish players.

Keywords: basketball, performance, efficiency rate

ⁱ Correspondence: email hdemir@selcuk.edu.tr

Introduction

The sport of basketball, which was invented by Doctor James Naismith at Training School (YMCA) in the Springfield state of the USA in 1891, has become a branch of sport, which is very different and specific to watch with the changes in the rules and the sense of game. During this chronological progress, the election of Turgay Demirel as FIBA (International Basketball Federation) President in 2014 is the indicator of the importance of basketball for Turkey as well. Professionally, the foundation of NBA (National Basketball Association) in the USA in 1949 started a very different era for the sport of basketball. This league, where every successful basketball player in the world would like to play, has become the top in the list of long-term objectives of the players.

The game of basketball is way beyond the simply throwing a ball through a basket. Despite the limited size of the basketball court, watching the game is very enjoyable and pleasurable. It is like a tree, which stretches starting from the stance in the court to the top-level tactical movement. It is impossible to climb up without holding the branch below, and therefore it is easier for the basketball players, who have a correct basic basketball training, to be successful and realize themselves than other athletes.

The greatest difference between basketball and other team sports is that it is a game mostly dominated by dependant variables. In other words, what happens during the game can be expressed with numbers (Kural, 2012).

The sport of basketball is closely related with numbers. All movements within court recorded numerically can provide a statistical data set. No measurements can mean anything without criteria and in basketball only numerical superiority cannot be always enough for a win. Match analysis plays a crucial role in the achievement of teams formed with great effort and time (Altın and Fişekçioğlu, 2015). Free observation technique and hand recorded match records are now replaced with a miraculous method developed with the modern technology. Many programs on match analysis now serve sports. Almost every top-level basketball club uses these programs not only during matches but also training sessions. Accordingly, team staffs started to employ a technical team for match analysis in a short time. While the records kept through free observation are limited, the analyses provided by the programs in digital environment present almost unlimited data.

In their researches, Kubatko et al. (2016) and Hucinski and Tymanski (2006) reported that there is only a limited number of scientific studies in journals of various disciplines on the quantitative analysis of this sport conducted using the statistical data of the sport of basketball. Hadley et al. (2000) stated that the studies, which use the

statistical data of sport branches, are mostly on sport branches played professionally. In the United States of America, where basketball is played professionally, studies using the statistical data are conducted frequently, while similar studies are rare in other countries.

Turkish Basketball Federation has conducted very successful studies on the statistical record archiving. In digital environment, instant data sharing is conducted during the matches, and additionally they provided open access to these statistics after the matches. Similarly, it is a great opportunity that all users have access to the statistics of NBA League on the official website. What matters here is the ability to assess data rather than having access to them. It is known that it is very difficult to apply technical and tactical options during the game for rapidly changing positions. Here, numerical data become very important for defining a game philosophy and its application later for both the coaches and the players. Statistical data for only their own team aren't always enough for success. Recording of the movements of other teams, and the measures taken by defining the strengths and weaknesses of other teams can also guide studies on the subject matter.

Karalejić (2009) reported that bio-motoric features should be conducted constantly and in a quality manner with technical and tactical skills for success in basketball. Previous studies in the related literature tried to establish relationships between player statistics and efficiency functions, and tried to develop models (Berri, 1999; Berri and Schmidt 2002). Variables that affect the winning or losing of a team were defined as main elements in efficiency analysis (Hadley et al. 2000). Zak et al. (1979) reported that in-game movements, such as free throw and shot percentages, rebound, ball loss and foul played an important role in efficiency analysis. In-game movements used in the present study are similar with the data used in the study conducted by Zak et al (1979). Additionally, there are other efficiency and performance defining criteria. Abdelkerim et al, (2007) stated that movements, such as abrupt halts, rapid replacement, acceleration, and steep slide had an important role in defining performance. Efficiency indicators can either be frequently observed moves during a match or a small nuance we may overlook in a match of basketball today. For this reason, it would be correct to analyse all moves during the whole match that can affect the winning or losing a game rather than the analysis of just one move.

The main objective of the game of basketball is throwing the ball through the opponent team's basket during a specified time period. Basketball can be defined as a game that can be won by the teams, which can gather both mental, and ability features and physical features. The most basic data for performance and efficiency is the recorded scores. It wouldn't be a correct approach to evaluate this by just the recorded

scores. It has been observed that players' performances can be defined by the whole of their successful and total variables. Cerynik et al. (2009) reported that efficiency score was an easy and understandable concept for defining the player and team performances in basketball. There are various and many efficiency and performance formulas presented in the related literature. The present study, which is based on the formula developed by John Hollinger (<http://www.bsl.org.tr>), presents the changes in performance and efficiency scores of players in Spor Toto Turkish Basketball team from Turkey, the USA and other countries in 2015-2016 seasons. The present research is of importance, as it will shed light on the further studies to be conducted in the field in the future.

