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The Oakland Athletics use of Sabermetrics and the rise of big data analytics in business

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Departmental Honors Thesis

The University of Tennessee at Chattanooga

Business Finance & Business Analytics

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Abstract

The *Moneyball* phenomenon revealed how Billy Beane, the Oakland Athletics general manager utilized advanced data analytics; Sabermetrics, to statistically analyze the data in baseball which aims to quantify baseball players' performances based on objective statistical measurements. As technology increases and big data becomes more accessible, sports organizations like the Oakland Athletics are illustrating how businesses, small and large, can use advanced analytics to promote growth. This research paper provides a meta-analysis on the results of large businesses using big data analytic techniques similar to Sabermetrics, to show the improvements in marketing, consumer outreach, revenue, and employee retention while questioning whether smaller businesses can replicate. Unfortunately, the opportunities for most small businesses to take advantage of big data capabilities are limited. Small businesses struggle to afford sophisticated tools to collect data and expert data analysts to exploit the data.

I. Introduction

Baseball will always be America's pastime. Like many kids in America, I grew up playing baseball; however, I played a little longer than most. My dad forced me into playing "diaper league" baseball when I was three years old, even though the minimum age was four. I found out years later that he had lied about my age, so I was eligible to play. My playing days ended after high school but my love for the game lives on. I am one of the biggest Atlanta Braves baseball fans, and I have watched the game change drastically over my lifetime. I was too young at the time to now remember the *Moneyball* phenomenon; however, I have always been intrigued by its lasting effects on financial management for both sports and businesses.

II. Moneyball, Sabermetrics, & the Rise of Data Analytics

If you have read *Moneyball* by Michael Lewis or have seen the movie based on Lewis' book, you know that the story focuses on the Oakland Athletics' general manager, Billy Beane, and his attempts to assemble a competitive team. The *Moneyball* story begins horrifically, the Oakland Athletics blew a two-game lead in the best of five - 2001 American League Divisional Series (ALDS) against the New York Yankees in the first round of the playoffs. That off-season, the Oakland Athletics lost three of their star players; 2000 AL MVP Jason Giambi to the Yankees, Johnny Damon to the Red Sox, and Jason Isringhausen to the Cardinals. Stephen Scott, the owner of the Athletics' refuses to increase the team's payroll. Billy Beane feared they would never win the World Series as wealthier teams will snatch their best players with more lucrative contracts. In the off-season, Billy Beane meets Peter Brand, an economics graduate from Yale, who is a player analyst for the Cleveland Indians. Shortly after Billy hires Peter as the Athletics' assistant general manager. Peter finally convinced Billy to take a look at their entire roster and realize he needs to view his team as a combination of undervalued, yet productive players rather than individual talent as major league scouts have done for most of the 20th and 21st century. For example, the Athletics signed catcher Scott Hatteberg, whose career was written off by teams due to an elbow injury. Scott Hatteberg, although a poor hitter, had a great ability to get on base, and eventually was taught how to play first base for the Oakland Athletics. Regardless, the journey the Oakland Athletics took to get to that moment is what fascinates sports fanatics and business-minded individuals like myself. Billy Beane, the Oakland Athletics general manager accomplished the unthinkable. The Oakland Athletics capped a 103-win season, a feat most large-market clubs aim to achieve. Their 103-59 record made for the second-best record in baseball in the 2002 season. Billy Beane had taken a team worth barely \$40,000,000 (2nd lowest payroll) to a 103-win season a year after losing three-star players to league rivals (MLB Salaries, 2001).

2002 Payrolls by MLB Team					
Rank	Team Name	Team Payroll	W	L	2001 Payrolls
1	New York Yankees	\$ 125,928,583.00	103	58	\$ 112,287,143.00
2	Boston Red Sox	\$ 108,366,060.00	93	69	\$ 109,675,833.00
3	Texas Rangers	\$ 105,726,122.00	72	90	\$ 88,633,500.00
4	Arizona Diamondbacks	\$ 102,819,999.00	98	64	\$ 85,247,999.00
5	Los Angeles Dodgers	\$ 94,850,953.00	92	70	\$ 109,105,953.00
6	New York Mets	\$ 94,633,593.00	75	86	\$ 93,674,428.00
7	Atlanta Braves	\$ 93,470,367.00	101	59	\$ 91,936,166.00
8	Seattle Mariners	\$ 80,282,668.00	93	69	\$ 74,720,834.00
9	Cleveland Indians	\$ 78,909,449.00	74	88	\$ 92,660,001.00
10	San Francisco Giants	\$ 78,299,835.00	95	66	\$ 63,280,167.00
11	Toronto Blue Jays	\$ 76,864,333.00	78	84	\$ 76,895,999.00
12	Chicago Cubs	\$ 75,690,833.00	67	95	\$ 64,515,833.00
13	St. Louis Cardinals	\$ 74,660,875.00	97	65	\$ 78,333,333.00
14	Houston Astros	\$ 63,448,417.00	84	78	\$ 60,387,667.00
15	Anaheim Angels	\$ 61,721,667.00	99	63	\$ 47,735,168.00
16	Baltimore Orioles	\$ 60,493,487.00	67	95	\$ 74,279,540.00
17	Philadelphia Phillies	\$ 57,957,999.00	80	81	\$ 41,663,833.00
18	Chicago White Sox	\$ 57,052,833.00	81	81	\$ 65,628,667.00
19	Colorado Rockies	\$ 56,851,043.00	73	89	\$ 71,541,334.00
20	Detroit Tigers	\$ 55,048,000.00	55	106	\$ 49,356,167.00
21	Milwaukee Brewers	\$ 50,287,833.00	56	106	\$ 45,099,333.00
22	Kansas City Royals	\$ 47,257,000.00	62	100	\$ 35,422,500.00
23	Cincinnati Reds	\$ 45,050,390.00	78	84	\$ 48,784,000.00
24	Pittsburgh Pirates	\$ 42,323,599.00	72	89	\$ 57,760,833.00
25	Florida Marlins	\$ 41,979,917.00	79	83	\$ 35,562,500.00
26	San Diego Padres	\$ 41,425,000.00	66	96	\$ 38,882,833.00
27	Minnesota Twins	\$ 40,225,000.00	94	67	\$ 24,130,000.00
28	Oakland Athletics	\$ 40,004,167.00	103	59	\$ 33,810,750.00
29	Montreal Expos	\$ 38,670,500.00	83	79	\$ 34,849,500.00
30	Tampa Bay Devil Rays	\$ 34,380,000.00	55	106	\$ 56,980,000.00

The Oakland Athletics changed the way baseball operated forever with their 2002 season. Non-baseball fanatics may view their season as an outlier fueled by luck; however, devoted fans recognize how truly remarkable the 2002 season was for the Oakland Athletics considering their budget constraints. Luck may have played a role, but the most significant factor was Billy Bean's implementation of Sabermetrics. Sabermetrics is the statistical analysis of data in baseball which aims to quantify baseball players' performances based on objective

statistical measurements, especially in opposition to many of the established statistics that give less accurate approximations of individual efficacy (Neyer, 2017). Bill Beane and the Oakland Athletics success using sabermetrics sparked a wave through the MLB in which major-league owners shifted their focus. They found an opportunity in an inefficient market, one that was unaware of the possibilities of Sabermetrics, and changed the game of baseball. Owners quickly expedited funding to hiring analytic experts in hope that their teams would produce better results with smaller player payrolls. New sabermetric analysts embraced roles analyzing the vast amounts of data provided by teams. Outside resources contributed to the mass data gathering, and companies such as Sports vision had cameras in every stadium that tracked and recorded as many data points as possible (Neyer, 2017). In 2015, Sportsvision came to be known as Statcast, a name much more familiar to sports fans. Statcast serves a wealth of information to not only teams but amateur and ordinary analysts outside of the front offices. From 2001 to the present – owners have attempted to rebuild teams using the lowest salary caps possible. Most teams now use some form of analytics and are aggressively hiring productive players found through sabermetrics at smaller salaries. This use of analytics did originally receive some pushback in baseball, especially due to its staunch nostalgia for tradition. Before advanced analytics, traditional baseball scouts relied primarily on subjective impressions such as appearance, potential, and an array of outdated statistics that fail to accurately measure the same undervalued-productive players Sabermetrics can find. One advantage of Sabermetrics is that it uses creative ways to analyze players that go beyond their individual statistics. For example, one of the newer and most popular ways to analyze players is to assess their ability to contribute to winning games, which is the ultimate objective in almost every sport.

