**SPMT 425 Final Project:**

**Fairfax Fennecs Analytics Report**

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The team that wins in a basketball game is the one who scores the most points. In a game of around 100 possessions for each team, the winning edge comes from how efficiently you score over the course of the game against various adjustments the opposing team might make. When building a championship contending team you need to have one of the best players in the league. The statistic I’ve created is for determining the best (most effective) player over the course of the 2018-19 regular season. Many T.V. analysts and casual watchers pay attention to players consistently dropping 30 points or so as points are ultimately all that move the scoreboard. But other statistics are equally important, like assists that create opportunities for other players to score points. If you take this idea even further, offensive rebounds essentially create another possession and give another potential opportunity to score. Halfcourt offense is more difficult than transition offense, so getting momentum building stops like steals really swings the course of the game as it prevents a score and gives a good opportunity to score.

The statistic I’ve developed is called: Net Points Created, NPC. The dataset provided lacks per possession data, so it’s difficult to apply an effective statistic measuring all players. Instead, I will use minutes played to adjust the final statistic. This statistic will primarily use offensive statistics but will also contain statistics that create opportunities for points like offensive rebounds, assists, and steals. Net Points Created also includes a negative value for fouls and turnovers that essentially create points for the opposing team. Other than points every value will be logically adjusted for the number of points the statistic is likely to create (or lose). All these values, once adjusted, will be added together to create NPC. I will also divide the NPC by minutes played to see which players are efficiently creating the most points. The Fairfax Fennecs will be able to see which stars in the league provide the most raw value with NPC and perhaps which role players provide efficient value with NPC/MP. I will provide tables with the top 10 and bottom players in NPC/MP above the 50th percentile in minutes played so that we can determine who to build our team around. I will also provide some visualizations to depict clearly just which players are creating the most Net Points and why.

**The Statistic: NPC/MP**

In basketball, the end all be all is getting the ball in the basket. The more measurable actions a player takes to give his team chances at getting the ball in the basket, including putting it in himself, the more points that player creates for his team. To find which player is creating the most points for their team, I had to discern which statistics are responsible for creating points and how to weigh them accordingly. I used R to read-in the dataset do the following calculations as well as the following visualizations.

First of all, points are the simple exact measure of points created. Next, are assists. However, to measure the number of points created by an assist without finding another dataset, I had to approximate the average value of a shot given that it was scored in 2018-19. To do this I had find the proportion of shots scored that were threes, .2766, and the proportion of shots scored that were twos, .7234. Then I multiplied both of those values by their respective point values and added them together. The resulting value of shot given that it was scored in 2018-19, was 2.277. Thus, assists were adjusted by the average value of a shot made to accurately estimate points created by 1 assist. Offensive rebounds give another chance at a possession and thus a chance at another shot (unless blocked, stolen, or turned over). On one possession it should be assumed that it’s easier for the defense to rebound than the offense and so getting a defensive rebound doesn’t create a point opportunity for your team. When adding offensive rebounds to the NPC formula, I had to adjust the rebound by the average value of shot taken because there’s no guarantee this extra shot is an extra point. I determined that the average value of a shot would be (total 3’s made \* 3) + (total 2’s made \* 2) / 3PA + 2PA. The average point-value of a shot in 2018-19 is 1.048. Steals create an extra possession for your time and more often than not lead into an easy transition shot. However, for the purpose of NPC I only used the average point-value of a shot in 2018-19 to adjust steals (1.048). Turnover’s give away the opportunity for your team to score on a single possession and thus should count as minus one average point-value of a shot in 2018-19 (1.048). The last statistic that doesn’t overlap with the others that effects points are personal fouls. To roughly estimate the points given over from one personal foul, I added up all the points from free throws and divided it by total personal fouls. This ended up being 0.8458.

