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# Utilizing data analysis to identify the best players from the 2019 draft

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**Abstract:**

This study seeks further standardization of the evaluation process of these players while recognizing that it is indeed inherently quite complex and subjective. Acknowledging the different skill sets in professional basketball, this research stresses the need for specialized approaches in evaluating players fully. Diversity and balance are what make a player fit as it assumes those who perform well in multiple positions, meaning they have both offensive and defensive skills are likely to be fitter. This research adopted a quantitative approach to analyze KPIs (games played, minutes per game, adjusted shooting percentage, rebounds, total points) in assessing player performance and return on investment. There was a very high correlation between minutes played and points scored from this analysis at a very high level of significance showing that one person can play many roles being versatile is key. The 2019 mock draft ranks players based on a combined scoring system, finding the highest value of players like Zion Williamson and Ja Morant. Research can improve draft strategies and objectives, and data-driven evaluation methods can boost player development and team success. It can help teams to find suitable players based on team playing styles.

**Keywords:** Player Evaluation, Versatility, Key Performance Indicators (KPIs), Performance Metrics, Data-Driven Evaluation, Re-Draft Simulation.

## 1. Introduction

The 2019 basketball draft marks the beginning of a new era filled with aspiring talent eager to make their mark on the professional scene. Identifying and building a comprehensive and reliable framework to evaluate and select the best new generation of basketball players from this draft is critical. This framework not only aims to highlight the most promising players, but also provides insights and methods to minimize mistakes in player selection, a process fraught with complexity and bias.

Draft decision-makers go through a very complex process to find the best option for their teams. Ultimately, such managers must carry out multiple immensely difficult judgments correctly to maximize the potential value of their decision. They do not only have to judge who the best prospect at the moment of the draft is but also have to anticipate who might possess the most room to grow as a basketball player. Furthermore, managers need to evaluate if their particular organization has the capabilities to enable ideal development for the picked talent [1]. Selecting team members based on roles is complex, especially in professional basketball, where players exhibit different performance characteristics . The skills and attributes of each player are multifaceted, which complicates the decision-making process of team formation. Every player has their own unique abilities. Role-specific capabilities further diversify assessment criteria, rendering one-size-fits-all assessment methods ineffective.[2] Moreover, NBA draft pick has always been ambiguous. Annual draft pick event is extremely important since underdog team can immediately become a champion contender after hiring a star player. The objective of this paper is to apply STEAMS methodology on choosing the appropriate player position.[3] In this study, we aimed to reveal the multifaceted nature of players' skills. We hypothesize that players who show both offensive and defensive skills at different playing positions will perform better in the game. In consideration of the aspects changing in modern basketball, versatility and all-around ability have a higher value. The assumption underlying this is that such players are more likely to sustain long-term success because they can transition roles seamlessly and contribute well to all aspects of the game.

## 2. Methodology

Study design: This study was designed to comprehensively examine the interaction between investment and player performance. Use KPIs to discover which players have

the best performance and return on investment.
Data collection methods: Data will be sourced from well-known platforms such as NBA.com and basketballreference.com, as well as potential scouting reports and expert analysis. Key performance indicators include:
(1)Games played: The total number of games players have participated in.
(2)Minutes per game: The average amount of time a player is on the court per game.
(3)adjusted Field Goal Percentage: A measure of shooting efficiency that measures the added value of a 3-point shot.
Data analysis: The analysis starts with descriptive statistics, calculating the mean, standard deviation, range, and percentage for each variable to summarize the data. Correlation analysis and linear regression modeling were used to determine the relationship between variables and predictors of NBA success. After that, a comparative analysis will be conducted to highlight which players have been successful in the 2019 draft. This will involve weighting the importance of different statistical categories in modern basketball and synthesizing them into a comprehensive evaluation framework.
Draft: Simulate the draft of the 2019 NBA class based on a comprehensive evaluation framework. Players will be re-ranked and drafted based on their performance and potential value to the team. The simulation will include:
● Re-ranking players based on their comprehensive scores.
● Re-drafting players in a manner that reflects their newly assessed value, ensuring that teams' needs are also considered.
(4) Rebound: The specific times of players getting scores after an attempt of failure.
(5) Aggregate Scoring: The total points dedicated by a player.
(6) Height: The physical height of a player, which inevitably affects their overall performance.
(7) Adaptability: A player's comprehensive capability in scoring within various game contexts.
Sample: The research involves basketball players from the 2019 NBA, who are taking part in at least one NBA game. Also, it includes a typical demonstration of total classes.
Data review: The study analyzes descriptive statistics, controlling variables, and establishing contrast to reveal the facts behind the data. A deep look into the correlations and or related aspects is emphasized, through which the success of NBA games can be possibly predicted. Meanwhile, the statistics also provide a comprehensive overview by carrying out diverse comparisons of NBA players. According to the analysis, the significance of various statistics can be evaluated in the field of contemporary basketball games.
Draft: This draft is realized on the foundation of the evaluation matrix. There will be a new assessment and ranking, which highly depends on their performance during the game. The simulation will encompass:
● A new assessment of player rankings on the basis of their achievement.
● A new draft about players, showing their contributions to the team and corresponding team requirements.

