Fragile Nature of Competitive Advantage in an Analytic Driven Market

SportVU in the NBA

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Abstract

The increase in the use of analytic measurements and technology in professional sports has grown and is considered to be the future of business. The National Basketball Association has entered an agreement with STATS, LLC, an analytic firm, for the use of their SportVU technology to track games and provide data to the teams. This advancement in technology has been heralded to be the break through advancement in analytics as it provides accurate and complex data to teams. Through regression model testing it was displayed that teams who invested in the technology prior to the league wide deal did in fact gain a competitive advantage in the league. However, the competitive advantage did not last due to saturation of the technology in the market. While the shift of focus to analytics is still prevalent in the league the next step is to focus on how to integrate the data provided by SportVU in a manner that creates another competitive advantage. Human capital will most likely be used to generate this advantage through unique insights into the overwhelming amount of data available to teams.

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In an industry where distinct and true differentiation is hard to create, there is a push to create a sustainable competitive advantage by employing analytics. The National Basketball Association (NBA) signed a deal with STATS, LLC, a statistic and analytic firm, that installed cameras in each arena to track the game for analytic use by teams (Aldridge 2013). The technology STATS uses is called SportVU. It was originally created to track missiles during testing, but has also proven effective in tracking the performance of basketball players. Organizations are shifting to analytics across all different sports rather than relying on an "eyeball test" or simple statistics (Aldridge 2013). The NBA is the first major league to implement this technology league wide. The perceived intentions of the league were to create a more complete box score and elevate the game (McCann 2012). The desire of the teams is to learn from the data and transform it into information that can allow their team to perform better and ultimately win. Individual organizations wanted to create a competitive advantage by using these analytics. Prior to the league wide implementation there were several teams who partnered with STATS and used SportVU (McCann 2012). While the executives from these teams are not named, they were upset because their team had already made the investment into SportVU and were upset that the league now provided everyone access to the technology and data (Aldridge 2013). However, they also conceded that it would be beneficial to have a full set of data league wide instead of the fifty percent of the season that teams got from their home games alone (Aldridge 2013). The league-wide expansion proved to show that the competitive advantage gained by having this technology was erased as it became easily imitated and the rarity of this advantage was lost. The advantage was no longer sustainable and ceased to exist but the opportunity to reinvigorate SportVU with the help of specialized human capital remains.

The sporting industry is often viewed as different from other industries in the way in which the product is produced. The output and performance of the team itself is not directly manipulated by executives and cannot be manufactured to an exact specification each and every year, much less every game. This creates challenges for the organizations because there is no assured way to duplicate a performance. Although there are other factors involved in selling a team and the organization being profitable the performance of the team is important. Fans want to see their team win and that is a priority of the organization. This is why the analytics promise of producing a better output is something teams hope to find viable to put together teams and strategic game plans to win games and win championships.

Analytics are not only being lauded in the NBA, but also in other leagues. The Arizona Coyotes of the National Hockey League (NHL) recently hired 26 year old John Chyaka as their new General Manager. He founded Statletes, a firm based in Canada which analyzes film of players and uses those analytics to grade players and provide insight into player and team performance (Statletes.com 2016). Hiring an analytics guru like Chyaka is a vote of confidence by the Coyotes in analytics. The Oakland Athletics of Major League Baseball (MLB) used an economic approach to valuing players and have consistently been the considered the "best bang for your buck" team in relation between performance on the field and payroll of players (Morris 2014). Even the Golden State Warriors' owners exploited the market inefficiency they found with the 3-point line in order to make strategic decisions in the building of their team (Cohen 2016). These increasingly analytical approaches are being observed in almost every major

league. While stats have always been kept there is a new depth of analysis emerging on levels that were not previously imaginable.

SportVU was first implemented into soccer in Europe. It was able to track the distance players ran and correlate this to their performance (Aldridge 2013). The potential for team doctors to tell players how far they are allowed to run in a game instead of a certain number of minutes they are allowed to play is far more helpful to their recovery process was one of the major perks of SportVU (STATS.com 2016). The scope of this technology does not simply reside in the win and loss columns, but in the way in which athletes recover and rehabilitate. The way players run down the court and efforts for their recovery can be tracked in a more accurate manner (Maese 2013). Analytics also reaches out into the valuation of players. It allows coaches to evaluate how the number of touches a player has in correlation to the teams overall scoring and can use this information to better value a player's efficiency in the game. The general consensus is that the data being captured will be used in contract negotiations and be a determining factor in the contracts that players sign in the future (Aldridge 2013).

