

DECISION-MAKING IN THE
NATIONAL BASKETBALL ASSOCIATION:
*THE INTERACTION OF ADVANCED ANALYTICS
AND TRADITIONAL EVALUATION METHODS*

by

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Decision-making in the National Basketball Association (NBA) occurs in the three general contexts of player evaluation, team evaluation, and roster construction. This thesis will explore the interaction of two primary methods of evaluating basketball—“advanced analytics” and “traditional evaluation methods”—that must be integrated together to reduce risk in decision-making and achieve competitive advantage. “Advanced analytics” does not have a precise definition, but can broadly be defined in this thesis as “insights gained from quantitative data analysis about basketball.” “Traditional evaluation methods” include any form of observation, such as on-site scouting, live coaching, and game film analysis. Through an interview and survey protocol, this thesis explores methods for quantifying human intangibles, the role of “gut instinct,” NBA organizational structures, as well as the specific strategies and tools in place for key decision-makers to balance all available information. The findings of this thesis are that NBA organizations should formalize their decision-making processes with repeatable strategies and specific tools that align with the strategic plan and vision of the organization, in order to maximize team performance and pursue NBA championships.

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Table of Contents

Chapter 1: Introduction	1
Background	1
Defining Analytics	4
Defining Traditional Evaluation Methods	6
Player Evaluation, Team Evaluation, and Roster Construction	7
Research Question	8
Contribution to the Field	9
Outline	10
Chapter 2: Literature Review	11
History of Sports Analytics- MONEYBALL	11
The NBA Adopts Analytics- BASKETBALL ON PAPER	12
Daryl Morey and the MIT Sloan Sports Analytics Conference	14
Recent Developments and Current Landscape of NBA Analytics	17
Important Analytics Trends	17
Plus-Minus and Player Efficiency Rating	20
SportVU Data	21
Synergy	22
Implementing Analytics	23
Organizational Structure	26
NBA Analytics Case Studies	28
Houston Rockets	28
Dallas Mavericks	31
San Antonio Spurs	32
Philadelphia 76ers	33
Toronto Raptors	34
Nonbelievers and Holdouts	36
Flaws in Current Processes	39
Limitations of Analytics	39
Limitations of Traditional Methods	40
Human Intangibles	42
Milwaukee Bucks Facial Coding	43
CogSports' "ATHLETT"	47

Importance of Leadership and a Strategic Plan	50
Chapter 3: Research Design	52
Participants	52
Instrument	53
Procedure	55
Limitations	57
Chapter 4: Results	59
Defining Advanced Analytics	59
Importance of Analytics	61
Advantages of Analytics	61
Limitations of Analytics	62
Importance of Traditional Evaluation Methods	64
Advantages of Traditional Evaluation Methods	67
Limitations of Traditional Evaluation Methods	69
The Interaction Between Advanced Analytics and Traditional Evaluation	70
Importance of Human Intangibles	72
Scientific or Psychological Methods to Evaluate Human Intangibles	74
“Gut Instinct”	75
Tension Between Analytics Personnel and Traditional Evaluators	76
Importance of Basketball Experience/Understanding for Analytics Personnel	77
Organizational Structure	79
Specific Strategy to Balance all Available Information?	81
Tools for Assigning Values to Different Information	82
Decision-Making Processes to Balance All Available Information	84
Chapter 5: Discussion	87
Chapter 6: Prescriptive Next Steps	100
Mixed Methods Research Design for Decision-Making in the NBA	100
Balanced Scorecards	102
Quantifying Human Intangibles	105
Biometrics and Sports Science	105
Salary Cap Considerations	106
Chapter 7: Conclusion	108
Bibliography	119

List of Accompanying Materials

1. Interview/Survey Protocol	113
2. Email Cover Letter	117
3. Follow-up Email After Three Days	118
4. Last Email After Three Days	118

List of Figures

Figure 1: Sports Analytics Framework	5
Figure 2: Comparing Mid Range to 3-Point Jump Shot Frequencies of 30 Teams	18
Figure 3: Data Integration	24
Figure 4: Player-Related Information	26
Figure 5: Houston Rockets Midrange and 3-Point Jump Shot Frequencies	30
Figure 6: Toronto Raptors “Ghost System”	36
Figure 7: Typical Emotions in a Successful Player and a Problem Player	45
Figure 8: What Expressions Can Say About a Player	46
Figure 9: Specific Strategy in Place for Balancing All Available Information?	94
Figure 10: NBA Organizations With Tools in Place to Balance All Available Information	96
Figure 11: Dashboard Design for Player Evaluation Decision	98
Figure 12: Convergent Mixed Methods Research Design for Decision-Making in the NBA	101
Figure 13: Visual Representation of a Generic Business Balanced Scorecard	103
Figure 14: Framework for Basketball Operations Decision-Making in the NBA	110

List of Tables

Table 1: “Analytics are important for evaluation and decision-making in your organization”	61
Table 2: “The following ‘traditional evaluation methods’ are important for evaluation and decision-making in your organization”	65
Table 3: “Human intangibles are important for player evaluation in your organization”	73
Table 4: “Your organization uses scientific or psychological methods to evaluate human intangibles”	74
Table 5: “There is an element of ‘gut instinct’ required for decision-making”	76
Table 6: “There is tension between analytics personnel and ‘traditional’ evaluators in organizations around the league”	77
Table 7: “It is important for analytics personnel to have basketball experience and/or an understanding of the game”	78
Table 8: “Which option below best describes the organizational structure for analytics and ‘traditional evaluation’ in your organization’s basketball operations?”	80
Table 9: “Your organization has a specific strategy in place for how to balance all information gathered from analytics and traditional evaluation methods.”	81

Chapter 1: Introduction

“With a philosophical battle brewing between the old-school Eye Test guys and the new-wave numbers guys, it’s been funny (and a little ridiculous) to watch this turn into an either/or thing. Ideally, you should blend both worlds into one larger vision.”– Bill Simmons¹

Background

Decision-making is critical in every walk of life. Some decisions have enormous consequences, while others are relatively meaningless. No matter the context, it is imperative to rigorously consider all available information from every source in order to make the best possible decision. As data sources continue to become more sophisticated around the world, it will be increasingly important to effectively balance all available information about a decision. “Because of big data,” according to the Harvard Business Review, “managers can measure, and hence know, radically more about their businesses, and directly translate that knowledge into improved decision-making and performance.”² Restaurants, retailers, and insurance companies, for example, are all using massive amounts of data to make informed, intelligent decisions, and gain competitive advantages in their industries.³ Likewise, the global sports industry has seen an enormous increase in the use of “advanced analytics,” or statistical and numerical data analysis in order to drive strategic decisions. This evidence-based approach was first widely used for player evaluation in Major League Baseball (MLB), but has since expanded to every other major professional American sports league.

¹ Simmons, Bill. “Simmons on the Road: It's All on LeBron.” *Grantland*. ESPN, 19 May 2014. Web.

² McAfee, Andrew, and Erik Brynjolfsson. “Big Data: The Management Revolution.” *Harvard Business Review*. Harvard Business Review, 01 Oct. 2012. Web.

³ Ibid.

At the forefront of the growth of analytics in 2015 is the sport of basketball, and specifically the National Basketball Association (NBA). In order to analyze basketball, and for NBA organizations to make decisions about their teams and players, there is a set of traditional and qualitative evaluation methods that coaching staffs have used for years. Scouts and coaches know what they see, as part of the so-called “eye test,” based on their years of experience watching and evaluating the sport. Only recently have advanced statistical models and other quantitative data offered another set of methods to evaluate basketball. There is an abundance of data available to all 30 NBA teams—every aspect of an NBA game is being measured and modeled by statistics—but correctly interpreting that information, and making it meaningful and easily understandable is still a source of competitive advantage.

Compared to a baseball game, which can be feasibly modeled as a discrete set of individual actions, a basketball game is a fluid set of interactions that is more difficult to summarize with numbers. As a result, “analytics will never replace the traditional methods of player evaluation,” Stephen M. Shea and Christopher E. Baker explain in their book, **BASKETBALL ANALYTICS**. “However, analytics and on-site scouting are not in competition with each other. Instead, each perfectly complements the other.”⁴ Historically there has been a dichotomy that MLB teams primarily evaluate players and base decisions on either analytics or the “eye test.” This dichotomy does not exist in the NBA. It is impossible to fully understand the very complicated sport of basketball by

⁴ Shea, Stephen M., and Christopher E. Baker. *Basketball Analytics: Objective and Efficient Strategies for Understanding How Teams Win*. Lake St. Louis, MO: Advanced Metrics, LLC, 2013. Print, 1.

only evaluating it with either stats or with eyes.⁵ “So, the two should work together,” Shea further explained in an email exchange with the researcher. “For example, analytics can suggest which prospects the scouts should visit. Analytics can suggest what the scouts might look for when they visit that prospect.”⁶

The complex and interconnected sport of basketball is a useful case study for the importance and difficulty of decision-making. The ultimate goal of key decision-makers in the NBA is for their team to win games, and eventually championships. In a league where the average player salary is around \$3.9 million, and the average valuation of all 30 NBA organizations is \$1.1 billion, there are enormous financial ramifications of decision-making in the NBA in 2015.⁷ Some decisions are large, such as whether to sign a particular free agent or whether to conduct a trade. Some decisions are smaller, such as which players should start, and what lineups should play the most minutes throughout a game. Regardless of the size and scope, every basketball operations decision can have either a positive or negative impact on the on-court performance of the team, and every decision can be informed by both advanced analytics and traditional evaluation methods.

⁵ Lowe, Zach, and Kevin Pelton. "The Lowe Post." Audio blog post. *ESPN Podcenter*. ESPN, 9 Apr. 2014. Web.

⁶ Shea, Stephen. "University of Oregon Thesis on NBA Analytics." Message to the author. 4 Feb. 2015. E-mail.

⁷ Badenhausen, Kurt. "Lakers Top 2015 List Of NBA's Most Valuable Teams; Average Franchise Is Now Worth Record \$1.1 Billion." *Forbes*. *Forbes Magazine*, 21 Jan. 2015. Web.

Defining Analytics

“Analytics” has become a buzzword in the media, however, there is not consensus around the NBA about what exactly constitutes “advanced analytics.” How advanced do data and models have to be in order to be considered analytics? Is there a difference between “analytics” and “advanced analytics”? Do data necessarily have to be quantitative to be considered analytics? This thesis will explore various NBA personnel’s definitions of analytics, and seek to come up with a more consistent definition. In general, analytics capture information that does not show up in traditional box score statistics. In the words of Houston Rockets General Manager, Daryl Morey, “Someone created the box score, and he should be shot.”⁸ Basic box score statistics, such as points, assists, rebounds, blocks, and steals, can be misleading, and do not accurately capture the value a player brings to his team. Analytics on the other hand, can offer more precise metrics that help accurately evaluate a player or lineup, and provide actionable information to a team.

According to Shea and Baker, “Analytics is the objective and efficient arm of information gathering.”⁹ Furthermore, in his book **SPORTS ANALYTICS**, Benjamin Alamar defines analytics as:

“The management of structured historical data, the application of predictive analytic models that utilize that data, and the use of information systems to inform decision-makers and enable them to help their organizations in gaining a competitive advantage on the field of play.”¹⁰

⁸ Lewis, Michael. "The No-Stats All-Star." *The New York Times*. The New York Times, 14 Feb. 2009. Web.

⁹ Shea and Baker, *Basketball Analytics*, 5.

¹⁰ Alamar, Benjamin C., *Sports Analytics*, Columbia University Press, New York, 2013. Print, 4.

Figure 1 illustrates the flow of “analytics” into actionable information for decision-makers, such as personnel executives, coaches, and trainers.

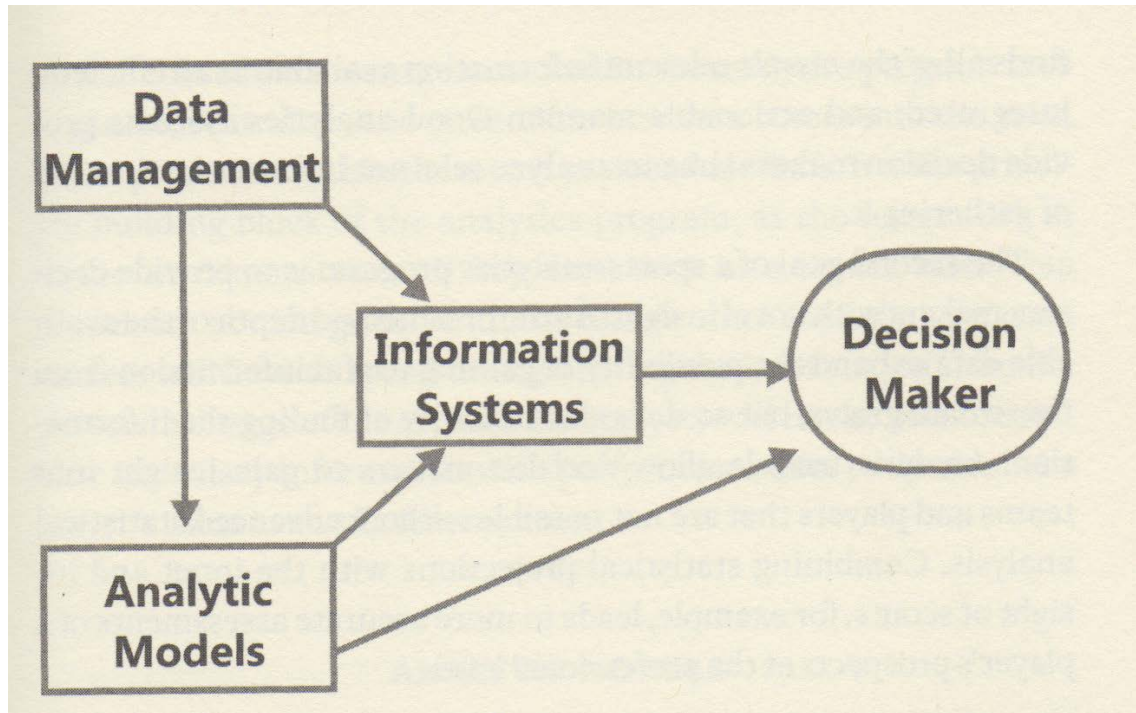


Figure 1: Sports Analytics Framework¹¹

Three components of sports analytics for decision-makers: Data Management, Analytic Models, and Information Systems.

Every type of data that is collected by an organization is first organized and processed by data management, then transformed into standardized, predictive models and algorithms. Information systems present structured data and analytic models to decision-makers “in an efficient and actionable manner.”¹² A classic example of an information system is the “magnet board,” where decision-makers can move and rearrange magnets of each player on their team, in the league, or in an upcoming draft class, in order to present information visually. Alamar details that the two main goals of

¹¹ Alamar, *Sports Analytics*, 5.

¹² Ibid.

analytics are to save the decision-maker time, and to provide unique insight that would not be possible without analytics.¹³

Defining Traditional Evaluation Methods

If analytics is the “objective and efficient arm of information gathering,” then the “traditional methods,” as they will be referred to in this thesis, are the subjective, qualitative methods of information gathering.¹⁴ These traditional methods, also called the “eye test,” include on-site scouting, live evaluation by coaches, and game film analysis. On-site scouting is when a trained scout watches a potential draft prospect or an upcoming opponent in-person, and generates a traditional, subjective scouting report. Live evaluation and game film analysis refers to a coaching staff watching live games and reviewing videos of their team or upcoming opponents. Scouts and coaching staffs impart subjective information from their observations, based on their many years of experience around the sport of basketball.

There is a certain human element to basketball that has historically been impossible to quantify with statistics, and has instead been evaluated with traditional methods and “gut instinct.” According to Shea and Baker, “There is no replacing the value of getting into the gym to see that college prospect play, to see how they interact with teammates and respond to coach’s demands in the huddle.”¹⁵ Intangibles such as chemistry, teamwork, work ethic, and attitude have previously only been evaluated subjectively through interviews and observations of a team or player. In recent years, however, there has been an increased push to quantify human intangibles using new

¹³ Alamar, *Sports Analytics*, 5.

¹⁴ Shea and Baker. *Basketball Analytics*, 5.

¹⁵ *Ibid*, 1.

analytical methods. This thesis will explore the importance of “gut instinct” and human intangibles for decision-making, as well as the practice of quantifying human intangibles using scientific or psychological methods.

Player Evaluation, Team Evaluation, and Roster Construction

Decision-making broadly takes place in all basketball-related situations in an NBA organization. Shea and Baker divide evaluation and decision-making into three separate categories in **BASKETBALL ANALYTICS**: player evaluation, team evaluation, and team roster construction.¹⁶ Player evaluation includes scouting a player’s skill sets, deciding how valuable that player is and what role he could play, and determining how to develop his skills through coaching. Team evaluation leads to tactical game planning, including rotation and lineup decisions, substitutions, play calling, and shot selection strategies. Based on player and team evaluations, an organization is then faced with roster construction decisions, such as drafting, trading, offseason free agency acquisitions, in-season transactions, and salary cap considerations. Analytics and subjective evaluations can be used together to inform every player evaluation, team evaluation, and roster construction decision in an NBA organization. Former basketball player, scout, and coach, Dean Oliver, explained in an ESPN article:

“The data will be there for every team to use however it wants—including making mistakes. The uncertainty in player evaluation, tactical evaluation and general team construction comes less from lack of data than from lack of analytic power. Decisions will continue to be made, some using ‘gut,’ some using data, and the best ones using the right blend of both.”¹⁷

¹⁶ Shea and Baker, *Basketball Analytics*.

¹⁷ Oliver, Dean. “How Numbers Have Changed The NBA.” ESPN. ESPN Internet Ventures, 15 Nov. 2013. Web.

Basketball operations decisions related to player evaluation, team evaluation, and roster construction are ultimately made to maximize team performance in pursuit of winning an NBA championship. However, there are a variety of different approaches to accomplish the same goal, depending on an organization's assets, constraints, and strategic plan. "The team's strategic plan refers to the long-term strategy for winning games, making the playoffs, winning championships, and maintaining success," Alamar writes.¹⁸ Every NBA organization's situation is unique and constantly changing, so each organization's strategic plan will also be unique. It is impossible to truly isolate the impact of an organization's decision-making approach on team success. At end of the day, each organization strives to identify every possible competitive advantage to reduce risk in decision-making, but these approaches will vary from organization to organization.

Research Question

The purposes of this thesis are to describe the interaction between advanced analytics and traditional evaluation methods in the NBA, and to explore how organizations balance all available information in their decision-making processes. This thesis will seek to answer the broad research questions: what is the interaction between the use of advanced analytics and traditional evaluation methods, and how do organizations balance all available information in their decision-making processes? In addition, this thesis will explore the importance of human intangibles and "gut instinct," as well as organizational structures, strategies, and tools, for decision-making in the NBA.

¹⁸Alamar, *Sports Analytics*, 21.

Contribution to the Field

Competitive advantages from advanced analytics come from not sharing secrets with other teams, so there is a shortage of public information about how NBA teams are specifically using analytics for player evaluation, team evaluation, and roster construction. Some NBA journalists use vague and general descriptions about how it is important for organizations to use analytics and traditional methods, not just one or the other, in order to make decisions. This research will contribute to the existing knowledge base about how advanced analytics and traditional evaluation methods complement each other, and what the process of integration looks like in an NBA organization. This thesis will help clarify to NBA journalists and the public that analytics and traditional evaluation methods are not mutually exclusive, and should be used together for decision-making.

In addition, NBA teams may gain insight about the importance of aligning decision-making processes and the integration of analytics and traditional evaluation methods in a way that matches the strategic plan of the organization. More generally, the findings from this thesis may be transferrable to other professional sports leagues; as the availability of different types of data continue to increase, the importance of rigorous decision-making processes and balancing all available information will increase as well. This thesis provides insight about the importance of appropriately balancing observations and quantitative data analysis in order to make basketball operations decisions in any context. This thesis also proposes some prescriptive next steps for future research projects about decision-making in the NBA, specifically

regarding strategies and tools for decision-makers to balance all available information about a decision.

Outline

This thesis consists of five major parts: literature review, research design, results, discussion, and prescriptive next steps. “Chapter 2: Literature Review” explores the history, recent developments, and current landscape of advanced analytics and decision-making in the NBA. This includes multiple case studies of how teams are implementing analytics, conducted from publicly available books and articles. Next, “Chapter 3: Research Design” details the interview and survey protocol that was administered to NBA front office personnel, coaching staffs, and analytics staffs, to investigate evaluation methods and decision-making processes. “Chapter 4: Results” presents the common themes from the data collected through the interview and survey protocol. “Chapter 5: Discussion” examines the implications of the findings from Chapter 4, and discusses the importance of balancing all available information for decision-making in the NBA. “Chapter 6: Prescriptive Next Steps” suggests future research that should be conducted about decision-making in the NBA. “Chapter 7: Conclusion” presents an original framework for NBA decision-making, and wraps up the thesis with some major takeaways from Chapters 4, 5, and 6.

Chapter 2: Literature Review

History of Sports Analytics- MONEYBALL

Sports analytics, in the form of empirical analysis known as “sabermetrics,” was first seen in the sport of baseball in the late 1970s.¹⁹ Sabermetrics is a term coined by statistician Bill James, referencing the Society for American Baseball Research (SABR), which conducted the research for advanced mathematical models and statistical formulas that analyzed baseball. James defined sabermetrics as “the search for objective knowledge about baseball,” and developed these concepts in his **BASEBALL ABSTRACT** books in the 1980s.²⁰ James’ writings were largely influential for the influx of sabermetrics in the MLB in the 1990s.