## 3. Results

Using statistics in sports is getting popular for the last two decades with the improvement in computer science. Team or player statistics had been used for a much longer time but implementing statistical methods to make inferences is a relatively new field. Statistics is widely used in sports in terms of measuring team success, predicting game outcomes, evaluating a player or team performance and efficiency, ranking players or teams.[4] The data set provided provides a comprehensive view of various basketball player metrics that can be analyzed and compared in detail. Figure 1 covers multiple aspects of player performance, from total points and assists to field goal percentage and variety. Here's a breakdown of the key findings and observations from the figure:

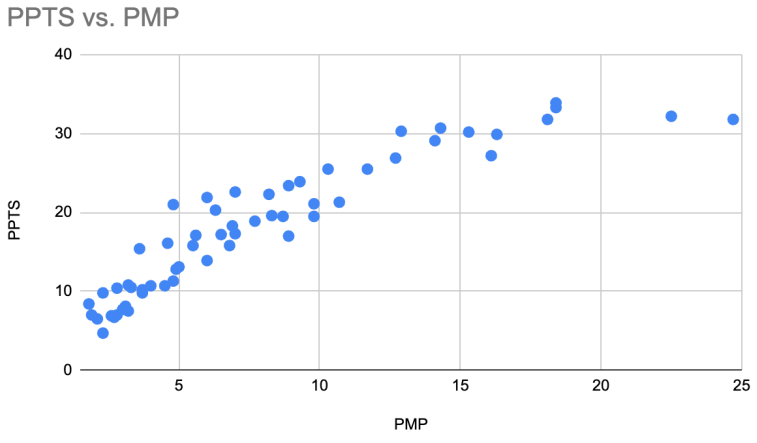

**Figure 1 the relationship between Points Per Game (PPTS) and Minutes Played Per Game (PMP)**

The scatter plot illustrating the relationship between Points Per Game (PPTS) and Minutes Played Per Game (PMP) reveals a positive correlation between the two variables. As PMP increases, there is a noticeable upward trend in PPTS. Most players with higher minutes per game also tend to score more points per game. This trend underscores the importance of playing time in contributing to scoring output, suggesting that players who are on the court longer have more opportunities to accumulate points.

