

Oprisor, Tudor; Cordos, George-Silviu

Article

Numbers beyond the pitch: A conceptual review concerning the impact of data analysis on football club valuation

European Financial and Accounting Journal

Provided in Cooperation with:

Faculty of Finance and Accounting, Prague University of Economics and Business

Suggested Citation: Oprisor, Tudor; Cordos, George-Silviu (2024) : Numbers beyond the pitch: A conceptual review concerning the impact of data analysis on football club valuation, European Financial and Accounting Journal, ISSN 1805-4846, Prague University of Economics and Business, Faculty of Finance and Accounting, Prague, Vol. 19, Iss. 2, pp. 1-19, <https://doi.org/10.18267/j.efaj.286>

This Version is available at:

<https://hdl.handle.net/10419/319723>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Numbers Beyond the Pitch: A Conceptual Review Concerning the Impact of Data Analysis on Football Club Valuation

*Tudor Oprisor – George-Silviu Cordos**

Abstract:

This article investigates how data analytics is revolutionizing how football clubs are valued. Previously, valuations were based on biased opinions and past financial results, which often resulted in errors and missed chances. Data analytics offers a more impartial method that considers elements including player worth, brand power, fan involvement, and online presence. The article delves into specific methodologies employed in data-driven valuations, highlighting their advantages over traditional methods. The article – structured as a literature review – showcases how various stakeholders benefit from this approach. Club owners gain a more reliable way to assess assets, while players and agents leverage data for contract negotiations. The article uses existing studies to delineate elements of data analysis which are prone to be included in valuation models. The article highlights the drawbacks of data-driven valuations, such as data reliability and the difficulty in quantifying intangible elements. It advocates for a hybrid strategy that balances data analysis with the judgment of human experts. Additionally, the article outlines the potential of data analytics for valuing intangible assets and making analytics more common in football, paving the way for a sports industry that is more competitive and driven by data.

Keywords: Data Analysis; Football; Metrics; Valuation.

JEL classification: M41; Z23.

1 Introduction

The multi-billion-dollar world of professional association football (also known as *soccer*) thrives on a delicate balance between on-field performance and financial prowess. Traditionally, club valuations relied heavily on subjective assessments and historical financial data. However, the advent of data analytics is revolutionizing this landscape, offering a transformative approach to football club valuation.

* Tudor Oprisor; Babes-Bolyai University of Cluj-Napoca, Faculty of Business, Department of Business, Horea Street 7, 400174 Cluj-Napoca, Romania, <tudor.oprisor@ubbcluj.ro>, ORCID iD: 0000-0002-2549-9501.

George-Silviu Cordos; Babes-Bolyai University of Cluj-Napoca, Faculty of Business, Department of Business, Horea Street 7, 400174 Cluj-Napoca, Romania, <george.cordos@ubbcluj.ro>, ORCID iD: 0000-0003-3239-6743.

This article aims to explore the transformative impact of data analytics on football club valuation and management. Building upon key prior studies, such as Müller *et al.* (2017), who investigated machine learning algorithms for player valuation, and Markham (2013), who developed a multivariate model for club valuation, we seek to provide a comprehensive conceptual framework that delineates how data analytics is reshaping football finance.

The objective of this research is to investigate how data-driven approaches are revolutionizing the way clubs are valued, players are assessed, and overall football operations are conducted. By synthesizing existing literature and industry practices, we aim to present an evidence-based overview of how data is fundamentally changing the football business model and competitive landscape.

Fuelled by the ever-increasing availability of complex data sets, clubs are now equipped to analyse not just past financial performance, but also player value, brand strength, fan engagement, and digital reach. This data-driven approach offers a more objective and nuanced perspective on a club's true worth, a necessity in today's competitive and globalised football market.

Our study will delve into specific methodologies employed in data-driven football club valuation, examining how these methods go beyond traditional financial metrics to provide a more holistic and forward-looking assessment. By doing so, we aim to contribute to the growing body of knowledge on the application of data analytics in sports management and finance.

This article provides a conceptual framework that explores how data analytics is fundamentally reshaping football finance, offering the foundation for more accurate and insightful ways to value these prestigious clubs. In doing so, we build upon and extend the work of scholars like Tunaru and Viney (2010), who pioneered data-driven approaches to player valuation, and Kim *et al.* (2019), who explored the use of machine learning in football analytics.

The remainder of this article is structured as follows. Section 2 outlines the research methodology, detailing the systematic literature review process following the PRISMA protocol and explaining the selection and categorising of the relevant literature. Section 3 examines the rise of data analytics in football and its implications for various stakeholders, from club owners to fans. Section 4 explores how data analytics is transforming football club valuation, comparing traditional methods with data-driven approaches and highlighting their respective strengths and limitations. Section 5 investigates how metrics and analytics are used to determine player market values and optimize salary structures. Finally, Section 6 presents conclusions, addresses remaining challenges in implementing data-driven valuations, and suggests directions for future research in this rapidly evolving field.