The most famous case study of the successful implementation of sabermetrics in the MLB is the 2002 Oakland Athletics baseball team, which was assembled entirely based on quantitative data analysis, as opposed to the traditional roster construction methods of the time. Author Michael Lewis detailed this narrative in his book **MONEYBALL**, which was adapted into a film of the same name, starring Brad Pitt. **MONEYBALL** brought sabermetrics into the public conversation about evaluating sports, focusing on the conflict between new-wave statistical analysis and the old school “eye test.”²¹ In **MONEYBALL**, scouts for the Oakland Athletics believe what they see, but General Manager Billy Beane and his Assistant General Manager, Peter Brand, argue that the scouts’ traditional evaluation methods are subjective and biased. Instead,

¹⁹ Porter, Martin (1984-05-29). “The PC Goes to Bat”. *PC Magazine*. p. 209. Retrieved 24 October 2013.

²⁰ Ibid.

²¹ Lewis, Michael. *Moneyball: The Art of Winning an Unfair Game*. New York: W.W. Norton, 2003. Print.

facing a limited payroll, Beane and Brand implemented radical, non-traditional methods for evaluating players' values, and exploited inefficiencies in the market for player acquisitions. Despite an intense cultural divide between Beane and the rest of the Oakland Athletics organization, the team eventually won 19 consecutive games and reached the postseason.

The NBA Adopts Analytics- BASKETBALL ON PAPER

Unlike baseball, basketball is a complex, contextual, team sport, comprised of overlapping interactions between players. On any given possession of an NBA game, there are infinitely many outcomes that are impacted by innumerable, unpredictable factors. Where sabermetrics have effectively mapped baseball to a series of discrete individual events, the complicated free-flowing nature of basketball does not lend itself as well to this sort of analysis. For this reason, the basketball equivalent of sabermetrics, ABPRmetrics (Association of Professional Basketball Research Metrics) did not appear until much later. Analytics eventually found their way to basketball in the late 1990s through the writings of Dean Oliver and John Hollinger, who were inspired by sabermetrics and Bill James' overall philosophy about the power of statistical analysis.²² Oliver published **BASKETBALL ON PAPER** in 2003, and introduced new formulas for evaluating teams and the contributions of individuals to team success.²³ Following the popularity of **MONEYBALL** and the increasing use of sabermetrics in the MLB, several NBA teams became interested in implementing more objective methods

²² Kubatko, Justin; Oliver, Dean; Pelton, Kevin; and Rosenbaum, Dan T. "A Starting Point for Analyzing Basketball Statistics." *Journal of Quantitative Analysis in Sports* 3 (Article 1), 2007. Web.

²³ Oliver, Dean. *Basketball on Paper: Rules and Tools for Performance Analysis*. Washington, D.C.: Brassey's, 2004. Print.

to analyze player performance and determine the most effective mix of players within the NBA's salary cap. In 2004, the Seattle SuperSonics took notice of **BASKETBALL ON PAPER** and hired Oliver as the first full-time basketball statistics analyst in the NBA.²⁴

Many of Oliver's concepts from **BASKETBALL ON PAPER** emphasize efficiency, and make up the basic fundamentals of analytics in the NBA in 2015.²⁵ For example, comparing statistics is more effective at the level of possessions instead of entire games, since teams play at significantly different paces, altering statistics for points scored and points allowed per game.²⁶ Analysts therefore evaluate points scored per 100 possessions, known as "Offensive Rating" (ORTg), and points allowed per 100 possessions, known as "Defensive Rating" (DRtg). These statistics can be applied to both individual players and the entire team.²⁷ In the words of Stephen Shea, "Great teams are efficient teams, and efficient players make for efficient teams."²⁸ Another key tenet of basketball analytics is that adjusted per-36-minute statistics are more useful than per-game statistics. In this case, performance is evaluated based on quality of play in a standardized number of minutes, instead of based on variable playing time.²⁹

According to Oliver in **BASKETBALL ON PAPER**, there are four crucial aspects to winning in the sport of basketball, both on the offensive and defensive sides of the ball: "shooting percentage from the field," "getting offensive rebounds," "committing turnovers," and "going to the foul line and making the shots."³⁰ "Effective Field Goal

²⁴ Kubatko, Oliver, Pelton, and Rosenbaum, "A Starting Point for Analyzing Basketball Statistics."

²⁵ Shea, Stephen M. *Basketball Analytics: Spatial Tracking*. San Bernardino, CA: n.p., 2014. Print, 40.

²⁶ Holmes, Baxter. "New Age of NBA Analytics: Advantage or Overload?" *BostonGlobe.com*. The Boston Globe, 30 Mar. 2014. Web.

²⁷ Oliver, *Basketball on Paper*.

²⁸ Shea, *Basketball Analytics: Spatial Tracking*, 40.

²⁹ Kubatko, Oliver, Pelton, and Rosenbaum. "A Starting Point for Analyzing Basketball Statistics."

³⁰ Oliver, *Basketball on Paper*, 63.

Percentage” (eFG%) adjusts for the fact that a three-point field goal is worth one more point than a two-point field goal, and can be calculated for both offense and defense. “Turnover Percentage” (TOV%) is an estimate of the number of turnovers per 100 possessions, and can be calculated for an offense, or the number of turnovers forced by a defense. “Rebounding Percentage” can be calculated for offense (ORB%) and defense (DRB%), and is an estimate of the number of available offensive or defensive rebounds a player grabbed while they were on the court. “Free Throw Rate” is a measure of how often a team gets to the free throw line and makes free throws, and can be calculated for a team on offense, or for what a team allows on defense. These statistics for measuring the “Four Factors of Basketball Success” are still used in 2015.³¹

Daryl Morey and the MIT Sloan Sports Analytics Conference

The Houston Rockets took NBA analytics to a new level by hiring Daryl Morey as their Assistant General Manager in 2006, and promoting him to General Manager in 2007.³² Morey had never played or coached in the NBA, but was a progressive-thinker about how to evaluate basketball and make decisions using statistics. “The numbers either refute my thinking or support my thinking, and when there’s any question, I trust the numbers,” Morey said in a 2009 New York Times article. “The numbers don’t lie.”³³ Morey has become known for expending a large payroll on statistical analysts,

³¹ “NBA Season Summary.” *Basketball-Reference.com*. Sports Reference LLC. Web.

³² Feschuk, Dave. “Morey’s ‘Moneyball’ Approach Paying Off.” *Thestar.com*. Toronto Star, 13 Mar. 2008. Web. 17 Oct. 2014.

³³ Lewis, Michael. “The No-Stats All-Star.”

and developing his team's styles of play to reflect efficient trends he discovered through statistical analysis.³⁴

To provide a forum for industry professionals and students to discuss trends and new developments in sports analytics, Daryl Morey founded the MIT Sloan (School of Management) Sports Analytics Conference in 2007. There was a "Basketball Analytics" panel in the conference's inaugural year, featuring Dean Oliver and John Hollinger, who helped bring analytics to the NBA. Oliver and Hollinger appeared on the panel for each of the next five years, as it continued to attract more high profile panelists. Boston Celtics Assistant General Manager Mike Zarren detailed his organization's use of analytics during the 2012 Basketball Analytics panel:

"We just try to get all the information we can that we think is useful to make every decision that we're making. Some of the decisions are really small: who do we sub in now? Other decisions are really big: what does a championship team look like? If there's information out there that will help us answer those questions, we want it."³⁵

In regards to implementing analytics into an organization, Zarren commented at the 2013 conference, "You want to have a process in place for making reasoned decisions with the information you have."³⁶ A prominent topic of conversation during both the 2012 and 2013 Basketball Analytics panels was the flow of analytics information in an organization, and specifically how analytics personnel with no basketball experience communicated their findings to more traditional thinkers and coaching staffs. At the 2013 conference, San Antonio Spurs General Manager R.C. Buford explained that Head Coach Gregg Popovich was not presented data in a spreadsheet, but analytics findings

³⁴ Feschuk, "Morey's 'Moneyball' Approach Paying Off."

³⁵ "SSAC12: Basketball Analytics." *YouTube*. 42analytics. 12 Mar. 2012. Web.

³⁶ "SSAC13: Basketball Analytics." *YouTube*. 42analytics, 7 Apr. 2013. Web.

were instead communicated to him directly, and he decided what information to act on and convey to his players.³⁷ Buford's explanation shows that player evaluation and team evaluation decisions occur through a process where key decision-makers are presented key analytics findings and make a final decision.

The theme of the 2014 Sloan Sports Analytics Conference was "From Ripple to Revolution," and as Daryl Morey explained, "Things start small, and using analytics, eventually become a necessary part of competing."³⁸ The 2014 Basketball Analytics panel explored the state of analytics in the NBA at the time, while the panelists acknowledged their concerns with an increased emphasis on analytics. Detroit Pistons Head Coach Stan Van Gundy explained:

"I think a lot of the analytics stuff can be very useful, but if you're using that in place of sitting down and watching film yourself... you're making a big mistake. One of the problems with analytics is a lot of people... don't know the game and all they know is analytics... and they use that to supersede what guys like us see with our eyes. There's no substitute for watching film over and over and over again."³⁹

All 30 NBA teams sent a representative to the conference in 2015. During the Basketball Analytics panel, Mike Zarren explained, "The use of this stuff is not just having somebody who says they look at statistics—you actually have to use it, and it has to affect the decisions that you make." Zarren also discussed the inconsistencies in defining "analytics," stating, "I don't even know what 'this stuff' is. If there are scouts involved, is that not 'analytics'?"⁴⁰ A primary theme of the rest of the panel was the

³⁷ "SSAC13: Basketball Analytics." *YouTube*. Web.

³⁸ "MIT Sloan Sports Analytics Conference."

³⁹ "SSAC14: Basketball Analytics." *YouTube*. 42analytics, 11 Mar. 2014. Web.

⁴⁰ "SSAC15: Basketball Analytics: Push the Tempo." *YouTube*. 42analytics, 10 Mar. 2015. Web.

importance of pace of play and spacing in NBA games.⁴¹ In addition, the panelists discussed visible changes in the style of play in the NBA as a result of information from analytics.

Recent Developments and Current Landscape of NBA Analytics

Important Analytics Trends

The use of analytics has continued to grow throughout the NBA, and roughly three quarters of the 30 NBA teams had full-time analytics employees by 2013.⁴² In 2015, all 30 NBA teams have at least one full-time employee dedicated to an analytics role, with titles including: Basketball Operations Analyst, Quantitative Analyst, Basketball Information Coordinator, and Basketball Analytics Manager.⁴³ As a result, there have been visible changes in style of play across the NBA, arising from discoveries made with analytics. One unnamed NBA executive explained this in a 2014 interview with the *Boston Globe*, “Progress has been fairly slow, but if you look at the way the game is played now and the way it was played five years ago or 10 years ago—it is quantitatively different.”⁴⁴ Some of these trends include an emphasis on the value of three-point shooting, free throw attempts, and shots near the rim.⁴⁵

Shooting 33% on three-pointers results in equally as many points as shooting 50% on two-pointers. Furthermore, the least efficient shot in basketball is the midrange

⁴¹ “SSAC15: Basketball Analytics: Push the Tempo.” *YouTube*.

⁴² Maese, Rick. “NBA embraces advanced analytics as Moneyball movement sweeps pro basketball.” *Washington Post*. 25 Oct. 2013. *Academic OneFile*. Web.

⁴³ *Ibid.*

⁴⁴ Holmes, “New Age of NBA Analytics: Advantage or Overload?”

⁴⁵ *Ibid.*

two-point jump shot, given its low relative percentage.⁴⁶ In accordance with analytics, teams around the league are trending to shoot fewer midrange jump shots and redistribute those attempts to three-point shot attempts. Figure 2 compares the frequencies of midrange jump shots and three-pointers from 2008 to 2014.

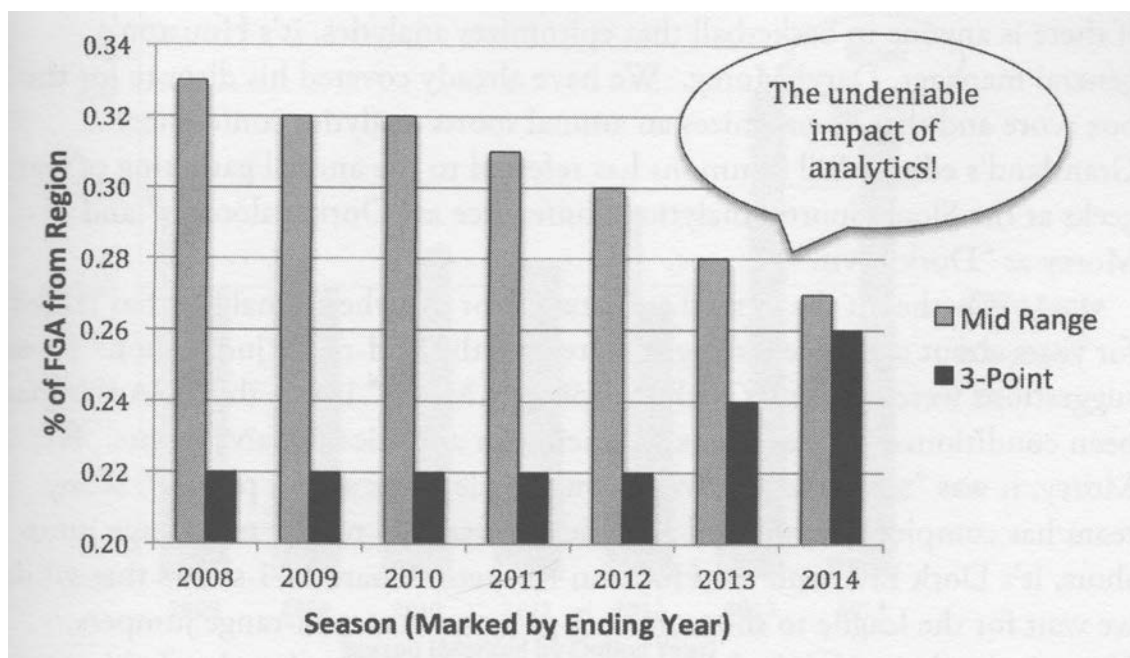


Figure 2: Comparing Mid Range to 3-Point Jump Shot Frequencies of 30 Teams⁴⁷

Percentages of field goals from both the midrange and three-point line by season indicate a trend toward fewer midrange jump shots, indicating the undeniable impact of analytics on the style of play in the NBA.

The average number of three-point attempts per game for all 30 NBA teams was 14.79 during the 2011-12 season, increased to 19.95 for the 2012-13 season, 21.54 for the 2013-14 season, and an all-time high of 22.41 during the 2014-15 season.⁴⁸ This trend reflects the increased value that NBA teams place on three-point shooting, seen as an

⁴⁶ Shea, *Basketball Analytics: Spatial Tracking*, 42.

⁴⁷ Ibid, 45.

⁴⁸ "NBA Season Summary." *Basketball-Reference.com*.

emphasis in player development, a tactical decision in game plans, and a priority in roster construction.

In general, three-point shooting from the corners is more highly valued, because the three-point line is shorter in these areas and shooting percentages are higher than anywhere else behind the three-point line.⁴⁹ For example, during the 2014-15 NBA season, the average corner three-point shooting percentage for all 30 NBA teams was 38.7%, in comparison to 35.0% overall on three-pointers.⁵⁰ In order to generate open catch and shoot opportunities from the corners, it is critical to have players that can effectively drive to the basket and draw attention from the defense. This also generates free throw attempts and easy baskets close to the rim. Whereas midrange jump shots are the least efficient shot in basketball, corner three-pointers, free throws, and shots at the basket are the most efficient shots in basketball.⁵¹

With regards to defensive analytics, there is still significant progress to be made to understand an individual player's true value on defense.⁵² Defensive box score statistics, such as blocks and steals, can be very misleading about how effective a player is on defense. A team's defensive strategy, however, is motivated to defend the most efficient offensive shots. This means limiting the opponent's made three-pointers, free throws, and shots at the rim. According to Stephen Shea, "defense begins with rim protection."⁵³ Although rim protection is a team activity, one individual that holds opponents to a very low field goal percentage at the rim can help anchor a defense.

⁴⁹ Holmes, "New Age of NBA Analytics: Advantage or Overload?"

⁵⁰ "NBA Season Summary." *Basketball-Reference.com*.

⁵¹ Shea, *Basketball Analytics: Spatial Tracking*, 50.

⁵² Holmes, "New Age of NBA Analytics: Advantage or Overload?"

⁵³ Shea, *Basketball Analytics: Spatial Tracking*, 180.

Plus-Minus and Player Efficiency Rating

One of the most common publicly used metrics for player evaluation is “Plus-Minus,” which simply measures what happens to the score when any given player is on the court. This statistic may be misleading, however, if a particular player is playing with superior lineups compared to their teammates. In order to avoid making inaccurate evaluations with basic “Plus-Minus” statistics, an adjusted version has been created, called “Real Plus-Minus,” in order to be more precise and descriptive. “Real Plus-Minus” can be used to help inform player and team evaluation, but these statistics must be taken with a grain of salt, and compared against other evaluation methods.

Another popular metric that appears in the media, and is discussed in many NBA front offices, is “Player Efficiency Rating” (PER). John Hollinger created the complicated catch-all statistic of PER to capture a player’s overall production, incorporating positive accomplishments such as field goals, free throws, 3-pointers, assists, rebounds, blocks and steals, and negative accomplishments, such as missed shots, turnovers and personal fouls. PER is adjusted to account for disparities in minutes played and pace of play for each player. While PER confirms that superstars, such as LeBron James and Kevin Durant, are elite players, PER also reveals that others, such as Rudy Gay, Brandon Jennings, and Ricky Rubio, might not be as valuable as they are perceived to be.⁵⁴ The PER metric can more accurately capture a player’s value than traditional box score statistics, and provides additional information for player evaluation decisions.⁵⁵

⁵⁴ Maese, “NBA embraces advanced analytics as Moneyball movement sweeps pro basketball.”

⁵⁵ Alamar, *Sports Analytics*, 66.

SportVU Data

Prior to the 2011-2012 season, the NBA partnered with the technology-consulting firm STATS LLC, to install “SportVU tracking-cameras” in six arenas.⁵⁶ Using six cameras installed in the rafters of an NBA arena, the SportVU software tracks the movements of the basketball and all 10 players on the court 25 times per second. The coordinates of the ball and every player on the court are converted into a wide variety of different information, including: the speed and distance traveled by each player, the number of times each player touched the ball, the total number of passes thrown by each player, as well as a player’s defensive impact, rebounding opportunities, and spatial information about where they shot from.⁵⁷ SportVU cameras produce an overwhelming amount of data, and measure aspects of a basketball game that would otherwise be incredibly difficult and time consuming to track by hand.

SportVU data alone is not descriptive, and must be effectively interpreted to make any meaningful, actionable conclusions.⁵⁸ “Having everyone’s location by itself doesn’t mean anything,” says Boston Celtics Assistant General Manager Mike Zarren. “The trick is saying, well, what things happen on the court that we want to know about? And can we tell those things from this information?”⁵⁹ In the 2012-13 season, 15 of the 30 NBA teams subscribed to SportVU services with STATS LLC. For the 2013-14 season, all 30 teams had SportVU cameras in their arenas. SportVU data will continue to revolutionize basketball analytics and decision-making in the NBA, as better metrics

⁵⁶ Lowe, Zach. "A New View: The NBA Will Install STATS LLC Cameras in Every Arena in the League." *Grantland*. ESPN, 23 Aug. 2013. Web.

⁵⁷ “Player Tracking.” *NBA Stats*. National Basketball Association. Web.

⁵⁸ Holmes, “New Age of NBA Analytics: Advantage or Overload?”

⁵⁹ *Ibid*.

are designed to analyze spatial tracking coordinates. Although a variety of SportVU statistics are publicly available on NBA.com, and all 30 NBA teams have access to the same data, the possible uses of SportVU data are limitless, and each NBA team currently uses the data in unique ways. In order to maintain a competitive advantage, NBA teams do not publicly share how they specifically utilize SportVU data in evaluation and decision-making.

Synergy

Another service that helps integrate analytics into an organization is Synergy Sports Technology, which provides “hard data with video to back it up.”⁶⁰ For example, the Synergy service automatically chops and tags video clips by play type, so General Managers, coaches, and scouts can watch post-ups, pick-and-rolls, isolations, off-ball screens, spot-ups, and transition plays. Synergy CEO Garrick Barr has explained that the video functionality is intended to provide missing context to statistics for trained coaches and scouts. Synergy also allows decision-makers to search and sort by any player or play type to learn player tendencies and create advanced scouting reports. The Synergy service essentially combines statistics with video to save decision-makers time in compiling videos and statistics for every different type of play in a basketball game. This service is widely used throughout the NBA to evaluate team tactics and components of player value.⁶¹

⁶⁰ Basketball Products.” Basketball Clips | Basketball Stats Software | Basketball Training. Synergy Sports Technology. Web.

⁶¹ Oliver, Dean. “How Numbers Have Changed The NBA.”

Implementing Analytics

According to ESPN NBA Insider Kevin Pelton, “The key for any team is how well it integrates analytics into its decision-making process.”⁶² Effectively integrating analytics into an organization’s decision-making processes is critical, otherwise analytics will not result in actionable information, and key decision-makers will base decisions only on limited information. In 2013, sports analytics consultant, speaker, and author Benjamin Alamar published **SPORTS ANALYTICS**, “a guide for coaches, managers, and other decision-makers.” Alamar echoes Pelton’s statement, explaining, “Organizations risk realizing no advantage from investment in an analytics program if they do not also invest in understanding and planning how to integrate analytics into the decision-making process.”⁶³ **SPORTS ANALYTICS** explores the opportunities for competitive advantage that organizations can realize with strong analytics programs, and ultimately helps guide decision-makers on how to implement analytics into their organizations.

In the context of analytics, the word “data” often specifically refers to quantitative, structured data in the forms of performance metrics, salary information, and physical measurements from the combine. In reality, quantitative information is just one type of data used by decision-makers. Qualitative information from scouting reports, game film, background checks, and coach’s notes, are all forms of unstructured data. Sports organizations, however, typically separate quantitative structured data from qualitative unstructured data, resulting in a disjointed process where neither set of data

⁶² Pelton, Kevin. "Advanced Stats Are Changing the Game and Leaving Some Big Markets behind." *ESPN*. ESPN Internet Ventures, 23 Feb. 2015. Web.

