

Final Project
Placing the Tallest Player of the Team, at the Opposite Hitter Position, in Volleyball
Mast 397 – Sports Analytics
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INTRODUCTION

For as long as sports have existed, there have been stereotypes along with it. Most of these are based on a person's height, weight, race and/or gender. If a short person wants to play basketball, generally they're not assigned the Center position but rather Point Guard. If a male and female are competing, many believe the male will always win, due to the belief that they are stronger and more dominant. There are a few stereotypes in volleyball, one of them being that the tallest player is automatically assigned to the Middle Hitter position. Coaches place them in that position, due to their blocking advantage.

However, is this strategy the most beneficial? Is the middle hitter the optimal position for the tallest to play at? This study was conducted to prove whether or not placing the tallest player at the opposite hitter position is a more effective strategy.

This is relevant, because I believe this to be a unique, effective and unorthodox strategy that coaches can use when exploring alternative ways to defeat their opponent, during losing sets. It is needed specifically for teams whose average hitters' heights are greater than the other team's and also when needing to block an opposing team whose outside hitters are considered very powerful.

LITERATURE REVIEW

Many formal academic paper journals haven't been done nor found regarding this strategy as it is not a popular study. However, many articles were found, regarding the reason why the tallest are placed in the MH position, reason being the block speed.¹ Nonetheless, an explanation of the positions in volleyball should be briefly addressed.

Usually, each player of the team is assigned a specific role. There are the liberos, the setters and the attackers/hitters. The setter (S) is seen as the

quarterback of the team. They are the ones that set the ball to the hitters for them to spike the ball to the other team. The libero's (L) goal is to receive the attacking balls from the other team and bump the ball to the setter. There are three types of hitters all with different objectives. There's the outside hitter (positioned in the left front row), the middle hitter (positioned in the middle front row) and the opposite hitter (positioned in the right front row). The outside hitter (OH) usually spikes from the front and back rows, plays front left or middle back, bumps in service receptions and blocks. For this reason, they're seen as the most agile. The middle hitter (MH) is the team's primary blocker and hits mostly fast-tempo sets. Lastly, the opposite hitter (OPP) has one responsibility, to spike the ball from the front and back rows and to block. They don't have to play defense during service receptions nor are they considered the primary blocker of the team. In the 6-player lineup, there is 1 libero (L), 1 setter (S), 1 middle hitter (MH), 1 opposite hitter (OPP) and 2 outside hitters (OH).

METHODOLOGY

I used a male dataset to show whether there is a relation between a player's position and their standing height. This was used to see whether there's a pattern as to how players are positioned, based on their height. Are the smallest players the setters or the libero? Are the tallest, on average, the MH players?

Next, I wanted to show using linear regression, whether there was a correlation or not with a player's standing height and their spike height. Generally, do tall players reach higher than shorter players, regardless of their positions?

I then showed whether there was a relation between a player's position and their respective spike height and compared it with their block height. Is there a difference between a player's

¹ Meale, 2022

spike height and their block height? Does it vary by position?

Then, with linear regression, I showed that the higher spike height a player has, the greater field range they would have to spike/kill the ball wherever they would want to. I did this by using the men's data to show whether there was a correlation or not between a player's spike height and the average number of points they produce per match. Logically, it makes sense that the higher a person jumps, the more field range they have. If physics was used, the spike angle would be discussed based on the player's spike height and I would prove that the higher a person reaches, the greater the spike angle that person would have. However, can this be proven statistically?

Lastly, I showed past and present professional teams that have used this strategy and showed how well they perform in terms of standings in their domestic league. How was the team performing before this strategy was used? If I had to do a season-by-season comparison, were they ranked higher or lower in league standings?

DATA

I found a dataset from the FIVB Men's 2022 Nationals League tournament website of the best attackers from the tournament, showing the attacking stats of over 200 male players. I also used the anthropometry and jumping stats for the players from the countries that participated in the FIVB Men's 2022 Nationals League tournament.

I started off by data scraping, using Python's BeautifulSoup4, for the FIVB Men's 2022 Nationals League tournament website, as well as each participating team's roster website. A total of 16 teams from all over the world competed at this tournament. At the 2022 tournament, the qualified teams were: Argentina, Australia, Brazil, Bulgaria, Canada, China, France, Germany, Iran, Italy, Japan, Netherlands, Poland, Serbia, Slovenia and USA.

