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Resources and capabilities to turn business data usage in Football Clubs into a competitive advantage

Author: Thibault VANDERSTEEN
Supervisor: Simon HAZÉE

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I. Introduction

Across the years, football has evolved from being a recreational activity, managed by amateurs or local people, to being a major and high-profile industry (Cross & Henderson, 2003). Football Clubs are now generating hundreds of millions of euros a year while the sport was still under-financed some decades ago. Manchester United, for instance, shows how fast the industry has developed over the years. While the English club has not attracted much attention in 1991 when being on sale for 10 million of pounds, it was offered 650 million only a few years later in 1998 (Cross & Henderson, 2003). Today, the biggest clubs in terms of enterprise value are Real Madrid and Barcelona, valued respectively at 2909 and 2869 million euros (KPMG, 2021). The two Spanish giants generated respectively 691.8 and 715.1 million euros in 2021, down 9 and 15% from 2020, mainly due to the Covid19 crisis (Deloitte Sports Business Group, 2021).

The increasing amount of money is not the only thing that has changed the football scene, as a large globalization phenomenon has occurred, starting in the 90's. Football clubs are being reorganized and are now aiming to be like a typical company, some are even listed on the stock market and matrix organizations are being developed to structure Football Clubs (Grass, Holt & Jonsson, 2001). In this context, clubs increasingly strive to develop organizational strategies that could give them an edge over competition and allow them to enhance performance, be it on the pitch or outside of it. Put differently, teams must find new, innovative ways to achieve superior performance and secure competitive advantages, including by combining internal capabilities in a way that makes it hard to copy (Olieslagers & Henrard, 2021; Gailly, 2021; del Giudice & Maggioni, 2014).

One way to innovate and detach from competitors is by making use of Big Data gathering and analysis techniques (McGuire, 2012). Across all industries, companies in the top of their industry in the use of data analytics are 5% more productive and 6% more profitable than other firms (McAfee & Brynjolfsson, 2012). The global market for sport analytics is growing at an impressive CAGR of 43.5% up to 2024 where it is expected to reach a revenue of $4.5 billion (BusinessWire, 2018). Even though data has only recently made its appearance in the sport industry, it is already perceived has an essential topic by some sporting directors or Football Clubs' managers (Van Haaren, 2021).

However, data analysis techniques come with their own challenges that teams need to be aware of. Indeed, McAfee and Brynjolfsson (2012) declare that the use of Big Data analytics does not prevent organizations from a need of human insights. Moreover, De Luca et al. (2020) argue

that the boost in performances implied by a data analytics decision making highly depends on the organizational ability to action the potential of data as well as on the industry level of digitalization. Football has become highly digitalized (Budovich, 2021) and consequently, aided by the appropriate technological tools, Football Clubs can benefit from a decision-making support and from objective inputs that could help the club perform better. As such, Football Clubs would highly benefit from understanding what resources (e.g., infrastructure) and capabilities are necessary to successfully enhance performance through big data analytics (Deloitte, 2021).

As opposed to prior research that has mainly focused on in-game data analytics in the sport industry (e.g., Apostolou & Tjorjis, 2019), this thesis uses a strategic management perspective and aims to deliver a comprehensive understanding of how out-of-the-game business analytics can provide Football Clubs with a competitive advantage and what are the necessary competencies or capabilities needed to leverage this advantage. By doing so, this thesis responds to recent calls for more research on big data analytics capabilities in organizations (e.g., Sabharwal & Miah, 2021). This leads us to the formulation of two key research questions:

RQ1: **How can data analytics impact a Football Club's overall business performance?**

RQ2: **What are the necessary resources and capabilities to leverage the use of business data analytics and turn it into a competitive advantage for Football Clubs?**

This thesis is structured as following. After this introduction, an extensive literature review on competitive advantage will be made. To finish the set-up of the theoretical backbone, we will then conduct research on data analytics in the context of the Football industry. Subsequently, the methodology will be presented and with this theoretical backbone in mind, this thesis will also address one real-life case, highlighting how some European clubs have been able to grasp the benefits of data analytics early and how it has benefited them. After that, we will conduct qualitative interviews with experts in the domain and try to establish trends that hint at the utility of data analytics and at the capabilities required to convert it into a potential competitive advantage. We finally discuss these findings against prior research, develop managerial recommendations and identify limitations and future research opportunities.