Just like financially disadvantaged teams in baseball, including all sports, small businesses can use data too. Data is no longer monopolized by top research universities, top research companies, and sophisticated investment firms that can afford the data. Data is everywhere and has become an integral resource for many businesses. Companies are

strategically analyzing data to find areas where they can improve or increase efficiency. For small businesses, using analytics is even more important as they try to compete with larger corporations with more resources (much like the Oakland Athletics trying to compete with the New York Yankees). Small businesses have a very important advantage over larger businesses in that they can be nimbler and adapt to change faster, which is a huge advantage in a business environment that is constantly changing due to technological innovation. Increases in technology are also creating better access to useful data. Thus, small businesses are realizing as technology advances, access to quantitative and qualitative analysis can be more beneficial to the success and growth of their business. The different types of data analytics are descriptive, predictive, and prescriptive analytics, which are interconnected procedures that make the most of information such as Sabermetrics.

Data analytics are very promising for businesses; however, data analysis is frequently being executed through the compilation of big data. Big data refers to large, diverse sets of information that grow at ever-increasing rates. It encompasses the volume of information, the velocity it is created and collected, and the variety of data points being covered. Big data often comes from multiple sources and arrives in multiple formats (Segal, 2020). Big data can give huge competitive advantages to large businesses when using the appropriate applications effectively. Small businesses see the cost of big data and analytics as a major concern, although it is gradually decreasing as the ease of access increases. The more data companies have the more servers, analysts, and expenses the company incurs.

Many studies have been conducted on data analytics, Sabermetrics, businesses, sports, and *Moneyball* separately; however, these topics are rarely grouped together in academia. I want to question how businesses, small and large, use similar techniques demonstrated in *Moneyball*, and whether or not they are successful. A meta-analysis on the results of small and large businesses using big data analytic techniques similar to Sabermetrics will be a sufficient method to finding an answer. If businesses use big data analytics, (i.e., similar to techniques

demonstrated in *Moneyball*), will the results show beneficial improvements in marketing and consumer outreach, financial revenues, and employee efficiency and retention? Will the small business sector struggle to attain the same results as larger organizations in the same industries?

III. Sabermetrics and Data Analytics

Since 2002, sabermetrics has changed the way baseball teams are constructed, pushing away old techniques of assessing talents through eye tests and intuition. Sabermetrics and the *Moneyball* experiment started the analytics movement by promoting two important but undervalued statistics, on-base percentage (OBP) and on-base plus slugging (OPS). OBP is the measure of how often a batter reaches base. It equals the number of times a batter reaches base compared to his plate appearances. The full-detailed formula is $OBP = (\text{Hits} + \text{Base on Balls} + \text{Hit by Pitch}) / (\text{At Bats} + \text{Base on Balls} + \text{Hit by Pitch} + \text{Sacrifice Flies})$. Batters are not credited with reaching base on errors or fielder's choice by the defense, and they are not charged with an opportunity for sacrifice bunts ("On Base Percentage", 2015). On the other hand, OPS adds OBP and slugging percentage together to achieve one number, one statistic. The purpose is to identify how well the batter is at reaching base while assessing how well he also hits for power ("On Base Plus Slugging"). For greater context on OPS, slugging percentage is calculated by the number of total bases divided by the number of at-bats. The formula is as follows: $OPS = ((\text{Singles}) + (\text{Doubles} \times 2) + (\text{Triples} \times 3) + (\text{Home Runs} \times 4)) / (\text{At Bats})$ ("Slugging Percentage", 2017). The *Moneyball* experiment was successful because Billy Beane used advanced analytics. Billy Beane searched exclusively for under-valued, lower-cost players with higher OPS percentages instead of signing over-valued home run hitters like league rivals were doing. His theory, which proved to be successful, was that a group of players with higher

OPS percentages would be more valuable and successful than teams with faster and stronger, high-priced, home run hitters.

Another game-changing statistic that has been introduced into Sabermetrics is Walks plus Hits-per-innings Pitched (WHIP). WHIP allows analysts, coaches, and fans to grasp how well a pitcher performs when allowing batters to reach base by either hits or walks. The calculation for WHIP is almost self-explanatory; by adding the number of walks and hits a pitcher allows divided by the total number of innings pitched. WHIP contrasts Earned Run Average (a very popular pitching statistic usually referred to as ERA), instead of focusing on the number of runners the pitcher allows on base – or keeps off. Statistics like on-base percentage, on-base plus slugging, wins above replacement, and walks plus hits-per-innings pitched have created a new foundation and perspective on evaluating baseball players that have been proven effective.

Moneyball not only gave a new appreciation for advanced analytics like OBP, OPS, and WHIP, but it also created a pathway to new and popular statistics in baseball and other sports. For example, wins above replacement (WAR) has become such a significant statistic that major league baseball teams value this metric above all others. WAR has gained quick strides in popularity since the rise in the use of Sabermetrics in baseball. Although WAR was created by the baseball analytic community over thirty years ago, when it appeared in Bill James' work from 1989 (Heipp, 2012), it wasn't widely used until after the *Moneyball* era. The WAR score we use today measures how each player contributes to his team's win or loss. WAR is measured by analyzing a player's value in all parts of the game in comparison to minor league replacements or available free agents at the same position. For example, if a catcher and left fielder generate the same amount of production, the catcher will produce a better WAR score. This higher WAR score accounts for the fact that the catcher position is an overall tougher position to play, which means teams value this position more than a left fielder and are willing to settle for a lower level of production from this position. WAR essentially factors in this information by comparing apples

to apples (i.e., catchers to catchers) and can automatically adjust scores for positions that commonly see a lower level of production from replacement players (Position, 2021).

Wins Above Replacement by Position	
Position	Season Adjustment by Runs
Catcher	+9
Shortstop	+7
Second Basemen	+3
Center Fielder	+2.5
Third Basemen	+2
Right Fielder	-7
Left Fielder	-7
First Basemen	-9.5
Designated Hitter	-15
Current Values (per 1350 innings played)	

WAR is an excellent statistic that modern baseball analysts use to value players in a context neutral way. Context neutral statistics are statistics that values a specified action equally no matter the circumstance or situation in which the event occurs. For example, a home run in the third inning is valued the same as a game-winning home run.

WAR is considered across baseball as the most significant metric used to evaluate players' performance to adjust players' salaries appropriately. WAR year after year continues to prove why it is the most dynamic statistic everyone in baseball looks at first. An analysis between WAR score and players' salaries shows correlation and the functionality of the metric. Since baseball commands consistency more than other sports, over a long 162 game season, it makes sense to test the correlation over multiple seasons. Using three-year averages for free-agent position players and pitchers (prior to signing new contracts), the results are as expected (In, 2021).

CORRELATION BETWEEN 3-YEAR STATISTICS AND AVERAGE ANNUAL SALARY	
3-Year Statistic	Correlation Coefficient (r)
BA	0.41
HR	0.39
OBP	0.47
OPS	0.57
SLG	0.57
WAR	0.72

CORRELATION BETWEEN STATISTIC AND AVG. ANNUAL SALARY	
3- Year Statistic	Correlation Coefficient (r)
ERA	-0.2
FIP	-0.31
K/9	0.27
WAR	0.78
WHIP	-0.49

The correlation holds true, three-year has the highest correlation with the average annual salaries for both pictures and position players compared to other popular metrics. WAR has also done a good job of predicting future performance. Analyzing the prior three-year WAR to the first year on a new contract for free agent players still shows a significant correlation.