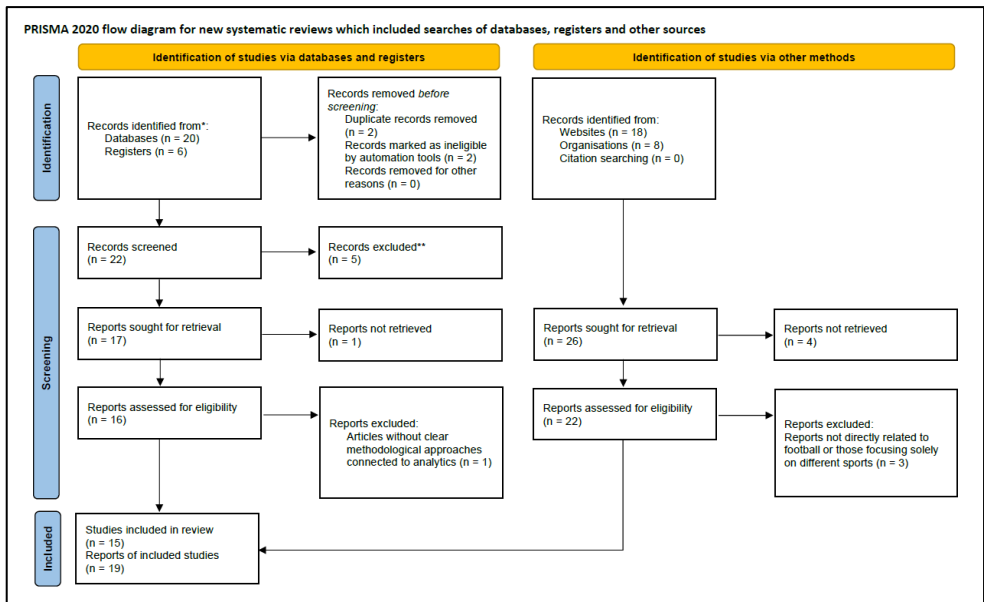
2 Research Methodology

Methodologically, the research employs conceptual analysis to delineate various metrics and data points used in data-driven football club valuation. By synthesising findings from multiple sources, the research identifies relationships and trends that illustrate how data analytics is reshaping club valuation and management practices. This methodology provides a robust framework for understanding the current state and future potential of data analytics in the football industry, offering a more nuanced and forward-looking assessment compared to traditional valuation methods.

By systematically reviewing existing literature and industry practices, the research highlights the transformative potential of data analytics in offering more objective, transparent, and dynamic valuation models. This is particularly valuable in an industry where valuations have historically been subjective and prone to volatility. This holistic approach ensures that the insights are both academically rigorous and practically relevant, paving the way for more informed decision-making and strategic planning in the football industry.

As designed in Fig. 1, the research employs a systematic literature review following the framework proposed by the PRISMA protocol (Page *et al.*, 2021) to explore data analytics' impact on football club valuation.

Fig. 1 PRISMA flow diagram for the systematic review



Source: Authorial computation based on Page *et al.* (2021).

The systematic search process is grounded by defining specific inclusion criteria:

- peer-reviewed articles and recognised industry publications published between years 2005–2024,
- studies or reports focusing on data analytics in football (soccer),
- papers addressing club valuation methods, and
- articles written in English.

Exclusion criteria include:

- studies not directly related to football or those focusing solely on different sports,
- literature not available in English, and
- articles without clear methodological approaches connected to analytics.

The literature search was conducted across the Web of Science network, Scopus, Google Scholar, as well as verified online sources from reporting organizations (industry reports) using keywords: “football analytics”, “soccer data analysis”, “club valuation”, “sports data analytics”, “football metrics”, and “player valuation”.

Our refined search yielded 52 potentially relevant articles and industry reports. After removing duplicates and screening titles and abstracts against the inclusion and exclusion criteria, the resulting refined pool includes 38 articles and industry reports for full-text review.

Following full-text assessment, 34 articles and industry reports met all inclusion criteria and were included in the final analysis. These articles were systematically categorised into three main themes (as presented in Tab. 1):

- data analytics applications in football,
- valuation methodologies, and
- player performance metrics.

Quality assessment of the included studies was performed using a standardised evaluation framework considering methodological rigor, data quality, and relevance to the research objectives.