After this, I needed to combine the men's attacking stats from the FIVB website, with their height, spike height, and positions variables from

their team's website. Unfortunately, Python's simple append() function didn't work because every player's names were different from the 2 websites. One encountered problem was that there were accents in some of the player's names, whereas the other website didn't include any accents. Or a few characters missing in a person's name from one website, compared to the other website's interpretation of the name. That's where FuzzyWuzzy came in and would match a string based on the position indexes of each character of the name. Doing so, I was able to append both tables, giving me a grand table where I got to see every player's attacking stats along with their anthropometric and jumping stats that I needed.

Figure 1 illustrates a histogram for a player's position and their standing height

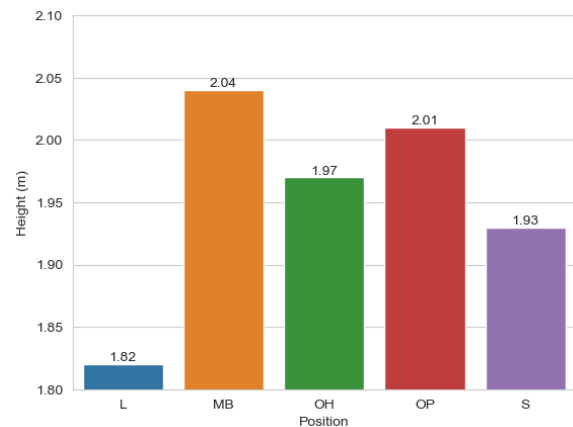


Figure 1. Average Standing Heights of 200+ Male Players, by Positions

We see that the order of height from tallest to shortest goes in the following order: Middle Hitters, Opposite Position Hitters, Outside Hitters, Setters, and lastly, Liberos.

Figure 2 illustrates the linear regression plot of the standing height and their spike heights of the players.

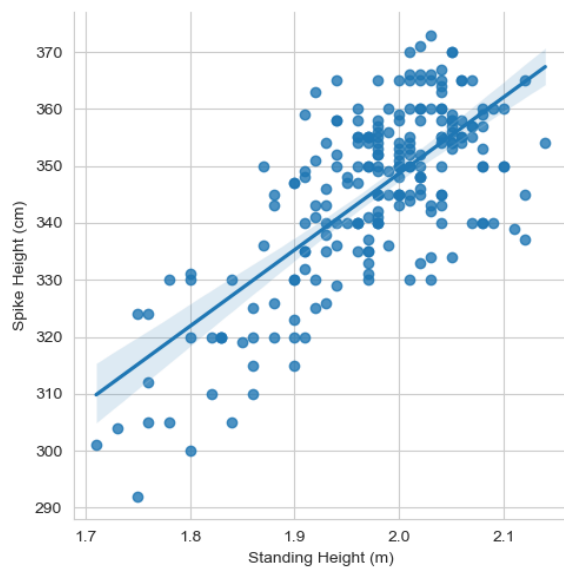


Figure 2. *Relation between Height and Spike Height of 200+ Male Players*

We see that there is a strong and positive correlation with height and spike height as the taller the player is, the higher their spike height is.

Figure 3 shows the comparison between the spike height and the block height.

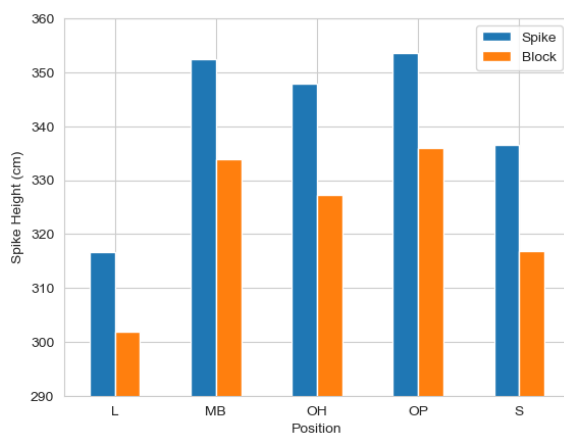


Figure 3. *Average Spike and Block Heights of 200+ Male Players, by Positions*

We see that on average, the spike height is always greater than the block height for all positions.

Figure 4 shows the linear regression plot when comparing the spike height with the field range of the player.