This move toward analytics has the potential to change the way fans and professionals look at games (McCann 2012). The deal the NBA made allows fans to have access to the new tracking statistics (Aldridge 2013). Fans and media will have access to the stats and the hope is that it will assist in a better understanding of why teams make the decisions they do that moves beyond the basic stats that have traditionally been shown to fans (Barker 2016). Now the media and fans can see the statistics that the organizations do and can enjoy them beyond the traditional box score that has been the standard for so long.

SportVU was not originally created to track sports, but SportVU was developed in 2005 by Miky Tamir, an Israeli scientist who worked for Elbit Systems. The original purpose was to track the trajectory of missiles post launch to see if they were actually where they were supposed to be in accordance to their designs by using advanced optical recognition (McCann 2012). Some of the workers at Elbit Systems were soccer fans and thought that SportVU could not only track missiles, but also soccer players. They were able to track how far players ran during games and how well they performed over the period of the game (Aldridge 2013). They were able to determine if a player got tired around a certain minute due to time played or if he was tired due to the distance he ran. It went beyond what was able to be analyzed and created advanced stats like the previously mentioned distance or even the average rate of speed or how consistent a speed was. STATS, LLC bought SportVU in 2008. During this time Brain Kopp, Vice President of Strategy and Development at STATS, LLC, began to think of how well it would work in a smaller playing field which led to basketball. Kopp saw the potential that SportVU had for basketball and began selling to teams individually before striking a deal with the NBA (Aldridge 2013).

The advancement of stats is already showing in the statistics SportVU provides. According to an ESPN article, analytics can tell who has the fastest top speed, who scores the most, and who scores the most per touch. They can also analyze if a team shoots more often off of passes from a certain player. For example, Celtic forward Paul Pierce was passing to his teammates when they had opportunities to shoot increasing the number of shots taken off of passes from Pierce. They can show if a specific player scores at a higher rate when passed to by a certain teammate over the average (McCann 2012). Teams are hesitant to share any information they have on the way in which they actually use the analysis or further the analysis

because they want to generate a competitive advantage from this technology (McCann 2012). Some of the stats are simply being enhanced by this technology more so than rewriting stats. It has changed the rebounds stat from looking at rebounds per game to integrating rebounding chances which is defined as a player being within 3.5 feet of the ball instead of the pure number of rebounds. It also accounts for rebounds in traffic, which is defined as when an opposing player is within 3.5 feet of the ball (McCann 2012). This shows a more definite picture of how good of a rebounder a player is because it takes into account how many times they actually have the opportunity and if they are facing competition for the rebound or if it is an "easy" rebound. There are also new categories of stats being created such as an "athleticism" category. This category tracks how quickly players move about the court and how long it takes them to close out on a shooter (McCann 2012). It changes the idea of pace as a number of possessions per game into an actual time the team is possessing the ball. STATS, LLC is looking to show a more detailed and better story of the game through stats instead of the basic, points, assists, rebounds that exist right now in the box score (McCann 2012).

In order to capture, track, compile and analyze all of this data, cameras had to be set up in each arena. The system includes six cameras on the catwalks in the arenas and three on each half of the court. Algorithms are programed to capture they x, y, and z positioning of objects on the court (Cervone 2014). This means it is three dimensional analysis of the court. The NBA was able to track to see if a goaltending call in the 2009 playoffs was correctly called and SportVU showed that the ball was indeed descending and the correct call was made (Aldridge 2013). All of this is done at a speed of 25 pictures per second. Once captured, they are processed by a computer that generates a report within 90 seconds of a play. ICE is the proprietary algorithms in the software that STATS, LLC created that allows these reports to be created and almost immediately available to the coaches on tablets or computers (Aldridge 2013). The basics of these algorithms is the creation of models that can identify different features of the game as passes, touches, shots, rebounds and so much more. They are extremely complex algorithms in order to correctly and effectively collect all of the data that they do. The vectors and histograms of frequently produced movements are created and called action recognition (Soomro 2014). The models are created to identify these by learning the motions, action poses, or other movements. The idea of learning is when models of different movements and poses are created and when they attempt to match these by the programing a real person would confirm or deny if the algorithm correctly identified the action (Soomro 2014). Then with enough repetition the algorithms are able to identify these actions based on all of the past learning. The next level is called action localization which deals with the location, space, and speed of these actions. This looks at the space in which actions are experienced and the time in which they occur. Background clutter and the actual time-space of the actions must be accounted for instead of just identification of said actions (Soomro 2014). All of this allows them to track how quickly they travel and how many times they touch the ball. It calculates passes in a possession and time dribbling. There is so much data that is compiled it is almost too much to use at this moment, but that is not stopping teams from using it. According to an ESPN article, they said executives were not even using 10 percent of the information the system provided, but say this is the way analytics in basketball is headed (McCann 2012).