II. Literature review

1. Strategic management and competitive advantage

A firm is said to have a competitive advantage when its value creating strategy is not being implemented by current or future potential competitors (Barney, 1991). Sources of such competitive advantages have been thoroughly discussed by the literature and most of the authors agree that in Strategic Management, a firm's superior performance can come from two main factors.

On the one hand, many claim that it is by responding to environmental opportunities that firms can gain an edge on competition. This echoes Porter's five forces framework, identifying potential outside threats or opportunities (Porter, 1980). This point of view attempts to describe how a firm's environment can affect its competitive position. The environmental context points out favourable conditions that firms can use to outperform rivals, due to changes in the industry structure (Porter & Millar, 1985). Gartner (1985) strengthen that point of view by stating that two main determinants underly the principle of competitive strategy: the attractiveness of the industry for long-term profitability and the factors that influence this very profitability. In that sense, competitive advantages could then come from the external environment.

On the other hand, a deeper analysis of an individual firm's resources and capabilities can highlight strengths and weaknesses to estimate potential sources of competitive edge. This constitutes the Resource-Based Theory (RBT) of competitive advantage (Barney, 1991; Kraaijenbrink, Spender & Groen, 2010). This theory aspires to explain sources of competitive advantage based on a firm's internal resources and capabilities. Based on presumptions of heterogeneity within firm's internal resources (Barney & Hesterly, 2008), the RBT suggests that firm's internal resources and capabilities are the main determinant of competitive advantage, outweighing any external aspect (Amit & Shoemaker, 1993).

In the context of this thesis, the focus will be placed on the internal factors as Football Clubs evolve in comparable contexts across countries and are all part of the same industry.

1.1 The internal factors as drivers of competitive advantage – A Resource-based theory

The idea that firms are heterogeneous in terms of resources and capabilities has been at the core of strategic management for a long time (Peteraf, 1993). Those which are distinctive may serve as the basis for a competitive advantage if they are used in adequation with the environmental landscape (Gailly, 2021; Peteraf, 1993). This means that the Resource-Based Theory (RBT)

that will be detailed below has to be combined with an external analysis of the threats and opportunities surrounding the firm.

When focusing on the firm rather than its environment, business management has for goal to create value. To do so, the RBT tries to grow a link between a firm's distinctive competencies and its capacity to outperform competition in terms of value creation (Reed & Defillippi, 1990). Grant (1991) explains how the RBT has for aim to explain the theory of competitive advantage as an advantage created when management employs a firm's internal resources and abilities to produce above average performance. Wernerfelt (1984) defined resources as "anything that could be thought of as a strength or weakness for a firm" (Wernerfelt, 1984, p172; Lado, Boyd & Wright, 1992).

Managers are concerned by resources and capabilities whose economic returns can be appropriated by the firm. The basic idea behind this perspective is that the obtention of resources and capabilities that are valuable and hard to replicate may enable the firm to expect higher economic returns (Amit & Schoemaker, 1993). A firm has a sustainable competitive advantage when it is using its core resources and capabilities to create value and that competitors are not simultaneously doing it (Barney, 1991).

This echoes the VRIN and VRIO frameworks, aimed at defining what resources hold the potential to create a sustainable competitive advantage. To be contenders, a firm's resource must have 4 main characteristics: (1) it must be valuable as it should enable to firm to exploit opportunities and to neutralize threats, (2) it must be rare as if the competitors all possess it, it is not distinctive, (3) it must be imperfectly inimitable, and (4) it must be either non-substitutable (VRIN model) or the firm must be organized to exploit this resource or capability (VRIO model) (Barney, 1991; Barney & Hesterly, 2008; Grass, Holst & Jönsson, 2001).

