The evolution of the center in the National Basketball Association

Ethan Liu & Viet Dang
STAT 306 - Spring 2024

Introduction

For nearly eight decades, the National Basketball Association (NBA) has showcased talented centers with diverse skill sets. Recently, a noticeable shift has occurred, moving away from traditional post-up play (exemplified by David Robinson and Shaquille O'Neal) towards roles that include mid-range and 3-point shooting, along with facilitating (as seen in Nikola Jokić, Joel Embiid). Using multiple comparison methods, principal component analysis, clustering, and time series analysis, we seek to find statistical evidence for this evolution of the centers, and predict the future of this position.

Methods

- **Data**

The data used for analysis were collected from *basketball-reference*, which included all players' season averages from 1950 to 2022. We filtered the data to include only players whose primary position is Center (C), and only seasons where the player played in at least half the games. In order to avoid confounding factors, as well as missing data, we included only data since the 1979-80 season, when the 3-point line was introduced in the league.

- **Techniques**

In order to compare the differences between centers in different eras, we utilized Analysis of Variance (ANOVA) tests to compare the mean of multiple season averages (rebounds, assists, 3-point attempts, 3-point made, field goal percentage) across different decades. Using Principal Component Analysis (PCA) and Hierarchical Clustering, we sought to simplify our analysis by reducing the dimensions in our data, identifying different groups of centers, each with a characteristic playing style, and exploring key trends within and between each group. Finally, using Autoregressive Integrated Moving Average (ARIMA) time series models, we predict centers' playing styles in the near future.

Results

ANOVA found significant differences between decades in all statistics tested (3-points attempts, 3-points made, assists per 36), with post-hoc analysis confirming that there has been a significant positive difference in the statistics over the last decade (since 2010) compared to previous decades. PCA yielded 6 components accounting for over 75% of the variance explained, some of which were represented by scoring statistics, 3-point shooting statistics, and defensive statistics. Clustering analysis confirmed this result, showing that the average season in the scoring and 3-point shooting clusters of centers were, respectively, 2013 and 2017. ARIMA time series predicted growth in the scoring and shooting clusters, and, at the same time, a shrink in the defensive cluster.

Conclusion

Our analyses provided evidence supporting the popular claim that centers have expanded their toolbox to include passing and range shooting. This is consistent with the overall trend in the league, which saw an uptick in three point shooting and scoring in general over the last decade. Prediction models suggest that this new wave of centers is here to stay, as the NBA continue to evolve its game.

References

Ghosh, A., & Steckel, J. H. (1993). Roles in the NBA: There's always room for a big man, but his role has changed. *Interfaces*, *23*(4), 43–55. https://doi.org/10.1287/inte.23.4.43

Richardson, C. A. (2020). Evolution of a player: Transitions in NBA player classifications. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3515711

Stutzman, E. D. (2021). *Multi-Dimensional Clustering of Roles in the NBA* (thesis).