SportVU's introduction to the NBA began in the 2009-2010 season when Kopp convinced the Dallas Mavericks, Houston Rockets, Oklahoma City Thunder and San Antonio Spurs to purchase the technology. In the following season the Boston Celtics and Golden State

Warriors also implemented this technology. By the 2011-2012 season the Milwaukee Bucks, Minnesota Timberwolves, New York Knicks, Toronto Raptors, and Washington Wizards joined the mix (McCann 2012). Then in the following season the Cleveland Cavilers, Orlando Magic, Philadelphia 76ers, and Phoenix Suns joined to bump the total of teams up to 15 (Cervone 2014). In the following year the NBA entered a partnership with STATS, LLC and it was put into place in every arena in the NBA for the 2013-2014 season and has been used ever since (Aldridge 2014).

All indications point to analytics continuing to impact the sporting industry. But was SportVU a competitive advantage in the NBA marketplace? Dr. Jason Kiley assisted me in running statistical analysis using Stata, a statistical analysis modeling software, in order to find correlation between SportVU and predictors of success in basketball. NBAMiner.com is a website that has archived several categories of stats from the 1996-1997 season to the current 2016-2017 season. These stats range from the basic stats of wins and losses and average points per game to pace of the game and effective field goal percentage. These stats are taken from the statistics kept by the NBA but all compiled together into one place that can be easily transferred to and analyzed using Stata software. Prior to importing the excel spreadsheets into Stata that were exported from NBAMiner.com it required some simple cleaning to prepare the data.

The stats from the 2008-2009 season through the 2015-2016 season were sorted alphabetically by team name and then a new set of data was created. For each season, a SportVU variable was created. Either a 0 or a 1 was entered for not having SportVU in that season or having SportVU in that season respectively. Once this was completed, the years were compiled into a master spreadsheet for each category of stats NBA Miner had created. These were as follows: basic stats, advanced stats, four factor stats and rare stats.

Once all of the data was compiled and cleaned it was time to import the files into Stata. One final change that needed to be made once in Stata was the name change of the New Jersey Nets to the Brooklyn Nets in 2012-2013 season, but a simple line of code to replace "Brooklyn Nets" if it was "New Jersey Nets" was created to complete standardization of the data set.

The next step was to decide what variables to look at in relation to the SportVU. There were a few factors that would seem to be predictive measures of success on the court and should be tested against the presence of SportVU. The three chosen were offensive efficiency, which is defined as the number of points scored per 100 possessions, defensive efficiency, which is defined as the number of points allowed per 100 possessions, and pace, which is defined as the number of possessions used by team per 48 minutes (DataMiner.com, 2016). A higher offensive efficiency rate and a lower defensive efficiency rate would lend to better offensive and defensive production and pace can lend not only to the more possessions for higher chance of scoring, but also to the speed and entertainment of the game the higher the pace. Also tested was the average home attendance. It was one of the rare statistics that seemed interesting to try and display a correlation between the presence of SportVU and higher attendance in a way of suggesting that SportVU creates or could create a more entertaining game and draw larger crowds.

Once all of the variables were chosen and the t-tests were performed to make sure that there were no missing matches per year with the SportVU data, restrictions by year were made. Regression models were used to show correlation between these variables more specifically so an x-t-regression (xtreg). An xtreg is a panel regression so it is needed because the observations look at team and season as a pair instead of as individuals. It also allows for the use of lagging in

order to allow for all perceived variables to precede the dependent variable in time. The prior season's data for the SportVU variable was used in relation to the four variables chosen to be tested. This was done to show that there has to be some lag time in the outcomes of employing this technology as there would not be an immediate effect from implementation of SportVU and success within the same season. This data showed that it was a good predictor of pace. That pace increased the years after SportVU was used by a team. However, in this model SportVU only seemed to share a correlation with pace, but not offensive or defensive efficiency. This was initially unexpected because the idea behind SportVU was to be able to analyze play to such an extreme level that having SportVU would allow for teams to use the data and analysis to make changes and improve the way the team plays and it was expected to have a correlation. Even in such a simple modeling it appeared that there was no strong, true correlation between having SportVU and an improvement in performance.