It is then by leveraging those resources within the competitive strategy that firms can aim for a superior performance and a sustainable competitive advantage (Barney & Hesterly, 2008). Barney (1991) adds that managers have the potential to generate sustainable competitive advantages as highly skilled personnel can help companies transform generic resources into strategic ones (Grass, Holst & Jönsson, 2001).

However, Barney (1991) points out that a firm should not expect to be able to purchase sustained competitive advantage on open markets (Barney, 1991; Wernerfelt, 1984) as these advantages are rather found by developing skills and capabilities that are causally ambiguous, meaning that there are barriers to imitation because it is difficult for competitors to clearly

understand what factors are responsible for the above-average performance of the firm (Lado, Boyd & Wright, 1992; Reed & DeFillippi, 1990). Resources that are more valuable within their current firm than they would be in any other are called imperfectly mobile resources. These are to a certain extent specialized to firm-specific needs (Peteraf, 1993).

Finally, Barney and Hesterly (2008) classified 4 main categories of resources that could enable the creation of a competitive advantage: Financial resources, physical resources, human resources and organizational resources. To add to those four, Hofer and Schendel (1978) suggested that technological and reputation resources could also be the source of sustainable competitive advantage (Amis, Pant & Slack, 1997). Table 1 lists the categories of resources enabling the creation of a competitive advantage that were identified in the literature.

Table 1: Categories of resources enabling the creation of a competitive advantage

Financial	Money used by firms to implement their strategies. It includes cash from entrepreneurs, equity holders, bondholders, banks and retained earnings (Barney & Hesterly, 2008).
Physical	All the physical technologies used in a firm. It includes plants, equipment, access to raw materials or geographical location (Barney & Hesterly, 2008).
Human	It includes the experience, intelligence, networks, trainings or insights of each individual of a firm (Barney & Hesterly, 2008).
Organizational	It is the attribute of a whole group of individual, not a single one. It includes reporting structure, planning, coordination system, culture (and reputation in certain cases) and relationships between the individuals in the organization (Barney & Hesterly, 2008).
Technological	Refers to the ability of the firm to be effective during its processes, compared to competitors. The most common measure to a firm's technological capability has 3 categories: financial (R&D spending), patents (evaluate innovative activity and new product introductions (ability to improve and develop products) (Hofer and Schendel, 1978).
Organizational reputation	It consists of five characteristics of the organization, namely credibility, reliability, responsibility, trustworthiness and accountability. An organizational reputation is determined through observer's opinions and perceptions (Hofer and Schendel, 1978).

All in all, the RBT expresses how a firm's performance is related to its strategy regarding resources and capabilities. It also relates to the fact that such resources and capabilities can be the source of sustained competitive advantage when being valuable and hard to replicate (Barney, 1991). Having heterogeneous and imperfectly mobile resources enable a firm to differentiate from its competitors while being confident that its recipe for success will take time to be matched (Peteraf, 1993).

2. Strategic management in sports: the case of Football

2.1 Peculiarities of Football Clubs

Even though professional football clubs are trying to become true regular companies and form a well-developed industry, the football industry still highly differs from some other companies. Indeed, the football industry has some peculiarities that could require an adaptation of the Resource-Based Theory. One of the things that complicates the analysis is that the **major factor that influences a club's demand is success on the field** (Gratton, 2000). Football clubs must then **compete on two different sides**: the **business** side as well as the **football** side, knowing that both are highly interconnected. In addition to that, the ticket **demand** for a game is **positively related to the uncertainty** of the result which implies that as the probability of either team winning becomes close to one, ticket sales drop and consequently, teams have no economic motive to become too superior to other teams (Gratton, 2000; Szymanski, 2003; Forrest, Simmons & Buraimo, 2005). Indeed, the ideal market position for almost any firm would be to have a monopoly to maximize profits. In that regard, the lower the competition, the better for the firm in the market. However, **sport teams** often **find a monopoly position unprofitable** as they need strong opponents to keep the outcome uncertain and increase the competition's competitivity which will in the end lead to higher profits (Neale, 1964).