⁶³ Alamar, *Sports Analytics*, 2.

informs the other, and all of the data is not considered at the same time.⁶⁴ Evaluating all available information at the same time is one of the challenges of integrating analytics and traditional evaluation methods. According to Alamar, “The combination of structured and unstructured data sets into useable information is only possible when the data are centralized and fully integrated.”⁶⁵ As can be seen in Figure 3, structured and unstructured data can be combined and analyzed together to produce actionable information to decision-makers.

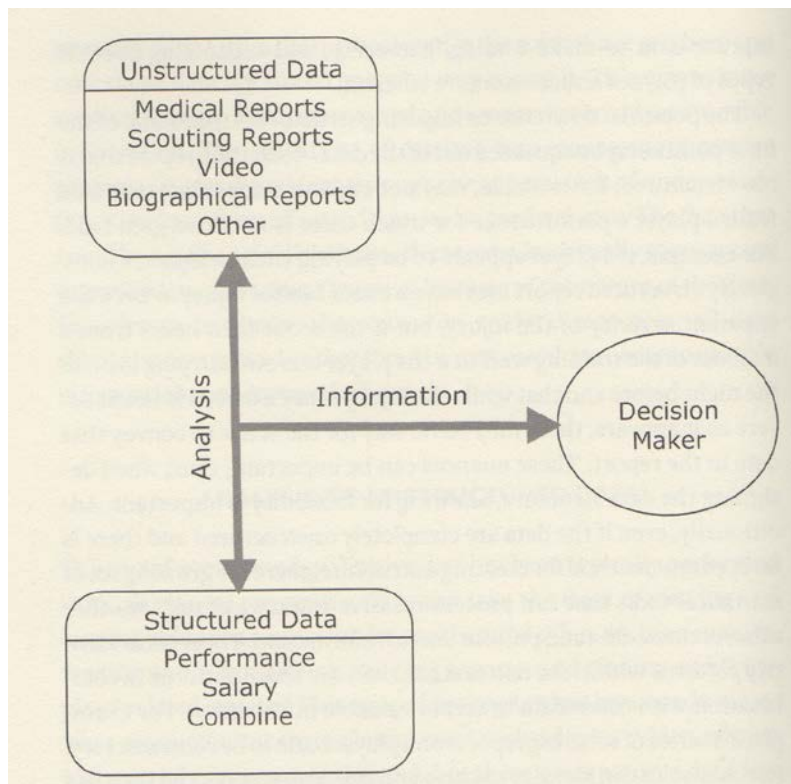


Figure 3: Data Integration⁶⁶

Different types of analysis of the various data types within the organization inform one another, presenting one rich set of information to the decision-maker.

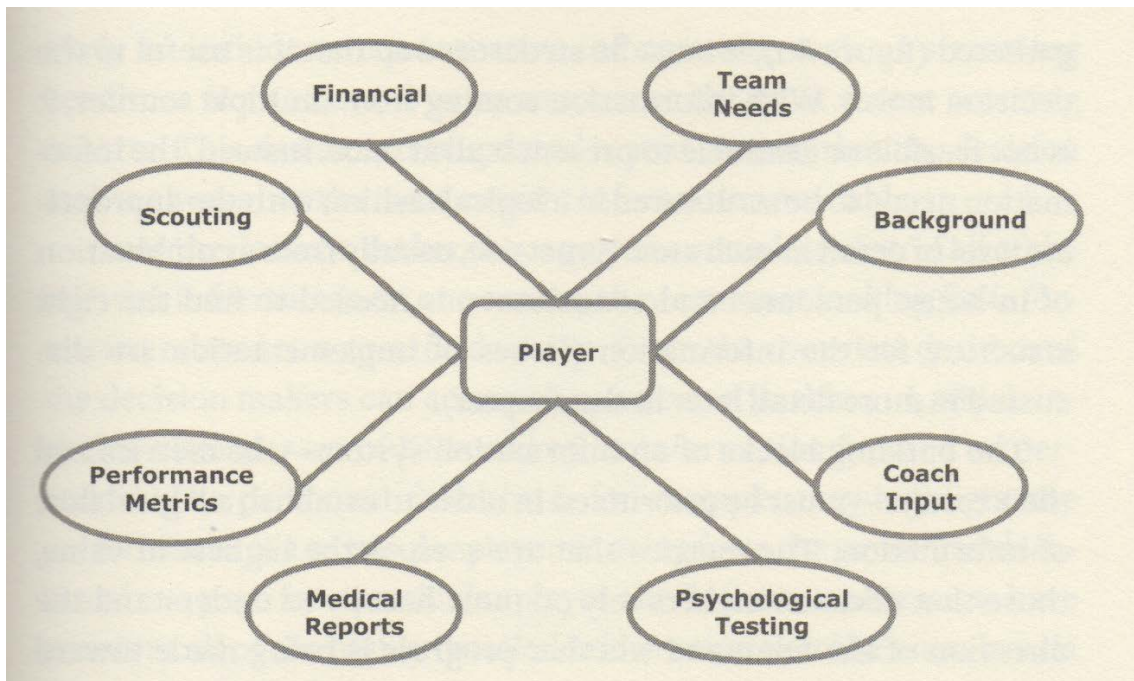
⁶⁴ Alamar, *Sports Analytics*, 36.

⁶⁵ *Ibid*, 36.

⁶⁶ Alamar, *Sports Analytics*, 42.

Integrating structured and unstructured data together is the first step in integrating analytics and traditional evaluation methods into a decision-making process. “The process of using all available information to dig deeper... and ask more questions actually produces even more information as the various types of information are combined and analyzed, further reducing the risk involved in the decision,” writes Alamar.⁶⁷

Sometimes the relevant information to be considered for a decision is obvious. Other information is not as clearly important, and identifying these pieces of information is vital to making effective decisions. In the context of player evaluation, all available information comes from a wide variety of sources, as seen in Figure 4.



⁶⁷ Alamar, *Sports Analytics*, 52.

Figure 4: Player-Related Information⁶⁸

Relevant player-related information includes structured and unstructured data in the areas of: financials, team needs, background, coach's input, psychological testing, medical reports, performance metrics, and scouting.

Some of the player-related information, particularly performance metrics and team needs, can be provided by analytics. Unfortunately, “the integration of new analytic tools and metrics into the decision-making process demands more than just including the new metrics in standard reports,” writes Alamar.⁶⁹ In order to successfully implement analytics into an organization's decision-making process, analysts need to think like innovators and develop new, creative ways to present information to decision-makers in an easily understandable way.

Organizational Structure

Another important consideration for teams implementing analytics is the organizational structure of the basketball operations front office. According to Alamar, “Once a team has decided to introduce analytics into its decision-making processes, the challenge is to determine how analytics will fit in an already established organizational structure.”⁷⁰ In **SPORTS ANALYTICS**, Alamar discusses three structural possibilities for a team's analytics personnel: “centralized,” “decentralized,” and “hybrid.”⁷¹ A centralized structure is the default structure for organizations beginning to implement their analytics program, where all analytics personnel are grouped together in a single group within the front office. The advantages of a centralized structure are that analysts

⁶⁸ Alamar, *Sports Analytics*, 83.

⁶⁹ *Ibid.*, 91.

⁷⁰ Alamar, *Sports Analytics*, 22.

⁷¹ *Ibid.*

can work on different projects, which promotes standardized metrics and sharing of expertise among analysts. The disadvantages are that it is more difficult for analytics personnel to increase their basketball knowledge, and nonanalytic personnel may lose trust in analytics if the analytics group is isolated from the rest of the front office.⁷²

On the other hand, a decentralized structure is where analytics personnel are added to existing groups in the front office, including the coaching staff, scouts, and salary cap personnel. In this structure, analytics personnel are embedded into each team function, allowing analysts to increase their basketball knowledge and understanding of traditional evaluation methods. The disadvantage of a decentralized analytics structure is that analysts have less interaction with each other, which may reduce the sharing of knowledge and information.⁷³

Lastly, there is a hybrid analytics structure, which combines the centralized and decentralized analytics approaches to realize the benefits of both structures. In the hybrid structure, analytics personnel work in a single department, but rotate through other functions of the team to work on projects with the coaching staff, scouts, and player-personnel staff (General Manager and staff). In this structure, analysts are exposed to the entire organization, but can still collaborate with each other on technical analytics projects.⁷⁴ As Alamar explains, “The ultimate model for the analytic program will depend greatly on the resources a team is willing to invest in analytics as well as the willingness of nonanalytic personnel to engage with the tools of analytics.”⁷⁵

⁷² Alamar, *Sports Analytics*, 117.

⁷³ *Ibid*, 22.

⁷⁴ *Ibid*, 123.

⁷⁵ *Ibid*, 22.

NBA Analytics Case Studies

In a February 2015 ESPN article, Kevin Pelton investigated the use of analytics by all 30 NBA teams, and classified each team into the categories: “All-In,” “Believers,” “One Foot In,” “Skeptics,” and “Nonbelievers.”⁷⁶ It is evident from this article that all 30 teams are using analytics differently, and there is not a uniform approach to decision-making in the league. “No two teams will use analytics in exactly the same manner,” explains Ben Alamar. “Different levels of investment, long-term strategies, and appetites for analytics will shape how teams implement and develop their analytics programs.”⁷⁷ The teams that are apparently “All-In” on analytics are the Houston Rockets, the Dallas Mavericks, the San Antonio Spurs, and the Philadelphia 76ers. What follows are brief case studies of these four teams, as well as the Toronto Raptors (who are “One Foot In” with analytics), to show how NBA teams have specifically integrated analytics into their operations.

Houston Rockets

The Houston Rockets were the first NBA team to fully commit to using analytics as a primary tool in all decision-making, thanks to their General Manager Daryl Morey, who is widely regarded as the NBA’s leading proponent of analytics.⁷⁸ **MONEYBALL** author Michael Lewis published a popular New York Times article in 2008 that depicted Morey as the NBA’s Billy Beane, and brought the NBA analytics revolution into the public conversation, exploring the advantages of advanced statistics

⁷⁶ Pelton, “Advanced Stats Are Changing the Game and Leaving Some Big Markets Behind.”

⁷⁷ Alamar, *Sports Analytics*, 4.

⁷⁸ Pelton, “Advanced Stats Are Changing the Game and Leaving Some Big Markets Behind.”

over box score statistics.⁷⁹ Morey was eventually able to acquire superstars James Harden and Dwight Howard and rebuild the Rockets by using the unpredictability of the NBA to his advantage.⁸⁰ The 2013-14 Rockets were a team that made sense on paper from an analytical approach—an elite post player, efficient three point shooting, and the player who attempted and made the second most free throws in the league. The rest of the roster consisted of players who would play at a fast-pace, shoot three-pointers, and avoid midrange jump shots. Figure 5 indicates the Rockets’ emphasis on three-pointers over midrange shots.

⁷⁹ Lewis, Michael. "The No-Stats All-Star." *The New York Times*.

⁸⁰ Shea and Baker, *Basketball Analytics*, 112-114.

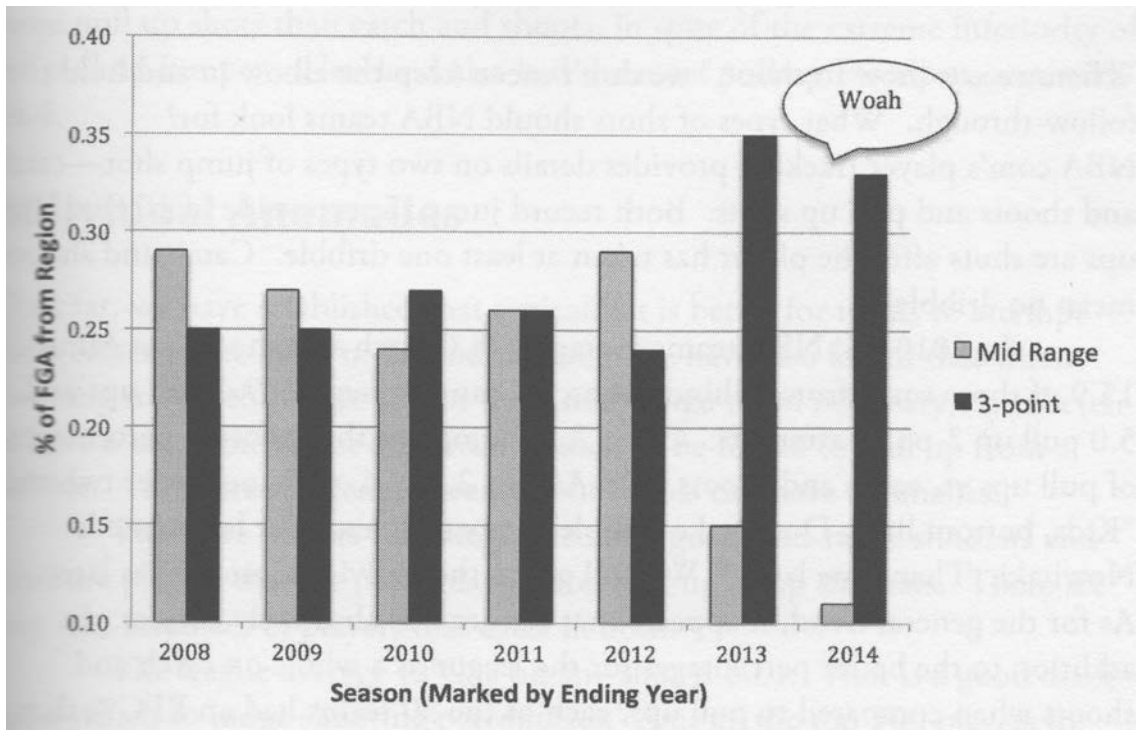


Figure 5: Houston Rockets Midrange and 3-Point Jump Shot Frequencies⁸¹

Percentages of field goal attempts from both the midrange and three-point line show that the Houston Rockets have begun to shoot dramatically more three-pointers and fewer midrange jump shots over time, beginning in the 2012-2013 season.

The 2013-14 Rockets attempted only 11% of their field goals from the midrange, compared to 18%, which was the second lowest percentage of any team in the league. As a result of their shot distribution in favor of three-pointers, free throws, and shots at the rim, instead of midrange jump shots, the Rockets averaged 1.09 points per possession, which was tied for the most in the NBA during the 2013-14 season.⁸²

However, despite embracing analytics, the Rockets have only advanced past the first round of the Western Conference playoffs once (in 2015) since Morey took over as General Manager. NBA writers and analysts have suggested that the Rockets have not addressed some of the fundamental “eye test” issues that are necessary to be successful.

⁸¹ Shea, *Basketball Analytics: Spatial Tracking*, 47.

⁸² Ibid.

The team was upset in the first round of the 2014 Western Conference playoffs, and has been criticized for having poor chemistry and two superstar players with poor leadership skills. In an online article during the 2014 playoffs, Bill Simmons asked, “Can you really throw out chemistry and assume math will carry you for four rounds?”⁸³ Furthermore, author T.D. Williams disputed Morey’s image as a revolutionary, and criticized Michael Lewis’ New York Times article as “an interesting, highbrow piece that struck a nerve among both sports enthusiasts and educated casual fans alike.” Williams continued, “We are collectively less interested in proof of Morey’s advanced thinking than in maintaining our belief that he has, in fact, subverted the old guard.”⁸⁴ The Houston Rockets are a fascinating case study of the interaction between advanced analytics and the “eye test,” and critics will likely continue to question Daryl Morey until his Rockets win an NBA championship.

Dallas Mavericks

The Dallas Mavericks were revolutionary in integrating analytics with traditional evaluation by promoting Director of Basketball Analytics Roland Beech to be the NBA’s first “stats coach,” where he travels with the team, participates in practices, and sits on the bench for games. According to Ben Alamar:

“This structure allows Roland to significantly increase his basketball knowledge and see how coaches use the analysis that he provides. Additionally, since they work with him on a daily basis, the coaches have more trust in the analyses that he produces than they would if they simply found them in their email each day.”⁸⁵

⁸³ Simmons, “Simmons on the Road: It’s All on LeBron.”

⁸⁴ Williams, T.D. “The Man Who Sold The World.” *Medium*. 15 July 2015. Web.

⁸⁵ Alamar, *Sports Analytics*, 123.

Beech discovered lineup data during the 2011 NBA Finals that indicated that the team was better off with J.J. Barea in the starting lineup, instead of in his sixth-man role.⁸⁶ This turned out to be a key adjustment that helped the Dallas Mavericks beat the Miami Heat for an NBA championship. In addition, Beech assisted with play calls, game planning, and in-season adjustments. The Mavericks owner, Mark Cuban, credited Head Coach Rick Carlisle for “putting Roland on the bench and interfacing with him, and making sure we understood exactly what was going on—knowing what lineups work, what the issues were in terms of play calls and training.”⁸⁷ Beech combines analytics and traditional basketball insights into his role, and serves as the Vice President of Basketball Strategy for the Dallas Mavericks in 2015.

San Antonio Spurs

The San Antonio Spurs have one of the largest analytics infrastructures in the NBA. The organization was one of the six original subscribers to the SportVU cameras, and this data has optimized Gregg Popovich's emphasis on resting aging stars for deep playoff runs. In his 2015 investigative article, Kevin Pelton thoroughly explained how the Spurs used analytics during their run of five championships in 16 seasons:

“Quietly, the Spurs have been leaders in applying and integrating analytics for years. The Spurs' famously fluid style of play comes in large part from the wisdom provided by the numbers. The Spurs get into their offense quickly and relentlessly seek out open shots from the three-point line and at the basket. No team has attempted more corner threes than the Spurs over the past decade.”⁸⁸

⁸⁶ Hollinger, John. "Carlisle Pushed All of the Right Buttons." *ESPN*. ESPN Internet Ventures, 13 June 2011. Web.

⁸⁷ *Ibid.*

⁸⁸ Pelton, “Advanced Stats Are Changing the Game and Leaving Some Big Markets Behind.”

Analytics have also changed the way the Spurs play defense. Specifically, the team improved their Defensive Rating by focusing on contesting shots and forcing turnovers at the expense of more fouls and fewer defensive rebounds.⁸⁹ Under Head Coach Gregg Popovich the Spurs have also excelled at limiting opponents' three-pointers and shots at the rim, forcing opponents to shoot inefficient midrange jump shots.

In regards to the **MONEYBALL** conflict between the old-school "eye test" and new-wave analytics, Bill Simmons wrote, "Ideally, you should blend both worlds into one larger vision."⁹⁰ According to Simmons, "This is why San Antonio keeps thriving. The Spurs value the new-wave thinking, while also putting significant stock in personalities and chemistry."⁹¹ Tim Duncan, Tony Parker, and Manu Ginobili played on the same team from the 2002-03 season through the 2014-15 season, and won four NBA championships together. "If you can keep together a group that has talent and work ethic, you can get better," explains Zach Lowe. "The Spurs are obviously the paragon."⁹² For teams with a culture and history like the San Antonio Spurs, it is possible to build continuity and chemistry, resulting in a long-term winning tradition.

Philadelphia 76ers

On the other end of the spectrum from the San Antonio Spurs are the Philadelphia 76ers, which were at the bottom of the NBA standings during the 2011-12, 2012-13, and 2013-14 regular seasons. The Philadelphia 76ers went all-in on analytics in 2013, when they hired new General Manager and President of Basketball Operations

⁸⁹ Schuhmann, John. "These Spurs Aren't The Same." *Hang Time Blog with Sekou Smith*. NBA.com, 22 Mar. 2013. Web.

⁹⁰ Simmons, "Simmons on the Road: It's All on LeBron."

⁹¹ Ibid.

⁹² Lowe, Zach. "NBA Windows: The Rockets' Missing Third Superstar and the NBA's Continuity Problem." *Grantland*. ESPN, 30 Sept. 2014. Web.

Sam Hinkie, who was previously the second-in-command to Daryl Morey with the Houston Rockets. According to Kevin Pelton, “In some ways, the 76ers are closer than the Rockets to a pure experiment in team-building driven by analytics.”⁹³

As reported by the Washington Post, Hinkie now plans to rebuild the 76ers from the ground up, “aided by formulas, statistical models and data-centric philosophies that will reduce risk and lead to smarter decisions.”⁹⁴ For example, Hinkie uses analytics to value assets and stockpile future draft picks. It has been difficult to see the influence of analytics on the court this early in the rebuilding process, however, the 76ers have played at a fast pace and shot a high proportion of their shot attempts at the rim under Head Coach Brett Brown, who was a former assistant coach for the San Antonio Spurs. The success of the Philadelphia 76ers’ use of analytics will only be determined when the rebuilding process is complete in the future.

Toronto Raptors

One of the few teams that have been transparent in their specific uses of SportVU data is the Toronto Raptors. In an exclusive Grantland article from the 2012-13 season, the Raptors’ analytics staff detailed a sophisticated system they developed to measure how Raptors players moved on defense in relation to the optimal responses the coaches believed they should have had.⁹⁵ Essentially the team uses SportVU tracking data to create visuals that show where each player moved on each defensive possession, and then overlays images of programmed “ghost defenders” to show how each player

⁹³ Pelton, “Advanced Stats Are Changing the Game and Leaving Some Big Markets Behind.”

⁹⁴ Maese, “NBA embraces advanced analytics as Moneyball movement sweeps pro basketball.”

⁹⁵ Lowe, Zach. “Lights, Cameras, Revolution.” *Grantland*. ESPN, 19 Mar. 2013. Web.

should have moved in the optimal way. This is an example of an innovative analytics strategy that one NBA team is using for evaluation and decision-making.

The article's author, Zach Lowe, explained how SportVU data integrate advanced analytics and traditional evaluation methods:

“SportVU data do something most smart NBA people have been doing for a long time: combine video (the “eye test”) with advanced statistics. Understanding sports has never been about one or the other; it’s about both, and the cameras represent the most advanced actualization of that marriage.”⁹⁶

The Toronto Raptors are a useful case study of the successful interaction between advanced analytics and traditional evaluation methods, where new quantitative data can be paired with coaching and watching film. The Toronto Raptors coaches actually helped the analytics team build the “ghost system,” and the analytics staff sends the coaching staff regular “ghost system” reports to share with the team and use for player development and game planning. Based on descriptive SportVU data, the Toronto Raptors’ coaching staff can show their players how they moved on defense, and then coach them about where they should have been instead (see Figure 6).