POSITION PLAYER AND PITCHER WAR CORRELATIONS	
Relationship	Correlation Coefficient (r)
3YR WAR vs. First Year WAR for Position Players	0.5
3YR WAR vs. First Year WAR for Pitchers	0.75

The correlation is better for pitchers, however, still useful to utilize in the evaluation of position players. As I stated earlier, baseball demands extreme consistency and that is commonly the problem in evaluating players. The correlation above shows that it is effective to use WAR to evaluate a player’s performance and value the following year, but often the further along a player enters his contract, the correlation declines. All of Major League Baseball is taking advantage of the ability WAR score has in evaluating players, therefore, the price for players with a high WAR score is increasing (Swartz, 2017)

Best Estimates of Dollars per WAR of Free-Agent Market	
Year	\$/WAR estimate (in millions)
2006	\$4.60
2007	\$5.30
2008	\$5.60
2009	\$5.70
2010	\$5.80
2011	\$6.40
2012	\$6.90
2013	\$7.50
2014	\$7.70
2015	\$8.70
2016	\$9.60
2017	\$10.50
Forecasted to grow at 8%	

As a result, sports organizations are paying much more for WAR as years go on and WAR is further proven to be a reliable advanced statistic. The one negative result sports teams are seeing when using WAR score is the long contracts teams are being tied into. The fight for better WAR score players is producing longer contracts which are ineffective relative to WAR score and salary the further a player gets into his contract. Performance naturally depreciates as athletes age, consequently, MLB teams should attempt to sign shorter contracts.

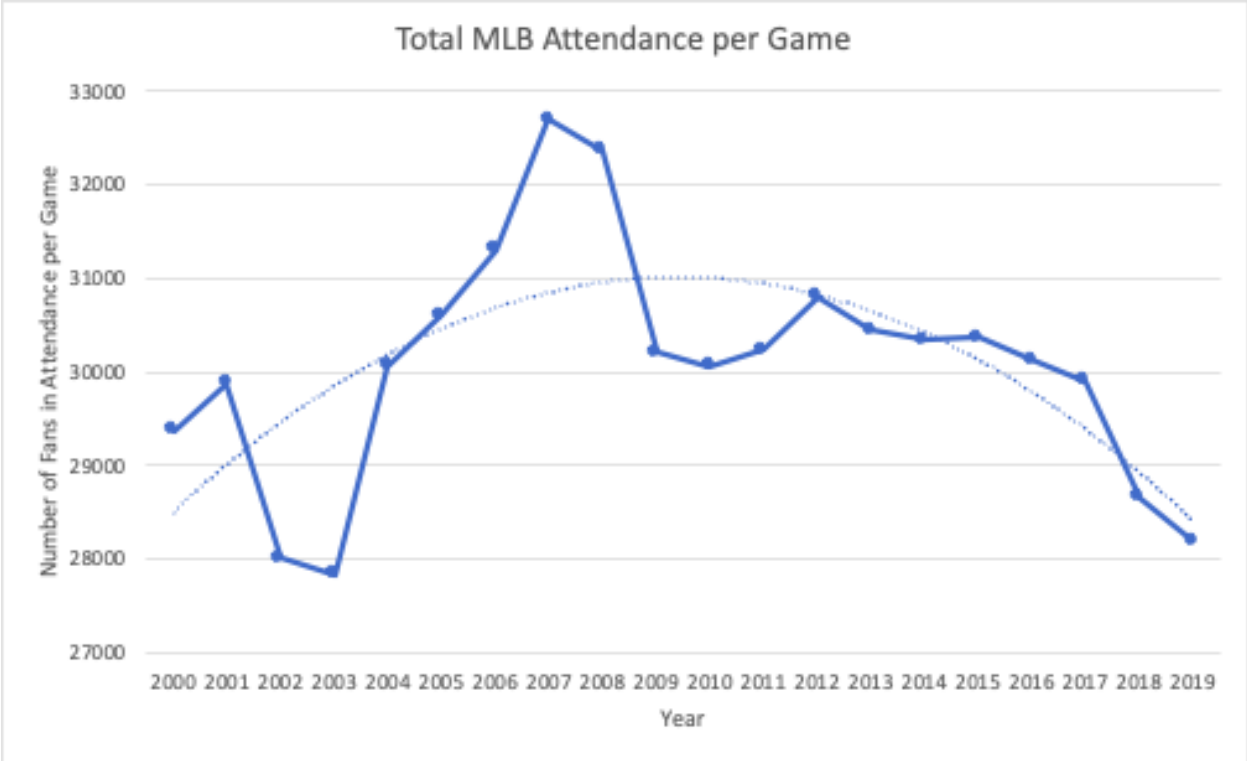
Sabermetrics often called advanced statistics or metrics in other sports, has gradually gained popularity as it did in baseball, just at a slower rate and later date. I will give examples of

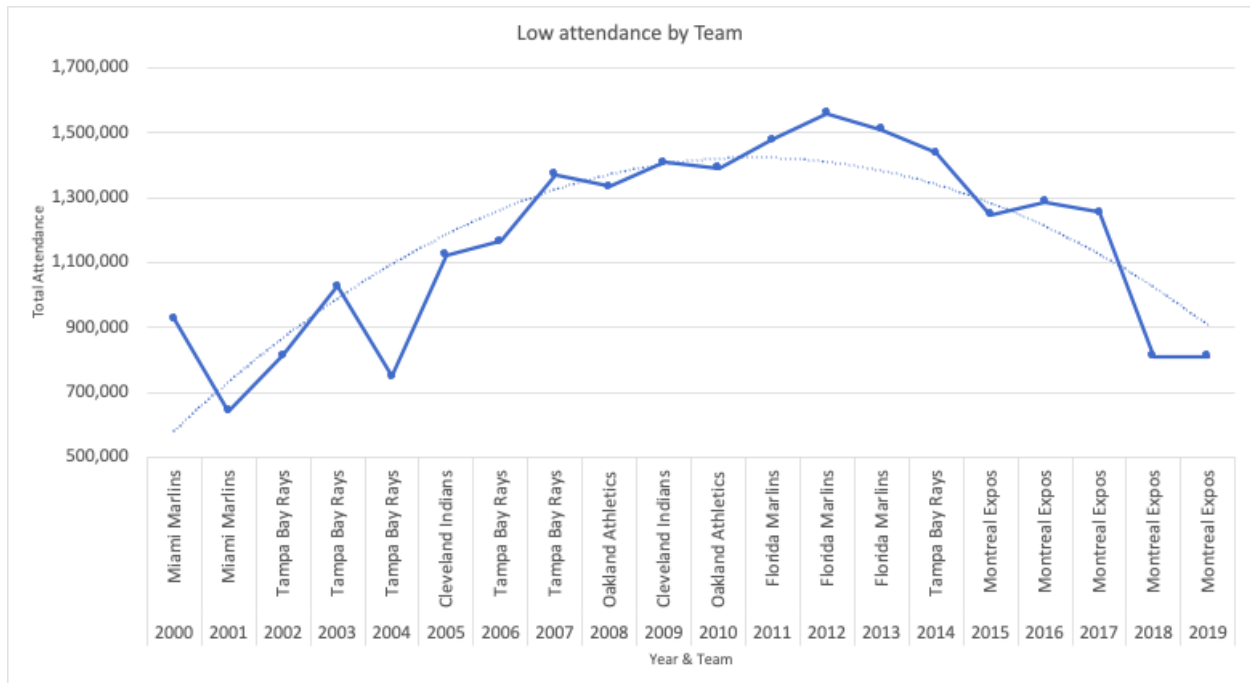
advanced statistics in other major sports. Analytic software has advanced to the magnitude that it is used now to track and analyze each shot, goal, home run, and a touchdown. Automated video analysis has taken teams such as Lincoln City in the U.K. football league into championship contention (Ricky, 2019). The National Basketball Association (NBA) has taken advantage of 3D camera tracking technology to analyze each individual shot by trajectory and location. 3D tracking technology combined with tracking wristband technology, coaches, players, and analysts can now gain a full understanding of their performances, strengths, and weaknesses. Other popular statistics such as the Hollinger Board rates LeBron James, commonly referred to as the best basketball player on the planet, was only ranked #14 when a wide range of statistics are combined and analyzed. ("2020-21 Hollinger", 2020). The National (American) Football League (NFL) has also established new analytics that improves performance and strategy on the field (Clark, 2018). Several NFL teams have concluded through analytics and player tracking data that when they run more offensive plays to the side of the field farthest away from the opponent's bench, that a defensive lineman exerts more energy running from the bench to the action on the field. Therefore, this strategy increases the energy used by opposing defensive linemen, causing more exhausted rotating players.