Linked to that, teams therefore **produce a joint product**, meaning a product that cannot be sold separately by a specific team but which results from the combination of the teams. As the product of the competition therefore relies on the different teams of the league, they all contribute to the overall value of it (Neale, 1964; Goossens, 2006). An effect of coopetition might therefore appear in the Football industry, defining the mix between competition and cooperation between teams (Nalebuff & Brandenburger, 1997).

Another major difference is the **emotional bonding** between a club and a supporter, changing the relation between customers and producers. As a matter of fact, the **extreme loyalty of customers** (supporters) is an extremely peculiar situation. When ticket prices rise, supporters won't go to competition so easily, offering a kind of local monopoly to football clubs. Furthermore, supporters have an impact on the value created by football clubs, notably by their positive effect on the team performance as the advantage of playing home might showcase. Finally, in case of financial difficulties, supporters might even help the club by donating money (Hamil et al, 2004; Grass, Holst & Jönsson, 2001). For these reasons, the **relationship between supporters and football clubs is more than a regular relationship with a customer** and it

should be recognized through governance mechanisms that include supporters in the decision-making process (Hamil et al., 2004). This uncommon loyalty might therefore highly impact a firm's strategies regarding marketing or fan experience as this high emotion and investment from fans can create valuable opportunities for Football Clubs (Karg, 2017).

2.2 Key success factors of Football Clubs

As mentioned above, there is a certain complexity when discussing competitive advantage in relation to Football Clubs. Success factors cannot only be the number of trophies won as it should be combined with factors such as financial success (De Mel, 2005). De Mel (2005) states that the main success factors of a football Club are match day revenues, commercial revenues, broadcasting and brand equity, forming the financial success to which we can add the "on the pitch" success (Appendix I). To that can be added categories such as media or player acquisition and disposal (Cross & Henderson, 2003). In their study, Costa et al. (2018) confirm that brand, communication and competition are relevant success factors when explaining differences in competitive advantage between Football Clubs. Indeed, they state that these are the variables influencing a club's competitive advantage the most.

2.3 Competitive advantage

The theory that links competitive advantage with the external environment is challenged for few reasons in the case of Football Clubs. First, as Football Clubs are all evolving in the same industry, the industry attractiveness is quite similar for all. Since the appearance of European competitions, external pressures have been of comparable impact for all teams. Indeed, the UEFA (Union of European Football Associations) imposes economic controls to all Football Clubs. They started by granting licenses to their competition under the condition that management standards of transparency and investment were respected and that economic instability was compensated (Sánchez, Barajas & Sánchez-Fernández, 2020). However, some of these external factors are still slightly different depending on the country of implementation with for example the financial supervision of Football Clubs varying based on the location (Sánchez, Barajas & Sánchez-Fernández, 2020).

Second, a cost leadership strategy hardly applies to the Football industry. In fact, even though control of costs is of uttermost importance, it is not sufficient to deliver a commercial competitive advantage (Cross & Henderson, 2003). This is due to the fact that a cost-cutting strategy often has an impact on the playing performance, thereby negatively affecting financial performance.

Regarding the internal analysis of Football Clubs, even though each of them have the same goal of winning games and trophies and performing well outside of the game, clubs possess heterogeneous resources in players and coaches that serve as a basis for marketing or communication purposes, making each team singular (Duarte et al., 2013). On top of that, these agents are bond by contracts to the club, making resources hardly mobile as they cannot be easily transferred (Grass, Holst & Jönsson, 2001; Porter, 1981).