⁹⁶ Lowe, “Lights, Cameras, Revolution.”

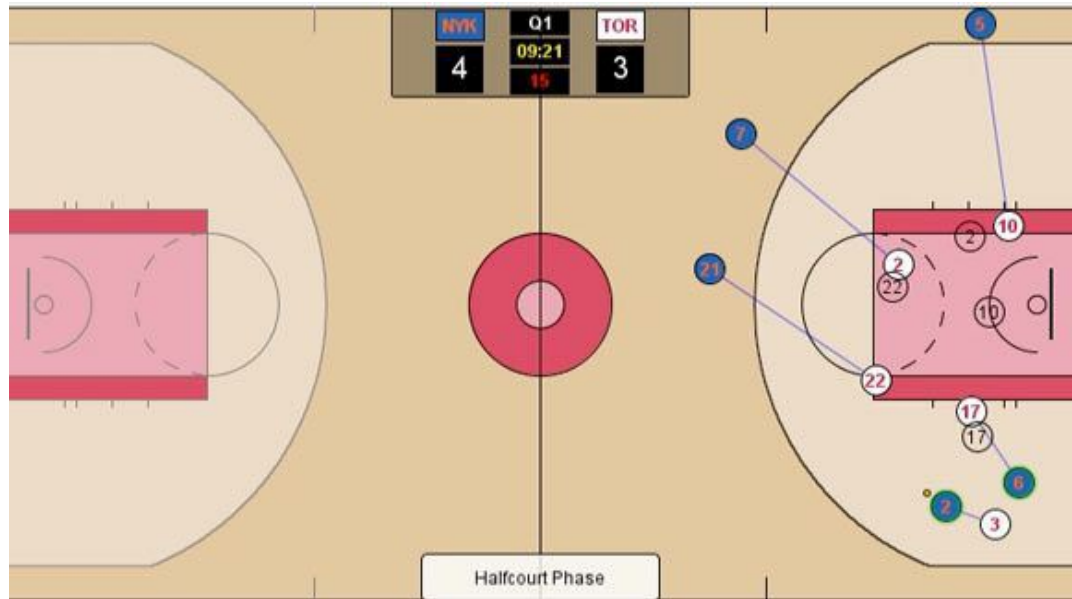


Figure 6: Toronto Raptors “Ghost System”⁹⁷

Example of visuals used by Toronto Raptors to show how the real players moved in comparison to the ideal movements of “ghost defenders.” White circles represent the real players, while the empty circles are “ghost” players.

Nonbelievers and Holdouts

Analytics is undoubtedly a growing aspect of the NBA, but there are still plenty of old school traditional coaches and executives who do not buy in to the value of analytics. For example, Kevin Pelton reported that the Brooklyn Nets, the Los Angeles Lakers, and the New York Knicks were “Nonbelievers” in analytics in 2015. Phil Jackson, President of the Knicks, won the most championships and fifth-most total games in NBA history as a head coach, but Jackson has been a conscientious objector to analytics, according to Pelton.⁹⁸ In an interview with the New York Times, Jackson questioned the staying power of analytics-based offensive trends such as fast pace, floor

⁹⁷ Lowe, Zach. “Lights, Cameras, Revolution.” *Grantland*. ESPN, 19 Mar. 2013. Web.

⁹⁸ Pelton, “Advanced Stats Are Changing the Game and Leaving Some Big Markets Behind.”

spacing, and three-point shooting.⁹⁹ Former NBA head coach Doug Collins once told the Philadelphia Inquirer, “I would blow my brains out if I had to rely on analytics.”¹⁰⁰ Instead, Collins explained that his methodology relied on his understanding of basketball and his “gut instinct.”

Former NBA players have been especially vocal in dismissing the validity of using analytics for decision-making in the NBA. For example, Hall of Famer and TNT analyst Reggie Miller has said that breaking down numbers can never trump the value of actually watching a game. “I’ve never been huge on analytics or statistics,” Miller said. “I was a big proponent of watching a lot of film and watching my opponent... and really based my assessment off that... to me, there is nothing like the eye test.”¹⁰¹ On a 2014 episode of the NBA TV show, “Open Court,” a panel of former NBA players, including Miller, Charles Barkley, Kenny Smith, Chris Webber, Chauncey Billups, and Isiah Thomas, decried the use of analytics in the league. Thomas was quoted:

“Us as players, who have gone to ‘basketball school’ ... have really been educated in the game of basketball... Now we have a group of individuals who have come into our game, who haven’t gone to the ‘basketball schools’ that we’ve gone to – the coaching, the training, the playing, the hours of film, institutional knowledge. Really they’re not taking the emotion out of the decision, they’re taking the intelligence out of the decision. We can all manipulate the stat sheet at any point in time.”¹⁰²

Furthermore, TNT analyst and former NBA superstar Charles Barkley went on a rant about analytics and Daryl Morey during a 2015 television broadcast of a Houston

⁹⁹ Araton, Harvey. “A Plan Is Slow to Take Shape.” *The New York Times*. The New York Times, 03 Feb. 2015. Web.

¹⁰⁰ Maese, “NBA embraces advanced analytics as Moneyball movement sweeps pro basketball.”

¹⁰¹ Ibid.

¹⁰² “The Game Is Changing.” *Open Court*. NBA TV. 14 Oct. 2015. Television.

Rockets game. “Daryl Morey is one of those idiots who believes in analytics.” Barkley argued. “They say that same crap in baseball, and they put these little lightweight teams together and they never win. It's the same thing in the NBA.”¹⁰³ Barkley claimed that the Houston Rockets were a poor defensive team, despite having the seventh highest “Defensive Rating” in the league at the time. Good stats did not necessarily mean good defense he contested. In addition, Barkley questioned what insightful analytics Daryl Morey could have used to acquire superstars James Harden and Dwight Howard. “The NBA is about talent,” Barkley continued. “All these guys who run these organizations who talk about analytics, they have one thing in common—they're a bunch of guys who have never played the game, and they never got the girls in high school.”¹⁰⁴

Barkley’s quotes illustrate the conflict between advanced analytics and traditional evaluation that has been presented in the media. However, most former players who have publicly criticized analytics fundamentally misunderstand the context and uses of analytics, and talk vaguely about their applications. This thesis will investigate whether there is actually tension between advanced analytics and traditional evaluation in NBA front office operations, or if the conflict only exists in the media. Although Barkley’s comments are fundamentally incorrect, there are some legitimate limitations of using advanced analytics for decision-making that should be noted.

¹⁰³ “Barkley Rips GM, Use of Stats.” *ESPN*. ESPN Internet Ventures, 11 Feb. 2015. Web.

¹⁰⁴ *Ibid.*

Flaws in Current Processes

There are flaws in every decision-making process that come from the inherent limitations of both analytics and traditional evaluation methods. Another challenge in decision-making is the reality that key decision-makers have the most power and influence in an organization, and have the ultimate say in every decision. It is possible for a key decision-maker to use their authority to make a decision before consulting with all basketball operations personnel. On the other hand, leadership that employs rigorous decision-making processes and balances all available information in a manner consistent with the organization's strategic plan will help minimize the limitations of analytics and traditional evaluation. What follows is an analysis of these limitations. This topic will be further explored in "Chapter 4: Results" and "Chapter 5: Discussion."

Limitations of Analytics

Despite the distinct advantages of using analytics for evaluation and decision-making in the NBA, there are still limitations. Statistics can be misleading, and numbers can be manipulated or misinterpreted to prove something entirely different than what they truly indicate. "If you torture a number badly enough it will tell you anything," John Hollinger explained at the 2012 Sloan Sports Analytics Conference. "You can find a number to support any point of view if you work hard enough."¹⁰⁵ It is important for the sample size to be large enough to be reliable otherwise statistics can lead to incorrect conclusions. There is so much information available with analytics that it is difficult to determine what is important, and then communicate it in an efficient

¹⁰⁵ "SSAC12: Basketball Analytics." *YouTube*.

manner. In addition, statistics are not presented with any context, so effective analysis of the data will determine how successful the use of analytics is.

Furthermore, one of the greatest limitations of analytics is in quantifying the human elements of basketball, such as chemistry, continuity, and teamwork. These elements are critical to success in basketball, and have historically not been evaluated quantitatively. Boston Celtics Head Coach Brad Stevens, who has been labeled as an analytically minded coach, argued, “I really believe the human element is so critical in winning. Mental toughness of a team, desire of a team, willingness to give for a team... you can’t put your finger on it.”¹⁰⁶ Dean Oliver echoes this sentiment in **BASKETBALL ON PAPER**, writing, “Teamwork is the element of basketball most difficult to capture in any quantitative sense.”¹⁰⁷

Limitations of Traditional Methods

“Live scouting’s first weakness is subjectivity,” according to Shea and Baker.¹⁰⁸ For the certain human elements of basketball that cannot be evaluated objectively, traditional evaluation methods may reach different conclusions and judgments about the same issues. There is no way to ever know if a subjective observation about a basketball player is entirely correct. Some scouts and coaches may also have biases in the aesthetics of a player. It is possible that a player has an unconventional looking shot, for example, but it still may be effective. According to the “eye test,” there are some fundamentally held beliefs about historical norms that may lead to unfair biases. Another potential problem with on-site live scouting is its inefficiency. It is impossible

¹⁰⁶ “SSAC14: Basketball Analytics.” *YouTube*.

¹⁰⁷ Oliver, *Basketball on Paper*, 77.

¹⁰⁸ Shea and Baker, *Basketball Analytics*, 2.

for a team to scout and evaluate everything subjectively, given limited time and manpower. As a result, basketball may have some objective truths that are better captured by numbers than by observations.

In a session at the 2015 MIT Sloan Sports Analytics Conference, Kyle Dubas, Assistant General Manager of the National Hockey League's Toronto Maple Leafs, elaborated on the limitations of traditional methods of evaluation, and explained how sports analytics have limited the impact of cognitive bias on personnel decisions in general.¹⁰⁹ Dubas began with the disclaimers that decision-making is “still an eyeballs business” and “analytics is more a teacher than a builder.” Although it cannot be the foundation of decision-making, analytics can be used to defeat cognitive biases in traditional evaluation.

First, the “recency bias” occurs in traditional evaluation, where decision-makers put too much emphasis on the most recent data instead of historical data. For example, decision-makers may know in their mind what their evaluation of a player is, but if that player has a good run in training camp, it may be tempting to add them to the roster instead of a player who has proven himself over the years. Next, the “simplicity bias” occurs in a scouting room when there is bias towards players who “keep it simple.” According to Dubas, veteran scouts may say, “He keeps it simple—you can count on him at the end when the game is on the line.” When in doubt, scouts automatically fall back on something that is simple to explain. Big, athletic players stick in scouts' minds because they stand out, but are they always effective? Last, the “confirmation bias” is the tendency for scouts to watch a player in a biased way that confirms the scout's own

¹⁰⁹ Dubas, Kyle. "SSAC15: CA - How Analytics Has Limited the Impact of Cognitive Bias on Personnel Decisions." YouTube. 42analytics, 10 Mar. 2015. Web.

preconceptions about a player. Analytics can help reduce the subjectivity and biases of traditional evaluation.

Human Intangibles

“Basketball is a great mystery,” Phil Jackson writes in his book, **ELEVEN**

RINGS: THE SOUL OF SUCCESS. Jackson continues:

“You can do everything right. You can have the perfect mix of talent and the best system... devise a foolproof strategy... and prepare your players for every possible eventuality. But if the players don’t have a sense of oneness as a group, your efforts won’t pay off. And the bond that unites a team can be so fragile, so elusive.”¹¹⁰

The “oneness” or “bond” that Jackson references relates to the theory that a team’s “chemistry,” and the relationships among teammates, can improve a team’s performance, or cause a team to underperform. Chemistry is one regularly discussed, but historically unquantifiable attribute of basketball.

In addition, there are other aspects of basketball that are important to decision-making, but have historically been unquantifiable. In the area of player evaluation, these attributes are often referred to as the player’s intangibles and come in a variety of forms in a non-quantitative scouting report. For example, descriptions such as “makes his teammates better,” “great leader,” “hustles on every play,” “coachable.”¹¹¹ Similarly, San Antonio Spurs General Manager, R.C. Buford, claimed at the 2015 Sloan Sports Analytics Conference that values were his organization’s first filter in player evaluation.

“If they aren’t going to live within the culture of our group, led by our best players, it

¹¹⁰ Jackson, Phil, and Hugh Delehanty. *Eleven Rings: The Soul of Success*. New York: Penguin, 2013. Print.

¹¹¹ Alamar, *Sports Analytics*, 47.

won't matter what the performance metrics look like.”¹¹² Coaches, scouts, and managers have used traditional methods to evaluate human intangibles for years, and these attributes are considered as pieces of information in decision-making. However, as Alamar explains in **SPORTS ANALYTICS**:

“Some questions ... never get asked ... These questions are usually not unquantifiable but just have not been previously quantified ... If decision-makers begin to ask the questions and probe on the meaning and effect of these attributes, the analyst can often devise methods to measure what was previously unmeasured—not immeasurable.”¹¹³

In recent years, NBA teams have begun using new, advanced methods to measure human traits that were previously measurable only with traditional evaluation methods. In a 2014 New York Times article, author Kevin Randall wrote:

“With the tenets of ‘Moneyball’ now employed in the front offices of every major sport, perhaps it was inevitable that professional teams would turn to emotion metrics and neuroscience tools to try to gain an edge in evaluating players.”¹¹⁴

Milwaukee Bucks Facial Coding

An example of a new method for evaluating human intangibles in the NBA is the Milwaukee Bucks hiring a facial coding expert, Dan Hill, to “read” the faces of college prospects and NBA players. Hill was hired for the 2014 NBA Draft, and was retained to analyze player emotions and team chemistry for the 2014-15 season. “We spend quite a bit of time evaluating the players as basketball players and analytically,” said David Morway, the Bucks’ Assistant General Manager. “But the difficult piece of the puzzle is the psychological side of it, and not only psychological, character and

¹¹² “SSAC15: The Future of the Game.” *YouTube*. 42analytics, 10 Mar. 2015. Web

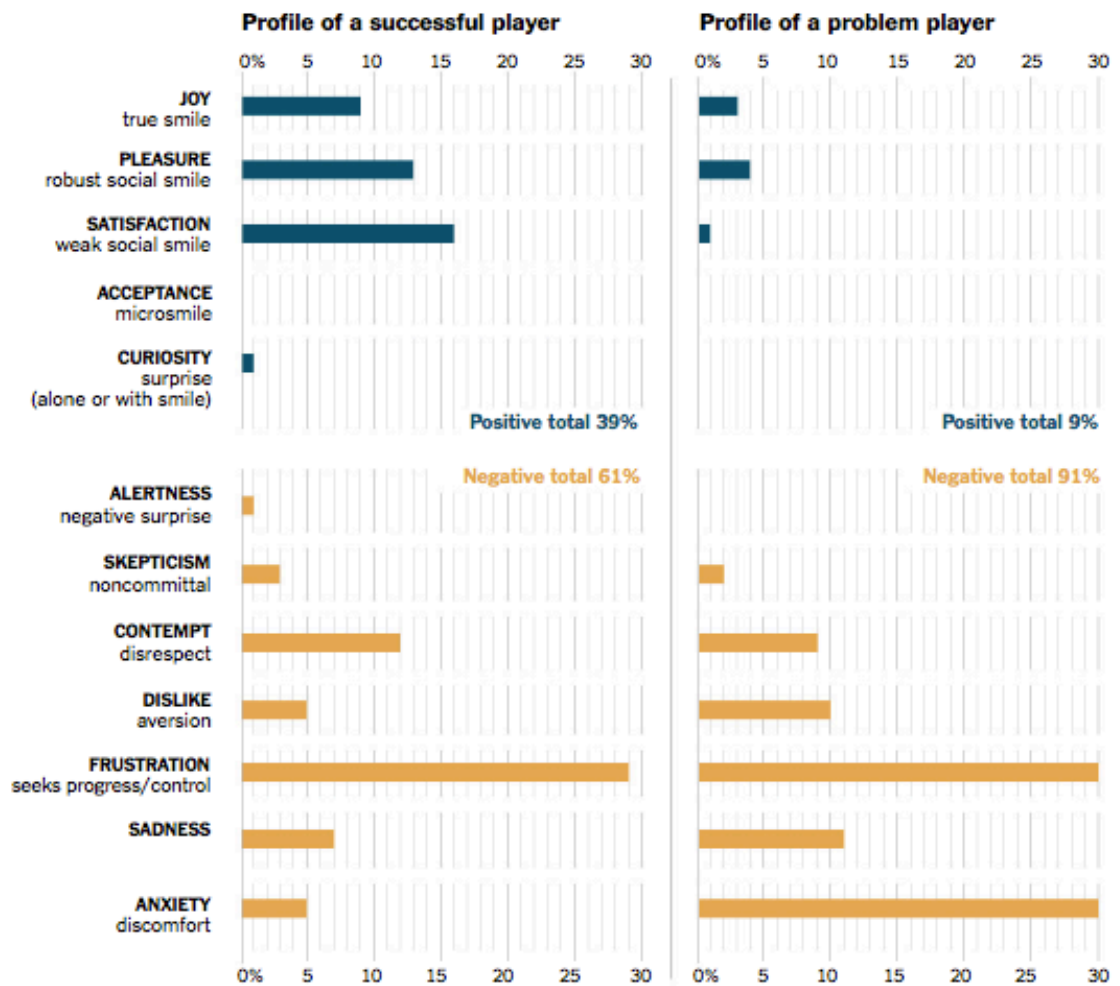
¹¹³ Alamar, *Sports Analytics*, 47.

¹¹⁴ Randall, Kevin. “Teams Turn to a Face Reader, Looking for That Winning Smile.” *The New York Times*. The New York Times, 25 Dec. 2014.

personality issues, but also team chemistry issues.”¹¹⁵ Hill contends that facial expressions display true emotions and can predict intentions, decisions and actions. Using a “Facial Action Coding System,” Hill can decipher which of the 43 muscles in the face are working at any moment to identify seven core emotions: happiness, surprise, contempt, disgust, sadness, anger and fear. These emotions can correlate with good or poor performance, both on and off the court. For example, “emotional resiliency, stability, and an immediate, assured presence” were all key considerations for the Bucks to select Jabari Parker with the second overall pick in the 2014 NBA Draft. Figures 7 and 8 show how Hill uses facial coding to analyze players’ emotions.

¹¹⁵ Randall, “Teams Turn to a Face Reader, Looking for That Winning Smile.”

Figure 7: Typical Emotions in a Successful Player and a Problem Player¹¹⁶



Positive Emotions: Joy, Pleasure, Satisfaction, Acceptance, and Curiosity are considered signs of happiness, fulfillment, and open-mindedness. These emotions generally point to a player who would make a good, upbeat teammate.

Negative Emotions: Alertness, Skepticism, Contempt, Dislike, Frustration, Sadness, and Anxiety. If a player’s profile is too heavily skewed toward negativity, it could mean locker room poison.

¹¹⁶ Randall, Kevin. “Teams Turn to a Face Reader, Looking for That Winning Smile.”

Figure 8: What Expressions Can Say About a Player¹¹⁷

Carmelo Anthony *Knicks*



Sadness and disgust, a signature emotion for Anthony, who often seems a bit distant in a situation like the one above.



An odd mixture of contempt and anxiety here seems to characterize Anthony this season: He is confident of his own abilities but doubtful of where the team is headed.

Stephen Curry *Golden State Warriors*



Typical of Curry is a combination of contempt and happiness: When those two emotions happen in tandem, the natural reading is that the person trusts in, and enjoys, his talents.



The will to win is evident in this combination of disgust, anger and a touch of fear. Wide-open eyes are notable in sharp athletes who are attentive to opportunities.

Carmelo Anthony Takeaway: Sadness as an emotion tends to slow you down, both physically and mentally, not a good thing in the flexible, give-and-take sport of basketball. Anthony comes across as despondent and resigned, with hardly any fight.

Stephen Curry Takeaway: Winning is fun, and Curry is enjoying the success. But he's not merely accepting it; he's pushing further. Determination, attentiveness, and the fear of going soft are evident in his intense emoting.

¹¹⁷ Randall, Kevin. "Teams Turn to a Face Reader, Looking for That Winning Smile."

Inevitably, there are many skeptics about the effectiveness of facial coding in the NBA, and the practice is not widespread. “How well does this method actually work?” University of Pennsylvania neuroscientist Martha Farah asked. “It’s not easy to get good evidence, because a player’s performance and teamwork are complex outcomes... It’s hard to know whether this system works well, gives some marginal benefit, or does nothing at all.” The acceptance of facial coding may depend on the success of the Milwaukee Bucks in the coming years. This thesis will explore whether teams use advanced methods, such as facial coding, to quantify human intangibles in 2015.