With this in mind the modeling turned into creating a three year lag command. This command simply captured those teams that had SportVU for three consecutive years. This was done to show the impact that it had on those who have implemented it over time and not just the prior year to show a more true expression of the time it takes to create a competitive advantage. After the modeling was showing an increase in pace, but a slightly negative correlation for offensive efficiency and a slightly negative correlation for defensive efficiency. This was not what was expected from this regression. As shown in this first regression table the main factor looked at is the SportVU variable being present and its correlation to pace. The coefficient shows just over a one point increase in pace for a team has that SportVU in comparison a one point increase in offensive efficiency basically does not affect pace in any manner as the correlation is so small.

pace	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	1.077631	0.3330482	3.24	0.003	0.3983747	1.756887
ast						
L1.	0.1558582	0.116273	1.34	0.19	-0.0812821	0.3929985
offeff						
L1.	-0.0795107	0.0430823	1.85	0.075	-0.1673776	0.0083562
pointplays						
L1.	-0.028469	0.0806062	0.35	0.726	-0.1928664	0.1359285
avghomeatte~e						
L1.	0.0002231	0.0001625	1.37	0.18	-0.0001083	0.0005545
pace						
L1.	0.4752655	0.0765533	6.21	0	0.3191341	0.6313969
_cons	49.48462	8.491804	5.83	0	32.16548	66.80377

This next regression table shows the negative correlation between SportVU and offensive efficiency. The negative correlation, while so minor it has almost no correlation would show less than a point decrease in offensive efficiency when SportVU was present in a team. The

thought was that the presence of the SportVU variable would increase the offensive efficiency as it is a predictor of success in basketball.

offeff	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	-0.28101	0.4894758	0.57	0.57	-1.2793	0.7172849
ast						
L1.	-0.12403	0.1593483	0.78	0.442	-0.4490253	0.2009606
pace						
L1.	-0.01839	0.1015413	0.18	0.857	-0.2254828	0.1887067
pointplays						
L1.	0.080091	0.0954074	0.84	0.408	-0.114494	0.2746755
avghomeatte~e						
L1.	0.000155	0.0001749	0.88	0.384	-0.0002022	0.0005112
offeff						
L1.	0.280496	0.081685	3.43	0.002	0.1138988	0.447094
_cons	78.53217	10.02309	7.84	0	58.08994	98.97439

Defensive efficiency was negatively correlated with the SportVU which is what one would expect. The negative correlation is good because the lower the defensive efficiency the better because it means teams are giving up less points per possession of opponents, so a decrease in the efficiency is actually an improvement. As displayed in the table there is a little over a quarter of a point drop in defensive efficiency when the SportVU technology is in place. Although there is a correlation that is productive, it is still very small advantage.

defeff	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	-0.29429	0.4845295	0.61	0.548	-1.282496	0.693913
rebrate						
L1.	-0.45113	0.1142463	3.95	0	-0.6841371	-0.2181233
pace						
L1.	0.059902	0.1239366	0.48	0.632	-0.1928686	0.3126722
blk						
L1.	0.053294	0.479762	0.11	0.912	-0.9251865	1.031775
avghomeatte~e						
L1.	0.000279	0.0001604	1.74	0.092	-0.0000486	0.0006057
oppto						
L1.	-0.31813	0.237859	1.34	0.191	-0.8032465	0.1669869
defeff						
L1.	0.170138	0.0866885	1.96	0.059	-0.0066643	0.3469406
_cons	105.2568	18.91201	5.57	0	66.68548	143.8281

Overall, it was a surprise that the technology that is being heralded to be the best analytical advantage in sports was not showing correlation to improvement in performance. However, there was still showing the lag of three years which every team in the NBA has now had the technology for three seasons. This still drew from data that had no variation for several seasons because every team had SportVU for a period of time. Again, the results implied that having SportVU was not a competitive advantage which is in contrast to the widely held belief that advanced analytics and statistics are the future.