Besides having different players, the RBT seems to be more suited to the challenges faced by Football Clubs to generate sustainable competitive advantages (Amis, Pant & Slack., 1997). Idiosyncratic competencies and resources of Football Clubs seems to be the main factors of differentiation between competitors. With the goal in mind to develop distinctive resources and capabilities, Football Clubs have the aim to estimate the current and future value of various resources in order to find ways to create a unique strategy that could give them an edge over competition (Lado et al., 1992; Barney, 1986). In that regard, some Football Clubs have turned their eyes towards technological and human resources as no manufacturing or production is involved. Some decided to focus particularly on the use of data and how to leverage it, which we will detail in the sections below (Manoli, 2014; Biermann, 2019).

3. Big Data analytics and competitive performance

3.1 Definition of Big Data Analytics

The emergence of technological development such as Big Data is seen as one of the most important areas of future information (Lee, 2017). It is evolving at a tremendous speed, driven by the internet of things, new technologies as well as social media. Some firms are now transforming to data-driven companies by implementing Big Data infrastructures and analytics. Big data and Big Data analytics are terms that have only recently appeared as they are used to describe data and analytical techniques that are large and complex to an extent that they require specific data storage, management and visualization techniques (Chen, Chiang & Storey, 2012). Runkler (2016) defines data analytics as the application of computer systems to facilitate interpretation of large data sets and therefore to support decision making.

Authors suggest that Big Data has 3 main dimensions, the 3 "V": volume, variety and velocity (Laney, 2001; Russom, 2011; Lee, 2017). Volume refers to the amount of data collected and generated, velocity to the speed at which it is being generated or processed and variety to the different types of data sources which can be video, audio, text, etc. However, other authors claim that there are more dimensions and add those of value as well as veracity (Bourany, 2018). The veracity dimension has been highlighted by IBM who defines it as the reliability, the certainty and the availability of data sources (IBM, 2019) while Oracle introduced value, trying to determine the benefit of the data (Lee, 2017; Oracle 2012). In addition to that, SAS added the dimensions of variability and complexity. Variability points out how the flux of data can be unpredictable and change but can then also bring dynamic opportunities in its interpretation (Mikalef et al., 2018) and complexity emphasizes the importance of figuring out the different data sources as well as the changes in data to manage the information quickly (SAS, 2022; Kapil, Agrawal & Ahmad Khan, 2016). Some models even refer to even more "V" such as Visualization or Vagueness (Arockia, Varnekha & Veneshia, 2017).

Most data do not provide value in an unprocessed state. Therefore, there exists many different types of analytics to discover patterns for decision-making (de la Torre et al., 2022; Bertolucci, 2013; Karg, 2017). Table 2 summarizes the different types of analytics in the case of sport.

Table 2: Types of analytics

Descriptive	Descriptive analytics aims to summarize what happened (Karg, 2017). It provides a visualisation and is used to describe the basics of the data (de la Torre et al., 2022). Nweke and Ajah (2019) mentions how it is a simple statistical technique providing layer and descriptive information that can be used to find business-related opportunities. It only deals with what happened and historical insights (Sabharwal & Miah, 2021).
Predictive	Predictive analytics are more advanced and aim to build predictive models and determine what is likely to happen (Sabharwal & Miah, 2021). The goal is to forecast the future and predict opportunities that the firm can use to improve (Nweke & Ajah, 2019; Karg, 2017). It is mostly used to identify patterns and predict what might happen in the future by identifying relationships using relatively complex statistics (de la Torre et al., 2022).
Prescriptive	Prescriptive analytics use complex descriptive and predictive analytics along with machine-learning algorithms to determine what should happen and how to influence it (Sabharwal & Miah, 2021). It aims to evaluate the effects of decisions before their implementation and it results in recommendations (de la Torre et al., 2022). Using the power of decision and management science, the goal is usually to make the best use of limited resources and to recommend actions based on that (Nweke & Ajah, 2019; Karg, 2017).