CogSports’ “ATHLETT”

Decision-makers have historically used background checks and personality tests, such as the Myers-Briggs Type Indicator, to gather psychological information about a player. The Center for Cognitive Sports Performance (CogSports) takes this concept even further with the “ATHLETT,” a proprietary psychometric tool that quantitatively captures more than 30 key characteristics of an athlete, allowing coaches, players, and decision-makers to identify a player’s strengths or weaknesses.¹¹⁸ This provides a framework for considering a player’s likely performance in different roles, and identifies attributes with room for improvement. The Maine Leadership Institute and the Princeton University Department of Psychology originally developed the “ATHLETT” to quantify the intangibles of NAVY SEALS. The “ATHLETT” has since been adapted to sports contexts, as a pre-draft and pre-contract evaluation tool. In basketball, the “ATHLETT” has been used at the Portsmouth Invitational pre-draft tournament to

¹¹⁸ “The ATHLETT.” *The ATHLETT*. The Center for Cognitive Sports Performance. Web.

identify players that already have personality issues, or may develop issues in the future.¹¹⁹

“Most psychological profiles are designed to pick out outliers on the low-end, not detect extreme behavior patterns on the high end,” R.C. Buford claimed at the 2013 Sloan Sports Analytics Conference.¹²⁰ CogSports’ “ATHLETT,” on the other hand, can identify high performers in human intangibles, such as decisiveness, perseverance, aggressiveness, selflessness, self-confidence, and emotional control.¹²¹ The “ATHLETT” consists of an online assessment that takes about 30 minutes to complete and consists of 140 statements to be evaluated by the athlete. The results of the assessment are applied through an algorithm that assigns a score to 33 intangible attributes in the following seven groups: “Mental Toughness,” “Self Leadership,” “Coachability,” “Team Leadership,” “Team Building,” “Stress Index,” and “Trust Index.” According to CogSports Co-Founder Jordan Denning, “Athletes get debriefed on their results to the assessment and then we then put together a program for the player that they can use with their teams, as well as on their own, to improve cognitive performances.”¹²² This thesis will explore whether NBA teams use similar methods to CogSports’ “ATHLETT” to quantify human intangibles in 2015.

¹¹⁹ Denning, Jordan. Telephone interview. 24 Feb. 2015.

¹²⁰ “SSAC13: Basketball Analytics.” *YouTube*.

¹²¹ Denning, Jordan. Telephone interview.

¹²² Shinzawa, Fluto. “New Techniques Help NHL Teams Assess Players’ Intangibles.” *BostonGlobe.com*. The Boston Globe, 4 Jan. 2015. Web.

“Gut Instinct”

Portland Trail Blazers General Manager Neil Olshey explained the role of “gut instinct” in decision-making in an interview with ESPN NBA Insider Kevin Arnovitz:

“Everybody wants to quantify 100 percent of the decision-making matrix and you can't. We've got live scouting, we've got workouts, we've got tape, we've got psych, we've got intel, we've got background, we've got the interview, we've got analytics. We've got to look at that pie chart and assign a value to each of those things. At some point, once you've quantified as much as you can quantify, there's an intrinsic feel for players and the game of basketball that can only come from being around it for a certain period of time. Whether you played, coached, worked with players, scouted players, at some point you know there's just an ‘it’ factor.”¹²³

This quote illustrates that at some point there is an element of gut instinct required to evaluate players. Organizations attempt to shift the odds in their favor by investing in trained professionals to make decisions based on all available information, but there will always be an element of intrinsic gut instinct required for decision-making. At the 2015 Sloan Sports Analytics Conference, Scott Pioli, Assistant General Manager for the National Football League’s Atlanta Falcons stated, “‘Gut instinct’ is just the volume of experiences that we have—you aren’t just born with ‘gut instinct’—we develop it over time with our experiences in the game, having gone through the process.”¹²⁴ Although some level of “gut instinct” may be required for decision-making, it is not a random guess, and is developed over time through years of experience. A small part of a decision may be made based on an intangible “it factor” or “gut instinct,” but only after rigorously and systematically considering all available information from analytics and traditional evaluation methods.

¹²³ Golliver, Ben. “Arnovitz: Blazers GM Neil Olshey Talks Analytics.” *Blazer's Edge*. 05 Mar. 2013. Web.

¹²⁴ “SSAC15: The Future of the Game.” *YouTube*.

Importance of Leadership and a Strategic Plan

There is no best way to implement analytics into an organization's decision-making process. As can be seen from the case studies of multiple NBA teams, there are varying approaches, and there is no consensus about what is ideal. As Ben Alamar says in his book, **SPORTS ANALYTICS**, "All teams have different structures, resources, and strategic plans."¹²⁵ The San Antonio Spurs, for example, won the 2013-14 NBA Championship and have been at the forefront of the analytics revolution in the NBA. The Philadelphia 76ers, on the other hand, were the worst team in the NBA for three consecutive seasons from 2011 to 2014, but are still one of the teams most invested in analytics in 2015. "Decision-makers all have different long-term philosophies and strategies for building successful teams, and it is important that the analytic resources a team employs are established to support that strategy," Alamar explains.¹²⁶

In addition to data management, analytic models, and information systems, leadership is a critical component of analytics. "Strong leadership is needed to support the implementation of new analytics that are in line with a team's strategic goals," Alamar writes.¹²⁷ As an analytics program is built and developed over time, it is the responsibility of an organization's leadership to establish analytics as a standard best practice for decision-making. Competitive advantages from analytics can only be fully realized when analytics are fully integrated with traditional evaluation methods in the decision-making processes of an organization. Implementing analytics is a very difficult transition for most decision-makers, and requires fundamental changes in daily habits

¹²⁵ Alamar, *Sports Analytics*, 108.

¹²⁶ *Ibid*, 21.

¹²⁷ *Ibid*, 99.

and decision-making processes. This integration starts at the top, and can only happen if leaders “map analytic tools to the team’s strategic plan and cultivate the use of the analytic tools within team departments,” as Alamar explains.¹²⁸ This thesis will further examine the importance of leadership and an organization’s strategic plan in “Chapter 5: Discussion.”

Recap

The key takeaways from “Chapter 2: Literature Review” are as follows:

- Analytics were first used in the MLB in the 1990s, and appeared in the NBA in the early 2000s, based on the concepts of Dean Oliver.
- Houston Rockets General Manager Daryl Morey started an annual sports analytics conference in 2007 that includes a basketball analytics panel, where basketball operations personnel discuss emerging trends.
- Recent trends in NBA decision-making emphasize shooting more three-pointers, free throws, and shots at the rim. In 2015, two major sources of analytics are SportVU motion-tracking data and the Synergy program.
- There are three possible organizational structures for analytics in the NBA, and every organization has a unique approach to decision-making and the interaction of analytics and traditional evaluation methods.
- There are many skeptics of the value of analytics, and in reality, both analytics and traditional evaluation methods have various limitations.
- Human intangibles are an important consideration for decision-making, and organizations are using new scientific and psychological tools to quantify human intangibles, such as leadership and mental toughness.
- After using analytics and traditional evaluation methods to evaluate, there is an inherent element of “gut instinct” required to make a decision.
- There is no single ideal approach to decision-making, and the integration of analytics and traditional evaluation depends on the leadership of key-decision makers and their organization’s strategic plan.

¹²⁸ Alamar, *Sports Analytics*, 103.

Chapter 3: Research Design

This thesis project relies on original interview and survey research in order to describe the interaction between advanced analytics and traditional evaluation methods in the NBA, and to explore how organizations balance all available information in their decision-making processes. The researcher developed an interview and survey protocol that was administered both over the phone and online. This chapter is a comprehensive explanation of the research design, specifically the participants, the research instrument, the procedure, and the limitations of the research design.

Participants

The target population for this study consisted of all basketball operations personnel from all 30 NBA organizations. The primary decision-maker in a basketball operations front office is typically the General Manager or President of Basketball Operations. In addition, basketball operations rely on supporting personnel, such as an Assistant General Manager, scouts, analysts, and coaches. The sampling frame of this study consisted of 75 possible participants representing basketball operations from all 30 NBA teams. Other than direct knowledge of the decision-making processes in their teams, there were no specific participant traits of the population. This sampling frame was comprised of 70 males and 5 females, reflecting the disproportionate ratio of males to females that occupy relevant roles in the field. These subjects were identified using all 30 NBA teams' websites, and contacted using the Sports Business Journal Resource Guide, which is a resource that provides the generic email addresses for every team in professional sports. The researcher ensured that the sampling frame consisted of a

diverse range of basketball operations roles related to both analytics and traditional evaluation methods, with multiple potential participants from each of the 30 organizations.

To explore league-wide trends and to avoid the possibility of redundancy in responses, only one subject from each team was invited to participate in the study. It was assumed that each participant's response was representative of the decision-making processes in their organization. In reaching out to all 30 NBA teams, the researcher contacted 56 total subjects from the sampling frame of 75—seven teams did not respond to the research request, and eight teams declined to participate in the study, citing an organizational policy for academic research. Fifteen subjects participated in the study, which was a nonprobability convenience sample of subjects that either completed the survey online or responded to the researcher's request for a telephone interview. This sample of participants is representative of half of the 30 teams in the NBA, and included a wide-variety of basketball operations roles, such as: Assistant General Manager, Vice President of Basketball Strategy, Director of Strategic Planning, Director of Analytics, Basketball Operations Analyst, Assistant Coach, and Personnel Video Scout.

Instrument

In order to gather information from the participants, the researcher developed a research instrument in the form of an interview and survey protocol (see “Accompanying Material 1” on page 107). This interview and survey instrument was created using Qualtrics, the University of Oregon's “online survey software and insight platform.” The instrument consisted of 17 total questions, nine of which were

structured, and the other eight of which were unstructured. The nine structured questions were either multiple choice, “yes/no,” or formatted on a five-point Likert Scale with the options: “Strongly Disagree,” “Disagree,” “Neither Agree nor Disagree,” “Agree,” and “Strongly Agree.” The eight unstructured questions were open-ended, and allowed the participant to provide as much or as little detail as he pleased.

Two Options for Participation: Phone Interview or Online Survey

The research instrument was compatible for administration through two primary strategies, a structured telephone interview, or by completing the survey on the Internet. The researcher emailed 56 of the potential participants in the sampling frame to schedule phone interviews, and included the link to access the survey protocol online if the participant preferred. During phone interviews, the researcher would follow the survey protocol, asking the same questions and taking notes while the participant provided his answers. As a result, the depth and quality of responses did not vary considerably between phone interviews and online survey participation.

Informed Consent and Confidentiality: Identifiable or Non-Attributable?

The first page of the online survey featured an informed consent statement that appeared before any questions, explaining the purpose of the study, the time required, and the potential risks and benefits of the study. By clicking “NEXT,” the respondent provided consent to participate in the research. Similarly, the researcher read participants the informed consent statement before the phone interviews, and asked if they consented to participate in the study. The second question on the interview and survey protocol offered two options for confidentiality: identifiable or non-attributable.

The participant's identity was pertinent to their role and capacity with their team, but the researcher ensured aggregate, non-attributable reporting of the participant's responses if they preferred. Data from the interview and survey protocol was stored on the University of Oregon Qualtrics account that only the researcher could access. Of the 15 participants, 13 selected to have their responses remain non-attributable. Participants also had the option to skip any question they pleased by clicking "NEXT" and "Continue Without Answering" on the online survey, or by asking the researcher to move on to the next question during a phone interview. Several participants were unable to disclose information in certain areas during the phone interviews, and several participants chose to skip multiple questions on the online survey, citing organizational proprietary knowledge.

Procedure

The researcher developed the interview and survey protocol online using the University of Oregon Qualtrics program. The researcher then developed a research plan and applied to the University of Oregon Institutional Review Board (IRB) to conduct human subjects research. The researcher was granted exemption from IRB review on December 19th, 2014, given the minimal risk of the research. The researcher then identified potential participants in the study by exploring the websites of all 30 NBA teams and compiling a list of relevant basketball operations personnel from each team. NBAstuffer.com also had a list of NBA teams' basketball analytics professionals and

statistical consultants that helped guide the researcher's sampling frame of potential participants in the study.¹²⁹

Once this sampling frame of 75 participants was compiled, the researcher developed an email cover letter to reach out to potential participants (see "Accompanying Material 2" on page 111). In this cover letter, the researcher emphasized that the focus of the study was to better understand general concepts and trends about how NBA teams make decisions in 2015 using all available information. The researcher clarified confidentiality requirements and the option to have responses non-attributable if requested. Additionally, participant responses would not be shared with participants from other teams, but the researcher agreed to share the finished thesis project with each participant at the end of the project. Using Sports Business Journal Research Guide, the researcher acquired the generic email format for each of 30 NBA teams, and drafted emails to the sampling frame of 75 potential participants. Before sending out emails, the researcher piloted the interview and survey protocol on the phone with three subjects who shared similar backgrounds and areas of interests as the target population, including one former NBA player and current NCAA Division-I Assistant Coach.

The researcher began by sending out batches of 10 emails at a time to personnel from different teams to avoid redundancy in responses. Typically participants did not respond immediately, and the researcher would have to follow up to encourage participation. After three days, the researcher would send a follow-up email to check in and see if the subject was interested in participating in the study (see "Accompanying

¹²⁹ "NBA Teams That Have Analytics Department." *NBA Moneyball*. NBAstuffer.com, 29 Oct. 2015. Web.

Material 3” on page 112). Some subjects completed the online survey, others responded to the researcher’s email to either schedule a phone interview or decline the request to participate in the research, and others still did not respond. For subjects who did not respond after the second email, the researcher sent a final email to check one last time to see if the subject would be interested in participating in the study (see “Accompanying Material 4” on page 112). The researcher would send out another batch of 10 emails when contact had been made, or a third email had been sent to, all 10 of the previous possible participants.

The researcher also attended the 2015 MIT Sloan Sports Analytics Conference on February 27th and 28th in Boston, and met with potential participants to discuss scheduling a phone interview or participating in the study through the online survey. Eventually the researcher reached out to personnel from all 30 NBA teams, and 56 individuals in total. Of the 15 individuals who participated in the study, six participated through phone interviews, and nine participated through the online survey. Phone interviews typically lasted between 20 and 30 minutes, and online participants typically spent around 15 minutes responding to the survey.

Limitations

There is an inherent limitation in this research design from examining a league with a small number of teams, as compared to other industries with more than 30 companies. Another primary limitation of the research design is that not all 30 teams participated in the research. Half of the teams in the league participated, and it is assumed that this sample is representative of the entire league. In addition, the confidential and sensitive nature of the topic material is a natural limitation to the study.

Because secrecy of the unique uses of advanced analytics in decision-making is a source of competitive advantage in the NBA, participants protected proprietary knowledge and did not share any sensitive information that may jeopardize their competitive advantages.

The sample of participants was a nonprobability convenience sample, and would have been more reliable if it had been a simple random sample. Furthermore, only one representative from each team participated in the research. Each participant was assumed to be representative of their organization's decision-making process, but this is a limitation, because it is possible that the responses could have varied from one role in an organization to another. However, given the limitation of the number of teams participating in the study, the data could have been skewed if multiple participants were accepted from certain teams but not others. Lastly, it is possible that the responses were biased because more analytics personnel participated than traditional evaluators. The sample may have been more reliable if an equal number of participants occupied each possible basketball operations role.

Chapter 4: Results

What follows is an in-depth analysis of the results of each section of the interview and survey protocol, with each section beginning with the question posed to the participants. For structured Likert scale questions (five point scale, “Strongly Disagree” to “Strongly Agree”) and dichotomous “Yes/No” questions, tables are presented with descriptive statistics (mean and standard deviation) for how participants responded to each question. For unstructured, open-ended questions, themes that emerged from the responses to each question are presented in the subsequent subheadings. The implications of the results to the interview and survey protocol are explored in “Chapter 5: Discussion.”

Defining Advanced Analytics

Question 2 on the interview and survey protocol was, “*How would you define ‘advanced analytics’?*” Based on 14 very different responses to Question 2, it is clear that “advanced analytics” is, in fact, difficult to define, and there is no single definition. The following themes emerged from participant responses:

Models and Formulas

A common theme is that analytics are not traditional box score statistics, and instead elaborate on these statistics through models and formulas. There is still value in less complex information, but analytics involves statistical models and formulas. For example, participants used the phrases “mathematical models,” “statistical model,” and “model/regression/projection” to define analytics.

Not Necessarily “Advanced”

One participant asked in his response, “Does this mean we have basic analytics?” They continued, “Let’s not make it more than it is. It is just ‘analytics’.” This implies that in reality there is no such thing as “advanced analytics.” This is further evidenced by the responses, where only two participants used the word “advanced” in their definition of “analytics.” Another participant responded, “I don’t know if I would use the term Advanced with Analytics because at its core, Analytics are just a way to quantitatively evaluate something. Whether it is an advanced method or a simple method, analytics can be helpful.” In this thesis, the terms “advanced analytics” and “analytics” are used interchangeably.

Questions and Information- Not Data

One participant defined analytics as: “The process of leveraging raw data to create information that assists in the decision-making process of an organization.” Another definition was: “Using new, objective information to provide insight and analysis.” As can be seen, analytics is not the raw data itself, but the analysis and interpretation of the data. For example, four participants referred to SportVU data in their definition, but a common theme was that the raw data alone is not considered analytics. One participant responded, “Analytics isn’t about the numbers. Analytics is about understanding the right questions to ask.” Therefore, the questions asked and the analysis conducted to obtain actionable information is the process and product of “analytics.”

Importance of Analytics

Question 3 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: *“Analytics are important for evaluation and decision-making in your organization.”*

Of 14 responses, seven participants responded that they “strongly agree,” and seven participants responded that they “agree” (see Table 1).

Table 1: “Analytics are important for evaluation and decision-making in your organization”

#	Answer	Response	%
1	Strongly Disagree	0	0%
2	Disagree	0	0%
3	Neither Agree nor Disagree	0	0%
4	Agree	7	50%
5	Strongly Agree	7	50%
	Total	14	100%

Statistic	Value
Min Value	4
Max Value	5
Mean	4.50
Variance	0.27
Standard Deviation	0.52
Total Responses	14

Advantages of Analytics

Question 4 on the interview and survey protocol was, *“What do you think are some advantages of using analytics for evaluation and decision-making?”* The following themes emerged from 13 responses:

Objective- Avoids Bias

One of the primary themes of the participants' responses is that analytics are objective and can weed out decision-makers' cognitive biases. Specifically, analytics are impervious to groupthink and the availability bias, as described by one participant. Participants' responses consistently supported their belief that an analytics evaluation is more objective and less biased than traditional forms of evaluation.

"Sees" More- Large Sample Size

According to one participant, "Analytics sees everything. Scouts only see so much." Similarly, other responses were: "The stats see all the games" and "Analytics doesn't 'watch' any games, but it can 'see' all the games together." Furthermore, the use of analytics is based on data collected over time that results in large data sets and reliable sample sizes. These responses indicate that analytics are quick and efficient at investigating a particular topic, and can save decision-makers time watching games and collecting information.

Limitations of Analytics

Question 5 on the interview and survey protocol was, "*What do you think are some limitations of using analytics for evaluation and decision-making?*" Based on 13 responses, the following themes emerged:

Missing Context

One of the primary limitations of analytics is that, in the words of one participant, "there is no context behind the numbers." Statistics can be used to quantitatively describe a problem, but analytics do not necessarily diagnose the root of

the problem. In order to fully understand what is going on, basketball operations personnel need to fully understand the context behind the numbers, including coaching philosophies and personalities. However, analytics cannot explain this side of the story. According to one response, for example, if a player is playing hurt, playing with bad teammates, or going through a shooting slump, his statistics will be skewed down without explanation. For this reason, it is important to provide context to analytics using traditional evaluation methods. This can be seen in the response: “Analytics is only one piece of the decision-making process and it works most effectively when considered alongside other areas of importance, such as, medical, scouting, psychological and financial information.”

Poor Analysis- Incorrect Conclusions

One response illustrated another limitation of analytics: “Poor analysis of available data can lead to incorrect conclusions.” Specifically, using the wrong metrics, and drawing incorrect inferences from limited samples. One example from a participant’s response is that a decision-maker may look at his team’s statistics and infer that they are a strong offensive rebounding team. In reality, the team may be a poor three-point shooting team, which would result in more offensive rebounding opportunities that skewed the statistics. Decision-makers must carefully ask useful questions about the data and understand exactly what can be extrapolated from the analytics. Furthermore, one participant’s response suggested that there is the risk of “discarding a process too early because it might have led to a single bad outcome, when the process in general leads to positive expected value decisions.”

Difficulty Measuring Human Intangibles/Psychology

Analytics inherently has some limiting gaps in the information that can be gathered. One participant explained, “There are many things that aren’t or can’t be measurable in an objective manner, and basketball is a sport with many inter-player interactions, which are too difficult or cumbersome to properly account for.” Multiple responses indicated that analytics have difficulty measuring player intangibles and player psychology. “For instance, team chemistry is extremely difficult if not impossible to quantify using a number,” notes one participant.

Importance of Traditional Evaluation Methods

Question 6 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: “*The following ‘traditional evaluation methods’ are important for evaluation and decision-making in your organization: live scouting, watching film, workouts, and interview/background checks.*”

According to the results of the interview and survey protocol, all four traditional evaluation methods are important for evaluation and decision-making (see Table 2).

Table 2: “The following ‘traditional evaluation methods’ are important for evaluation and decision-making in your organization”

#	Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Total Responses	Mean
1	Live Scouting	0	0	0	1	13	14	4.93
2	Watching Film	0	0	0	2	12	14	4.86
3	Workouts	0	2	2	5	5	14	3.93
4	Interviews /Background Checks	0	0	0	5	9	14	4.64

Statistic	Live Scouting	Watching Film	Workouts	Interviews/Background Checks
Min Value	4	4	2	4
Max Value	5	5	5	5
Mean	4.93	4.86	3.93	4.64
Variance	0.07	0.13	1.15	0.25
Standard Deviation	0.27	0.36	1.07	0.50
Total Responses	14	14	14	14

Live Scouting

Out of 14 participants, 13 strongly agreed that live scouting was important for evaluation and decision-making in their organization. The other participant agreed that live scouting was important. There appears to be consensus that live scouting is important, and this result suggests that live scouting is the most important traditional evaluation method for organizations in the sample, slightly ahead of watching film.

Watching Film

Out of 14 participants, 12 strongly agreed that watching film was important for evaluation and decision-making in their organization. The other two participants agreed that watching film was important. Again, there is consensus that watching film is an important traditional evaluation method, and the results of the interview and survey protocol indicate that watching film is the second most important method, only barely behind live scouting (one more “Agree” for watching film in comparison to one more “Strongly Agree” for live scouting).

