Analyzing NBA Champions and the Player Efficiency Rating

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1 Introduction

The National Basketball Association is a very competitive and widely followed sports league. The ultimate goal and prize for teams and players is to win the NBA Championship. In this paper, I try to analyze the relationship between the Player Efficiency Rating and NBA Championships using NodeXL. Player Efficiency Rating (PER) is an overall rating of a player’s per-minute productivity [1]. PER is calculated using all player statistics including points scored, rebounds, assists, and others. The statistic also incorporates overall team statistics to get an understanding of how important the players production is for the team.

2 Data Set

A publicly available list of the top 250 players with the highest Player Efficiency Ratings of all time [3]. For each player, I obtained the championship teams each player was on through their careers if any. This gave the relations of each player to their Championship which can be used as the edges of the graphs we will produce using NodeXL. So to summarize, the edges are player name to Championship team. If a player was not on a Championship team, then he was related to a vertex called No Championship Team. There are individual vertices for each player and each NBA championship team since 1950. As a note, only NBA championship teams were included and no ABA championship teams. So, why are the top 250 players chosen? Mostly, because that is what the source consists. Also, it contains players with PER above the league average which is 15 [2]. The PER ranges from 16.11 to 27.91.

3 Results and Analysis

After loading the data into NodeXL and calculating the graph metrics, the graph consists of 314 vertices and 369 edges. The goal was to say whether PER has an effect on the NBA Championship winning teams. After modifying some graph visual settings, some interesting headlines were discovered. In the graphs the players are colored by their PER value. The higher their PER, the more red
the color. Teams are colored black. Vertex size is determined by their in-degree. Teams will have this value.

3.1 High Player Efficiency does not always lead to NBA Championships

This is something not so obvious. As we see in Figure 1, most players have not won an NBA Championship. In fact, out of the 250 most efficient players, only 94 have won. So, 156 have not won an NBA Championship. Some of the most efficient of all time have not won including Karl Malone, Charles Barkley, Chris Paul, Yao Ming, and others.

So what is a good PER in order to win a Championship? After filtering vertices based on PER, including only the players with PER above 20, we get Figure 2. Here we see that there is more of an even distribution of Championship winning players and ones who have not won. In fact, this is true. 32 of the 62 did win.

If we filter to get the top 25 players with the highest career avg PER, we
Figure 2: Players with avg career PER above 20.
Figure 3: Top 25 Players with highest avg career PER.

get Figure 3. Here we see that most of these have won a championship. This is true with 19 of the 25 winning a championship. However this may not be a realistic goal for most players, since we see that most of these top 25 players are some of the best players of all time.

Being in the top 250 all time PER list does not mean that player is one of the 250 greatest players of all time. Examples are 250-100: Lamar Odom, Jason Richardson, Drew Gooden, Josh Howard, Gerald Wallace, Rashard Lewis, Devin Harris, Jose Calderon, Corey Maggette, Kevin Martin, Zydrunas Ilgauskas, Vlade Divac; top 50-100: Andrei Kirilenko, Paul Millsap, David Lee, Gilbert Arenas, Carlos Boozer, Al Jefferson; 20 - 50: Elton Brand, Amare Stoudemire, Yao Ming. In fact, most of the players listed have not won a championship. The goal for players should be to increase efficiency, but that is not enough to win a Championship.
Figure 4: NBA Champions with 2 or more top 250 PER players
3.2 Multiple top 250 PER teammates leads to Championships (the more the merrier)

We may assume that most winning teams out of the 30 teams in the league have a good balance of efficient players throughout the roster, but the truth is the NBA is a star driven league. This means only a few "very" efficient players are enough to win. Now filtering to get the teams with 2 or more top 250 PER players, we get Figure 4. We see that most of the Championship teams have 2 or more of the top 250 players. And, there has not been a single champion with only one top 250 PER player in the last 45+ years. There has only been 4 instances and the last was in 1977. We see some of these at the bottom of Figure 4 (the vertices with no edges).