Tab. 1 Comprehensive classification of literature streams

Author(s) and year	Data analytics applications in football	Valuation methodologies	Player performance metrics
Ahmed (2022)	✓		
Amir and Livne (2005)		✓	
Analyisport (2021)	✓	✓	✓
Brandsen Sports (2023)	✓		
Chauhan and Khairnar (2020)		✓	

Author(s) and year	Data analytics applications in football	Valuation methodologies	Player performance metrics
Deloitte (2024)	✓	✓	
Dougramaji (2023)	✓		
Fantinel (2023)		✓	✓
Franceschi <i>et al.</i> (2023)		✓	✓
GameInsight (2023)	✓		
Gulbrandsen and Gulbrandsen (2011)		✓	
Guzmán-Raja and Guzmán-Raja (2021)	✓	✓	
Harper (2021)	✓		
Ikwechegh (2020)		✓	
Katerova (2023)	✓		✓
Kim <i>et al.</i> (2019)		✓	✓
Laidig (2018)		✓	✓
Lichtenthaler (2020)	✓	✓	
Mark (2023)	✓		
Markham (2013)		✓	
McHale and Holmes (2023)		✓	✓
Müller <i>et al.</i> (2017)		✓	✓
Pykes (2022)	✓		
Quansah <i>et al.</i> (2021)		✓	
Scarfe <i>et al.</i> (2021)		✓	
Schroer (2024)	✓		
SciSports (2021)	✓		
Segner (2023)	✓		
Slater (2022)		✓	
Totime (2023)	✓	✓	
Trichard (2021)		✓	✓
Tunaru and Viney (2010)		✓	
WDSportz (2024)	✓		✓
Yaldo and Shamir (2017)		✓	

Source: Authorial computation.

Note: Several sources (papers and/or industry reports) contribute to more than one category, reflecting the interdisciplinary nature of football data analytics.

The analysis revealed several key methodological approaches employed across the studies, including statistical modelling, machine learning applications, case studies, and mixed methods approaches. A balanced distribution reflects the diverse analytical techniques used in football analytics.

Given the diverse nature of our sources, we acknowledged and addressed heterogeneity by discussing potential limitations due to different methodologies, data sources, and contexts. This discussion helped in contextualizing our findings within the broader scope of football finance.

To ensure methodological rigor, the review process was documented using the PRISMA flow diagram, detailing the number of studies identified, screened, assessed for eligibility, and included in the final analysis.

3 Data Analytics in Football: Rise and Implications

The use of data and statistical analysis in football is not new. In the 1950s, Charles Reep pioneered the use of notational analysis to track and analyse events that occurred during matches (Katerova, 2023). However, it is only in the last 10–15 years that data analytics has really taken off in the sport, driven by advances in technology that have made it possible to capture and process large volumes of data.

Today, football clubs have access to a wealth of data on players and team performance. This includes traditional event data like shots, passes and tackles, captured by companies like Opta, as well as newer forms of data like player tracking, which provides detailed information on players' movements and physical output (GameInsight, 2023). Clubs are using this data in a variety of ways, from opposition analysis and game preparation to player recruitment and development (Brandsen Sports, 2023).

The use of data analysis in football has led to the emergence of a new generation of data-driven decision-makers within clubs. This includes data scientists, analysts, and engineers who use data to guide their choices (Schroer, 2024). It has also spawned a thriving industry of sports analytics companies and consultancies that provide data and analytical services to clubs (Pykes, 2022).

As more clubs invest in their data analytics capabilities, it is becoming a key source of competitive advantage. The application of data analytics in football club valuation has important implications for various stakeholders. For club owners and investors, data-driven valuations offer a more reliable way to assess the worth of their assets and make informed investment decisions (Chauhan and Khairnar, 2020). This is particularly crucial in an industry where club valuations can be highly volatile and subjective.

For players and agents, data analytics provide new insights into player value and performance that can be used in contract negotiations and transfer deals (Schroer, 2024). Clubs are increasingly using data to identify undervalued talent and make more efficient use of their transfer budgets. This is leading to a more rational and transparent transfer market, where prices are more closely aligned with a player's objective performance data (Müller *et al.*, 2017).

The rise of data analytics is also having an impact on how fans engage with and consume football (GameInsight, 2023). Advanced metrics like expected goals (xG) and pass completion percentage (see Tab. 2) are becoming more mainstream, used by broadcasters and journalists to analyse matches and players. Fantasy football and betting markets are also being shaped by data analytics, as fans and gamblers seek to gain an edge through data-driven insights.

Tab. 2 Comprehensive classification of literature streams

Key metric	Delineation	Source
Expected Goals (xG) and Expected Assists (xA)	These advanced metrics assess a player's ability to create and convert goal-scoring chances, moving beyond just raw goal and assist totals. xG measures the likelihood of a shot resulting in a goal based on factors like shot location, while xA estimates the likelihood of a pass leading to a goal.	Dougramaji (2023), WDSportz (2024)
Passing metrics	Clubs analyse a range of passing statistics to evaluate a player's ability to maintain possession and create chances. Key metrics include pass completion rate, key passes per game (passes leading directly to a shot) and passing accuracy in different areas of the pitch.	Fantinel (2023)
Defensive contributions	For defensive players, clubs look at metrics like tackles won, interceptions made, aerial duels won, and clearances. This metric helps assess a player's ability to win back possession and prevent opposition attacks	Fantinel (2023)
Pressing and off-ball metrics	To evaluate a player's work rate and tactical fit, clubs are increasingly using metrics that capture off-ball actions. These include the number of sprints made, distance covered, and the success rate of pressuring opposing players.	Fantinel (2023)
Shooting accuracy	For attacking players, shooting metrics like shot conversion rate, shots on target percentage, and shooting efficiency from different areas help assess their ability to consistently test the goalkeeper and score goals.	Fantinel (2023)