Workouts

Workouts are when a scout, coach, or other decision-maker, observes or facilitates a player performing various basketball drills (shooting, dribbling, passing, etc.), either individually or in a group. This was the traditional evaluation method with the least consensus about importance to evaluation and decision-making in the sample of 14 participants. Two participants disagreed that workouts were important, while two neither agreed nor disagreed. Workouts were the only traditional evaluation method where not every participant either agreed or strongly agreed about the method being important. Five participants agreed and five participants strongly agreed, in comparison to 14 and 13 either agreeing or strongly agreeing about live scouting and watching film, respectively. Although this result indicates that workouts are the least important traditional evaluation method in the organizations, 10 out of 14 participants still found workouts to be important for evaluation and decision-making.

Interviews/Background Checks

Out of 14 participants, nine strongly agreed and five agreed that interviews and background checks are important to evaluation and decision-making. Interviews and background checks are clearly important for evaluation and decision-making in organizations, but these traditional evaluation methods were the third most important in this sample, behind live scouting and watching film, and ahead of workouts.

Advantages of Traditional Evaluation Methods

Question 7 on the interview and survey protocol was, “*What do you think are some advantages of using ‘traditional evaluation methods’ for evaluation and decision-making?*” The following themes emerged from 11 responses:

Provide Context

There are more people involved in traditional evaluation methods, so there is a broad range of perspectives that may not be available through analytics. As one participant pointed out, “There’s a level of comfort there, since it’s been done for a while, and the people doing it are very skilled at what they do.” Live evaluation provides a more complete picture of what is happening in a basketball game, and can fill in gaps where analytics are not descriptive. One example from a response to the interview and survey protocol was evaluating a player’s defensive position while defending a specific type of play (“pin-down screen”). It is possible to describe analytically how well a defender guards a certain type of play, but live evaluation can provide context for what is happening.

Capture Intangibles

A repeated theme in six out of 11 responses is that there are many subtleties and nuances of a basketball game that traditional evaluation can capture. “There are so many other factors that go into a player's makeup than just his numbers, including, but not limited to, his character, his team, and his role on a team,” one participant explained. Examples of player intangibles that can be captured by traditional evaluation are: “body language,” “non-verbal communication style,” “effort,” “how a player handles adversity,” “how a player reacts after missing a shot or committing a foul,” “how his teammates view him,” and “how he takes hard coaching.” Interviews, in particular, are an effective tool to gather more information and evaluate a player’s character and makeup.

Evaluating Athleticism and Potential

According to one participant, “Scouts do a great job of projecting athleticism and future potential.” A specific example cited by another participant that scouts have a frame of reference for future prospects from having watched players like Kobe Bryant, LeBron James, and Tracy McGrady while they were in high school. Scouting athletic players at a young age and understanding what happened to their careers are a useful predictor of future success for athletic prospects that are widely considered to have outstanding potential.

Limitations of Traditional Evaluation Methods

Question 8 on the interview and survey protocol was, “*What do you think are some limitations of using ‘traditional evaluation methods’ for evaluation and decision-making?*” The following themes emerged from 11 responses:

Sample Size Issues

Multiple responses addressed the limitation that traditional evaluation can be based on small sample sizes. There is a limit to the amount of time scouts can dedicate to watching entire games in-person or on film. As a result, decision-makers may base their decisions on limited sample sizes that may not be representative of a player or team over the course of a longer period of time.

Subjective- Cognitive Biases

Another limitation of traditional evaluation methods is their subjectivity. Those who use traditional evaluation methods are inconsistent in their methodologies, and there is often no history of grading their abilities to make judgments, as one participant explained. Furthermore, “traditional methods tend to have more biases, simply because human beings tend to be more biased than analytical models.” One participant explained, “Scouts may have things they ‘want’ or ‘expect’ to see, which can influence their views and prevent them from making an objective decision.” This is an example of the confirmation bias. The same participant continued, “The human brain can only retain so much information, so when retrieving these memories, scouts may not recall correctly what actually happened.” This is an example of the recency bias. Another participant explained a different type of bias, the simplicity bias, where a scout “may be

overly influenced by the spectacular/awful play and not tied well to routine plays/efficiency overall.”

The Interaction Between Advanced Analytics and Traditional Evaluation

Question 1 on the interview and survey protocol asked the participants to respond to the following prompt: “*Please describe the interaction between advanced analytics and traditional evaluation methods in the NBA.*” The following themes emerged from 15 responses:

Varies from Organization to Organization

One theme from responses is that the interaction between analytics and traditional evaluation varies from organization to organization. Some organizations are extremely reliant on analytics and some hardly use analytics. In the words of one participant, “Some organizations are more adversarial than others.” Another participant explained, “Every team is going to do things in their own unique way, depending on how much that team values analytics.”

Collaborative and Complementary

Another primary theme from the participants’ responses is that analytics and traditional evaluation methods are complementary tools. In the words of one participant, “When used properly, they (analytics and traditional evaluation methods) complement each other nicely.” Another participant stated, “At this point, I think it’s mostly analytics identifying possibilities that hadn’t been explored by traditional evaluation methods, and then using those traditional methods to identify solutions.” For example, analytics may be able to identify that a team has struggled against a certain type of play,

and the coaching staff can take that information and figure out what the team needs to do differently. Similarly, another participant explained, “As opposed to giving answers, analysts can say, ‘we're seeing blank.’ Then the coaching staff can look and decide if it is relevant/important.” Lastly, analytics can bring attention to a player the scouts may have previously overlooked, which can improve the scout's future evaluation processes. In these ways, analytics complement traditional evaluation methods.

Analytics and traditional evaluation can also be collaborative when scouts and coaches provide feedback and assistance to analysts on their analytical projections. As one participant pointed out, “Scouts typically bring more basketball knowledge than the analyst and can point out flaws that can meaningfully improve an analyst's work.” The participant continued, “It can also provide serious added value to an analyst's model if they can incorporate scouting information, along with whatever objective information they may be using, to create that model.” These quotes illustrate how traditional evaluation methods complement analytics.

Support or Refute

A final theme from the results of Question 1 of the interview and survey protocol is that analytics and traditional evaluation methods can either support or refute each other. As one participant explained, “Analytics provides support or counter-evidence to thoughts generated by traditional scouting methods.” Another participant added, “A lot of times when things come together, you can confirm what you already know.” When analytics support what is already thought to be true by traditional evaluation methods, there is further evidence to support a decision. This is illustrated by one participant's response, “If all the different tools agree in their assessment of a

player, then the GM's job is easy.” This same participant continued, “If one of them (tools i.e., analytics and traditional evaluation methods) differs from the others, then we take a step back to examine what the outlier is seeing that the other tools aren't, or what it's missing that the other tools aren't.” Valuable insight can be gathered when analytics refute something that is thought to be true according to traditional evaluation methods. In this case, decision-makers have to further investigate the issue and make a decision.

Importance of Human Intangibles

Question 9 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: *“Human intangibles, such as emotional profiles, leadership, and teamwork, are important for player evaluation in your organization.”*

Of 14 responses, 10 participants responded that they “strongly agree,” and four participants responded that they “agree” (see Table 3).

Table 3: “Human intangibles are important for player evaluation in your organization”

#	Answer		Response	%
1	Strongly Disagree		0	0%
2	Disagree		0	0%
3	Neither Agree nor Disagree		0	0%
4	Agree		4	29%
5	Strongly Agree		10	71%
	Total		14	100%

Statistic	Value
Min Value	4
Max Value	5
Mean	4.71
Variance	0.22
Standard Deviation	0.47
Total Responses	14

Scientific or Psychological Methods to Evaluate Human Intangibles

Question 10 on the interview and survey protocol was the “Yes/No” structured question, “*Does your organization use scientific or psychological methods to evaluate human intangibles that have historically been unquantifiable? E.g.: Milwaukee Bucks Facial Coding, CogSports’ ‘ATHLETT.’*” Participants were asked to explain their responses.

Of 15 responses, 11 participants answered, “Yes,” and 4 participants answered “No” about whether their organization uses scientific or psychological methods to evaluate human intangibles (see Table 4).

Table 4: “Your organization uses scientific or psychological methods to evaluate human intangibles”

#	Answer	Response	%
1	No	4	27%
2	Yes	11	73%
	Total	15	100%

No

From the four “No” responses, one participant stated, “Psychology is involved but not to any significant degree, especially not quantified...yet.” Another participant explained:

“Interesting, but not trustworthy yet. What happens if you get false data? All the data is meaningless if it's not actionable. If one thing is off, you may be thinking you're getting great data, but it's not a large enough sample size. It's not really trustworthy until you can prove that it has worked over time.”

Yes

Of the 11 “Yes” responses, six chose to explain their answer. One participant explained, “Psychological tests are used to quantify human intangibles and psychology as much as possible—specific practices kept under wraps.” Another participant stated, “Many teams have hired sports psychologists to try and evaluate players, and many of those people use their own internal systems that may try to quantify in their own ways.” The rest of the responses, including the following, were vague and confirmed that approaches to quantifying human intangibles are proprietary knowledge and vary from team to team:

- “Sure, we make some efforts in this direction”
- “Multiaspect approach”
- “Psych test”
- “Each team has its own system in place, but always changing and adjusting”

“Gut Instinct”

Question 11 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: *“After using analytics and traditional methods to evaluate players, there is at some point an intrinsic element of gut instinct required for decision-making.”*

Of 14 responses, six participants responded that they “neither agree nor disagree,” seven responded that they “agree,” and one responded that they “strongly agree” (see Table 5).

Table 5: “There is an element of ‘gut instinct’ required for decision-making”

#	Answer	Response	%
1	Strongly Disagree	0	0%
2	Disagree	0	0%
3	Neither Agree nor Disagree	6	43%
4	Agree	7	50%
5	Strongly Agree	1	7%
Total		14	100%
Statistic		Value	
Min Value		3	
Max Value		5	
Mean		3.64	
Variance		0.40	
Standard Deviation		0.63	
Total Responses		14	


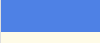
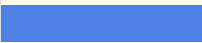

Although there was no consensus among the 14 participants, eight either agreed or strongly agreed that there was an element of “gut instinct” required for decision-making, while zero neither disagreed nor strongly disagreed. “Gut instinct” is further discussed and defined in Chapter 5.

Tension Between Analytics Personnel and Traditional Evaluators

Question 12 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: *“There is tension between analytics personnel and 'traditional evaluators' in organizations around the league.”*

Of 14 total responses, four participants responded that they “agree,” six responded that they “neither agree nor disagree,” three responded that they “disagree,” and one responded that they “strongly disagree” (see Table 6).

Table 6: “There is tension between analytics personnel and ‘traditional’ evaluators in organizations around the league”

#	Answer		Response	%
1	Strongly Disagree		1	7%
2	Disagree		3	21%
3	Neither Agree nor Disagree		6	43%
4	Agree		4	29%
5	Strongly Agree		0	0%
	Total		14	100%
Statistic		Value		
Min Value		1		
Max Value		4		
Mean		2.93		
Variance		0.84		
Standard Deviation		0.92		
Total Responses		14		

Responses were inconsistent, and there was no consensus among participants, as the most common response was “Neither Agree nor Disagree.” There were also an equal number of participants that agreed or strongly agreed, as there was that disagreed or strongly disagreed. One participant explained in an interview:

“I think that in the media the interaction between analytics and traditional evaluation is often portrayed as tense, but inside teams it is rarely so. Much more often both sides recognize that there are pieces of both types of evaluation that do well, and that both are made better by factoring in the results of the other. In healthy organizations, certainly, neither side is dogmatic but sees value in multiple perspectives.”

Importance of Basketball Experience/Understanding for Analytics Personnel

Question 13 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider

this statement: *“It is important for analytics personnel to have basketball experience and/or an understanding of the game.”*

Of 14 responses, five participants responded that they “strongly agree,” six responded that they “agree,” two responded that they “neither agree nor disagree,” and one responded that they “disagree” (see Table 7).

Table 7: “It is important for analytics personnel to have basketball experience and/or an understanding of the game”

#	Answer	Response	%
1	Strongly Disagree	0	0%
2	Disagree	1	7%
3	Neither Agree nor Disagree	2	14%
4	Agree	6	43%
5	Strongly Agree	5	36%
	Total	14	100%

Statistic	Value
Min Value	2
Max Value	5
Mean	4.07
Variance	0.84
Standard Deviation	0.92
Total Responses	14

There is not consensus among the participants, but 11 out of 14 either strongly agreed or agreed that it is important for analytics personnel to have basketball experience or an understanding of the game. The participant that disagreed explained that understanding context is not necessary for analytics personnel to manage data and present their findings to questions asked by traditional evaluators and key decision-makers. Contrarily, one participant who responded, “Agree,” explained:

“It is not imperative for analytics personnel to have basketball experience/understanding, but it is beneficial. Plenty of analytics personnel around the league do not have basketball experience, but there is an element of understanding that only comes from having played.”

Organizational Structure

Question 14 on the interview and survey protocol asked participants to select from three descriptions provided—“*Which option below best describes the organizational structure for analytics and ‘traditional evaluation’ (film, scouting, etc.) in your organization’s basketball operations?*” Participants were asked to explain their answer. The three different forms of organizational structure were:

- “Distinct separation between departments for analytics and traditional evaluation—no functional overlap”
- “Two separate departments, but with some overlap in functional roles between departments”
- “No separation between departments for analytics and traditional evaluation—all basketball operations personnel work together”

Of 14 responses, 10 participants responded that there was no separation between the departments for analytics and traditional evaluation, three responded that there were two separate departments with some overlap, and one responded that there were two distinct departments with no functional overlap (see Table 8).

Table 8: “Which option below best describes the organizational structure for analytics and ‘traditional evaluation’ in your organization’s basketball operations?”

#	Answer	Response	%
1	Distinct separation between departments for analytics and traditional evaluation- no functional overlap	1	7%
2	Two separate departments, but with some overlap in functional roles between departments	3	21%
3	No separation between departments for analytics and traditional evaluation - all basketball operations personnel work together	10	71%
Total		14	100%

Distinct Separation

The one participant who responded that there was a distinct separation between the departments for analytics and traditional evaluation explained that there was “Not much interaction between analysts and scouts—working on their own projects, not sitting in the same room.”

No Separation

Of the 10 participants who responded that there was no separation between analytics and traditional evaluation, several explained their responses. For example:

“We have a very fluid process where members of the organization are constantly discussing potential moves and giving feedback on each other's processes. Obviously, a scout isn't writing code for an analyst and an analyst isn't watching a game and writing a report for a scout. Thus, they do work separately, but their different ‘outputs’ are discussed and used by the whole staff during our evaluation and decision-making processes.”

Another participant stated, “The analytics group is present in all areas of our operations.”

Specific Strategy to Balance all Available Information?

Question 15 on the interview and survey protocol asked participants to evaluate a statement on a Likert Scale from “Strongly Disagree” to “Strongly Agree”—Consider this statement: *“Your organization has a specific strategy in place for how to balance all information gathered from analytics and traditional evaluation methods.”*

Of 14 responses, two participants responded that they “strongly agree,” four responded that they “agree,” six responded that they “neither agree nor disagree,” and two responded that they “disagree” (see Table 9).

Table 9: “Your organization has a specific strategy in place for how to balance all information gathered from analytics and traditional evaluation methods.”

#	Answer	Response	%
1	Strongly Disagree	0	0%
2	Disagree	2	14%
3	Neither Agree nor Disagree	6	43%
4	Agree	4	29%
5	Strongly Agree	2	14%
	Total	14	100%
Statistic		Value	
Min Value		2	
Max Value		5	
Mean		3.43	
Variance		0.88	
Standard Deviation		0.94	
Total Responses		14	

There was considerable variation to the responses of Question 15, and it is difficult to determine a trend from the results. In an interview, one participant explained, “My organization does not necessarily have a specific strategy, but it is more intuitive. Not always X-Y-Z, but trying to be as scientific as possible. It depends on the

decision being made, and the context of the decision.” Another participant claimed, “Very few (NBA organizations) do (have a specific strategy). There is more information every year, and it is impossible to maintain the same strategy. It’s a fluid situation and the strategy evolves.”

On the other hand, one participant explained in an interview that they did have a specific strategy, however the values of each piece of information are constantly changing for decision-making. This participant explained decision-making with a pie analogy: each piece of information available to an organization can be thought of as a piece of pie. The four major pieces of the pie are: “visual analysis” (scouting, eye test, gut feel), “analytics,” “background” (intangibles, personality, college experience), and “measurables” (physical attributes, size and speed). How much value does each team place on each piece of the pie? According to the participant, the slice of pie for analytics has grown over time. Fundamentally, each team places a different value on each slice of the pie, but the pie is constantly swirling and changing. For example, another participant estimated that in an “ideal world” their organization would weight 40% of a decision on analytics and 60% on traditional evaluation, though it depended on the context of the decision.

Tools for Assigning Values to Different Information

Question 16 on the interview and survey protocol was, “*What types of tools, if any, does your organization use to assign values to different information for decision-making? E.g.: Decision-making matrix, balanced scorecard.*” Participants were then asked to explain their answers.

Of 11 responses, seven participants responded that their organization did not have a tool for assigning values to different information in decision-making, while four participants responded that their organization had its own proprietary tools:

None

Two participant responses were “None” and “N/A.” Two other participants explained that most NBA teams, including their own, do not use any specific tools for balancing information, but that there is potential to develop such a tool:

- “This is definitely something we are interested in creating/improving on, but at the moment we do not have any specific tools in place. I would estimate that for the majority of NBA teams the ‘assigning of value’ rests on the shoulders of the GM, asst. GM or scouting director (depending on the decision).”
- “I think for many teams assigning value to different pieces of information is not a formal process, but happens based on everyone's internal compass and the internal debate amongst the decision-makers. It can, of course, be formalized, and some teams choose to do this but they are very likely in the minority.”

Proprietary Tools

A theme of the participant responses is that the details of an organization’s tools for assigning values to different information is proprietary knowledge. One participant described their organization’s tools as “dashboards and models.” Another participant responded, “Yes, there is a tool used in the front office that was developed by a consultant—details are kept under wraps.” Further, another participant explained:

“We have matrices and other tools, but I think at the end of the day, it is up to the decision-makers to balance all the information and make the best possible decision. Evaluation is a sort of sliding scale that might be weighted more or less heavily depending on the player and the situation.”

The most specific response detailed a rating system used for player attributes, including rebounding, scoring and shooting. The participant explained:

“We assign players ratings on a scale of 1-3, both by the scouts and the analysts. We also give players an overall rating, both in general and as far as their value to our team, both by the scouts and the analysts. There's no specific overarching system to place the information from the various sources in a relative comparison.”

Decision-Making Processes to Balance All Available Information

Question 17 on the interview and survey protocol was, “*Please describe the decision-making processes in your organization- specifically, how do key decision-makers balance all available information?*”

According to one participant, there is “no consistency or uniformity around the league.” Furthermore, another participant claimed that the decision-making process was different for each team, depending on how they operate and what their organizational structure is. However, the following themes emerged from 14 responses:

Discussions and Consensus

A common theme from participant responses was that decision-making occurs through group discussions and a process of consensus building. Basketball operations personnel in an NBA organization’s front office, including scouts, coaches, and analysts, all have information that can contribute to a decision. According to several participants of the interview and survey protocol, all relevant personnel meet together to reach consensus on decisions. The general decision-making process for one participant’s organization was described as, “Everybody gets in a room together and presents information from their perspective/lens—they tease out where everyone is

coming from and eventually come to a consensus.” Another participant said, “For this organization, everybody comes together in a room and presents each piece of the information.” Similarly, a third explanation was, “Typically we get the key decision-makers in a room and discuss/weight the merits of whatever we are looking into.”

Support or Refute

A theme of Question 1 was that in the interaction of analytics and traditional evaluation methods, different pieces of information could either support or refute each other. Responses to Question 17 indicate that checking for pieces of information that either support or refute each other is a key aspect of the decision-making processes in NBA organizations. One participant gave an in-depth explanation:

“Our key decision-makers receive information from numerous sources: analytical, scouting, medical, financial, psychological, thoughts of coaching staff, etc. Often times, these pieces of the puzzle will line-up or agree and make the decision rather simple. Other times, there will be a ‘red flag’ that can veto the other factors; for example, a bad medical report. Things obviously become much more difficult when there is disagreement between separate pieces of information; in these circumstances our organization does our best to level with each other and make the best move for team.”

Similarly, the approach to decision-making, according to another participant, “is to look at all sources of information, and if one of them differs from the others, then we take a step back to examine what the outlier is seeing that the other sources aren't, or what it's missing that the other sources are seeing.” Another participant elaborated on this same concept, explaining that decision-makers can “See something in the numbers and go check what's happening in the film, or see something on film and check to see what's happening with the numbers—it goes both ways.”

Key Decision-Maker Has Final Say

Although some participants emphasized the importance of consensus building in their organizations, another theme from other responses is that the key decision-maker eventually has the final say in decisions. “Our GM talks to everyone and comes to his own conclusions,” one participant stated. “Everyone in the organization has input on decisions they feel strongly about, and then our GM makes the final decision.” Another participant explained that their organization has a “hierarchical chain of command.” He elaborated, “Every piece of the organization does their part and communicates with the next group, collaborating along the way, and passing information along. Ultimately all information is passed to the key decision-maker who makes a final decision.” As was explained by another participant, consistency helps in decision-making, which starts at the top of an organization and relies on the organization’s philosophy and strategic plan about the approach to decision-making and the interaction between advanced analytics and traditional evaluation.

Chapter 5: Discussion

What follows is a discussion of the results of the interview and survey protocol. Results to certain questions are further explained, and the implications of these findings are explored in-depth. Some of the sections in Chapter 5 correspond with sections from Chapter 4: “Defining Advanced Analytics,” “The Interaction Between Advanced Analytics and Traditional Evaluation Methods,” “Scientific or Psychological Methods to Evaluate Human Intangibles,” “Gut Instinct,” and “Organizational Structure.” The other sections, “Tension and Basketball Experience—Analysts and Traditional Evaluators” and “Strategies and Tools for Balancing All Available Information” discuss information from multiple sections of Chapter 4.