So, the final formula for Net Points Created (NPC) was determined to be: PTS + (AST \* scored\_shot\_val) + (ORB \* shot\_val) + (STL \* shot\_val) - (TOV \* shot\_val) - (PF \* foul\_val). NPC/MP is self-explanatory. NPC is more an offensive statistic than defensive and are overall measure of effectiveness of putting points on the board for their team. After creating the additional column in R and sorting by NPC I found that the newly created statistic was fairly accurate, at first glance, at displaying the most effective offensive engines in the league. James Harden was clearly above everyone else with 3774 NPC while Russell Westbrook and Damian Lilliard held second and third respectively at around 3150 NPC. I was a bit surprised to see Kemba Walker so high up at fourth, but when sorting by NPC/MP I saw that many players that were playing less minutes were much more effective than him during their time on the court: like Lebron James, Lou Williams, and Anthony Davis for example. This made it clear that because of injuries or reduced roles, I needed to solely accept NPC/MP as my final statistic for measuring a player’s net effectiveness at creating points. I then filtered the entire dataset to include players above the 25th percentile in minutes played to make analysis of the top players in NPC/MP more accurate. Later on, I will also filter out the top 25% in minutes played to scout some of the more effective bench or younger players for the Fennecs’ roster.

**Tables and Data Visualizations Discussion**

In the final section, I created the tables using Excel and the visualizations using R. These tables and visualizations are made to help the General Manager of the Fennecs discern the value of NPC/MP as well as scout efficient offensive engines for their team. Table A1 lists the top 10 players in NPC/MP for the 2018-2019 season with at least 323 minutes played. The table includes the statistics used in the calculation of the statistic as well as statistics for context like position, age, and team. James Harden had the highest NPC/MP by a large margin since he had quite a high number of assists as well as the most points by far. NPC weighs points and assists heavily, and the only defensive metric included is steals which means that NPC/MP is skewed towards Point Guards. Point Guards are traditionally the offensive engine of the team, so the resulting top 10 makes sense given the goal of the statistic. It’s notable that the only non-guards are Lebron James, Giannis Antetokounmpo, and Nikola Jokic. Two of which are known for their passing ability and constantly have the ball in their hands. Giannis is still an offensive engine and had high number of assists even compared to other players on the top ten list. Lebron James had a lower raw NPC value and played less games than most players in the top 10 due to injury, however the NPC/MP shows that he is the second-best player when it comes to efficiently creating points for his team. It’s also important to note that Damian Lillard has the 2nd most points, 6th most assists, and is 3rd in raw NPC in this top ten table however because of his high minutes played, he ends up 9th on this top ten table.

Table A2 shows the same statistics but for the bottom 10 players in Net Points Created per Minute Played. Of these bottom 10 players, 6 played in half the games and 3 started in around half the games. Bruce Brown, P.J. Tucker, and Terrance Ferguson all started in over half the games played in the 2018-2019 season. P.J. Tucker scored 601 points and Terrance Ferguson scored 513 points. This is pretty decent given their roles on their team however they are still in the bottom 10 for NPC/MP. The 3 players that started in over half their games also have an insane amount of personal fouls compared to their minutes played or points scored. The personal fouls of these three players are around the same as the players in the Table A1 but their points, assists, and offensive rebounds are lacking significantly to make up for this. Bruce Brown and P.J. Tucker specifically are known for their defensive prowess so perhaps they are fouling a star player when that star player would otherwise have scored the shot. The rest of the players on this bottom 10 NPC/MP list are pretty bad inefficient players.

In Figure A1, we can see the distribution of Net Points Created per Minutes Played across each of the five roles. Since NPC/MP is a statistic that is measure of how effective of a point generator each player is, it makes sense that the distribution for point guards is significantly higher than the distribution for any other position. The median value for a point guard is above the 3rd Quartile for every other position. Point Guards typically have the ball in their hands so they will rack up lots of assists and points. These boxplots disregard any players with less than 323 minutes played as to not skew the data. From Table A1 we can see that the top outlier for shooting guards is Lou Williams, the top outlier for small forwards is Lebron James, the top outlier for power forwards is Giannis Antetokounmpo, and the top outlier for centers is Nikola Jokic. After creating this boxplot, I was curious to see who the other outliers are.