The more top 250 average PER, the more the chance of winning a Championship. We have seen these recently in 2011, with Dallas Mavericks (with 6 top 250 PER players) beat the Miami Heat (with 3 top 250 PER players). The Heat were the favorites with an explosive trio, while the Mavericks were considered old and incapable of beating the Heat, but the Mavericks had 6 top PER players. Though they were old, they still had this career tendency of being efficient. We see this also in other examples, such as 2008 Boston (with 4) beat Los Angeles (with 3), and with 2004 Detroit (with 4) beat Los Angeles (with 3).

We can in a way predict the NBA Championship winning team by using this observation: The more top 250 average career PER players the more likely a team is to win the NBA Championship. As we saw with the case of Dallas, they may be of any age (even at the end of their career’s), but they still are efficient. This has not always been true. We saw the Los Angeles Lakers last year had 4 but could not win. Lakers in 2004 with 4 could not win. Mostly the Lakers have been exceptions, mostly because those teams lacked team chemistry. So the observation might be able to predict given team chemistry levels. I do believe that player efficiency will play more of a factor in the future of the NBA. Most of tomorrow’s player’s will be in top 250 PER averages since the game is evolving and becoming quicker. Players are required to do more of everything. We see this with players like Lebron James, Chris Paul, and more of the newer players like Kevin Durant, Kevin Love, Kawhi Leonard, Michael Carter Williams, and more. Also with data analytics being a larger part of the NBA game players will be more aware of PER [4]. Already out of the top 250, 59 are active players, and more are expected. A count of top PER player by itself might not be enough. Average team efficiency might matter, too, but the count of top PER’s is relative to the average.

3.3 Most Champions are connected

Figure 5 shows a Harel-Koren Fast Multiscale of the top 250 PER players who have won NBA Championships. This shows that most NBA champions are connected. We see this because many teammates have moved to other teams that have won titles too.
Figure 5: Harel-Koren Fast Multiscale of the top 250 PER players who have won NBA Championships
3.4 The Lakers and Celtics have lead to the Miami Heat NBA Champions

As we see in Figure 5, the components of Miami Heat Champions of 2006 and 2012 are connected to the Los Angeles Lakers and Boston Celtics who have also won championships. They are connected because of what was said in the previous section about teammates moving. The fact of these two instances is that players such Shaquille O’Neal and Ray Allen moving to the Heat lead to them winning in the very same year of the movement. The movement of the players happened because of internal conflicts between players. Most of this research was done to prove this. So player conflicts on Championship teams can lead to other teams winning. This also proves the previous point of top PER players making a difference.
3.5 Robert Parish has played with Larry Bird and Michael Jordan

After changing the layout of Figure 5 to get Figure 6 (which is zoomed) I was surprised to see that Michael Jordan and Larry Bird were connected by a teammate. Yes, this does need prior knowledge of basketball, but it shows how other networks such as social networks also work. Michael Jordan and Larry Bird are among the greatest players of all time. They are connected by Robert Parish, who is also another great player. I did not even know that Robert Parish played for the Chicago Bulls. He is known to play for the Boston Celtics. He won NBA Championships with the Celtics very early in his career, but he did play for the Bulls in one of his final seasons of his career. In fact, he has been recorded to be the 3rd oldest player at 43 to play a NBA game. So, he won very early and late in his career, again showing the value of top average PER players when it comes to winning the NBA Championship.

4 NodeXL Critique

4.1 Pros

I really liked using NodeXL because it did not require much learning. It is integrated with Microsoft Excel which is very familiar to me. I really liked the part that I can just copy paste some data and it just worked and created a graphical visualization. I really enjoyed exploring a dataset I am really interested in. NodeXL was uncover some interesting insights that I had never known. Also, it allowed me to come up with an analysis and prediction technique. In terms of features, I found the calculating of graph metrics very useful since it allows to filter and create new representations.

4.2 Cons

At times when laying out a graph, some edges would not show up, but after refreshing the graph, they would show up. It would have been nice if the graph produced was a clickable or interactive graph, where we can drag and move nodes and edges. Also, some of the filters in Autofill Columns should have descriptions next to them, since they all did not make complete sense.

References