IV. Big Data Analytics in Sports Marketing

The leading reason for sports teams trying to increase production for their players is to increase attendance from their fans. Sports teams are a business, and a business is about profit. The rise in analytics in performances by athletes has created a focus on increasing revenue and enhancing fan experience using similar data. Before *Moneyball* and advanced analytics devoured every major sports market; phones, computers, and video games did not consume every second of our lives like it does in 2020. America's pastime (baseball) and other sports have seen decreases in fan engagement in the last decade caused by the emergence of

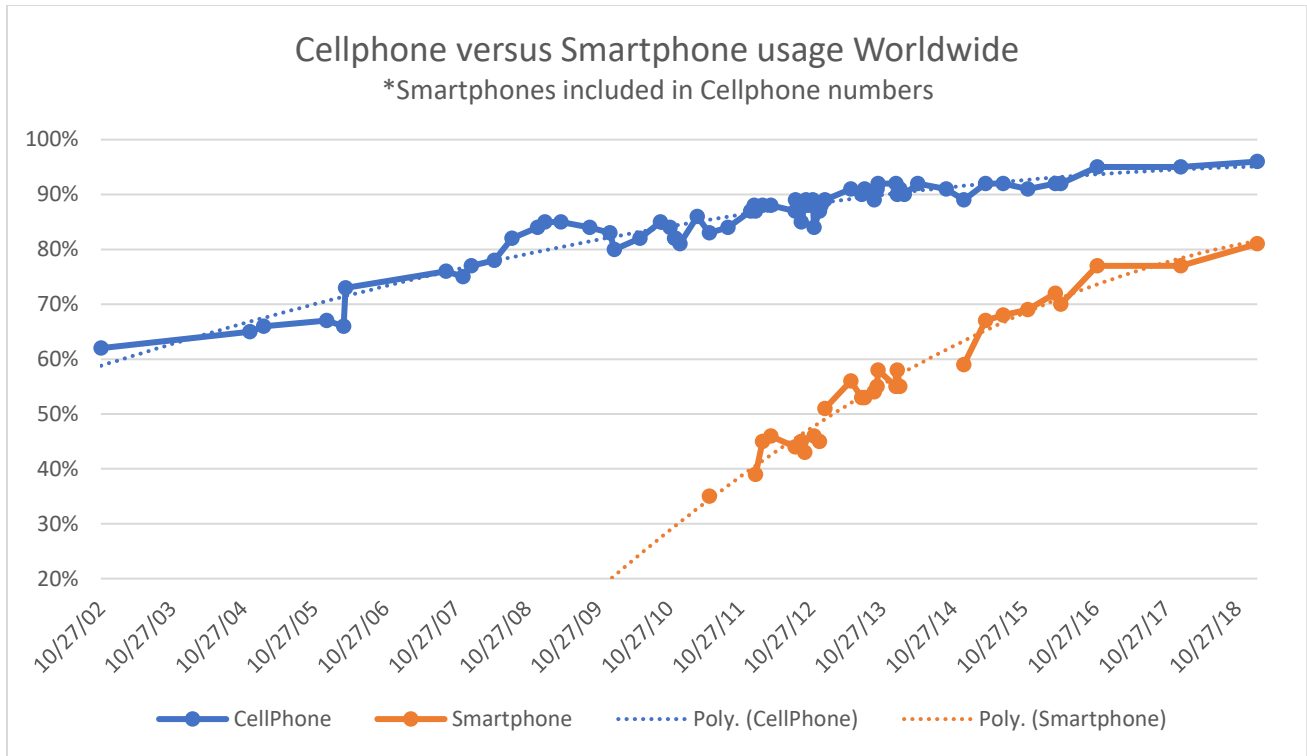
technology (Gough, 2021). Analytic and marketing experts must find new alternatives to capture the audience’s attention and create more enthusiasm for seeing live sports instead of staying at home. For example, below are two-line graphs of total attendance by all the MLB teams combined and the lowest team attendance from 2000 – 2019. The data will help show why I believe attendance declined drastically over the time period and how businesses and sports teams are combatting the decline (“MLB Attendance History,” 2019).





One of the major contributions to the drop in attendance is the rise of technology, specifically because of smartphones. Major League Baseball and every other league across the United States have seen a decline in attendance and engagement from fans since the early 2010s. The graphs above illustrate easily the steep decline in attendance for MLB games from around 2008-2012. The graphs do not give an explanation for the decrease in attendance, but rather a visualization that I believe will further support the correlation between technology - specifically smartphones and attendance. Since the beginning of the internet boom in the early 2000s, Americans are increasingly becoming more interconnected into the digital world. The past two decades have transitioned to mobile, smart devices, rather than heavy, bulky, stationary desktops like we used before. This rapid transformation in technology has specifically increased the ownership of cellphones and smartphones. From 2002 to 2018 - cell phone ownership has increased from 62% to 96% for Americans, a 34% difference (“Demographics of mobile device ownership,” 2020). Along with the increase in ownership of cellphones, smartphones started gaining major traction in the very early 2010s. from 2012 to 2019 smartphone ownership has increased from 39% to 81%, a 42% total increase. Both trends in the ownership of cell phones

and/or smartphones were quick, however, the increase in smartphones was at a much rapid rate in a much shorter period of time.



There is a strong relationship (correlation) between the increase in smartphone usage and the decrease in MLB attendance, a quick glance at the graphs above visibly demonstrates that the correlation begins to become noticeable around 2012.

The increase in technology and smartphones have shifted our focus from outside, hobbies, spending time with friends and family, to our eyes being glued to screens. Smartphones are the enemies of Americans' short attention spans. On an average day, Americans touch their smartphones 2,600 times, according to Dscout (Budd, 2017). Checking our phones have taken such a large part into our lives that busy city streets are filled with commuters looking down at their phones as they walk to work, and households filled with families surfing the web on their couches. A 2016 survey by Deloitte concluded that greater than 40% of users check their phones within minutes of waking up, over 50% check their phones in the middle of the night. As our attention spans become accustomed to checking our phones

throughout the day, we begin to seek it more and more. Browsing social media has become the biggest norm when checking our phones, and our brains start to crave the attention and adrenaline we get when we receive notifications that our friends tagged us in a post on Instagram, or a family member sent you a viral video on Twitter. Americans have lost the ability to unplug from smartphones to the point that activities such as watching a three-hour baseball game are less appealing.

The decline in attendance is visible within all sports across America. Turn on the television or stream to your local professional sports teams, the majority of the time the data I presented earlier is not necessary when there are empty seats spread throughout the stadiums, arenas, and domes that can be seen from across the house. The lack of fans in attendance has also contributed to an increase in fans at home. Smartphones hold responsibility for the term “second screening.” Second screening refers to using multiple screen-based devices at the same time. The most common form of multi-screening is using a smartphone while watching television. Fans today have the luxury of watching their favorite teams play while surfing social media, shopping online, and doing homework/business. Fans also have lost the urge to solely watch the less significant games on television because they can receive notifications as the game plays on or instant results, statistics, and highlights from applications such as ESPN. The comfort of doing such is increasingly making it tough for sports teams and their respective companies to pull fans in to watch live games (“4 ways smartphones,” 2018).