Key metric	Delineation	Source
Dribbling and ball retention	Dribbles attempted, dribble success rate, and mis controls are used to gauge a player’s ability to beat opponents and maintain possession under pressure.	Fantinel (2023)
Set piece productivity	For players who take free kicks and corners, clubs will look at metrics like the number of shots and goals created from set play deliveries.	Fantinel (2023)
Physical and fitness data	Metrics on a player’s top speed, acceleration, stamina and injury history help determine if they have the physical profile to meet the demands of the club’s style of play.	Dougramaji (2023)

Source: Authorial computation.

Note: In addition to these objective performance metrics, clubs also use more subjective data points like scouting reports, character references, and “football IQ” assessments to gain a more complete picture of a potential signing’s suitability. By combining traditional scouting with advanced data analysis, clubs aim to make more informed and less risky decisions in the transfer market.

Data analysis provides football clubs with an objective, evidence-based approach to player recruitment that was previously impossible. While traditional scouting still plays an important role, data is now a crucial complement that enables smarter, more efficient decision-making in the transfer market.

In essence, data analytics enables a more objective approach to club valuation that relies on underlying performance metrics rather than just subjective factors like brand value and recent on-pitch results (see Tab. 3). This makes valuations more transparent and replicable (Müller *et al.*, 2017). Moreover, by analysing detailed player and team performance data, clubs and investors can identify undervalued assets in the transfer market. This allows them to make smarter investments and gain a competitive edge (Analisport 2021; Mark, 2023).

Tab. 3 Comprehensive classification of literature streams

Team	Use of data analysis	Source
Arsenal FC	In analysing the value of star player Thierry Henry during the 2003–04 season, Tunaru and Viney (2010) used a data-driven model that incorporated Henry’s average Opta Index performance points per match compared to team average. They estimated the correlation between the club’s week-by-week revenues and the team’s performance to determine the value Henry contributed to Arsenal’s revenues that season, which they calculated to be over GBP 20 mil.	Gulbrandsen and Gulbrandsen (2011)

Team	Use of data analysis	Source
Real Madrid and FC Barcelona	As the two most valuable football clubs in the world at USD 4.2 bil. and USD 4.02 bil. respectively, Real Madrid and Barcelona have likely employed data analytics as part of their overall valuation methodology. Factors like stadium utilization, fan demand, and the club's history and brand are quantified and included in their valuation calculations.	Ikwechegh (2020)
Manchester United	Valued at USD 3.8 bil., Manchester United is the third most valuable club globally. With a huge worldwide fan base and commercial appeal, the club uses data analysis to optimise its sponsorship and marketing revenues. Data around fan engagement, social media reach, and consumer spending is leveraged to drive the club's commercial value.	Ikwechegh (2020) Deloitte (2024)
Liverpool FC	In terms of match analysis and player recruitment, data is collected through various means, including tracking systems and wearable technology. This provides insights into player positioning, passing patterns, physical performance metrics (distance covered, speed), and even shot locations. Analysts use this to evaluate opponents' tactics, identify weaknesses, and tailor game plans to exploit them. Liverpool's data science team, led by William Spearman, utilises statistical models to assess potential player signings. This goes beyond traditional scouting methods by analysing a player's performance data and how it might translate to Liverpool's specific style of play. Also, wearable tech monitors player fatigue levels during training, allowing coaches to optimise training regimes and prevent injuries. This ensures peak physical condition throughout the season.	Lichtenthaler (2020)
Top 20 European clubs	The annual Football Money League report by Deloitte tracks the revenues and value of the top clubs in Europe. Advanced data analysis of financial statements and direct club data is used to split revenues into matchday, broadcast and commercial sources. This granular revenue data provides a more meaningful comparison of clubs' financial performance and valuation.	Deloitte (2024)

Source: Authorial computation.

In addition, data analysis vastly increases the number of players a club can assess when looking for new signings. It helps identify talent that fits the club's style of play and is available at an affordable price. This makes recruitment more efficient and less risky (Harper, 2021).

For club owners and investors, data-driven valuations provide a more reliable way to assess the value of their assets. This enables more informed investment and budgeting choices to keep clubs financially sustainable (Totime, 2023). Also, beyond player recruitment, data analytics also helps clubs demonstrate their value to sponsors, personalise fan engagement, and make smarter operational decisions to maximise revenues (Dougramaji, 2023; Totime, 2023).

Data analysis is transforming football club valuations by making them more objective, dynamic, and precise. While not perfect, data-driven valuations are a powerful complement to traditional methods that can give clubs and investors a significant competitive advantage in the modern football industry (Müller *et al.*, 2017).