2. Method

Universe of study consists of players belonging to Turkey, United States of America and the other countries and taking part in team line-ups in 2015-2016 Sport Toto Basketball League. Normal league season is examined and all of the used variables are obtained from the website of Turkish Basketball League (TBF).

Efficiency point calculations are made from statistics of players. Efficiency points of players are used for season average from variables. Efficiency points of players are calculated by the following formula developed by John Hollinger (<http://www.bsl.org.tr>).

$$\text{PLAYER EFFICIENCY RATING} = (\text{point} \times 1.0) + (\text{Field Goals Made} \times 0.4) + (\text{Field Goals Attempted} \times -0.7) + ((\text{Free Throws Attempted} - \text{Free Throws Made}) \times -0.4) + (\text{Offensive Rebounds} \times 0.7) + (\text{Defensive Rebounds} \times 0.3) + (\text{Steals} \times 1.0) + (\text{Assists} \times 0.7) + (\text{Blocks} \times 0.7) + (\text{Personel Fouls} \times -0.4) + (\text{Turnovers} \times -1.0)$$

Analysis of Data

In this study, data were analyzed by using statistical program (SPSS 22.0). Significance level was accepted to be $p > 0.05$ like some other studies (Dedecan et al., 2016; Pancar et al., 2016; Polat et al., 2011; Özdal, 2016a, 2016b, 2016c; Özdal, 2015; Yıkılmaz et al., 2015). Data were presented as mean and standard deviation like some other studies (Cinpolat et al., 2016; Abakay, 2013; Alıncak, 2016; Biçer et al., 2015; Bilgiç et al., 2016; Özdal et al., 2016). One Way ANOVA and Tukey were used for the statistical analysis for determining differences between groups.

3. Findings

Table 1: Averages of Players of Sport Toto Basketball League

Team' Statistics	Turkish Players (x ± SD)	USA Players (x ± SD)	Other Countries (x ± SD)	F
Game	17.55 ± 1.07	21.56 ± 1.07	23.86 ± 1.41	7.189*
Points	70.9 ± 7.76	243.73 ± 14.83	231.96 ± 20.23	66.293*
Field Goals Made (2 Point)	17.38 ± 2.08	60.26 ± 4.01	59.76 ± 6.12	54.222*
Field Goals Attempted (2 Point)	34.01 ± 3.91	117.31 ± 7.41	108.9 ± 10.24	59.629*
Field Goals Made (3 Point)	8.78 ± 1.17	25.11 ± 2.50	23.82 ± 3.63	20.870*
Field Goals Attempted (3 Point)	26.02 ± 3.18	68.86 ± 6.55	60.31 ± 8.81	20.098*
Free Throws Made	9.86 ± 1.28	47.61 ± 3.44	40.96 ± 3.91	69.905*
Free Throws Attempted	14.55 ± 1.78	62.20 ± 4.39	56.35 ± 5.53	64.722*
Offensive Rebounds	8.60 ± 0.94	23.76 ± 2.24	31.73 ± 3.93	33.392*
Defensive Rebounds	21.65 ± 2.24	64.72 ± 4.64	71.61 ± 7.29	47.293*
Total Rebounds	30.25 ± 3.00	88.48 ± 6.53	103.33 ± 10.35	47.953*
Assists	15.87 ± 2.14	52.61 ± 4.65	38.69 ± 5.11	30.842*
Blocks	1.45 ± 0.23	7.21 ± 1.08	9.33 ± 1.65	22.937*
Steals	6.43 ± 0.71	18.52 ± 1.27	15.24 ± 1.59	39.421*
Turnovers	11.59 ± 1.21	36.05 ± 2.30	32.20 ± 2.91	54.325*
Personel Faul	29.09 ± 2.39	51.81 ± 2.77	58.86 ± 4.33	29.344*

*p<0.05 Meaningful difference between parameters of players

As is understood from Table 1, it is determined that there are statistically meaningful differences in all parameters belonging to players struggling in 2015-2016 Spor Toto Basketball League (p<0.05). Parameters belonging to Turkish players are found more statistically meaningful in comparison to players of United States of America and the other countries (p<0.05). There is no difference between players of United States of America and the other countries.

Table 2: Comparison of efficiency rates of players of Spor Toto Basketball League

Players	Efficiency Ratings (x ± SD)	Min	Max	F
Turkish Players	51.88 ± 6.41	-4.20	419.40	
USA Players	201.82 ± 12.45	5.80	485.60	69.717*
Other Countries	199.14 ± 18.61	3.40	505.90	

*p<0.05 Meaningful difference between parameters of players

As is seen in Table 2, efficiency points of Turkish Players (51.88 ± 6.41) are found different from points of players of United States of America (201.82 ± 12.45) and the other countries (199.14 ± 18.61) and it is determined that this change is statistically

meaningful ($p < 0.05$). There is no difference between players of United States of America and the other countries.