The next step was to account for the seasons in which every team in the league had the technology. The data was restricted not only with lag, but was completely restricted to the first six seasons of the data set. The sixth season was the last season that not every team in the league had the technology. This was done in order to eliminate the bias of the data when there is no difference across the teams of having or not having SportVU. This gave the opportunity to look at the competitive advantage of having the technology was able to create when at least half of the league was not using it. This was done by adding a simple line of code that created a condition to limit the data for the first six seasons only. Once these restrictions and parameters were put into place offensive efficiency was up nearly a point per season that SportVU was used.

defeff	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	-0.4325241	0.9249874	0.47	0.644	-2.324336	1.459287
rebrate						
L1.	-0.1949504	0.1895829	1.03	0.312	-0.582691	0.1927902
pace						
L1.	-0.0017417	0.1968291	0.01	0.993	-0.4043023	0.400819
blk						
L1.	-0.1967491	0.5227289	0.38	0.709	-1.26585	0.8723515
avghomeatte~e						
L1.	0.000345	0.000289	1.19	0.242	-0.0002461	0.0009361
oppto						
L1.	-0.6095513	0.3819519	1.6	0.121	-1.390731	0.1716281
defeff						
L1.	0.213486	0.134025	1.59	0.122	-0.0606259	0.4875978

This table shows a negative correlation between the presence of the SportVU technology and defensive efficiency, which as previously stated is an improvement. This is up from a quarter of a percent to almost a half of a point improvement in defensive efficiency per year. This shows that when SportVU is exclusive to many in the NBA it does correlate to better defensive performance and it is what you would expect when using this technology. Next shows the reverse of what was observed prior to the season limitation with offensive efficiency.

offeff	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	0.9198516	1.001121	0.92	0.366	-1.127671	2.967374

ast						
L1.	-0.765607	0.2309839	3.31	0.002	-1.238022	-0.2931919
pace						
L1.	-0.0234155	0.1736913	0.13	0.894	-0.3786542	0.3318231
pointplays						
L1.	0.0946536	0.1935065	0.49	0.628	-0.3011117	0.4904189
avghomeatte~e						
L1.	0.0002987	0.0003033	0.98	0.333	-0.0003216	0.0009191
offeff						
L1.	0.1920892	0.1095344	1.75	0.09	-0.0319339	0.4161122

By eliminating the data bias the competitive advantage is again seen in this regression table. It shows a correlation of nearly one whole point increase in offensive efficiency per season with the presence of the SportVU technology. This would lead to the inference that while SportVU analytics can lead to better defensive efficiency that teams who had SportVU prior to the league wide implementation used it to increase their offense more than their defense.

pace	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
sportvu						
L1.	-0.2335781	0.647598	0.36	0.721	-1.558065	1.090908
ast						
L1.	-0.0662726	0.1836737	0.36	0.721	-0.4419275	0.3093823
offeff						
L1.	-0.0138655	0.0577626	0.24	0.812	-0.1320032	0.1042722
pointplays						
L1.	-0.0432916	0.1016808	0.43	0.673	-0.2512521	0.1646689
avghomeatte~e						
L1.	-0.0000807	0.0001436	0.56	0.578	-0.0003744	0.000213
pace						
L1.	0.3297545	0.1107132	2.98	0.006	0.1033207	0.5561883

The correlation between pace and the presence of SportVU is negative. It is a very small correlation and does not show that teams actually slowed their game down or had less possessions per game each season, but that they were not increasing their possessions at the same rate as those teams that did not have SportVU. It could be attributed that slowing down the game and taking less possessions, but better possessions were the case or that they were slowing down their opponents as well. It is a small correlation, but still shows a slower increase in pace.

These regression models show the potential of the competitive advantage that was gained by teams that implemented SportVU. Before the NBA struck a deal with STATS, LLC and the technology was league wide there was in fact a competitive advantage. These results imply that the time when everyone had SportVU created the effect competitive advantage was wiped out because the aspects of rarity and the difficulty to imitate or substitute for SportVU were lost and therefore, while it may still be valuable the competitive advantage was lost.