**Table 1. the relationships between different player metrics**

| | TPTS | TG | TMP | TTRB | TAST | SFGp | S3Pp | SFTp | PMP | PPTS | PDRB | Height(cm) | WS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPTS | 1 | | | | | | | | | | | | |
| TG | 0.81284833 | 1 | | | | | | | | | | | |
| TMP | 0.94912737 | 0.92649541 | 1 | | | | | | | | | | |
| TTRB | 0.82494498 | 0.87026856 | 0.88267815 | 1 | | | | | | | | | |
| TAST | 0.88558373 | 0.66539539 | 0.81534357 | 0.58466183 | 1 | | | | | | | | |
| SFGp | 0.36248902 | 0.52332028 | 0.38272592 | 0.63853594 | 0.18563342 | 1 | | | | | | | |
| S3Pp | 0.21149901 | 0.06000971 | 0.20339916 | -0.0557417 | 0.25149272 | -0.4293407 | 1 | | | | | | |
| SFTp | 0.19243565 | 0.06866986 | 0.15054076 | -0.0624787 | 0.24360189 | -0.2256116 | 0.26897987 | 1 | | | | | |
| PMP | 0.92645172 | 0.79872125 | 0.92984026 | 0.82441952 | 0.80967421 | 0.3416063 | 0.21311718 | 0.164083 | 1 | | | | |
| PPTS | 0.7597415 | 0.65601778 | 0.83155269 | 0.73414328 | 0.84412701 | 0.3560487 | 0.21058274 | 0.16640417 | 0.92030003 | 1 | | | |
| PDRB | 0.7597415 | 0.68341896 | 0.7659347 | 0.91148215 | 0.52655582 | 0.51968602 | 0.02409887 | -0.1054843 | 0.81771373 | 0.76473827 | 1 | | |
| Height(cm) | -0.0514775 | 0.12594116 | 0.01836256 | 0.26242694 | -0.2581547 | 0.47859711 | -0.1358298 | -0.4094493 | -0.0471552 | -0.0942889 | 0.30554677 | 1 | |
| WS | 0.75446385 | 0.77739912 | 0.77428506 | 0.85566682 | 0.61449932 | 0.72050854 | -0.0941614 | -0.0066384 | 0.70624092 | 0.69369951 | 0.70011411 | 0.16084232 | 1 |

The correlation matrix here (Table 1) reveals the relationships between different player metrics. Strong positive correlations exist between Total Points (TPTS) and Total Minutes Played (TMP) (correlation coefficient of 0.95), indicating that players who spend more time on the court tend to score more points. Additionally, Total Points (TPTS) also show a high correlation with Total Rebounds (TTRB) and Total Assists (TAST), suggesting that high-scoring players are also active in other areas of the game. These correlations highlight the interconnected nature of player contributions in various statistical categories.

## 4. Impact of Versatility

The simplified analysis explores the concept of versatility and its effect on player performance. Players like Zion Williamson, who score high on the versatility scale, show improved performance metrics when versatility is considered. For instance, his scoring average is 7.61 points per game without versatility, but it rises to 8.57 points per game when versatility is factored in. This model demonstrates that versatility significantly enhances a player's overall impact on a game.

## 5. The re-draft

Re-evaluating draft picks is quite challenging. In this article, we applied nine criteria, assigning each player 100 points, and then summing the nine scores together. We also find lots of paper about the the concept of bivariate weighted distributions and proposed four different families of weight functions. In several real data applications a biased sample arises naturally from the selection procedure. Recently, Economou et al. (Biom J 62: 238–249, 2020) used the concept of bivariate weighted distributions and proposed four different families of weight functions to describe cases in which the bias in a bivariate sample is caused by adopting sampling schemes that result in over- or under-representation of individuals with specific properties in the sample.[5]

•Win Share (16%)

The Win Share metric evaluates how many victories a player adds to their team. It offers a clear evaluation of players' contributions and dedication to a team's victory. The percentage means that Win Share is of great significance during the evaluation of individuals' value, which embodies their comparative influence on a game.

● Versatility (15%)

In the field of basketball professions, the figure featured by a player's personal ability, showing how well they perform in different roles. Those athletes armed with great flexibility are often highly valued among their competitors.

● Scoring per game (15%)

It is the average number of points a player scores per game. This is a direct indicator of a player's scoring ability and offensive contribution. The 15% weighting underscores the importance of scoring in evaluating a player's overall performance.

It shows the average level of players' achievement in each game, which is a clear reflection of player's performance in getting scores and the amount of team contribution. The big percentage also indicates the importance of the player's scoring proficiencies to the team's success.

● Assists per game (9%)

This figure measures the level of assists provided by each player, showcasing their assisting and cooperative skill in the teamwork of scoring. According to the allocated 9%, we can see the significance of assisting teammates but matters no more than getting scores.