The fight to bring sports fans back into the stadiums is at an all-time high. Although the rise in technology used to view games is inevitable, technology is the center point of some lives forcing sports teams’ companies to shift their marketing strategies for fans. Sports teams are catering to both crowds, those who love technology and watching games at home but are also trying to restore the live game experience for those hardcore fans who love attending games. Fortunately for all sports fans, teams are spending millions of dollars into capturing their fans, again through analytics. Through analytics companies are finding new avenues to cater toward

their fans, those who enjoy the at-home experience, but primarily those who would rather engage in the live game-day experience, which ultimately makes the sports teams more revenue. Fans who attend live games are attempting to get the most out of their ticket experience. In order for teams to learn what fans want, the use of analytic tools is super effective in measuring fan engagement while they are watching the game. Stadiums for the last few decades have been steadily improving their technology around the stadium, but the surge to do so in the last 10 years is stronger than ever. Stadiums have placed high-definition scoreboards across the entire stadium, which are game-changers when you can catch the home run you would miss coming from the bathroom. Stadiums have started providing free Wi-Fi through the area, so fans can share their favorite moments with the world, which is free exposure and advertising for teams (Heichler, 2018). Fan's love posting pictures to applications like Instagram and Snapchat with their favorite filters using features such as geotagging. This benefits both the fans and sports organization, fans can brag a little about being at the biggest rivalry baseball game while the team receives exposure. Social Media is becoming the top marketing technique to connect with fans, specifically "millennials" and "generation-z." Sports teams have also taken advantage of the increasingly popular fantasy football application. Teams have installed what is called "fantasy football lounges," where fans can get together, continue to watch the game, interact with other fans while following how their fantasy football team is performing (Becker, J). As sports teams are creating ways for more fans to stay engaged and reap benefits from their experience such as incentive programs, analytics and data are being compiled. Analytics is a major reason why sports teams have either seen a small increase in attendance and engagement or are optimistic about seeing the benefits in the near future. Teams are providing fans with more of what they want through studying their habits, preferences, and trends that they gather from data. Through studying behavioral analytics, teams have been successful in delivering what the fans desire and keeping them engaged. Analytics are becoming a way to make sure there are no empty seats on game-day.

V. Big Data Analytics in Business Marketing

Businesses and sports organizations have tackled analytics for two reasons; to compete with other teams and businesses and to compete for fans and customers. As much as fans and I hate to say it; sports are a business. Ultimately, it is about how much money owners, players, and employees can earn. Thankfully, sports organizations have created a movement for using Sabermetrics that businesses can imitate with big data analytics. The increase in big data analytics being used by businesses is easily identifiable in businesses' marketing campaigns. Before the ability for businesses to utilize big data, gathering data for marketing mostly came through small surveys and focus groups. Those techniques can still be used today; however, our advancements in technology allow social media applications, ecommerce stores, websites, etc. to collect data at much larger and faster rates than before. Big data again are the large, diverse sets of information that grow at ever-increasing rates. It encompasses the volume of information, the velocity or speed at which it is created and collected, and the variety or scope of the data points being covered.

One of a business's main tactics is the attempt to reach consumers, halt their movement, and capture their attention. Once a customer is acquired, companies can use analytics to boost customer acquisition and retention. Without customers, businesses will not survive. Under the assumption that the customer is the most significant part of any business, it is safe to claim that success is established by generating a returning, loyal, and solid customer base. In the ever so changing environment businesses have to compete, adaptation to your customers' needs is crucial. If businesses are slow to learn and gather the demands of customers, clientele will be lost, and competition will thrive off the poor movements made by the business. The evolving uses of data empowers businesses to identify their consumers latest tendencies. Delivering what a consumer craves is a key part of creating brand loyalty. It is becoming increasingly easier to understand a modern consumer and the behavioral insights

that big data analytics can produce to retain a loyal customer base. Like sports organizations attempting to keep fans engaged and coming back to live games, consumer product companies are in the same race to create higher retention rates. For example, Coca-Cola has innovated several different ways to interact with their consumers. In 2015, Coca-Cola introduced their digital loyalty program, "My Coke Rewards," in which members are rewarded for sharing content. My Coke Rewards introduced benefits for both Coca-Cola and their loyal consumers of their products. Available across mobile devices, Coca-Cola offered a content-based application influenced by social interactions that gave attention to consumers' desires, which in turn, earned consumers perks (Coca-Cola Refreshes). While customers benefited from a better overall user experience with Coca-Cola, the company captured huge amounts of data about their customers. In an interview around the same time with Justin De Graaf, Director of Data Strategy and Precision Marketing, Justin explains the role that data plays in Coca-Cola conserving their massive brand loyalty that was established 130 years ago. Justin said "Data plays an increasingly important role in marketing and product development. Consumers do a great job of sharing their opinions with us - either by phone, email or social networks - that allow us to hear their voice and adjust our approach. We often talk about why we have two ears and one mouth - it's better to listen more than we speak. This holds true with our approach on consumer input. Data is also helping us create more relevant content for different audiences. We want to focus on creating advertising content that speaks differently to different audiences. Some people love music. Other people watch every sport no matter what time of year. Our brands are already visible in those spaces, and we're working hard to use data to bring branded content that aligns with people's passions" ("How Coca-Cola," 2017). Justin continues in the interview to explain the approach that Coca-Cola takes on big data analytics. Data has advanced to the point where it can address an endless number of problems; however, the goal is to address the correct problem and prioritize resources that create the most value for customers, employees, and the company.

Big data analytics have changed the way businesses market to their customers, similar to sports organizations, in the attempt to make smarter, more sophisticated marketing campaigns that do not lose millions like the former efforts. Companies have often introduced new marketing techniques while skipping one of the most important aspects, research. High-level managers have relied on their intuition in their fumbling attempts to market to consumers far too often. High-level managers commonly have a few things going against them; age and the inability to properly operate or understand advancing technology. Numbers do not lie and possess the possibility of producing greater results more frequently than intuition. Observing online movements and activity, tracking point of sales, and utilizing adaptive-trend and pattern-discovering technology are all part of the research phase of using big data analytics. The former techniques are all employed when creating successful targeted marketing campaigns. Frequently the data used from applications like Coca-Cola's will be used to gather big data that can assist the marketing campaigns. Observing who your customers are, what they want, and then targeting these high potential customers toward a companies' products is the goal of collecting big data and analyzing successfully. This is the essence of capturing customer behavior. For example, Netflix has done a fantastic job of targeted marketing. Netflix desktop and mobile applications capture data from over 100 million subscribers, which plays the role in delivering your suggested watchlist that keeps us glued to the screen for hours. (Kopanakis, 2021). Past search history, watch data, and viewing tendencies deliver customer insights and produce what subscribers are interested in or what Netflix wants the subscriber to be interested in. Big data analytics, just how they help find consumer trends, is a trend in and of itself. Businesses have found ways such as those above to create competitive advantages, create glorious marketing campaigns that break retention rate goals. As big data becomes more accessible (eventually to small businesses), consumers should notice the advertisements, programs, campaigns, and products that will become more tailored to what attracts our attention and keeps customers coming back.

VI. Big Data Analytics in the Workforce

The next significant aspect that companies are investigating that keeps customers returning is the way we attract, hire, train, and retain employees alike. There are many benefits to establishing a great employee reputation, ask Chick-fil-A. Chick-fil-A is one of the most profitable fast-food restaurants in the world and it is not by coincidence, or solely because their chicken is really good. Impressively, fast-food restaurants' reputations usually fall upon cheap greasy food rather than amazing customer service, Chick-fil-A exemplifies just that. Their employees are an immense reason why they are successful. The same can be said for many other businesses, companies, and organizations. Google, Microsoft, and many more have adopted big data analytics to increase production, efficiency, satisfaction, and retention rates for their human resource and employee stability. Like sports organizations, great employees keep consumers returning. As I said earlier, using Sabermetrics for evaluating great ballplayers can play a huge role in increasing the attendance at ball games, just the same as evaluating who your employees are, and how they can improve using analytics; the result is customer retention. Chick-fil-A is similar to the Los Angeles Dodgers, the company with the best customer service is becoming the nation's largest and most profitable fast-food restaurant while the best team with the best players in the MLB, the 2020 World Series Champions, year-after-year boasts the MLB's leading attendance. If Chick-fil-A had horrible employees that lacked the great customer service we have grown accustomed to or the Dodgers stopped using analytics to find the best-most compatible players in Major League Baseball, they would not rank among the best in their respective categories. A quick google search headlines Chick-fil-A, America's favorite restaurant for the sixth year straight (Kelso, 2020) and the Dodgers dominating attendance throughout the MLB ("Major League Baseball Attendance Records," 2020).