Defining Advanced Analytics

From published articles and panel discussions at the MIT Sloan Sports Analytics Conference, it would seem as if there is no consensus about what exactly constitutes “advanced analytics.” Based on 14 very different responses to Question 2 of the interview and survey protocol, it is clear that “advanced analytics” is, in fact, difficult to define, and there is no single definition. According to Stephen Shea, “‘Basketball analytics’ is an umbrella term for the use of any form of quantitative information to gain insight into the game of basketball.”¹³⁰ Although there is not consensus among participants of the interview and survey protocol about the precise definition of “analytics,” Shea’s “umbrella term” definition is consistent with the themes and insights gathered from the interview and survey protocol. Analytics can take many forms in an

¹³⁰ Shea, *Basketball Analytics: Spatial Tracking*, 1.

organization, but a common theme from participant responses is that analytics is the analysis conducted on quantitative information to gain insight. Analytics consists of the three broad components of data management, analytic models, and information systems, as defined by Ben Alamar in **SPORTS ANALYTICS**.¹³¹

The Interaction Between Analytics and Traditional Evaluation Methods

All 14 participants of Question 3 either agreed or strongly agreed that analytics are important to evaluation and decision-making in NBA organizations (see Table 1). The buy-in to analytics of all 30 NBA teams varies throughout the league, and responses to the interview and survey protocol indicate that there are some personnel who are cautious about the value of analytics (discussed in the “Nonbelievers and Hold-Outs” section of Chapter 3). However, the results of the interview and survey protocol indicate that analytics undoubtedly provide useful information for decision-making in the contexts of player evaluation, team evaluation, and roster construction (see “Player Evaluation, Team Evaluation, and Roster Construction” section of Chapter 1). Likewise, responses to Question 2 indicate that traditional evaluation methods are important for evaluation and decision-making in NBA organizations. These traditional evaluation methods, ordered from most important to least important, are: live scouting, watching film, interviews/background checks, and workouts (see Table 2).

A primary theme from participant responses to the interview and survey protocol is that analytics and traditional evaluation methods are complementary tools. “When used properly, they complement each other nicely,” said one participant. This finding is consistent with Stephen Shea and Christopher Baker when they explain,

¹³¹ Alamar, *Sports Analytics*, 5.

“Analytics and on-site scouting are not in competition with each other. Instead, each perfectly complements the other.”¹³² As can be seen in responses to Questions 4, 5, 7, and 8 on the interview and survey protocol (Chapter 4 sections: “Advantages of Analytics,” “Limitations of Analytics,” “Advantages of Traditional Evaluation Methods,” and “Limitations of Traditional Evaluation Methods”), the advantages of analytics compensate for the limitations of traditional evaluation methods, and the advantages of traditional evaluation methods compensate for the limitations of analytics.

The limitations of both analytics and traditional evaluation methods were discussed in the “Flaws in Current Processes” section of Chapter 2, and supported the findings from the interview and survey protocol. For example, one of the limitations of traditional evaluation methods is that they are subjective and prone to bias. On the other hand, an advantage of analytics is their objectivity in weeding out decision-makers’ cognitive biases. Toronto Maple Leafs Assistant General Manager Kyle Dubas discussed this topic at the 2015 Sloan Sports Analytics Conference, specifically exploring the “confirmation bias,” the “recency bias,” and the “simplicity bias,” all of which were referenced in participant responses to the interview and survey protocol.¹³³

Where traditional evaluation methods are subjective and limited by cognitive biases and sample size issues, analytics are objective, avoid cognitive biases, and have large sample sizes. Where analytics are missing context and have difficulty measuring human intangibles and psychology, traditional evaluation methods are effective at

¹³² Shea and Baker. *Basketball Analytic*, 1.

¹³³ Dubas, Kyle. "SSAC15: CA - How Analytics Has Limited the Impact of Cognitive Bias on Personnel Decisions." YouTube.

providing context and capturing intangibles. Therefore, the findings of the interview and survey protocol suggest that effectively combining traditional evaluation methods and analytics together will generate complementary information and enable decision-makers to make the best possible decisions for their organizations.

Scientific or Psychological Methods to Evaluate Human Intangibles

All 14 participants of Question 9 on the interview and survey protocol either agreed or strongly agreed that human intangibles, such as emotional profiles, leadership, and teamwork, are an important consideration for player evaluation (see Table 4). This result suggests that human intangibles are undoubtedly an important piece of information for player evaluation in NBA organizations, as was discussed in the “Quantifying Intangibles” section of Chapter 2. Questions 5 and 7 also highlighted that one of the limitations of analytics, and one of the advantages of traditional evaluation methods, is in evaluating human intangibles. However, the “Quantifying Intangibles” section of Chapter 2 detailed new scientific and psychological (psychometric) methods for evaluating human intangibles, including CogSports’ “ATHLETT” assessment, and the Milwaukee Bucks’ facial coding expert.

Out of 15 responses, four participants indicated that their organizations do not use any scientific or psychological methods to evaluate human intangibles. Given the consensus on the importance of human intangibles for decision-making in the NBA, there is potential future growth in the implementation of tools such as the “ATHLETT” into NBA organizations’ decision-making processes. For example, the “ATHLETT” assessment should be used for player development at the NBA Draft Combine or Rookie Symposium to identify which players already have personality issues or may

develop issues in the future. Furthermore, NBA organizations should use the assessment to develop a better understanding of their players' makeups, assessing traits such as decisiveness, perseverance, aggressiveness, and emotional control. Quantifying these human intangibles would assist NBA organizations with player development and situational, tactical decisions.

Organizational Structure

The possible organizational structures for analytics in basketball operations were explored in the “Organizational Structure” section of Chapter 2: centralized, hybrid and decentralized structures.¹³⁴ For Question 14 of the interview and survey protocol, participants were asked which of three different organizational structures best represented their organization:

- “Distinct separation between departments for analytics and traditional evaluation—no functional overlap”
- “Two separate departments, but with some overlap in functional roles between departments”
- “No separation between departments for analytics and traditional evaluation—all basketball operations personnel work together”

The first structure where there is a distinct separation between analytics and traditional evaluation is the centralized structure where, according to Alamar, analytics personnel are grouped together in one single department. The second structure where there are two separate departments with some overlap between analytics and traditional evaluation is the hybrid structure, where a staff of centralized analytics personnel rotates through the other functions of the team. Lastly, the structure with no separation between analytics

¹³⁴ Alamar, Sports Analytics, 22.

and traditional evaluation is Alamar’s decentralized structure, where analytics personnel are embedded into each team function.

Of 14 responses to the interview and survey protocol, 10 participants responded that there was no separation between the departments for analytics and traditional evaluation, three responded that there were two separate departments with some overlap, and one responded that there were two distinct departments with no functional overlap (see Table 8). According to the results of the interview and survey protocol, the most common organizational structure from the sample was decentralized, the hybrid structure was the next most common, and only one organization had a centralized structure. A specific example of a decentralized organizational structure for analytics is the Dallas Mavericks, which was discussed in the “NBA Analytics Case Studies” section of Chapter 2. Former Director of Basketball Analytics, Roland Beech, was promoted to Vice President of Basketball Strategy, where he serves as a “stats coach” and sits on the bench with the rest of the coaching staff. This structure allows him to increase his basketball knowledge and have greater influence providing the rest of the organization insight from analytics. An organizational structure where there is no separation between the departments for analytics and traditional evaluation is optimal for NBA organizations, allowing for improved integration of the two functions, and therefore decreased risk in decision-making.

Tension and Basketball Experience—Analysts and Traditional Evaluators

Of 14 total responses to Question 12 of the interview and survey protocol, four participants agreed that there was tension between analytics personnel and traditional evaluators, four participants disagreed, and six participants neither agreed nor

disagreed. This result indicates that the level of tension between analysts and traditional evaluators depends on the organization. As was seen in Chapter 2, many former NBA players are skeptical about the value analytics can provide for evaluation and decision-making. Although the media often portrays a tension between analytics personnel and traditional evaluators, the same dichotomy between both methods that exists in baseball is not present in the NBA. In reality, while there may be tension in some front offices about the value of analytics, many organizations do not have tension, and this dynamic has improved over time.

Of 14 responses to Question 14, 11 participants either strongly agreed or agreed that it is important for analytics personnel to have basketball experience or an understanding of the game. If analytics personnel are working in another function of the organization in a decentralized structure (the most common structure identified in Question 13), it is beneficial for them to understand the context of the decision being made, and have knowledge about traditional evaluation methods. This eases communication between analysts and traditional evaluation personnel, and allows analysts to communicate their findings in a more easily understandable way. In addition, when an analyst has basketball experience and understanding, they are more likely to be trusted by key decision-makers, and insights from analytics are more likely to be accepted and acted upon.

There is a future opportunity for more NBA organizations to further alleviate tension between analytics personnel and traditional evaluators, and implement decentralized organizational structures. NBA organizations should invest more heavily in interactive analysts like Roland Beech, who have basketball knowledge or

experience, travel with the team, and are trusted by the coaching staff and General Manager. Just like analytics personnel should have an understanding of the sport of basketball, it is beneficial for traditional evaluators to develop an understanding of analytics. There is future potential for NBA teams to train their scouts in analytics, and provide experiences working alongside analytics personnel. It is difficult to find the right personnel, but it is worth investing the resources, in order to further improve the interaction between analytics and traditional evaluation.

Strategies and Tools for Balancing All Available Information in Decision-Making

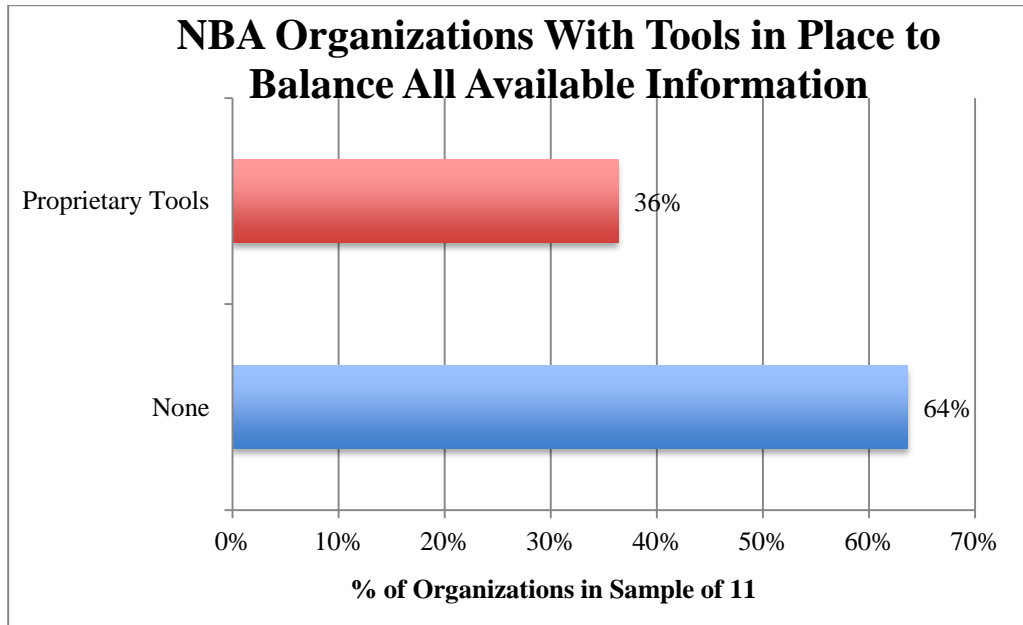
The results to Question 15 indicate that it is not widespread for NBA teams to have a specific strategy in place for how to balance all available information, as only 43% of participants indicated having a specific strategy in place for decision-making (see Figure 9).

Figure 9: Specific Strategy in Place for Balancing All Available Information?

“Our GM talks to everyone and comes to his own conclusions,” one participant explained of their organization’s decision-making process. In a situation where a key decision-maker makes the final decision independently, there is a risk of the most highly ranked individual having the most influence, regardless of their expertise of the decision being made. In order to ensure a rigorous, objective decision-making process, it is critical to avoid the most influential individuals dominating decision-making without considering all available information. Another participant explained of their organization’s decision-making process, “Typically we get the key decision-makers in a room and discuss/weight the merits of whatever we are looking into.” If basketball operations personnel are already meeting to discuss the relative weights of each piece of information, organizations should establish a benchmark for how to balance all available information, and then be consistent in that approach.

In order to follow a specific, repeatable strategy, it would be beneficial for organizations to develop tools to help assign values to different pieces of information. However, the results of Question 16 indicate that many NBA teams do not have tools in place for balancing all available information in 2015 (see Figure 10).

Figure 10: NBA Organizations With Tools in Place to Balance All Available Information



One participant explained, “This is definitely something we are interested in creating/improving on, but at the moment we do not have any specific tools in place.” Another stated, “Assigning value to different pieces of information is not a formal process... it can, of course, be formalized, and some teams choose to do this but they are very likely in the minority.” It is clear that there is a future opportunity for organizations to develop tools to help assign values to different pieces of information, and ensure that the organization follows a specific strategy for balancing all available information.

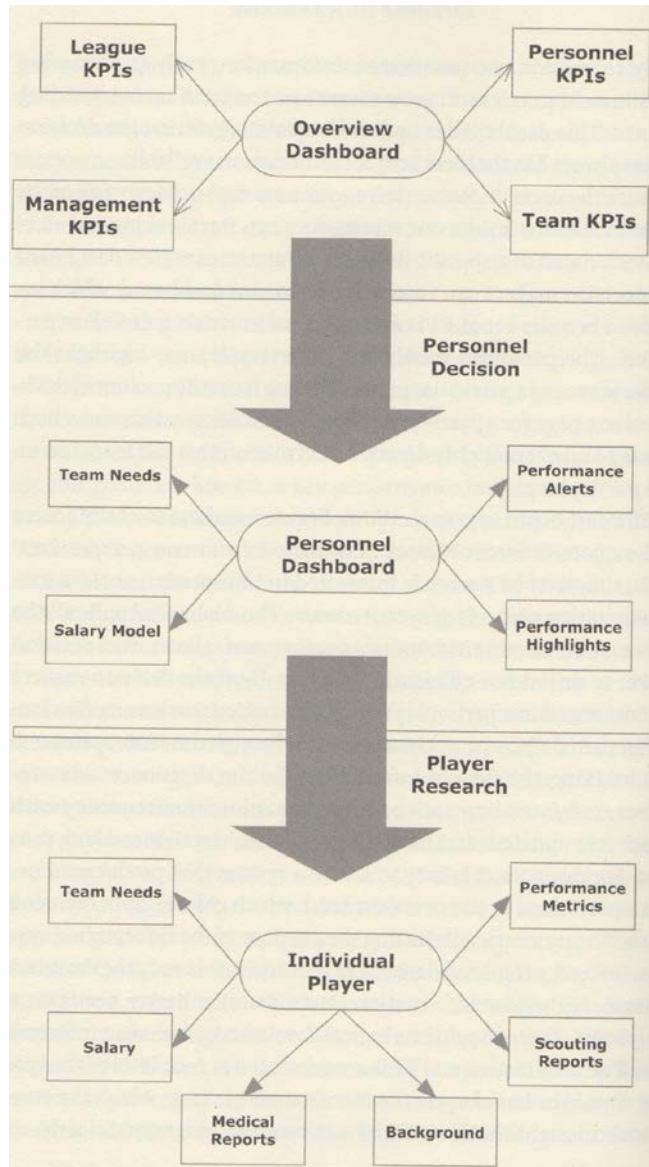
Tools to help assign relative values to different pieces of information in an organization could take the form of some type of an integrated rubric or decision-making matrix with optimal criteria and weighted values. In addition, the component of analytics that Ben Alamar calls the “information system” (discussed in the “Defining

Analytics” section of Chapter 1) could be the foundation of a tool for balancing all available information about a decision. “The information system is the tool that the decision-maker uses to meld information with strategy,” Alamar explains. “Designing an effective information system requires knowledge of the decision-making process.”¹³⁵ Depending on the type of decision being made, key decision-makers identify the highest value pieces of information, known as “key performance indicators” (KPIs), such as specific analytics models and qualitative information from traditional evaluation methods. According to Alamar, “The information and KPIs that are presented at each level of the system should be based upon the team’s strategic plan, which the analyst who designs the flow of information must understand clearly.”¹³⁶ Once the KPIs are selected, they can be layered in a dashboard design that presents decision-makers with all relevant information about a decision. Figure 9 is an example of an interactive information system in the form of a dashboard for a player evaluation decision. A potential variation to this tool could be to assign a relative value to each KPI, in order for decision-makers to balance all available information in a specific, systematic manner.

¹³⁵ Alamar, *Sports Analytics*, 90.

¹³⁶ *Ibid*, 85.

Figure 11: Dashboard Design for Player Evaluation Decision¹³⁷



This Dashboard presents information at three different levels: “Overview,” “Personnel,” and “Individual Player” with a unique set of KPIs for each. This information system would be interactive and clickable to explore each group of KPIs.

¹³⁷ Alamar, *Sports Analytics*, 86.

As was discussed in the “Importance of Leadership and a Strategic Plan” section of Chapter 2, there is no single ideal approach to decision-making and the interaction of analytics and traditional evaluation. That being said, it is critical for the approach to align with the leadership philosophy and strategic plan of the organization. Analytics are critical for evaluation and decision-making in all organizations in the NBA in 2015, but it is not always possible to draw a straight line from analytics investment to team success. As was seen in the “NBA Analytics Case Studies” section of Chapter 2, the San Antonio Spurs and Philadelphia 76ers both invest heavily in analytics, but have very different strategic plans. In reality, the ideal approach to analytics, and its success, is dependent on the analytics program’s alignment with the organization’s strategic plan. Decision-makers need to have a general understanding of the three criteria of analytics (data management, analytic models, and information systems), allowing these decision-makers to identify KPIs related to the strategic plan and monitor them with analytics. This allows an organization to work backwards from the end goal to establish clear performance targets, and use analytics to help execute a strategic plan.

The processes to balancing all available information may be formalized more often in organizations throughout the NBA in the future, and there is potential for organizations to develop tools to help balance all available information. Alamar’s dashboard information system is a useful example of a potential tool to help balance all available information for a particular decision, and another tool will be discussed in Chapter 6. Regardless, it is critical that the specific approach to integrating analytics with traditional evaluation, and the relative importance of each method and piece of information, are aligned with the vision of key decision-makers and their strategic plan.

Chapter 6: Prescriptive Next Steps

What follows is a discussion of prescriptive next steps to build on this thesis, as well as recommendations for future study regarding decision-making in the NBA, specifically the interaction of advanced analytics and traditional evaluation methods.

Mixed Methods Research Design for Decision-Making in the NBA

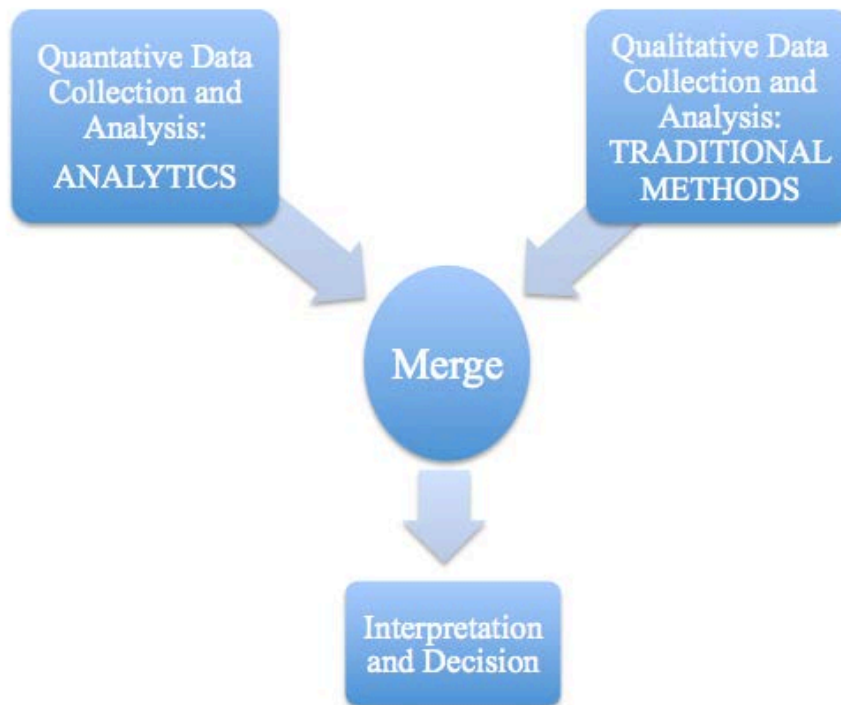
Based on the results of Question 15 of the interview and survey protocol, it is clear that not all NBA teams have a specific strategy in place for how to balance all available information in decision-making processes. One topic for further research is how to design NBA decision-making as a mixed methods research project. There is potential for teams to formalize their decision-making through repeatable processes, and a mixed methods research design would provide teams with a more consistent strategy for evaluating all available information from different sources.

Mixed methods research is an approach to research design in the social, behavioral, and health sciences, where an investigator gathers both quantitative and qualitative data, merging the two sources and drawing robust interpretations based on the combined strengths of both data sets.¹³⁸ The logic behind mixed methods research is that the collective strength of quantitative and qualitative data together provides a better understanding of a research problem than either form of data alone. In considering a basketball operations decision as a research problem, information gathered from analytics and traditional evaluation methods provide a better understanding of the decision than one or the other alone, as has been established in this thesis.

¹³⁸ Creswell, John W. *A Concise Introduction to Mixed Methods Research*. Thousand Oaks, California: SAGE Publications, 2015. Print.

Specifically, a “convergent design” to mixed methods would help provide basketball operations personnel with a systematic and rigorous process to merge information from analytics (quantitative data) and traditional evaluation methods (qualitative data), and examine to what extent the quantitative results confirm or refute the qualitative results, and vice versa.¹³⁹ Figure 12 shows what a convergent design would look like for decision-making in the NBA.