3.2 Return on Big Data Analytics

Big Data analytics has seen its use in businesses skyrocket in the last few years. Top-performing organizations are said to use analytics five times more than lower-performing institutions. However, companies must face the challenges of Big Data to try and achieve differentiation and survive in their industry (Duan & Xiong, 2015). Big Data analytics as a firm's innovation is aimed at achieving heterogeneity and creating higher value. Drawing on the RBT, IT capabilities as well as good data management are a virtuous force to increase a company's competitiveness (Kwon, Lee & Shin, 2014). Companies in the top third in their industry in terms of data-based decision-making usage are usually 5 percent more productive and 6 percent more profitable than other companies (McAfee & Brynjolfsson, 2012). This can be due to several benefits created by Big Data. Raguseo (2018) sorted these benefits into 4 different categories: transactional, strategic, transformational and informational.

The most important transactional benefit is an enhancement of the productivity and the growth, allowing companies to increase their efficiency (Raguseo, 2018; McAfee & Brynjolfsson, 2012). In transactional benefits are also included a reduction of operating costs as well as saving in the supply chain management (Raguseo, 2018). Davenport (2014a) states that this cost reduction initiated by Big Data is very important and that it can provide a substantial cost advantage. A survey conducted by Bange, Grosser and Janoschek (2015) indicates that such cost reduction is of 10% on average.

The most recognized strategic benefits are the ability to create and adapt products and services (Davenport, 2014a; Raguseo, 2018; McAfee & Brynjolfsson, 2012), to align the IT with the general business strategy and to allow for a quicker response to changes occurring in the business environment. Related to that, another very important strategic benefit is the ability to improve and accelerate decision-making (Davenport, 2014a; Russom, 2011; Janssen, van der Voort & Wahyudi, 2017; McAfee & Brynjolfsson, 2012). However, Raghunathan (1999) as well as Janssen, van der Voort and Wahyudi (2017) declare that the decision quality can be improved by Big Data but still depends on both data quality and decision-maker quality.

Considering the transformational benefits, Raguseo (2018) identifies the ability for a company to expand its capabilities as the most important benefit. Since investing in news technologies provokes a need for new skills, new hirings and new capabilities, this is followed by the development of new business opportunities as the firm is now able to operate in new types of value chains.

Finally, according to Raguseo (2018), the most important informational benefits are related to data accuracy, data management as well as creating an easier access to data (Russom, 2011).

3.3 Challenges of Big Data Analytics

Despite the potential benefits, Big Data projects can be among the riskiest and most costly investments and therefore require strategic planning as well as other methods to determine the value of the investment. Indeed, Big Data comes with its challenges.

First, there are indeed raising concerns about data privacy and data collection as the appearance of the GDPR in Europe can prove. 7 rights now have to be offered to customers to avoid data collection excess (Olieslagers & Henrard, 2021; Raguseo, 2018). Sometimes, it is not clear who owns the data, but using it without asking for the permission and the legal foundation may imply serious consequences on the company.

Data security, along with data privacy, could also create resistance to the implementation of Big Data processes in the firm as the lack of it could lead to damages to a firm's reputation. In that regard, firms should make sure to implement security mechanisms and to protect confidential information (Raguseo, 2018). On top of that, data quality is paramount for firms adopting data analytics. If that is not the case, measures need to be taken to solve quality problems for example by initiating data quality controls, repair processes etc. (Redman, 1995). Furthermore, data management requires great infrastructure, and it comes with a cost. Added

to the fact that there are shortages of qualified data scientists, instituting Big Data analytics can sometimes be really challenging (Lee, 2017).

Finally, firms often face difficulties proving the true value of big data analytics (Accenture, 2013). Many projects have unclear problem definitions and tend to use emerging technologies, causing higher risks. In addition, if tangible costs outweigh tangible benefits, firms tend to forget about intangible benefits, therefore making it difficult to justify the investment.