Chick-Fil-A Named America's Favorite Restaurant Chain For The Sixth Straight Year



Alicia Kelso Senior Contributor

Food & Drink

I cover quick-service, fast casual and pizza restaurants.

Highest and Lowest Attendance By Season [\[edit \]](#)

Season ↕	Team With Highest Attendance ↕	High Attendance ↕
2020	30 Teams tied	0
2019	Los Angeles Dodgers ^[18]	3,974,309
2018	Los Angeles Dodgers ^[18]	3,857,500
2017	Los Angeles Dodgers ^[18]	3,765,856
2016	Los Angeles Dodgers ^[18]	3,703,312
2015	Los Angeles Dodgers ^[18]	3,764,815
2014	Los Angeles Dodgers ^[18]	3,782,337
2013	Los Angeles Dodgers ^[18]	3,743,527

Articles and databases are filled with how analytics helps businesses as such above, but employee retention, satisfaction, efficiency, like finding valuable players using Sabermetrics, have transformed how businesses look at their employees. Businesses are learning from sports teams that their players, or in this case, their employees are their most important and valuable assets (Davenport, 2014). Historically, there are plenty of companies that consumers can name that has a bad track record for treating their employees fairly, especially in comparison to the lavish treatment professional sports players receive. Why would companies not treat their most beneficial resource better? Businesses need to take a page from sports organizations books and focus more on the human dimensions. Sports teams already do this in various ways. As I mentioned before, teams address many different parts of an individual's game performance by tracking statistics like WHIP, OBP, and OPS. These are a few of the new performance metrics that individual teams or sports analysts have created. Teams also assess a player's performance in multiple contexts rather than solely their individual performance. In baseball, analysts have innovated statistics like WAR (wins above replacement) that determine how many wins an individual player adds to a team's record. Again - WAR measures how each player contributes to his team's win or loss. WAR is measured by analyzing a player's value in all parts of the game in comparison to minor league replacements or available free agents at the same position (Position, 2021). Major League Baseball has had players that many would believe to accumulate a high WAR throughout their career, ironically the opposite is true. For example,

Ken “The Kid” Griffey Jr., believed to be one of the best baseball players in the last 30 years, absolutely disappeared in terms of producing WAR once he entered the second half of his career in Cincinnati. Vice versa, Mike Cameron, Ken Griffey’s centerfield replacement in Seattle, produced more WAR (18.4) (“Mike Cameron Stats,” 2021) in four seasons in Seattle than Griffey did for the rest of his career in Cincinnati (12.1 WAR in 10 seasons) (“Ken Griffey Jr. Stats,” 2021). The shocking fact is Mike Cameron, while just as valuable for a majority of their careers, does not hold near the same household name, popularity, and acknowledgment that Ken Griffey does. There are thousands of examples of this same phenomenon throughout all sports; however, analytics has only recently led to teams and fans discovering these shocking statistics. Most businesses typically focus only on operational and marketing strategies, issues, and development, unfortunately skipping the human dimension of performance that retains just as much value and significance. Assessing employees and management could be a very effective technique to evaluate a business organization’s team performance with or without a specific employee’s presence. For example, the efficacy of a company’s business-to-business sales team can be evaluated across various team configurations with their customers to recognize the “Mike Cameron,” or “Ken Griffey” in the organization. Hypothetically, let’s start assessing SAR, sales above replacement to individuals on sales teams.

A. Talent Management

Using big data analytics to achieve maximum value-focused solely on their employees, also known as “people analytics,” takes multiple steps. People analytics requires focusing the necessary attention on areas that are essential to creating successful talent management. Talent management is defined as the methodically organized, strategic process of getting the right talent on board and helping them grow to their optimal capabilities keeping organizational objectives in mind (Ghosh, 2021). Identifying what talent an organization requires to meet specific goals and objectives is the first step to success through talent management and

generating the greatest return on investment from employees. Identifying necessary talent starts with understanding a company's mission statement, values, and goals. Shareholders, management, and future talent's cogitation must be in line with the organizations, they must simply buy into the process, as lots of sports teams refer to the concept. As the greatest college football coach of all time, Nick Saban said, "We create a standard for how we want to do things, and everybody's got to buy into that standard" (Barnett, 2013). An organization and potential talent should be able to mutually convey the role they will play in an organization and how they can contribute to the execution of the company's objectives. Workplace planning analytics is planning for the exact number of employees necessary with specific skill sets to complete objectives in a timely and logistical manner at an optimal cost. Workforce planning analytics plays a major role in the developing analytic processes that companies should focus on when acquiring, developing, and retaining their talent. One example of a company that uses big data analytics in workforce planning is FedEx. FedEx is the world's largest express shipping company and processes five million physical shipments and 100 million electronic transactions across 211 countries every business day. FedEx employs an unbelievable number, 375,000 people, workforce planning is essential to their success. FedEx not only recognizes how many employees are required short term, but they also consider the skills and capabilities their talent possesses pivotal to long term success. For example, when FedEx enters acquisition of another company, FedEx uses big data analytics to collect mass amounts of employee data from the acquisition target. The data includes employee engagement survey results, which is compared to data FedEx has accumulated and stored about their own company. Bob Bennet, the chief learning officer and VP of HR at FedEx says, "our analysis provides management with another data point before they make their decision...The important message is that now, more than ever, deriving value from data is critical in the business environment. HR has an important role because it has to use data to drive employee behaviors, making sure those behaviors are measured, monitored, and shaped to achieve business goals" (Isson, 2016)

B. Sourcing Analytics

The next step after workforce planning is sourcing analytics. Sourcing analytics is about capturing all the possible data and information about potential talent. Successful sourcing analytics optimizes sourcing results from determining which means are most functional in locating probable candidates, assessing their potential, and acquiring engagement and interaction within. The means by which we retrieve the data necessary to discover potential candidates for specific positions demands leveraging job boards, referrals, staffing firms, and even utilizing social media resources and tools. Wells Fargo is a great example of sourcing analytics. Wells Fargo acquired Wachovia Corporation and immediately centralized recruiting efforts for their banking division. The new centralization focused on recruiting employees to Wells Fargo, their 6,200 retail branches, and call centers. Big data analytics helped narrow the selected candidates to a more realistic volume that Wells Fargo believed to have more successful attributes. Wells Fargo strived to focus on the most certified candidates for their targeted positions. The areas of focus included experience, performance, aspiration, and skills beneficial to working at Wells Fargo. Wells Fargo's predictive analytic sourcing model developed a list of answers that produced candidates that they felt qualified in their chosen areas of focus. Out of the total 65 questions candidates answered, some included were, "How many job promotions have you had? What is the highest level of education that you've completed" (Isson, 2016)? The answers were scored in real-time and upon receiving a high enough score determined the next steps, often an atomically scheduled interview. Wells Fargo accrued over one million job-hunting candidates. Wells Fargo developed performance metrics and retention rates between employees that their sourcing tools would highlight as priority hires compared to those Wells Fargo would normally hire without their predictive analytic sourcing model. Convincingly, the predictive analytic sourcing model selected better - higher qualified employees that benefited Wells Fargo.

C. The Ideal Candidate

The next step toward implementing successful employee analytics is choosing the ideal candidates for the company. In the last paragraph I mentioned how Wells Fargo developed a precise pool of candidates that fit the job requirements and expectations, the next move is finalizing those investments of employees that create short and long-term success for the company. Acquisition analytics focuses on addressing the correlations between a talent's resume and interview performance in comparison to how they would perform in the specific role. Big data analytics have made it easier to address and decide whose talents will translate the best to the workplace by generating talent acquisition questions such as: What are the best sets of questions to ask during an interview? How many interviews should we conduct before hiring? What is the impact of candidate experience and the interview outcome? Do referred candidates tend to perform better than other candidates? An example of a company that successfully uses acquisition analytics is Transcom. Transcom employs at-home agents and contact center employees to provide customer care services for sales, technical support, and credit management. Transcom employs nearly 30,000 specialists across 54 contact centers in 23 countries around the world. Their network provides services in 33 languages that have launched them into a global success. Their global dominance surfaced through Transcom's business strategy of hiring and retaining high-performance service professionals. They established their strategy through big data analytics to discover that the trait, honesty, was correlated to a candidate's and employee's performance. Transcom created a pilot project to test this hypothesis and later prove it to be true. It started by screening candidates, asking questions such as how comfortable they were working on a personal computer, and if they knew basic shortcuts on keyboards. Candidates who answered yes were later asked to perform such a task to prove their skills and more importantly, honesty. The best performers in honesty usually proved to retain their positions for 20% to 30% than those who scored lower.