4. Discussion and Conclusion

The greatest coefficient in John Hollinger efficiency score is the number of recorded scores and ball loss. The increase in the positive moves naturally decreases in the bad performance values. Every missed free throw is a basic factor in low score. The players need almost perfect basic motoric features in order to be able to perform all moves that increase performance values within the court. Read et al. (2014) reported that according to their analyses high performance of short term abrupt accelerations and decelerations, rapid replacements and jumps were dominant during the match. The related literature presents many studies on the interpretation of the basic needs and load basis of basketball through match analysis (Abdelkrim B 2007). These are defined as moves, such as standing, walk, slow run, run with long steps, rapid run, jump, turn and slide.

In this study, performance values of Turkish players are found lower than players of USA and the other countries ($p < 0.05$) and naturally this situation causes efficiency points to be low ($p < 0.05$). There may be many different reasons of this change in performance values; especially it can be said that the biggest factor is this change of infrastructure training. With motion analysis, information is reached about motion base of play and it realized on which intervals; and this information is pathfinder for exercise planning. In addition to common features of an exercise to be required as basis, it would be a right attitude to plan it collaterally as per inadequacies of players.

Kostomin (2015) reported that quality physical skills might affect the technical performance presented in basketball at an important extent. While the American players have the highest score average (243.73 ± 14.83), and players from other nationalities have similar averages with the American players (231.96 ± 20.23), this value for Turkish players (70.9 ± 7.76) is different from these two groups at a statistically significant level ($p < 0.05$). This finding related to the score parameter is naturally similar in the free throws, and similar findings were obtained for total and successful double, triple and free shot percentages.

Uzun and Pular (2011) defined shot as the basic item and among the most basic elements of basketball, and reported that basketball trainings had a positive effect on the shots and shot technique could be developed as a habit with special trainings. Mülazımoğlu et al. (2009) reported that high shot percentage within a match had an important effect on winning a match. Passing, dribbling, rebound and the basic skills of

defence are performed for high score production and having high shot percentages (Wissel, 2011). According to the findings of the present research, high percentages of successful shots of American players and players from other nationalities also provided them with high performance and efficiency scores. On the other hand, Turkish players' performance of fewer numbers of shots towards the basket resulted in fewer number of successful shots and lower total score averages. According to Cedra and Serio (2008), free throw is the first thing to learn in theory and practice in basketball, and it is considered as the basis of other shot techniques. Throwing shots towards the basket and passing the ball through it underlies the whole basic move balance in basketball. When this is ignored or forgotten, all other numerical superiorities will be overwhelmed by the score superiority. The USA team, which won 2014 Spanish Basketball World Cup, stood out as the team, which scored most (941) and performed most score attempts (71.4%).

The finding that players from the USA and other countries have high and similar efficiency scores indicates that these players contribute more to their teams, while Turkish players had significantly lower efficiency scores than both groups, which is an indicator of low contribution. Considering that the decrease in the performance parameters has an effect on efficiency scores, we can claim that Turkish players need to be more industrious especially in self-confidence and scoring attempts.

In 2015 Basketball European Championship, when Spain became the champion by beating Lithuania with a score of 80-63, Pau Gasol played a crucial role in his team's championship with averages of 25.6 scores and 2.3 blokes. Moreover, his rebound average of 8.8 took his efficiency even further.

In the same championship, Mantas Kalnietis performed 7.8 assist, Jonas Valančiūnas 1.4 bloke, and Jonas Mačiulis 1.9 steal averages and all three played important roles in their team's second place. On the other hand, despite his 21.0 score average, Dennis Schröder couldn't prevent Germany's elimination, even without qualifying out of the group (<https://tr.wikipedia.org>).

Kostmorin S (2015) reported that players' physical and physiological requirements could be defined with match analyses and accordingly required measurements could be conducted and necessary loads could be provided more easily. Sport-specific multi-dimensionality in basketball was emphasized, and it was reported that the changes between moves during a match occurred every two seconds (McInnes et al. 1985, Caprino, 2012).

What is implied here is the importance of the ratio of change in direction and the speed and agility during the match? Additionally, there are some findings, which

indicate that step slide moves are observed at 22% within the game. These findings reveal that basketball is not only forward runs of up jumps (Ziv and Lidor, 2009).

The USA team was the champion in both 2010 and 2014 Basketball World Championships, which cannot be a coincidence for a country where basketball is played professionally at top-level. American basketball players are preferred by other countries' teams, which is directly related with their contributions to their teams.

Numbers don't lie, but they also cannot tell the whole truth. Additionally, without the correct perspective, they can refract facts like the refraction of light. But with the correct perspective, they provide you with the opportunity to express and understand what you see with your eyes in numbers (Kural, 2012).

Symbolic figures do not mean so many things for basketball sport. The important thing is statistical meaningful to be found by numerical data and its value to add to the team. The fact that efficiency points of players of USA and the other countries are both high and close to each other, creates an impression about that their values are high to add their teams, Turkish players show a statistically meaningful change to the both groups with a very low efficiency point. If it is considered that drop in performance parameters affects the efficiency rate, it can be said that Turkish players need to be more diligent for especially self-reliance and score intentions.

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