Very few regression models showed the significance that would usually be required to count the correlation as a legitimate correlation. However, because the data is historical and a complete data set from the league and the whole league instead of a sample of the whole population the lack of significance can be disregarded. This is only because the entire data set is included and analyzed not just a sample to model a much larger and incomplete data set. After the progression to get to these regressions that look at those with SportVU while others do not have SportVU it appears that having SportVU is in fact a competitive advantage. It is valuable as it shows a correlation between higher offensive efficiency and lower defensive efficiency. Showing these correlations shows the value it has through the benefits it provides in performance of the team. The increase in offensive efficiency and decrease in defensive efficiency are the basis of the value attached to the competitive advantage. Both appear to be helped by the presence of SportVU.

The components that create and sustain a competitive advantage are value, rarity, difficulty to imitate and difficulty to substitute. The value is displayed in the correlations that show improved offensive and defensive efficiency. This is not to say that there is still not value to SportVU after everyone used it. Not only did it have value, but SportVU also was rare, in the first season it was introduced only four teams had it and on half of the league had it before it was implemented league wide. The rarity allowed it to be a competitive advantage because it was not widely available to all in the marketplace. In the first six seasons of the data set it proved to be rare and that was a factor in why SportVU was a competitive advantage in that time. SportVU was also not easily substitutable as no one else had the same type of analytical power and data capture the SportVU provided. This analysis it provided was far beyond the stats that were formerly and still are used. There was nothing of the sort to substitute for it. There were no products that could provide the level of analytics. For the first few years no one could imitate what SportVU did for the teams, it took the adoption of the same technology to wash out the advantage. There was no other technology or company doing anything close to what SportVU was providing to these teams, there was no imitation of the technology. Then when the technology was adopted by the entire NBA the rarity, substitution, and imitation factors were removed. This is what created the destruction of any competitive advantage that SportVU once provided. The only that remained was the argument of value. Once SportVU was no longer difficult to imitate and cost that money for teams that only select teams decided to pay and the NBA stepped in to provide it for everyone the competitive advantage was forfeited.

This leads to the idea that the NBA is currently in an arms race to find the "next best thing" to create a competitive advantage and hold onto it as long as possible. This does not mean that teams should not use SportVU to its full potential, even though it appears that the full potential is a long way off. It simply means that innovations will continually enter the marketplace and that teams will continually have to assess if they think they can capitalize on the advantage and keep it rare, valuable, not easily imitated or substituted.

It does not lend to the idea that analytics are not the future or that they do not help teams. This notion would be false in the way it did show correlation to improvement. SportVU has become a necessity teams must use in order to even have a chance to compete in the NBA. It is the new baseline because without it teams would be behind the curve of where analytics is going. While the general trend still leads to analytics it is now about how to use these analytics to beat the competition by creating something that will be a competitive advantage once again. The movement towards analytics is believed to be the future by NBA executives (McCann 2012).

However now that SportVU has lost its competitive advantage it's a race to see which teams can capitalize on the next use of SportVU or the next technology and attempt to maintain the competitive advantage before it becomes an arms race again. The biggest obstacle may be the lack of understanding. A decision on what factors to look at in order for coaches to improve their teams performance or evaluate who to draft or trade for or even if the volume of data can be sifted through and comprehended in a manner that is helpful is the dilemma (Steinberg 2015).