Figure 12: Convergent Mixed Methods Research Design for Decision-Making in the NBA



In a convergent design, quantitative and qualitative data are collected and analyzed separately, but at the same time. Next, the two databases are merged and the results are examined to determine to what extent quantitative results are confirmed by the qualitative results or vice versa. Based on this interpretation, a decision is made.¹⁴⁰

¹³⁹ Creswell, *A Concise Introduction to Mixed Methods Research*, 35-37.

¹⁴⁰ Ibid.

Essentially, this process of merging analytics and traditional evaluation already occurs for decision-making in NBA front offices. However, it is possible to define each basketball operations decision as an individual research problem using a “convergent design” to mixed methods research. This would allow NBA organizations to ensure that the same systematic, formalized process takes place for each decision.

Balanced Scorecards

According to the results of the interview and survey protocol, many NBA organizations do not have any specific tools in place to help balance all available information in decision-making processes. There is clearly an opportunity for teams to further develop tools that help facilitate decision-making. One type of tool that could be used for decision-making in the NBA is the balanced scorecard, which is “a strategic planning and management system that is used... to align business activities to the vision and strategy of the organization,” as detailed in a Harvard Business Review Article by Robert Kaplan and David Norton.¹⁴¹

“Balanced scorecards enable organizations to clarify their vision and strategy and translate them into action,” Kaplan and Norton explain. “It provides feedback around both the internal business processes and external outcomes in order to continuously improve strategic performance and results.” The balanced scorecard provides a holistic view of an organization from a variety of perspectives, such as “finance,” “internal business processes,” “learning and growth,” and “customer,” for example. For each perspective, the balanced scorecard can include objectives, measures,

¹⁴¹ Kaplan, Robert S., and David P. Norton. "Using the Balanced Scorecard as a Strategic Management System." *Harvard Business Review*. Harvard Business Review, Jan. 1996. Web.

targets, and initiatives. Figure 13 is an example of the visual representation of a generic balanced scorecard for any business.

Figure 13: Visual Representation of a Generic Business Balanced Scorecard¹⁴²



This generic business balanced scorecard includes objectives, measures, targets, and initiatives for four criteria: financial, customer, internal, and learning & growth.

In the context of decision-making in the NBA, it is possible to develop a balanced scorecard with other perspectives, representing each type of information relevant to decision-making. The organization’s vision and strategy would still be at the center of the balanced scorecard, as seen in Figure 13. However, the different perspectives of the balanced scorecard could include the four major “pieces of the pie”

¹⁴² Kaplan and Norton, *Harvard Business Review*.

that one participant described in their response to Question 15: “visual analysis” (scouting, eye test, gut feel), “analytics,” “background” (intangibles, personality, college experience), and “measurables” (physical attributes, size and speed). Other important perspectives could include medical information and salary cap considerations. For each relevant perspective, the balanced scorecard would include different objectives, measures, targets, and initiatives, depending on the type of decision being made—player evaluation, tactical team evaluation, or roster construction. It is also possible that relative values could be incorporated to a balanced scorecard tool to help key decision-makers weight information from different perspectives.

In a future research project, a balanced scorecard could be developed for decision-making in the NBA. A balanced scorecard would help formalize the process of balancing all available pieces of information from traditional visual analysis, analytics, background, and physical measurables. Specifically, this tool would ensure that an organization valued each perspective in an established way that aligned with the vision and strategic plan of the organization. One key tenet of balanced scorecards is that the organization is constantly evaluating and changing the measures, targets, and initiatives to remain aligned with the organization’s vision and strategy. As the relative value of each piece of the decision-making pie changes over time, the balanced scorecard could be adjusted to reflect these changes. If a research project was conducted to develop a general balanced scorecard for decision-making in the NBA, each organization could customize it to their vision and strategic plan, and set the relevant objectives, measures, targets, and incentives for each perspective.

Quantifying Human Intangibles

In addition to research about formalizing specific strategies and tools for balancing all available information in decision-making processes, further research should be conducted on psychometric methods for quantifying human intangibles. There is clearly an opportunity for NBA organizations to further implement methods such as CogSports' "ATHLETT" and facial coding into their decision-making processes, but additional research should be conducted to explore the implications of quantifying human intangibles. These psychometric tools will provide information about human intangibles that could also be evaluated through traditional evaluation methods, but in a more objective, efficient manner. A future research project should be conducted to identify additional methods to quantify human intangibles, as well as to investigate how quantitative evaluations of human intangibles interact with traditional evaluations and gut instinct.

Biometrics and Sports Science

Along with psychometric tools used to evaluate and quantify human intangibles, there are other progressive tools that will provide additional information for player evaluation decisions in the future. Specifically, biometrics and sports science is the next frontier of athlete analytics. The NBA Development League (D-League) introduced performance analytic devices for players to wear in games during the 2014-15 season. These devices have the potential to help maximize player performance and avoid injuries, by generating individual player data on cardiovascular exertion, musculoskeletal intensity, fatigue, rate of acceleration and deceleration, number of

jumps, and distance run.¹⁴³ The D-League is a training ground for many potential programs in the NBA, and it is possible that performance analytics and wearable devices will eventually be introduced to the NBA. Future research should focus on how information regarding a player's medical and injury history fits into player evaluation decisions. Furthermore, research should be conducted about the impact of biometrics and sports science in the NBA, and specifically how information from devices such as the D-League's wearable devices will inform decision-making in the NBA.

Salary Cap Considerations

Lastly, future research should be conducted about how salary cap considerations play a role in decision-making in the NBA. Financial ramifications and details about player contracts are vital information to be considered for player evaluation and roster construction decisions. This topic was not discussed in this thesis, but decision-makers must take salary cap considerations into account in all roster construction decisions. Realistically, an organization's salary cap situation is one of the largest restraints to decision-making. A player's contract and its impact on their team's salary cap situation are a major "piece of the pie" to consider for decision-making, and could be included as one of the perspectives of a balanced scorecard tool. The NBA's salary cap for the 2014-15 season was \$63.2 million, and is expected to increase to \$67.1 million for the 2015-16 season, \$89 million for the 2016-17 season, and as much as \$108 million for the 2017-18 season.¹⁴⁴

¹⁴³ "NBA D-League Unveils Groundbreaking Analytic Device." *NBA.com*. NBA, 14 Feb. 2014. Web.

¹⁴⁴ Bien, Louis. "NBA Salary Cap Projected to Hit \$108 Million in 2017." *SBNation.com*. SB Nation, 17 Apr. 2015. Web.

As the NBA's salary cap increases dramatically in the future, the financial ramifications of each roster construction decision will become more severe, and salary cap considerations for organizations will become increasingly important. There is considerable existing literature about the NBA's collective bargaining agreement and salary cap, but little research exists about how organizations evaluate salary cap considerations in conjunction with the rest of the information available about a decision. How do teams evaluate salary cap considerations? Is there a formal process in place? What is the interaction between salary cap considerations and information gathered from analytics and traditional evaluation methods? Future research should be conducted to answer these questions, to help incorporate salary cap considerations into the decision-making processes of an organization. This would provide a competitive advantage to organizations that were more effectively able to integrate salary cap information with insights from analytics and traditional evaluation methods.

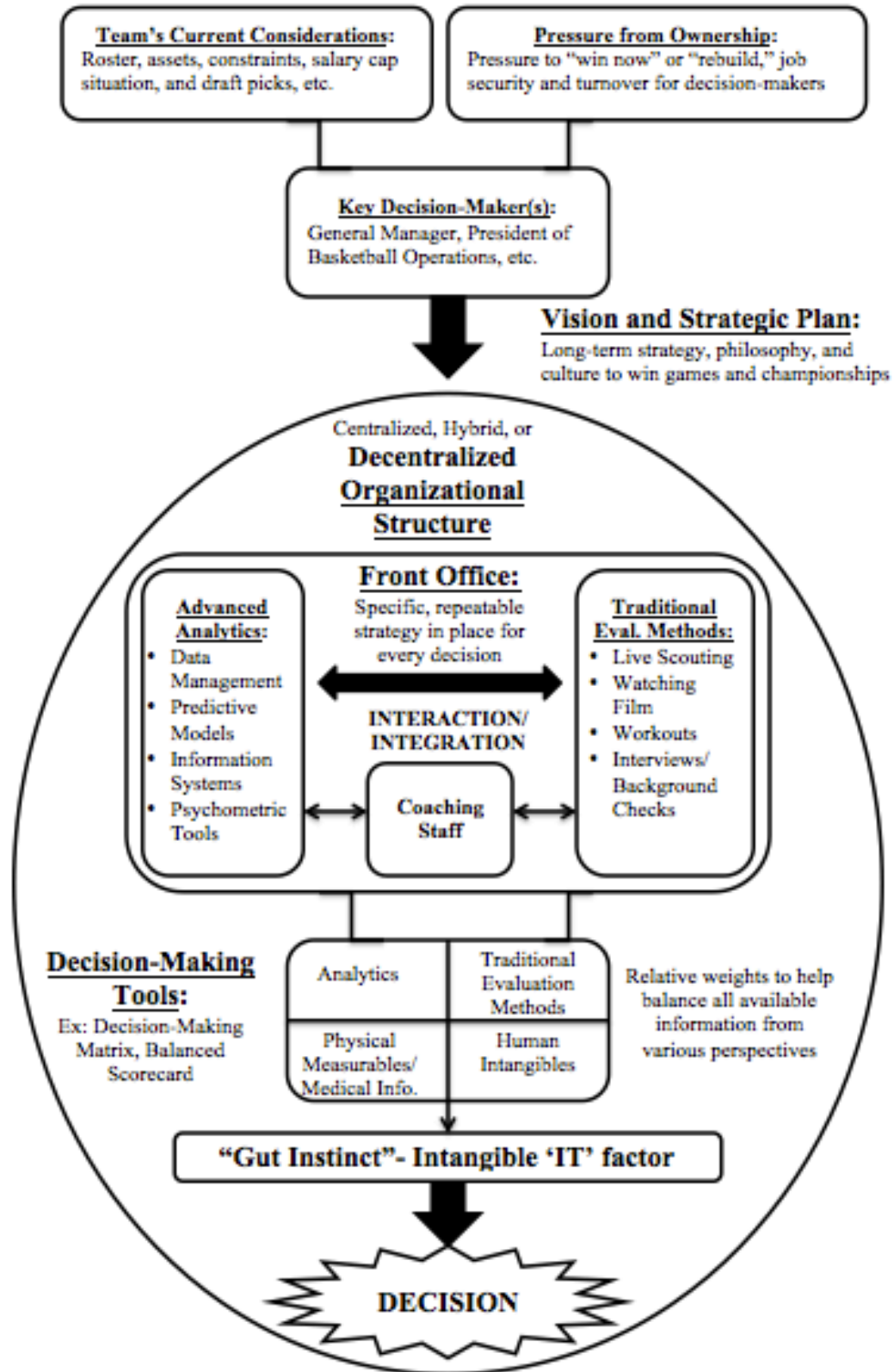
Chapter 7: Conclusion

Individuals make decisions all around the world, in every context of every organization. Sports are no exception, and the complex and interconnected sport of basketball is a particularly interesting case study for the importance and difficulty of decision-making. In the NBA, player evaluation and team evaluation decisions have a direct impact on a team's on-court performance, and there is an enormous amount of money at stake with every roster construction decision. All 30 NBA organizations have the same ultimate goal of maximizing team performance and winning a championship, and therefore attempt to minimize risk by making the most informed decisions possible. In reality, every organization has a different situation and a unique strategic plan, so every organization will have a different approach to basketball operations decision-making. The most effective decisions in the NBA are informed by both advanced analytics and traditional evaluation methods, but some organizations rely more heavily on one or the other, and there is no benchmark around the league for the optimal interaction of analytics and traditional evaluation. The NBA is an unpredictable, constantly changing ecosystem, and oftentimes success is more a product of random luck than a sound decision. Outcomes of decision-making in the NBA are measurable with wins and losses, but there are numerous interrelated factors that determine whether a decision has a positive or negative outcome. As a result, it is not possible to directly correlate an organization's decision-making approach with their on-court success.

As was seen in this thesis, there is no single, ideal approach to decision-making in the NBA, but it is critical for each organization to have a rigorous, repeatable process in place to balance all available information about a decision. Although there is no clear

benchmark around the league for the optimal balance of advanced analytics and traditional evaluation methods, every organization should have their own benchmark. In order to be most effective, and minimize risk, a decision-making process must align internally at every level of the organization, and reflect a greater organizational philosophy and strategic plan set by the key decision-maker. Figure 14 presents a framework for any player evaluation, team evaluation, or roster construction decision in the NBA.

Figure 14: Framework for Basketball Operations Decision-Making in the NBA



Two key factors that play a role in any basketball operations decision are a team's current situation and pressure from ownership. The key-decision maker (General Manager or President of Basketball Operations) must consider the team's current roster, competitive position, and team needs, before making a decision. In addition, the key decision-maker must take into consideration their organization's assets in the form of salary cap space and future draft picks, as well as their organization's constraints, such as a lack of financial flexibility. Every key-decision maker faces varying levels of pressure from ownership to either "win now" or enter a rebuilding phase. Depending on the job security of the key decision-maker, and the turnover in the organization, ownership pressure will be more or less impactful. Based on the macro factors of a team's current situation and pressure from ownership, the key decision-maker must establish a vision and strategic plan for how the organization will attempt to win games and championships. The strategy, culture, and philosophy set by the key-decision maker will dictate the rest of the decision-making process, and this strategy must align at every level of the organization.

The optimal organizational structure for decision-making is a decentralized system with analysts who understand basketball, and traditional basketball operations personnel who have an understanding of analytics. This allows for improved communication and trust between all members of the front office. Given the complementary nature of analytics and traditional evaluation methods, there must be an integration and interaction of both, and the coaching staff should be involved in this process. The specific strategy for the interaction and integration of analytics and traditional evaluation methods should be repeatable for every decision in an

organization. In order to facilitate a systematic, repeatable process, the organization should have decision-making tools, such as a decision-making matrix, to assign relative values to all available information. The information sources and relative weights of each piece of information will vary from organization to organization, but the process and balance of information must align internally with the organization's vision and strategic plan. After a rigorous decision-making process, there will be a varying level of "gut instinct" required for a final decision. At the end of the day, the framework in place for decision-making will help minimize risk and the role of "gut instinct," but the key decision-maker will eventually make a decision based on their best judgment.

In the words of statistician George Box, "all models are wrong, but some are useful." There is no magic model for decision-making in the NBA, but each organization should have a benchmark model in place. According to a 2015 *Harvard Business Review* article, "Without a proven, organization-wide approach, there may be, at best, isolated pockets of high-quality decision-making where individual leaders have elected to take a rigorous, transparent approach."¹⁴⁵ Decision-makers will continue to make decisions, some with positive outcomes and others with negative outcomes. Just because a decision results in a negative outcome, it does not mean that the process of the decision was wrong. The NBA is unpredictable, and as of 2015, basketball operations decision-making is more of an art than a science. However, this thesis suggests that there is potential for decision-making processes to become increasingly scientific, as the interaction of analytics and traditional evaluation evolves in the future.

¹⁴⁵ Neal, Larry, and Carl Spetzler. "An Organization-Wide Approach to Good Decision Making." *Harvard Business Review*. Harvard Business Review, 27 May 2015. Web.

Accompanying Material 1: Interview/Survey Protocol

Thank you for your voluntary participation in my thesis research about decision-making in the NBA. As part of my research, I am reaching out to basketball operations and analytics personnel around the league, and I have identified you as somebody with direct knowledge about the topic.

Purpose of the Study: To explore how teams integrate both advanced analytics and traditional evaluation methods together, and what decision-making processes look like in the NBA.

Time Required: I have piloted this survey with a current Division-I College Basketball Coach and determined that this will take about 15 minutes of your time. Participation will be one-time only.

Potential Risks of Study: There should be very little risk associated with this research. The only potential risk of participation is a breach of confidentiality.

Benefits: Better understanding of organizations' decision-making processes and integration of advanced analytics and traditional evaluation. This research may help provide clarity for fans, analysts, and even teams, about the best way to evaluate basketball.

By clicking "NEXT," you consent to participate in my study (confidentiality conditions to follow).

Two Options for Confidentiality: Identifiable or Non-Attributable?

I am not attempting to uncover specific information about your team's use of advanced analytics. Rather, I am attempting to learn about the league-wide interaction and balance between analytics and traditional evaluation methods, and the processes in place for decision-making in the NBA. Your identity is pertinent to your role and capacity with your team, but your identity will not be included in my final report without your permission. If you prefer not to have your responses identifiable, I will ensure non-attributable reporting of your responses in my thesis.

Data from this survey will be stored online on the University of Oregon Qualtrics account that I have exclusive access to.

You will have the option to skip any survey question you please by clicking "NEXT" and "Continue Without Answering."

Do you want your responses to be identifiable or non-attributable?

- Identifiable
 Non-Attributable

Please explain your role and capacity with your organization

Name

Team

Role

Capacity

Advanced Analytics and Traditional Evaluation

1.

Please describe the interaction between advanced analytics and traditional evaluation methods in the NBA.

2. How would you define "advanced analytics"?

3.

Consider this statement:

"Analytics are important for evaluation and decision-making in your organization."

Strongly Disagree

Disagree

Neither Agree nor
Disagree

Agree

Strongly Agree

4. What do you think are some advantages of using analytics for evaluation and decision-making?

5. What do you think are some limitations of using analytics for evaluation and decision-making?

6. Consider this statement:

"The following "traditional evaluation methods" are important for evaluation and decision-making in your organization."

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Live Scouting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Watching Film	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workouts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interviews/Background Checks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. What do you think are some advantages of using "traditional evaluation methods" for decision-making?

8. What do you think are some limitations of using "traditional evaluation methods" for decision-making?

9. Consider this statement:

Human intangibles, such as psychology/emotional profiles, leadership, and teamwork, are important for player evaluation in your organization.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10.

Does your organization use scientific or psychological methods to evaluate human intangibles that have historically been unquantifiable? Please explain. (Ex: CogSports' "The ATHLETT," Milwaukee Bucks hiring a facial coding expert, etc.)

No

Yes

11. Consider this statement:

"After using analytics and traditional methods to evaluate players, there is at some point an intrinsic element of gut instinct required for decision-making."

Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree

12. Consider this statement:
 "There is tension between analytics personnel and 'traditional evaluators' in organizations around the league."

Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree

13. Consider this statement:
 "It is important for analytics personnel to have basketball experience and/or an understanding of the game."

Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree

14.
 Which option below best describes the organizational structure for analytics and "traditional evaluation" (film, scouting, etc.) in your organization's basketball operations?

Please explain.

Distinct separation between departments for analytics and traditional evaluation- no functional overlap <input type="radio"/>	Two separate departments, but with some overlap in functional roles between departments <input type="radio"/>	No separation between departments for analytics and traditional evaluation - all basketball operations personnel work together <input type="radio"/>
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15. Consider this statement:
 "My organization has a specific strategy in place for how to balance all information gathered from analytics and traditional evaluation methods."

Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree

16. What types of tools, if any, does your organization use to assign values to different information for decision-making? Please explain. (Ex: Decision-making matrix, Balanced Scorecard, etc.)

17.
 Please describe the decision-making processes in your organization- specifically, how do key-decision makers balance all available information?

Accompanying Material 2: Email Cover Letter

SUBJECT LINE: University of Oregon Thesis on NBA Analytics

Dear _____,

My name is Jonathan Mills, and I am a senior honors student at the University of Oregon. I am working on an **undergraduate thesis project about analytics and decision-making in the NBA**. The purpose of this study is to explore how teams integrate both advanced analytics and traditional evaluation methods together, and what this decision-making process looks like in organizations across the league.

As part of my research, I am reaching out to player-personnel and analytics staffs around the league. Based on your role as _____ with the _____, I identified you as somebody with direct knowledge about the topic. I was wondering if you would be willing to participate in my study either with a phone interview or an online survey: https://oregon.qualtrics.com/SE/?SID=SV_3DGe8IIFYw9yWTb

I understand that much about this topic is not public information. **Instead of asking about specific team strategies, my study's focus is to gather general ideas and concepts** about how NBA teams are making decisions today using all available information. I am flexible with confidentiality requirements and can ensure that your responses will be non-attributable if you prefer. I will not share any responses with other teams, but I would be happy to share my thesis project with you at the end of my research. I hope this will encourage further participation.

I have piloted this interview and survey protocol with multiple subjects around the league, and have determined that this process may take up to about 15 minutes of your time. I would really appreciate any insight you are able to provide. **Please let me know if you are interested in participating**, and I look forward to hearing from you soon.

Thank you for your consideration,
Jonathan Mills

Accompanying Material 3: Follow-Up Email after Three Days

SUBJECT LINE: University of Oregon Thesis on NBA Analytics

Dear _____,

This is Jonathan Mills from the University of Oregon Honors College. As a reminder, I am writing an undergraduate thesis about decision-making processes in the NBA, and specifically studying the interplay between advanced analytics and traditional evaluation. I am just following up on my email from _____ to see if you would be willing to participate in my research either via phone interview or online survey (https://oregon.qualtrics.com/SE/?SID=SV_3DGe8IIFYw9yWTb). I would appreciate any insight you may be able to provide. Let me know if you are interested, or if there is somebody else in your organization I should contact.

Thank you for your consideration,
Jonathan Mills

Accompanying Material 4: Last Email after Three Days

SUBJECT LINE: Last email- University of Oregon Thesis on NBA Analytics

Dear _____,

This is Jonathan Mills from the University of Oregon Honors College, writing an undergraduate thesis about decision-making and analytics/traditional evaluation in the NBA. This is the last time I will bother you with an email, but I wanted to check one last time to see if you were willing to participate in my research either via phone interview or online survey (https://oregon.qualtrics.com/SE/?SID=SV_3DGe8IIFYw9yWTb). Let me know if you are interested, and I will look forward to hearing from you soon.

Thank you for your consideration,
Jonathan Mills

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