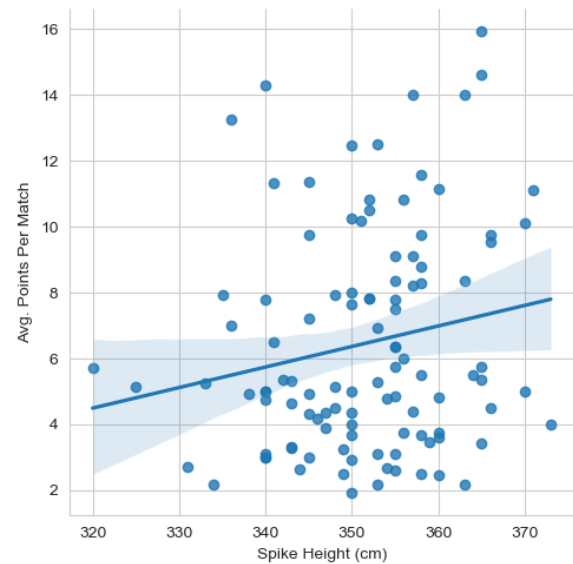


Figure 4. *Relation between Spike Height and Avg. Points Per Match*

We see here that there's a weak, yet positive correlation between the two variables, proving that the higher the spike height of a player is, the more points/kills they'd produce on average per match.

RESULTS

I found 4 teams, 3 of which are presently using this strategy and 1 that used this strategy in the past. The Osaka Sakai's, the Wolfdogs Nagoya and the Suntory Sunbirds are the 3 present teams that use this strategy and they all belong to Japan's professional domestic league. The team that used this strategy in the past, was in South Korea's professional domestic league, called the Ansan Okman.

Starting off with the Osaka Sakai, the tallest player on the team is their OP player Sharone Vernon-Evans who is a starter for Team Canada with a standing height of 2.06m. Sharone was recruited at the 2020-21 season.

4 Placing the Tallest Player of the Team, at the OP Position

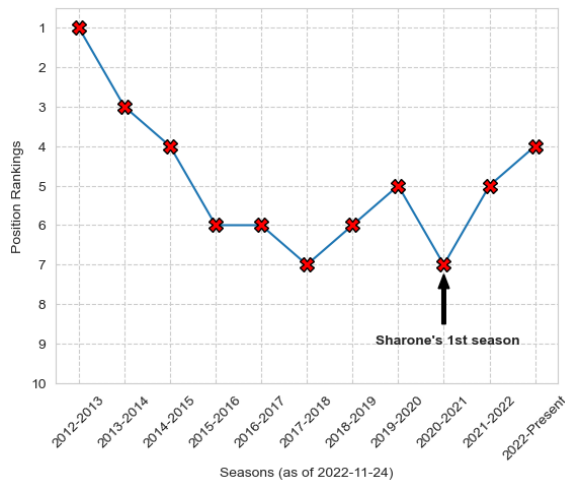


Figure 5. *Osaka Sakai's yearly standings, from last 10 years*

From Figure 5, we see that Osaka Sakai hasn't been in good standings in the past decade. When they recruited Sharone, they were placed 7th out of the 10 teams. However last year, they were ranked 5th and are presently ranked 4th in the league.

We then have the Wolfdog Nagoya's starting OP player Bartosz Kurek from Poland, who is the tallest with a standing height of 2.05m.

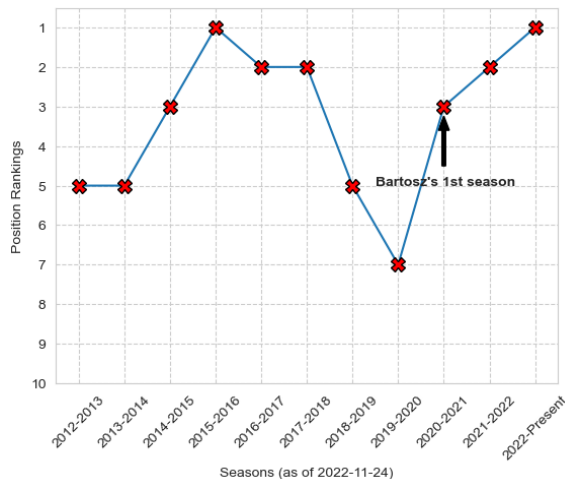


Figure 6. *Wolfdog Nagoya's yearly standings, from last 10 years*

Bartosz was recruited in the 2020-21 season. In Figure 6, we see that the two previous seasons, the club were respectively placed in 5th and 7th. Yet when the club recruited Bartosz, in his first season, they were placed 3rd and then the following season, second best. Currently, the team is ranked the best in the league.

Ansan Okman used this strategy with Cuba's MH player, Robertlandy Simon, from 2014 till 2016. Robertlandy has a standing height of 2.08m and has always played the MH position for most of his life. However, for 2 seasons with Ansan Okman, he played the OP position and was the tallest of the team.