● Total rebounds per game (9%)

This statistic represents the rebounds on average in NBA games. The allocated figure is not relatively high, suggesting that although rebounding plays an important role in competitions, the significance is not quite valuable when a player's comprehensive performance is evaluated.

● Play time per minute (9%)

It is a metric that indicates the standard of one's overall performance by referring to statistics, considering how long they play on the court. By analyzing this figure, a comparison of relative fairness and equality can be realized among all the players. In a limited period, a player's true efficiency can be fully demonstrated.

● Shooting percentage (9%)

It refers to the proportion of attempts a player attempts to score in total. Holding a 9% significance signifies crucial precision in shooting for a team's scoring, particularly for sustaining a high conversion rate.

● Shooting 3-point percentage (9%)

Three-point shooting percentage measures the accuracy of a player's three-point shot. As the three-point shot becomes more and more central to modern basketball strategy, this metric is crucial in assessing a player's long-range shooting ability. The 9 percent weighting reflects the growing importance of the skill, especially in expanding the space and adding a high-risk, high-reward element to a team's offense.

● Field goal free throw percentage (9%)

Free throw percentage indicates how often a player makes free throws. This metric is essential in close games, as free throws can be the deciding factor.

The new ranking system provides a detailed assessment of overall performance, considering factors like winning percentage, overall ability, points per game, assists per game, total rebounds per game, minutes played, field goal percentage, three-point distance, and free throw line. We re-drafted the top players in this draft class by thoroughly analyzing nine performance criteria. Due to his convincing performance, Zion Williamson was regarded as the top pick. Despite his relatively lower capability in three-point scoring, he still showcased an excellent comprehensive performance. Next comes Ja Morant, a player being especially distinctive in his win-sharing and great flexibility, making him a symbol of a competitive defender. Deandre Hunter comes to the third position, as he displays a well-balanced capacity in various metrics, despite his shortage of assists. The top five witness R.J. Barrett and Darius Garland, as Barrett is outstanding in rebounding and game-scoring. Garland's accuracy in scoring and useful assists shows his ability as well. This ranking underlines player's comprehensive proficiency, confirming that Williamson and Morant as the leading roles.

## 6. Conclusion

These datasets highlight the complex and diverse aspects that contribute to basketball player performance. Correlations between metrics emphasize the importance of well-rounded players who can contribute in multiple areas. Detailed player statistics enable comparisons that highlight individual strengths and roles within teams. The impact of versatility on performance metrics further demonstrates the value of adaptable players who can influence various aspects of the game. Overall, these insights can inform coaching strategies, player development, and team composition to enhance overall performance and success in the league.

## 7. Discussion

For NBA teams, the draft can be a part to turn a team's future around, or to acquire
more assets for the future or contend for a championship. For a player to register for the
draft, must meet these conditions.[6] Some parts in the findings are similar to literature. However, some of them are different. In the literature, it said "Historically, the first overall pick has the highest chance of being the best player in the draft." In our research, the paper supports this view by emphasizing the importance of early draft picks, particularly the first overall pick. It highlights those top picks, including the first, generally have better career outcomes and performance metrics. Also, literature shows that "Top 15 picks generally outperform the last 10 picks in the draft." The paper also acknowledges that higher draft picks tend to perform better on average than lower picks. It supports the notion that players selected within the top 15 typically have better statistics and career trajectories compared to those picked later in the draft. On the other hand, the historical insights focus primarily on the pick number and general performance outcomes. But we need also notice about Achieving expertise in basketball is a complex and multidimensional process . For instance, a diverse sporting backgroun during childhood, high jump and fast sprint capabilities, and advanced achievement and competitiveness motivation have all been revealed as contributing factors towards greater long-term player development in basketball.[7] In contrast, the research paper places a significant emphasis on the versatility and balanced skill sets of players. It suggests that players who

can perform multiple roles and excel in both offensive and defensive aspects are more likely to succeed, regardless of their draft position.

## 8. Limitations

Data availability and quality: This study relies heavily on the diversity and completeness of data from basketballreference.com. Not enough data, such as turnovers, fouls and injuries.