The increasing use of data analytics in football – on the other hand – is not without its risks and challenges. There are concerns about the privacy and security of player data, as well as the potential for data to be misused or manipulated for competitive gain. There is also a risk that an overreliance on data could lead to a more homogenised and less creative style of play, as clubs optimise their tactics based on analytical models rather than individual flair (Brandsen Sports, 2023).

4 Connecting the Numbers: Data Analytics Implications on Football Clubs' Valuation

One of the most important applications of data analytics in football is in the valuation of clubs. Historically, football club valuations have been a somewhat subjective exercise, relying heavily on factors like brand value, stadium ownership and recent on-pitch performance (Slater, 2022). However, the explosion of data in the sport is enabling a more objective, data-driven approach to valuation.

Traditionally, football club valuations have relied on a few key methods, each with their own strengths and limitations:

- **Revenue multiples:** One of the most common traditional valuation approaches is using revenue multiples, where a club's value is calculated by multiplying its annual revenues by a certain multiple (Chauhan and Khairnar, 2020). The choice of multiple depends on factors like a club's profitability, growth prospects and risk profile. While revenue multiples are relatively straightforward, they do not fully capture a club's assets and liabilities or its ability to control costs (Chauhan and Khairnar, 2020).

- **Discounted Cash Flow (DCF):** DCF is a widely recognised method for assessing a company's value, including football clubs. The value is determined by discounting the expected future free cash flows back to their present value using a discount rate reflecting the perceived investment risk (Ikwechegh, 2020). DCF can be suitable for clubs with predictable, positive cash flows. However, it relies heavily on assumptions about long-term growth and discount rates, which can be subjective (Ikwechegh, 2020).
- **Book value:** Some valuations consider a club's book value, which is the value of its assets minus liabilities on the balance sheet. This method provides an objective measure based on accounting data. However, book values are backward-looking and do not reflect a club's ability to generate future revenues or intangible assets like brand value and player contracts (Amir and Livne, 2005).
- **Comparable company analysis:** This approach values a club based on financial metrics from similar publicly traded clubs. Common metrics include revenue, EBITDA, and price-to-earnings ratios (Markham, 2013). While this accounts for sector-specific factors, it is challenging to find truly comparable clubs given differences in market size, league, and on-pitch success (Markham, 2013).
- **Multivariate model:** Another popular valuation approach is the multivariate model developed by Markham (2013). This model considers a wider range of factors beyond just revenue, including net profit, net assets, stadium utilization and wage control. The model has been found to be more accurate than other valuation methods like discounted cash flow and market capitalization (Markham 2013; Kim *et al.*, 2019).

While these traditional methods provide a starting point, they each have limitations in capturing the complexities of modern football finance. Revenue multiples and DCF are highly dependent on assumptions, book value ignores intangibles, and comparable analysis is limited by a lack of true comparable data. As a result, there has been growing interest in data-driven approaches that can provide a more holistic, objective assessment of a club's value.

More recently, researchers have explored the use of machine learning algorithms to estimate the market value of players and clubs (Müller *et al.*, 2017). By training models on large datasets of player transfers and performance metrics, it is possible to build predictive models of player value that can be aggregated to estimate overall club value. While still an emerging area, machine learning offers the potential for more precise and automated valuations.

Regardless of the specific methodology used, data-driven valuation models offer several advantages over traditional approaches, mostly because they are more objective, transparent, as well as replicable (Ahmed, 2022). They can also be

updated in real-time as new data becomes available, providing a more dynamic view of a club's value (Slater, 2022).

For valuation models that rely heavily on financial metrics like revenue and net profit, clubs use audited accounting data from official financial statements to ensure accuracy. The Markham multivariate model for example uses verified accounting data (Chauhan and Khairnar, 2020). To ensure accuracy, clubs source their player performance and transfer data from established analytics companies like Opta, Wyscout, StatsBomb *etc.* These firms have rigorous data collection and verification processes to maintain data integrity (SciSports, 2021).

Top clubs are building in-house data teams and infrastructure to collect, store and analyse data in a systematic way. Having centralised data warehouses and pipelines helps maintain data consistency (Branden Sports, 2023). While data provides an objective starting point, clubs recognise its limitations. Most use a hybrid approach, combining insights from data with the subjective assessments of coaches and scouts to get a reliable overall picture (Analysisport, 2021). Some clubs are starting to adopt data observability platforms that automatically monitor data pipelines and flag anomalies. This proactively identifies data quality issues before they impact decision-making (Segner, 2023).

However, data-driven valuations are not without their limitations. They are heavily reliant on the quality and completeness of the underlying data, which can vary between clubs and leagues (Müller *et al.*, 2017). They may also struggle to capture intangible factors that can influence a club's value, such as fan loyalty or global brand appeal (Slater, 2022). As such, data-driven valuations should be seen as a complement to, rather than a replacement for, traditional valuation methods. Data inconsistencies between different providers and the fast-paced nature of the football industry also make it difficult to always have reliable real-time data. But overall, the trend is clearly towards more data-driven, objective valuations as analytics capabilities mature.