To determine whether companies should then implement Big Data, several techniques are being used but the Critical Success Factors (CSFs) is the technique that has been adopted to many authors because of its great applicability to Big Data, its suitability to Information Technology (IT) as well as its ability to be adapted to rapid changing environments (Shim, French, Guo & Jablonski, 2015; Al-Sai, Abdullah & Husin, 2020).

3.4 Critical success factors of the deployment of Big Data Analytics

Because of its suitability to the case of Big Data, the CSF's application will be detailed, while the Return on Investment and the benefit-risk techniques are difficult to adapt to a rapid changing environment (Shim, French, Guo & Jablonski, 2015). D. Ronald Daniel introduced in 1961 the concept of Success Factors and highlighted the importance of these factors in determining organizational success and in addressing potential data overload (Eybers & Hattingh, 2017; Frefer, Mahmoud, Haleema & Almamlook, 2018; Al-Sai, Abdullah & Husin, 2020). Rockart (1978) expanded that research and developed the concept of CSF as a way to identify key requirements for project implementation. CSF then become key areas where everything needs to be done in a proper way to, in the end, achieve the company's and the project's objectives (Al-Sai, Abdullah & Husin, 2020). Saltz and Shamshurin (2016) define CSF as areas in which organizations can improve in order to deliver successful projects (Saltz & Shamshurin, 2016; Al-Sai, Abdullah & Husin, 2020). Eybers and Hattingh (2017) add to that that they perceive CSF as an analysis guide to identify potential critical factors that could either ruin the project or on the contrary, that could be used to gain value from Big Data projects. In conclusion, the identification of CSF is a business management approach to support the strategic planning and readiness assessment of information system (Eybers & Hattingh, 2017; Al-Sai, Abdullah & Husin, 2020).

When considering CSF linked to Big Data, Eybers and Hattingh (2017) identified three main categories: organizational, people and technology. Al-Sai, Abdullah and Husin (2020) added two more categories to those, namely data management and governance. Table 3 provides a summary of these CSF.

Table 3: Summary of the critical success factors of the deployment of Big Data

Organization	Clear identification and alignment of the Big Data strategy with the firm's strategy. The mission, the vision and the strategy should be aligned with the Big Data objectives of the organization and Big Data should be seen as key on the organization level (Al-Sai, Abdullah & Husin, 2020; Gao, Koronios & Selle, 2015; Eybers & Hattingh, 2017). Leadership and a flexible data-driven culture are therefore very important capabilities for Big Data projects (McAfee & Brynjolfsson, 2012; Gómez & Heeks, 2016).
People	Availability of appropriate people on the project team has a high positive effect on the project's outcome. People are then critical to determine the maturity of Big Data projects and to ensure a successful implementation (Gao, Koronios & Selle, 2015). The people category refers to statistical and analytical skills for team members (Eybers & Hattingh, 2017). Unfortunately, Big Data experts which such skills can be very difficult to find and expensive to hire due to the novelty of Big Data as well as competition (Gao, Koronios & Selle, 2015; Nweke & Ajah, 2019).
Technology	Technological tools to meet Big Data needs and requirements. These are related to data collection, storage, analysis, applications and processing (Eybers & Hattingh, 2017; Al-Sai, Abdullah & Husin, 2020; Gao, Koronios & Selle, 2015).
Data Management	Covers all the processes that include acquiring, storing, validating, processing or protecting data to make sure it is reliable, easily accessible and to ensure the timeliness of the data. It refers to specific concepts and technology of data management in Big Data (Al-Sai, Abdullah & Husin, 2020). One main goal is to transform large volume of data into well-structured data, but it goes even further than that (Gao, Koronios & Selle, 2015).
Governance	Governance covers all the activities, processes, policies and practices undertaken by the organization or one of its stakeholders. It often also relates to the act of governing the organization, in this case with the various actors involved in Big Data projects. It is then critical as it contributes to efficiency and effectiveness of other CSFs (Veeneman, van der Voort, Hirschhorn, Steenhuisen & Klievink, 2018; Al-Sai, Abdullah & Husin, 2020). Governance also addresses questions of legal frameworks and security (Al-Sai, Abdullah & Husin, 2020).