**Team Improvements Based on Visualizations**

In order to become a championship contender, the Fairfax Fennecs need to make a big trade for a star offensive engine or draft one. Figures B1 through B5 depict the top 10 players in NPC/MP for each role and their points played. The scatterplot also depicts visually the gap in between each player’s overall effectiveness. We can see in Figure B1 that James Harden is leagues ahead in both NPC/MP and Points Scored. Russell Westbrook is more efficient when it comes to point generation than Lillard, Walker, or Curry but they all score more points than him. In figure B2, we can see that Bradley Beal scored the most points over any other shooting guard, followed by Donovan Mitchell. However, Lou Williams was the most efficient in his minutes played. Lou Williams often got to play against the bench as he was 6th man of the year during this season. Devin Booker scored the third most points, and had the second highest Net Points Created per Minutes Played. If I had to build a team around shooting guard then he would be my number one pick. In figure B3, Paul George, Kevin Durant, and Kawhi Leonard all scored more points than Lebron James and they all have around a similar NPC/MP of 1.0. Lebron James missed about 26 games this season due to a groin injury and so his points would have been a lot higher had he played. He does beat the rest of them out by far in terms of NPC per MP with a whopping 1.23. In figure B4, Giannis Antetekounmpo led by far in NPC per MP and beat out Blake Griffin by about 100 points scored. Blake Griffin was the sole good player on a struggling Detroit Pistons and so it makes sense that he took on the role of creating and scoring for his team as he came in second in both NPC/MP and points scored. Julius Randle had the 4th most points scored with slightly less than Tobias Harris, however his NPC/MP was significantly higher than Tobias Harris’ so he was a more efficient generator of offense for his team and a much better pickup in my eyes. In Figure B5 we can see that quite a few players scored more than Nikola Jokic and Anthony Davis, however their NPC/MP suggest that they are much more effective at generating points as a whole.

Figure A2 shows the top 16 players in NPC/MP and their points scored. When starting a franchise, I would pick from one of the younger players on this list to secure my future. Lillard, Booker, Russell, Young, Antetokounmpo, and Davis would be my primary trade targets. Lillard and Antetokounmpo being the best two options.

**Shortcomings and Improvements**

The main shortcoming of the NPC/MP statistic is that it does not account for the strength of the team that the player is currently playing on. Unlike statistics like box plus minus, I don’t take into account the teams overall points scored or the teams average NPC to determine if the team is just really efficient. Another shortcoming is that there isn’t a great way to quantify steals or blocks in regards to the points they create. In the NPC formula I just count the steal as an opportunity for one shot when most of the time a steal results in a transition dunk or layup. Also, a third of the time someone gets blocked it results in an opportunity for one shot so perhaps I could have also included that in my formula for NPC. NPC also highly favors players with the ball in their hands and playmakers as opposed to just really efficient shooters. This statistic isn’t the best at finding role players or glue pieces that can work well within an offense. NPC/MP finds the highest generators of points, this statistic helps find out who is the offense. It might also be helpful to add the amount of time a player has the ball in their hand to the formula to adjust for how they effect the team’s offense as a whole.

**Conclusion**

In conclusion, NPC/MP is a crucial statistic in determining who can be a worthwhile offensive engine and point generator. This is a very useful tool that can even be used to identify players in college that the Fennecs could potentially bring up. The only issue is that once we’ve identified the point generators and brought them on the Fennecs’ defense could be lacking. To counteract this I would recommend a defensive minded Head Coach and staff. The statistic NPC/MP helped to pick out both the MVP and the 6th man of the year for this regular season in its top 10 chart as well as many of the MVP candidates and other well known offensive juggernauts around the league. If the Fairfax Fennecs are able to snag one of the top 10 players in NPC/MP and round out their team with solid defense then there is no doubt the team could be a championship contender in the years to come.

**Table A1**



Table A1. This table shows the players with the highest NPC/MP as well as statistics relevant to the calculation of the statistic.

**Table A2**



Table A2. This table shows the players with the lowest NPC/MP as well as statistics relevant to the calculation of the statistic.

**Figure A1**

Chart, box and whisker chart

Description automatically generated

**Figure A2**

Chart

Description automatically generated

**Figure B1**

Chart, scatter chart

Description automatically generated

**Figure B2**

Scatter chart

Description automatically generated with medium confidence

**Figure B3**

Scatter chart

Description automatically generated

**Figure B4**

Chart, scatter chart

Description automatically generated

**Figure B5**

A picture containing chart

Description automatically generated