5 Assessing the Sum of the Parts: Metrics Versus Football Players Market Value

Traditionally, a player's financial impact on a club has been gauged by two key metrics: transfer fees and salaries. Transfer fees represent the upfront cost of acquiring a player, while salaries reflect the ongoing financial commitment a club makes to a player's services. Analysing these figures allows clubs to assess the return on investment for a player and project their overall financial impact on the club's budget.

When transferring a new player to their squad, clubs look at a wide range of statistical measures to assess a player's on-pitch contributions. This includes traditional stats like goals and assists, as well as advanced metrics like expected goals (xG), pass completion rates, defensive contributions *etc.* By quantifying performance, clubs can determine what a player should be worth (Tunaru and Viney, 2010; Müller *et al.*, 2017; Laidig, 2018). Some clubs use machine learning algorithms trained on large datasets of player transfers and performance metrics to estimate market values. These models consider factors like age, contract length, playing position, and league to predict what a player could be worth (Kim *et al.*, 2019; McHale and Holmes, 2023).

Data allows clubs to compare a player's performance and value against those of similar players in their squad and across different leagues. This helps determine if a player is over or undervalued relative to market rates for a given level of performance. For younger players, data models are used to forecast how a player's performance is likely to progress based on factors like age, experience, and rate of improvement. This helps clubs project what a player could be worth in the future (Müller *et al.*, 2017).

All in all, football clubs are increasingly leveraging data analysis to estimate player market values more accurately and objectively. By considering a wide range of performance, contextual, and commercial factors, and utilizing advanced statistical and machine learning techniques, clubs aim to gain a competitive edge in the transfer market.

In the past, setting player salaries was a subjective process based on gut feeling and reputation. Today, data analytics offers a more objective approach. By leveraging data, clubs can make informed decisions about player compensation while optimizing their financial health. In this sense, football clubs can ground their decisions on the following proxies (embedding data analytics):

- **Analysing detailed performance metrics:** Clubs look at a wide range of statistical measures to assess a player's on-pitch contributions. This includes traditional stats like goals and assists, as well as advanced metrics like expected goals (xG), pass completion rates, defensive contributions, *etc.* By quantifying performance, clubs can determine what a player should be worth in salary. (Yaldo and Shamir, 2017; Trichard, 2021; Totime, 2023).
- **Benchmarking against comparable players:** Data allows clubs to compare player's performance and salary demands against those of similar players in their squad and across different leagues. This helps determine if a salary request is reasonable based on market rates for a given level of performance and experience (Scarfe *et al.*, 2020; Yaldo and Shamir, 2021; Franceschi *et al.*, 2023).

- **Assessing injury risk:** Clubs analyse player's injury history using data to predict the likelihood of future absences. Players who are more injury-prone may be offered lower salaries or contracts more heavily weighted with performance incentives (Analyisport, 2021).
- **Projecting future potential:** For younger players, data models are used to forecast how a player's performance is likely to progress based on factors like age, experience, and rate of improvement so far in their career. This helps clubs project what a player could be worth in future salary if they continue developing (Müller *et al.*, 2017; Analyisport, 2021).
- **Evaluating off-pitch contributions:** Some clubs try to quantify a player's off-pitch value in areas like shirt sales, social media following, and fan appeal. Players who generate substantial commercial value may be offered higher salaries (Kim *et al.*, 2019; Scarfe *et al.*, 2020).
- **Optimizing wage bill:** Data helps clubs understand what proportion of their overall revenues should be spent on player wages to remain profitable. Predictive models show the impact of player salaries on the club's finances (Guzmán-Raja and Guzmán-Raja, 2021; Quansah *et al.*, 2021).
- **Determining contract structure:** In addition to base salary, data informs how a contract should be structured in terms of bonuses, incentives, and add-ons to optimise the club's return on investment and protect against overpaying for underperformance (Analyisport, 2021).

Data analytics provides an objective basis for player salary negotiations that were previously often quite subjective. By quantifying performance, off-pitch value, injury risk, and future potential, clubs can determine market-driven compensation for players while also optimizing their overall wage bill. However, data is ultimately just one input, and clubs still must balance analytics with intangible factors like team chemistry and leadership when making final salary decisions.

6 Conclusion and Future Trends

In conclusion, data analytics has fundamentally transformed football club valuation by introducing objective, evidence-based methodologies that supersede traditional subjective assessments. The integration of comprehensive data analysis enables more accurate valuations by incorporating real-time performance metrics, fan engagement statistics, and commercial indicators.

The shift toward data-driven valuation has enhanced transparency and reliability in the football industry. Statistical models and quantifiable metrics have made the valuation process more replicable and less susceptible to bias, particularly important in an environment where valuations have historically been contentious.