It falls back onto the human capital of those working with the analysis. Teams must try to outplay their opponent like a game of chess and strategize what course to take that will best benefit them. As previously stated executives said they only use around ten percent of the analytics that they can at this point (McCann 2012). This leaves room for differentiation and strategy to grow out of SportVU and not render it obsolete. Each organization must find the right people to hire in order to make sense of the overwhelming amount of data. Teams will need to find computer programmers and stats personnel and spreadsheet analysts that understand the game, but can make the data into sense for the coaches and staff and can in turn be acted on (Lowe, 2013). Spreadsheet experts alone can no longer create a difference as the data has now become so advanced that statistical programming and computer science are now required to derive value from the data (Alamar, 2015). The people who decipher this data into meaningful concepts and ideas are arguably the most important part to successfully using the data. Prior to the introduction of SportVU some teams did contract work for analytic help. The Oklahoma City Thunder, Seattle Super Sonics at the time, hired Ben Alamar to provide his analytic expertise prior to the 2008 Draft, and beyond, in which he was met with some skepticism as he was one of the first "analytic guys" to be hired by an NBA team (Alamar, 2015). Since then more teams have hired consultants and implemented analytics into their operations. However, it was not a seamless transition or marriage of traditional scouting and analytics on those being scouted. Alamar noted a time when he was watching film and presented an argument in favor of Johnny Flynn being a good defender due to a high rate of steals but was countered by the traditional basketball knowledge of a scout that zone defense was likely the probable cause for this (Alamar, 2015). There is no value in the use of SportVU unless the marriage between the analytics and stats are met with the traditional intuition and knowledge of the game itself. Dan Cervone, Alexander D'Amour, Luke Bornn, and Kirk Goldsberry of the Department of Statistics and Institute for Quantitative Social Science at Harvard University did research on how to use the SportVU data to value the decisions players make (Cervone 2014). They created the expected possession value (EVP) in order to analyze decisions throughout the game instead of simply assists and scores of turnovers. It utilizes the SportVU data that captures all of the movements and ranks different situations like passing to open players or taking a shot under duress or not (Cervone 2014). This allows for valuation of decisions made even if the play does not result in points. Not only does it look at the basics of basketball, like passing to an open player rather than a guarded player being a better choice, but the differences in how good players are more so in their ability to shoot above average (Cervone 2014). Research and implementation of the data like this is a step in the direction that teams will go. While EVP may not be the direction that every team goes and is not fully developed due to the fact only half of the teams in the league used SportVU at this point does lend to a possible result of the data captured. Understanding what the coaches want out of the data and then extracting that information for the coaches and then transferring that knowledge in a meaningful way is the key. The data appears to be so overwhelming it is not to be taken lightly the knowledge and experience needed to understand and properly manipulate the data. Linking the data to the sport

itself may end up being the biggest obstacle in order to use the technology to its full potential. Teams may begin to look into their division and try to predict what their opponents will do. Will teams begin building outside shooting teams only and cause a cyclical effect for others to build a team with a good distributer and big inside men to dominate the paint? Will teams go to try and create an extremely balanced team and try to win on the margins? The strategic step will differ between teams if teams decide to lean towards a more defensive appearance as a team or if they continue to push on offense and try to out-score all their opponents. Humans make the difference and call the shots. Even with all of the data in the world, it comes down to the "stat guys" and programmers and analysts successfully translating the data into manageable results for coaches and executives to aid in their decision making process.

Some teams will be reluctant to make the changes or may not see the changes immediately (Lowe, 2013). While others were looking into analytics before the NBA made the deal with SportVU. Toronto was looking at analytics (Aldridge 2013) and Oklahoma City had pre-draft analysis in 2008 before teams even had SportVU (Alamar 2015). The opportunities are out there to find the top grade analysts and programmers to employ, but as Alamar noted these positions pay about half of the salary that they could get going to work on Wall Street or another firm (Alamar 2015). Until teams take the position seriously and offer competitive pay for these positions there will be a lack of results from the data. Without top tier talent and skills to make the copious amounts of data meaningful the overall results will not reflect the potential that the SportVU data has to provide. Without the correct human capital the data is meaningless to teams. One thought is that teams may look to firms with more experience in data analysis over hiring people full time into the organization. Based on the recent trends of paying far below what these analysts could get elsewhere the likelihood of teams going to outside firms and paying the going market rate is not likely.

Gambling on sports has been a reality and could potentially change with the new stats available to the public. Currently there does not appear to be any bets that would require these stats to be used in order to place the bet or determine the outcome. Most are still who scores first, which team scores more in a quarter, or first team to a certain point total (Bovada 2016). These do not need the advanced stats such as something odd as if a team will have a higher shooting percentage off of Durant or Curry passes. However, in the trend from betting with bookies and in Las Vegas to daily or weekly fantasy betting on sites FanDuel or DraftKings there could be a small trend to smaller prop bets moving in this direction as fans gain a better understanding of the new stats they are seeing.

The varying directions in which teams can go with their strategy epitomizes the opposition to standardization in the sport industry. It cannot become like a manufacturing plant that creates the same output every time. The Sporting industry so much more human capital driven than other industry and it lies not only in the players on the court, but those who decide who is on each team and those who decide how to use their talents. Analytics do lead to improvement, but instead of the technology used for analytics it is the use of these analytics are what create the ever fleeting competitive advantage. Analytics is the future of many leagues including the NBA, but most will most likely be the same as SportVU: a short lived competitive advantage that is shortly washed away once it loses one of the elements that makes is a true competitive advantage until human capital is implemented to rejuvenate the technology.

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