Call-center jobs typically have very high employee turnover rates due to the nature of the industry. Call-centers generally have a poor reputation that stems from low wages, poor culture, and the high-volume load that employees are expected to work. Therefore, employee attrition is often much higher than in other industries. Transcom, comparatively, outperformed other call center companies based on attrition statistics. In the call-center industry, 5% attrition monthly is coveted. Training employees in such an industry commonly takes at least a month, therefore, the cost to hire replacements is expensive. Transcom used their new big data-analytical method to hire around 800 employees, three months later 500 workers were still employed. It would require normally 1,000 new hires to reach the same level of attrition from their employees. Neil Rae, an executive vice president of Transcom, explains how the acquisition has become “more a science and less subjective,” as big data analytics have started to influence how businesses make decisions when hiring talent (Isson, 2016) The results according to Neil Rae, Transcom has saved millions of dollars and customer service keeps improving thanks to their increasing retention rates.

D. Onboarding

Once the selected employees are hired, onboarding is another crucial step to ensuring your employee selection produces the greatest possible results. Onboarding plays an important role in guaranteeing new talent has values, goals, and a mission similar to the business. Within the first six to twelve months, depending on the position the new talent is undertaking, onboarding should consist of the company providing the talent with resources, tools, direction, and the expectations of their role in the organization. Employee reliability and productiveness are thus desired after months of training and mentoring. Big data analytics can also be used during this transition period as organizations try to surpass their new employee’s expectations. Questions asked when focusing on talent management include: How does the employee fit in with the company culture? How much does onboarding affect employee retention? In 2021,

cultural fit is more crucial than it has ever been. The workplace is becoming more diverse as multiple generations are beginning to work together much more often. Consequently, cultural fit is significant for ensuring the successful integration of new and old employees. Multiple studies, such as Northcentral University's; proves that value congruence (the extent an employee behaves while working consistently to their own image) reduces the risk and number of incidents of turnover by enhancing work retention (Olubiyi, 2019). Cultural fit and a friendly workplace environment were some of Northcentral's most important aspects in customer retention. A friendly workplace environment ensures great relationships between management, employees, and customers. Participants in the study reported that work-related stress was virtually non-existent because of the great workplace environment and fit companies exemplified. Wells Fargo, as we know, embraced big data analytics into their whole hiring process and employee retention objective. During their sourcing analytics process, they were able to collect valuable amounts of data that lead to successful onboarding. The large amounts of data allowed Wells Fargo to create individual onboarding experiences that were fit for each new employee. Wells Fargo calculated the retention rate of the new hires during this project and concluded that retention rates increased by 15% for tellers and 12% for personal bankers.

E. Employee Engagement

Once an employee is onboarded, it is their time to prove themselves in the role the company places them in. An employee's goals, such as a baseball player's motivation to hit home runs, and win The World Series, should be to perform to the best of their ability for themselves and the organization. Performance assessments and big data analytics should go hand and hand when evaluating employees. For companies to be competitive in their respected industry, employee engagement must be top-notch to surpass organizational goals and customer expectations. A lot of the steps I mentioned before should lead to more employee engagement, but there are plenty more. An engaged employee is often seen as passionate and

inspired by the challenges that their role and customers present. Big data analytics can provide an easier understanding of the numerous ways to increase employee engagement. The benefits of discovering methods to provide more employee engagement are to create a happier, more productive, and longer-lasting workforce. Questions that are often frequently answered are, what are the main pilots to employee engagement? How to increase productivity from employee engagement? How does employee engagement affect attrition rates? Employee engagement analytics has proven that there is a correlation between engagement scores and performance evaluations. These scores are influential in eliminating poor employees, but furthermore, enhancing an exceptional employee's career path and merit. The Container Store is a great example of a company applying big data analytics to assess and improve engagement throughout its organization. Fortune has named The Container Store, "one of top 100 places to work," 18 years in a row. (Noyan, 2017) The Container Store was established in 1978 and now has over 60 stores across 22 states. Retail stores across the industry train their employees in their first year on average – only seven hours. In comparison, full-time employees at The Container Store receive upwards of 260 hours of training. As a result of excellent training which leads to excellent performances, they make at least 50% more on average than companies in the same industry. The Container Store has also adopted wearable technology to help foster their movement in using big data analytics to improve their employee engagement. The wearable technology is called Theatro service, which was first piloted through feedback from The Container Store. The wearable technology quickly links the employee and managers to product information that allows continuous attention toward their customers. Data is sent to Theatro's cloud service and routes to whoever needs the information. The system uses asynchronous communication and compression algorithms for voice assistance. The voice-operated Internet of Things, wearable-technology, is connected with applications uniquely for The Container Store through software as a service (SaaS) (Grill-Goodman, 2018). The SaaS applications provide product information like stock-keeping unit searchability, all the while the

analytics application attached captures insights from employees' daily activities, how their teams work together, and performance comparisons across floors and across the whole country. The motivation that The Container Store has to ensure high engagement speaks true for the high performances they receive from their employees. The Container Store has created a high engagement, high performance, team culture throughout the nation that is a win-win for both employees, managers, and owners. The Container Store's wearable technology is not surprisingly similar to the big data wearable technology that sports organizations have adopted. The wearable technology that professional sports use measure mostly biometric statistics, which include heart rate, temperature, sleeping patterns, and have the capabilities to include many more data generated insights (Brown, 2020). The most advanced wearables initially were used during training, but in recent years leagues have allowed the increasing use of it during live games. Some wearables have the ability to capture thousands of data points per second. For example, many devices capture full three-dimensional visuals of swing paths, insights, and information that enhance the performance of our favorite athletes.

F. Retaining Employees

One of the most important goals that an organization will strive to achieve is high retention rates among all employees, both young and veteran. By following the recent big data analytic trends and techniques, organizations are looking to earn their employee's trust, loyalty, and engagement that creates success for everyone involved. Whether employees are top performers creates negative value for your organization, the company will have to deal with both voluntary and involuntary employee turnover. Voluntary turnover happens when an employee leaves for a more favorable position somewhere else, oftentimes for a company's competitor. Involuntary attrition involves the termination of an employee. Introducing big data analytics to employee retention can easily generate value by examining multiple questions: Who will

experience employee success or failure? Which top performers could the company risk losing? What proactive steps can be taken to retain valuable employees? The goal of asking and answering these questions is identifying what employees will leave, when that employee will leave and why that employee left. An example of a company using big data analytics to increase retention rates across the company is Omnitrac. Omnitrac uses SaaS, software as a service, to provide operational management guidance to logistics and transportation companies across the world. Omnitrac further offers techniques through technology to improve fuel efficiency management, overall productivity, minimize costs through safety improvements and driver retention. Omnitrac offers its services across 70 countries while managing millions of transportation assets to thousands of fleet customers. Driver retention is believed to be one of the most important aspects of a successful fleet company. Retaining drivers is a super difficult task in the transportation industry and the use of big data analytics by Omnitrac has offered helpful solutions. In the transportation industry, the absence of drivers causes more trucks to sit empty; therefore, less revenue is earned. Thankfully, Omnitrac have created predictive models that provide company insights to retain valuable talent. In the transportation industry, driver satisfaction is a huge component to retaining talent while also improving the conditions surrounding the talent. Driver satisfaction is significant to a transportation companies' success because it saves millions of dollars long term. First, training new drivers is extremely expensive, estimates range upwards to \$20,000. Second, a lack of driver satisfaction generates a domino effect. The discontent drivers can also lead to negative exchanges and relationships with customers during shipment deliveries. Omnitrac has helped numerous transportation companies improve driver contentment, thus increasing driver retention rates. For example, an Omnitrac client that employed over 1,400 drivers had been encountering high turnover rates from their drivers in recent years. Omnitrac, using big data analytics and their predictive modeling, averted almost 300 drivers from leaving. The result: the reduction in driver turnover fell by 50% and saved the company over \$1.2 million dollars. Omnitrac utilized their predictive

modeling to analyze thousands of real-time data points to calculate probabilities on when drivers are most likely to quit, without even knowing the drivers personally. Drivers were most likely to quit from a discontent with managers, other employees, or because of family and relationship problems. Once transportation companies became equipped with the knowledge of when and why employees were quitting, drivers' satisfaction increased because they were now heard, supported, and cared for.