A significant advance has been the ability to quantify previously intangible assets. Modern analytical tools can now measure and evaluate elements such as brand value, fan relationships, and intellectual property, which are increasingly critical components of a club's overall worth.

By striking the right balance, data analytics can help create a more efficient, transparent and sustainable football economy, where clubs are valued fairly based on their true underlying performance and potential. This research provides a foundation for further development of data-driven valuation models and case studies to refine and validate these approaches in practice.

Overall, this research has successfully fulfilled its objective of providing a comprehensive conceptual framework on the transformative impact of data analytics in football club valuation and management. Through an extensive review of existing literature and industry reports, the study has delineated the keyways in which data-driven approaches are revolutionizing how clubs are valued, players are assessed, and football operations are conducted.

However, several challenges persist in the implementation of data analytics for football club valuation. These include maintaining data quality, ensuring consistency across different sources, and establishing robust security protocols while preserving privacy.

In terms of future perspectives, further research should explore how advanced AI algorithms can improve valuation accuracy and predictive capabilities, particularly in forecasting player performance and market trends. Additionally, more studies can develop standardised valuation frameworks that can be consistently applied across different leagues and markets, ensuring better comparability.

Also, further investigations into how emerging digital technologies, including blockchain and NFTs, might influence club valuations and create new revenue streams. From different lens, research examining how cultural and regional differences affect club valuations across different football markets can provide valuable insights for international investors.

By presenting this evidence-based overview, grounded in current industry practices, this research dimension provides a robust foundation for understanding how data analytics is fundamentally reshaping the football business model. This framework lays the groundwork for future empirical studies to develop more refined data-driven valuation models and further advance analytics in the football industry.

References

Ahmed, N., 2022. Understanding Sports Data Analytics Simplified. Hevo Data. Available from: <<https://hevodata.com/learn/sports-data-analytics>>. [15 March 2024].

Amir, E., Livne, G., 2005. Accounting, Valuation and Duration of Football Player Contracts. *Journal of Business Finance & Accounting*, 32(3–4), 549–586. DOI: 10.1111/j.0306-686x.2005.00604.x.

AnalyiSport, 2021. How Football Clubs Use Data to Sign Players. AnalyiSport. Available from: <<https://analysisport.com/insights/how-football-clubs-use-data-to-sign-players>>. [15 March 2024].

Brandsen Sports, 2023. The Game-Changer: Data Analytics in Football. LinkedIn. Available from: <<https://www.linkedin.com/pulse/game-changer-data-analytics-football-brandsen-sports-c5zje>>. [15 March 2024].

Chauhan, D., Khairnar, A., 2020. Multivariate Model - An Optimal Method for Valuing Football Clubs? Aranca. Available from: <<https://www.aranca.com/knowledge-library/articles/investment-research/multivariate-model-an-optimal-method-for-valuing-football-clubs>>. [15 March 2024].

Deloitte, 2024. Deloitte Football Money League 2024. Deloitte. Available from: <<https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/deloitte-football-money-league.html>>. [15 March 2024].

Dougramaji, M., 2023. Data Analytics in football: How LFC Used Data to Gain the Edge. Rockborne. Available from: <<https://rockborne.com/graduates/blog/data-analytics-in-football-lfc>>. [15 March 2024].

Fantinel, P., 2023. Evaluating Football Players. DAIN Studios. Available from: <<https://dainstudios.com/insights/evaluating-football-players>>. [15 March 2024].

Franceschi, M., Brocard, J. F., Follert, F., Gouguet, J. J., 2023. Determinants of football players' valuation: A systematic review. *Journal of Economic Surveys*, 38(3), 577–600. DOI: 10.1111/joes.12552.

GameInsight, 2023. The Rise of Data Analytics in Football: How Big Data is Transforming the Beautiful Game. GameInsight. Available from: <<https://gameinsight.sport/data-analytics-football-transforming-game>>. [15 March 2024].

Gulbrandsen, A. M., Gulbrandsen C. M., 2011. Valuation of Football Players: A Complete Pricing Framework. Master's thesis, Norwegian School of Economics. Available from: <<http://hdl.handle.net/11250/169019>>. [15 March 2024].

Guzmán-Raja, I., Guzmán-Raja, M., 2021. Measuring the Efficiency of Football Clubs Using Data Envelopment Analysis: Empirical Evidence From Spanish Professional Football. *Sage Open*, 11 (1). DOI: 10.1177/2158244021989257.

Harper, J., 2021. Data experts are becoming football's best signings. *BBC News*. Available from: <<https://www.bbc.com/news/business-56164159>>. [15 March 2024].

Ikwechegh, J., 2020. Valuation of Sports Organizations: Football Clubs? *LinkedIn*. Available from: <<https://www.linkedin.com/pulse/how-football-clubs-valued-jerry-nnochiri-ikwechegh>>. [15 March 2024].

