The target audience for this presentation is people with an interest in data analytics and possibly an interest in basketball/NBA. That is not to say that an individual interested in basketball with no initial interest in data analysis couldn't enjoy the presentation. The themes and content will be within their knowledge base. They will leave the presentation knowing more about data analysis and how it is applied.

The overarching purpose of the presentation is to discuss the practical application of data analysis. The NBA and 3-point shooting are the vehicles for that discussion. My goal is to demonstrate how a group of people used a data set to move the direction of a company and a sport.

Key takeaways for the audience:

1. Data analytics can be used to make improvements with data-driven decision making
2. The NBA is a dynamic league
3. The rise of the 3-point shot changed the makeup of the NBA

SCRIPT

On February 5, 2016, the Miami Heat beat the Charlotte Hornets by three points. That is the last time a team won an NBA basketball game without scoring a single 3-point field goal. With the current explosion of prolific 3-point shooters in the league today, it may very well be a fossil brought out in times like this presentation to describe the "time before."

When was the "time before?" Officially, that time began in the summer of 1979. That summer, the team owners met, as was customary, to discuss any changes they wanted to make to

the rules for the upcoming season. They decided to introduce a mark on the floor indicating any shot taken further away from the basket than the line would count for three points instead of two (The 3-point line was added 43 years ago. It is understandable when someone is shocked to hear that it didn't always exist.). Their goal was to increase the excitement for the fans by way of increasing scoring. Prior to the 3-pointer, basketball generally consisted of passing the ball to the tallest man on the court who was as close to the basket as possible. While efficient, this wasn't as dynamic a game as possible. There were still shooters in the league, but a cursory glance at the all-time scorers prior to 1990 will show almost exclusively centers i.e., the biggest men in the league from the 1950s, 1960s, and 1970s.

The popularity of the 3-point shot increased in a slow, linear fashion increasing by just less than 1 attempt per game each year, on average. (Another attempt to increase scoring came during the summer of '94 when the 3-point line was moved closer, but that only lasted 3 years.) Then, in 2011, something changed.

Before I discuss that bit, let me step back and discuss a few very important characters in this story. The first is Daryl Morey. He was the general manager for the Houston Rockets in 2006. His background was not in basketball. He came to the NBA via an analytics consulting firm. He did work with the Boston Celtics who brought him on as a full-time employee. From there he went to Houston. Mr. Morey deeply believed in the power of numbers. He believed that there was real value in the numbers. All you had to do was poke and prod. By digging through the analytics, Mr. Morey found gems. From a team that consistently finished in the bottom half of the division, Daryl Morey built a team that won the division four times in six years, produced an MVP in James Harden, and just missed the NBA finals.

The second and third characters are Bill James and Billy Beane. Bill James is a baseball writer, baseball statistician, and one of the foremost proponents of an advanced statistical analysis of baseball known as Sabermetrics. Bill James and his book, *Bill James Baseball Abstract*, are the person and ideas that inspired Daryl Morey to look at basketball statistics in a new way. Billy Beane was the general manager of the Oakland Athletics that decided to acutely focus on Sabermetrics to build a baseball team. Oakland's payroll was ranked 27th in the league. Their payroll was a third the size of the New York Yankees from the same year. Yet, at a much lower cost, the A's made it to the playoffs.

We've talked a bit about general managers, baseball writers, and the plot of a great Brad Pitt movie. Now let's circle back to the 3-pointer. Basic math tells us that a 3-pointer is 50% more than a 2-pointer. If you can make 3-point shots at a similar pace to 2-point shots, your scoring will be more efficient. By more efficient I mean you score the same number of points using fewer attempts. That seems simple enough. Just get more players that can consistently shoot 3-pointers and you stand a better chance of winning games. But NBA teams were hesitant to commit.

We'll look at four examples of generational shooters to compare the impact of the 3-pointer across eras of the NBA. Larry Bird was considered a tremendous threat from long range during his time in the NBA. He averaged 144 3-point attempts per year with a peak of 237 attempts in 1988. Reggie Miller stepped this up a notch during his time in the 1990s. Reggie averaged 360 attempts per season with a peak of 536 in 1997. Ray Allen held the record for most 3-pointers made up until recently. Ray averaged 415 attempts per year with a peak of 653 in 2006. Stephen Curry is the most prolific 3-point shooter in the history of the NBA. He has

averaged 647 attempts per year and peaked at 886 in 2016. That is nearly 4 times as many attempts as Larry Bird took in 1988 AND Curry made a higher percentage of his shots.

What changed? Are shooters simply better now than they used to be? I think that is a difficult question to answer in this venue but know this- Larry Bird had a higher percentage of field goals made than Steph Curry does. His ability to shoot was not standing in his way. One of the biggest things that changed is how coaches and general managers looked at prospects. In 1984, Michael Jordan was drafted 3rd overall behind two centers. There were no questions about his ability, but the belief at the time was a team needed a dominant big man to contend for a title. In 2009, Steph Curry was drafted 7th despite scoring 44 points against the player drafted 1st. The idea of a dominant big man was still part of the collective consciousness of the NBA decision-makers.

The linear trajectory of the 3-pointer changed in 2011. This was due in no small part to data analytics. Two obvious things were beginning to happen. Smaller, accurate shooters were gaining value at a higher-than-expected rate based on historical figures. Second, taller players were shooting more shots from further distances. Data was being used to help direct coaches and players where the high-value shots were and started to change the paradigm.

In 2013 the NBA installed cameras in every stadium to track players and the ball on the court. The data gathered is used to calculate the distance between players and various passes from player to player and other pieces of information that can't be parsed from a stat line or box score. And since that time, the number of 3-point attempts has increased almost every year. 3-pointers peaked in 2019 with James Harden, from Daryl Morey's Houston Rockets, taking 1028 3-point shots.