VII. Big Data Analytics in Small versus Large Businesses

Companies in wide-ranging industries across the world have competed with each other for hundreds of years to utilize the best resources to produce the best products and services. The most valuable resource that goes underappreciated, employees. Widely successful companies aren't created, developed, and sustainable without the talent that produces the services or products. Top employees, personnel, and managers are constantly at the brink of innovating movements, developing products, and producing the most profit. Prized talent builds addicting and attractive work environments that in turn leads to other employees developing the same type of mindsets. Searching for, attracting, and retaining prized talent is the key to success for a company's future, and big data analytics is helping to adapt organizations to capitalize on their talent.

The companies mentioned above are multinational, majority fortune 500, successful companies that have the ability and resources readily available to embark on big data analytics. I want to make a call for small businesses to adapt. As larger enterprises are adopting big data analytics, developing strategies to improve marketing and employee retention, they are further separating themselves from the competition, especially from smaller businesses. The reliance on tradition and word of mouth is becoming less and less significant for mom-and-pop stores, and other small local businesses alike (Polakoff, 2020). Large corporations have established

themselves in all markets, and along with e-commerce and the rise of online shopping. Unfortunately, small businesses are not adopting big data analytics at the same rates as larger entities, even though they have the same goals and aspirations. The goal is to create the best – most efficient products or services to retain customers. In the connected, data-driven world we live in, data represents the customers' voices and demands. Therefore, the biggest reason small businesses should adopt big data analytics is because their biggest competitors are doing so. As large competitors are embracing big data analytics, smaller organizations must no longer ignore the movement. Times have changed. Covid-19 and the worldwide pandemic has only further sped up the movement to big data analytics, however, there are challenges for small businesses.

As small business owners are being influenced and urged to adapt, the transition is not easy. Adopting big data analytics is not simple. There are a lot of common issues that are preventing small businesses from taking advantage of big data analytics. The most common issue small businesses have is not collecting their data, but rather interpreting the data. The advancement in technology is gradually increasing the accessibility to data capturing technology. Nevertheless, simply gathering the data does not improve business. Business owners who do not have a lot of experience interpreting data tend to struggle with this task, and it can be costly to hire someone experienced enough to perform such. The price for hiring experienced employees with sharpened analytical skills is only rising because of the growing popularity demand. The most common difficulties interpreting data are understanding business insights, understanding the return on investment from data gathering technology, accessing the correct data to transcribe, using the data to answer appropriate questions, and implementing the data into actions (Su, 2018)

Data collection is another difficulty small businesses face when entering the world of big data. Data collection itself has not been the issue, however, collecting more sophisticated data has been the underlying problem. There are plenty of basic tools that have helped businesses

start capturing analytics such as Shopify, Google Analytics, and other social media insights, but it is not precise enough for some operations. The main issue is collecting qualitative data on customers. Small businesses struggle to find the resources and time to gather qualitative data, that basic analytical tools fail to do. It is also complicated to gather clean, useful, and accurate data about consumer behaviors without advanced data capturing tools. Simply put, quantitative data collecting has become easier to access while qualitative data accessibility is lagging behind. Another issue that occurs is the combination of multiple tools to collect data. Not all data comes in the same forms, and sometimes certain analytic tools are only good at one or two tasks. Integrating multiple resources of data can be very challenging. For example, small businesses sometimes have to collect data from multiple, handfuls of platforms and systems to analyze a customer's whole purchasing journey. Marketing a product or service all the way to a customer's purchase, utilization, and feedback can be a long, timely, and challenging process. That leads to the last problem, real-time analytics is the most useful form of analytics. Without the correct resources to explore data, it can become useless. Often data analysts have to surf through collected data to produce valuable information and insights. The more insights and answers that businesses desire require more effort, time, resources, and obviously – investment. Many small businesses do not have the resources to afford highly sophisticated tools (which are limited) or very experienced data analysts.

Although small businesses cannot reasonably adopt the same big data analytic opportunities as larger businesses, there are several ways for them to get involved. More so than sports organizations, small businesses do not have the resources to sustain insufficient hiring decisions. Similar to Transcom's experiences with retention rates, turnover is expensive, and can cause major setbacks. Fortunately, there are analytical tools becoming more accessible to smaller businesses such as the Predictive Index assessment (Levit, 2012). Predictive Index assessment (PI) is a reliable predictor of an employee's workplace efforts and success. Through a system created uniquely for small businesses, PI uses analytical tools that

improve communication, manage conflict adequately, hire, train, and retain employees that deliver great results. PI also has the ability to evaluate leadership styles and how performance is impacted. PI provides small businesses with the technology to optimize their talent through understanding employees' strengths, reducing turnover, while influencing confident hiring decisions.

Net Promotor Scores (NPS) are the next source of analytical tools that small businesses can adopt to evaluate their employees. Originally NPS tools were constructed for customers to measure a service or product and the probability they would recommend it. Since the early development of NPS in the 2000s, the simplistic characteristic of the tool has attracted many businesses. Naturally a variant of the NPS, eNPS has been developed to allow businesses to evaluate their employees' opinions about the company they work for. Companies continued to add eNPS surveys to gauge the engagement of their employees, while including original NPS surveys to find correlations in employee engagement and customer loyalty. A LinkedIn study reported that 36% of people who switched jobs left their former employer from workplace dissatisfaction (Krzych, 2020). Employee engagement tools such as NPS and eNPS are critical analytical tools for companies to discover disengagement and discontentment from their employees which help measure metrics such as productivity, revenue, and prevent turnover.

WAR was developed through the advancement of other statistics in baseball, and I believe businesses could implement a similar metric to evaluate employees. Like I mentioned earlier, sales above replacement (SAR) would be an industry-specific score. For example, SAR could measure the performance of a furniture sales representative. A SAR score of 6 would imply the sales representative averages 6 more sales than a replacement would acquire. Another example, market share above replacement (MSAR), would suggest that either a marketing team or an individual over a marketing team reaches more potential customers than a replacement would acquire (Gandy, 2015).

VIII. Conclusion

The Oakland Athletics proved they could take advantage of an inefficient market using Sabermetrics. Advanced statistics and Sabermetrics were not utilized in the early 2000s like they are today, therefore, the Athletics capitalized on the opportunity to evaluate undervalued athletes to compete with large market organizations like the New York Yankees and Boston Red Sox. Big data analytics drastically increased in popularity into the 2010s allowing all 32 Major League Baseball teams to deploy the same tools, therefore, once again creating an even playing field relative to statistics. Comparably, large businesses are taking advantage of an inefficient market where all companies have yet to embrace big data analytics. Unfortunately, small businesses take up the majority of the businesses that have struggled to implement analytical tools to capture big data. The ability for small businesses to take advantage of big data capabilities are limited. Small businesses struggle to afford sophisticated tools to collect data and expert data analysts to utilize the data and improve their marketing, consumer outreach, revenue, employee efficiency and retention rates. Personally, I had a more difficult time finding information regarding small businesses' approach to big data and advanced analytics. Although I found a few examples of small businesses' adoption of big data analytics, I mostly found articles on the future opportunities for small businesses to use such techniques as Sabermetrics. Only in the last two decades have businesses adapted to the world of big data analytics, specifically when evaluating employees as organizations evaluated their athletes. Large companies have made strides to evolve, and it is time for small businesses to replicate the same success.

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