Katerova, L., 2023. How Big Data & Analytics Improve Football Performance. *B EYE*. Available from: <<https://b-eye.com/blog/how-big-data-analytics-improve-football-performance>>. [15 March 2024].

Kim, Y., Bui, K. H. N., Jung, J. J., 2019. Data-driven exploratory approach on player valuation in football transfer market. *Concurrency and Computation: Practice and Experience*, 33(3). DOI: 10.1002/cpe.5353.

Laidig, D., 2018. Building a System for Assessing Player Value. *American Soccer Analysis*. Available from: <<https://www.americansocceranalysis.com/home/2018/9/10/building-a-system-for-assessing-player-value>>. [15 March 2024].

Lichtenthaler, U., 2020. Mixing data analytics with intuition: Liverpool Football Club scores with integrated intelligence. *Journal of Business Strategy*, 43(1), 10–16. DOI: 10.1108/jbs-06-2020-0144.

Mark, A., 2023. What Marketers Can Learn From Football Analytics. *CVE*. Available from: <<https://controlvexposed.com/what-data-driven-marketers-can-learn-from-football-analytics>>. [15 March 2024].

Markham, T., 2013. What is the Optimal Method to Value a Football Club? *SSRN Electronic Journal*. DOI: 10.2139/ssrn.2238265.

McHale, I. G., Holmes, B., 2023. Estimating transfer fees of professional footballers using advanced performance metrics and machine learning. *European Journal of Operational Research*, 306(1), 389–399. DOI: 10.1016/j.ejor.2022.06.033.

Müller, O., Simons, A., Weinmann, M., 2017. Beyond crowd judgments: Data-driven estimation of market value in association football. *European Journal of Operational Research*, 263(2), 611–624, DOI: 10.1016/j.ejor.2017.05.005.

Page, M. J. *et al.*, 2021. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews, *BMJ*, 372, DOI: 10.1136/bmj.n160.

Oprisor, T., Cordos, G. S.: *Numbers Beyond the Pitch: A Conceptual Review Concerning the Impact of Data Analysis on Football Club Valuation*.

Pykes, K., 2022. Sports Analytics: How Different Sports Use Data Analytics. DataCamp. Available from: <<https://www.datacamp.com/blog/sports-analytics-how-different-sports-use-data-analysis>>. [15 March 2024].

Quansah, T., Frick, B., Lang, M., Maguire, K., 2021. The Importance of Club Revenues for Player Salaries and Transfer Expenses—How Does the Coronavirus Outbreak (COVID-19) Impact the English Premier League? *Sustainability*, 13(9), 5154. DOI: 10.3390/su13095154.

Scarfe, R., Singleton, C., Telemo, P., 2021. Extreme Wages, Performance, and Superstars in a Market for Footballers. *Industrial Relations: A Journal of Economy and Society*, 60(1), 84–118. DOI: 10.1111/irel.12270.

Schroer, A., 2024. Sports Analytics: What It Is, How It's Used. Built In. Available from: <<https://builtin.com/big-data/big-data-companies-sports>>. [15 March 2024].

SciSports, 2021. State of the football analytics industry in 2021. SciSports. Available from: <<https://www.scisports.com/state-of-the-football-analytics-industry-in-2021>>. [15 March 2024].

Segner, M., 2023. How TOCA Football Achieved Their Data Quality GOOOOOOAL! Monte Carlo. Available from: <<https://www.montecarlodata.com/blog-how-toca-football-achieved-their-data-quality-goal>>. [15 March 2024].

Slater, M., 2022. How do you value a football club? The Athletic. Available from: <<https://theathletic.com/3068619/2022/11/22/how-do-you-value-a-football-club>>. [15 March 2024].

Totime, J., 2023. Data Analytics Revolutionizing Football Contract Negotiations. LinkedIn. Available from: <<https://www.linkedin.com/pulse/data-analytics-revolutionizing-football-contract-negotiations>>. [15 March 2024].

Trichard, T., 2021. What are the main determinants of professional soccer players wages? An Examination of the top 5 European Leagues. Adam Smith Business School, University of Glasgow. Available from: <https://www.researchgate.net/publication/354859802_What_are_the_main_determinants_of_professional_soccer_players_wages_An_Examination_of_the_top_5_European_Leagues>. [15 March 2024].

Tunaru, R. S., Viney, H. P., 2010. Valuations of Soccer Players from Statistical Performance Data. *Journal of Quantitative Analysis in Sports*, 6(2). DOI: 10.2202/1559-0410.1238.

WDSportz, 2024. Uncovering Hidden Patterns: A Look at the Role of Data Analytics in Player Recruitment. WDSportz. Available from:

<<https://wdsportz.com/uncovering-hidden-patterns-a-look-at-the-role-of-data-analytics-in-player-recruitment>>. [15 March 2024].

Yaldo, L., Shamir, L., 2017. Computational Estimation of Football Player Wages. *International Journal of Computer Science in Sport*, 16(1), 18–38. DOI: 10.1515/ijcss-2017-0002.