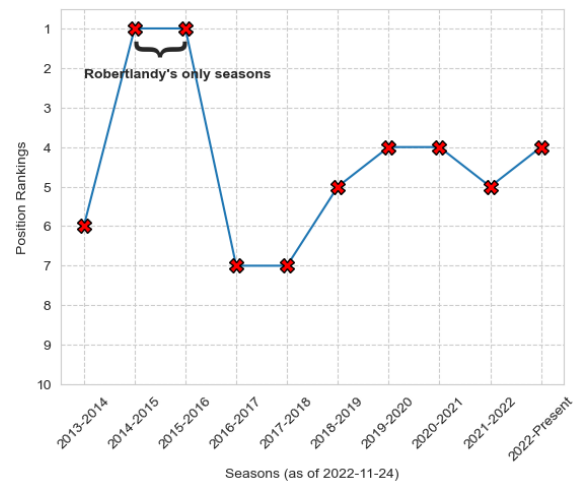


Figure 7. *Ansan Okman's yearly standings, from last 9 years*

From Figure 7, we see that the two seasons that Robertlandy played, they were ranked the best team in their league. Yet, his absence was clear, by the team's future standings over the years. Before his recruitment, the team was ranked 6th and after he left, the best position that the team has ever been was 4th.

Lastly, from the Suntory Sunbird, there's Russia's MH player, Dmitriy Muserskiy, with a standing height of 2.18m. Dmitriy, like Robertlandy, played MH for the entirety of his career and is considered to be one of the best MH players of all time. However, with the Suntory Sunbirds, he plays the OP position and is also the tallest of the team.

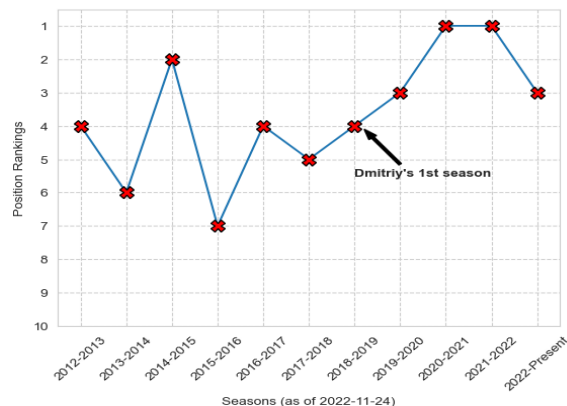


Figure 8. *Suntory Sunbirds yearly standings, from last 10 years*

Figure 8 shows that Dmitriy was recruited at the 2018-2019 season and his addition has been evidently rewarding. Before his recruitment, the team was very inconsistent in standings, yet following his addition the team has been ranked the best for 2 seasons and has always been part of the top 4.

DISCUSSION

The benefits of my model show there are offensive and defensive advantages of having the tallest of the team as the OP player. From an offensive standpoint, they would generally have a much higher spike height than the previous OP player and there would be a much bigger difference between their spike height and the opposing player's block height. Previously, I proved that spike heights are always greater than block heights. When placing a taller person in the OP position, with a higher spike height than the previous OP player, the gap between the hitter and the blocker becomes much bigger giving the hitter more space for them to kill the ball at a greater range.

Defensively, this model would show that the hitter of the opposing team would go up against someone that has a higher block height than the previous blocker. This would give the opposing hitter less field range when spiking the ball.

The biggest limitation with this model is if there's a team whose tallest player doesn't have the highest spike height of the team. There are a

handful of players that are shorter in height, yet have a higher spike height than those taller than them. For example, player A has a standing height of 2.10m with a spike height of 3.6m and player B has a standing height of 2.00m with a spike height of 3.7m. Player B is shorter, yet has a higher spike height than player A. If this is the case, then evidently, the coach should place the player with the highest spike height in the OP position.

CONCLUSION

In conclusion, overall, placing the tallest player of the team to the OP position is an effective and advantageous strategy. In general, the taller a person is, the higher spike height they would have. However, this strategy isn't as beneficial if a shorter player has a higher spike height than the team's tallest player. When placing the tallest player in the OP position, they would have a greater field range and a larger kill angle when spiking offensively. Defensively, the opposing hitter would compete with someone with a greater block height, adding advantage to the team.

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- ***If I added the women's plot, I would've exceeded the page limit. The plots, however, showed the same as the men's plots.