Any errors or omissions in these databases may affect the reliability of our findings. Sample size and generality: The sample is limited to 2019 NBA Draft players who have played in at least one NBA game. That may not be fully representative of all potential players, especially those who might have been drafted but didn't get playing time (Jalen Hands and Vanya Malinkovic), or those who developed skills outside of the NBA. For example, a player who plays in a European league may also perform well.

Bias in performance metrics: Metrics used to assess player performance, such as points, rebounds, and assists, are influenced by a variety of factors, including team chemistry, coaching strategies, player roles, and the physical condition of players. These factors introduce biases that are difficult to quantify and adjust for in the analysis.

The impact of injuries: Injuries are common in professional sports and can have a significant impact on an athlete's performance and career trajectory. The study did not fully take into account the long-term impact of injuries on player evaluations and performance metrics.

The number of situations that require individual judgments and evaluations, and that may be object of different sources of conscious and unconscious biases is endless. Generally, sports data are irregular and sparse. They are sparse because the majority of the players do not have long careers, and do not remain in the same league and/or team for many years. The data are not regular because the career of each player belongs to different chronological periods.[8,9]

## 9. Implications

Although one might logically expect that teams play and keep their most productive players, we found significant sunk-cost effects on each of these important personnel decisions. Results showed that teams granted more playing time to their most highly drafted players and retained them longer, even after controlling for players' on-court performance, injuries, trade status, and position played. [10]

For team management and scouting: This study offers valuable insights that can enhance drafting strategies by highlighting the significance of versatility and overall performance. By prioritizing players who contribute across all areas of the game, teams can achieve more successful draft outcomes. In addition, the integration of objective, data-driven evaluation methods can reduce bias in player selection, create fairer opportunities, and potentially enhance a team's performance over the long term.

For coaches and player development personnel: The findings of this study can be directly applied to coaching and training methods. A key insight was the emphasis on versatility as a crucial aspect of player development. Coaches can enhance players' overall value and effectiveness on the field by designing training programs aimed at improving skills across various aspects of the game. This aligns with the study's conclusion that possessing a diverse skill set is highly advantageous.

## References

*[1] Berger, T., & Daumann, F. (2021). Anchoring bias in the evaluation of basketball players: A closer look at NBA draft decision-making. Managerial and Decision Economics, 42(5), 1248-1262.*

*[2] Pérez-Toledano, M. Á., Rodriguez, F. J., García-Rubio, J., & Ibañez, S. J. (2019). Players' selection for basketball teams, through Performance Index Rating, using multiobjective evolutionary algorithms. PloS one, 14(9), e0221258.*

*[3] Chen, M. "STEAMS" Methodology of NBA Draft Player Position.*

*[4] Cene, E., Parim, C., & Özkan, B. (2018). Comparing the performance of basketball players with decision trees and TOPSIS. International Journal of Data Science and Applications, 1(1), 21-28.*

*[5] Economou, P., Batsidis, A., Tzavelas, G., & Malefaki, S. (2021). Understanding the sampling bias: A case study on nba drafts. Journal of Statistical Theory and Practice, 15, 1-20.*

*[6] Hussey, A. (2021). NBA Draft Analysis (Doctoral dissertation, Dublin, National College of Ireland).*

*[7] Kelly, A. L., Jiménez Sáiz, S. L., Lorenzo Calvo, A., de la Rubia, A., Jackson, D. T., Jeffreys, M. A., . & Santos, S.D. L. D. (2021). Relative age effects in basketball: exploring the selection into and successful transition out of a national talent pathway. Sports, 9(7), 101.*

*[8] Osório, A. (2020). Performance evaluation: subjectivity, bias and judgment style in sport. Group Decision and Negotiation, 29, 655-678.*

*[9] Sarlis, V., & Tjortjis, C. (2020). Sports analytics—Evaluation of basketball players and team performance. Information Systems, 93, 101562.*

*[10] Staw, B. M., & Hoang, H. (1995). Sunk costs in the NBA: Why draft order affects playing time and survival in professional basketball. Administrative Science Quarterly, 474-494.*