4. Big Data in sports

4.1 Rise of Big Data

Sport teams have now used analytics for more than 50 years (Harrison & Bukstein, 2017). Harrison and Bukstein (2017) explain how Big Data Analytics applied to the sport business industry can be used as a tool to find, understand and use data to enhance decision-making based on an objective decision-making process. They specify that sport business analytics have for aim to convert data into meaningful insights and actionable information that would allow professionals to make informed decision. Such effective analytics can result, as mentioned above, in increased revenue, mitigation of risk, better usage of human resources, lower costs, optimized product and service development or enhanced marketing and service (Troilo et al., 2016). But if today, data analytics allow experts to save time, that has not always been the case. Indeed, until very recently, many of the applications were only linked to basic players and strategies on the field (Harrison & Bukstein, 2017).

Sports analytics indeed originated in the US around the 60's where coded notes (notational analysis) were used in American football and basketball (Morgulev, Azar & Lidor, 2018). Such first analyses allowed coach to assess more objectively performances based on data. These notational analyses took place mostly for Basketball or Baseball as these are less-dynamic sports, making it easier to break down into distinct events and to make notes about it.

During this pre-computerized era, managers and coaches have for a long-time evaluated players' performances based on a mix of these very time-consuming surface statistics like points, batting average or yards thrown and their subjectivity but beyond that, they were not doing any deeper data analysis.

Bill James started challenging such subjective decision-making in the 80's as he came up with a mathematical system called Sabermetrics that allowed to evaluate Baseball players. For that system, he designed equations that allowed to predict performances based on objectives factors, which would help coaches optimize their teams' performances (Schroer, 2022). Such a development in the usage of data was also due to the technological developments in the 80's where gradual computerization was enabled for data-gathering as well as the analysis (Morgulev, Azar & Lidor, 2018).

After such technological developments, sports gradually entered a Big Data era. On that base, sports analytics started really taking off in 2002 when Billy Beane, the general manager of the Baseball team Oakland Athletics, put together a team of less-known players that fell just short

of winning a World Series. That team was put together through statistical analysis, now well-known as “Moneyball”, like in the movie (Schroer, 2022).

Around the same time, a bit more than 15 years ago, sport organizations started integrating data-driven decision-making into their core business functions with for example Customer Relationship Management, ticketing, corporate partnerships or fan engagement (Troilo et al., 2016; Harrison & Bukstein, 2017). For example, since the 1990’s, airline and hotel industries had implemented practices of data-driven strategies for the operations, notably a dynamic ticket and room pricing in addition to including reward and loyalty programs. Sport organizations also adopted such techniques but only a bit later. However, data-driven strategies in the sport business industry differ from hotel or airline industries as the sport industry has so many peculiarities (See 2.1 Peculiarities of Football Clubs).

After integrating data in the core business functions of the sport institution, it then became relevant to collaborate and learn from innovators in different industries. Davenport (2014b) highlights for instance how the Orlando Magic, a famous Basketball team in the NBA, learned, developed and integrated analytics strategies from its partnership with Walt Disney Co. On the same note, lots of sport organizations based their marketing and consumer brand techniques on e-commerce giants such as Amazon. Harrison & Bukstein (2017) explains how sport business organizations therefore have reproduced revenue management and yield management from other industries. However, even though organizations can base some of their Key Performance Indicators (KPI) on such firms, it is to be remembered that adaptation to the industry is also deeply needed (Harrison & Bukstein, 2017).

4.2 Sport business analytics

Sport business analytics are therefore data analytics focused on out-of-the-pitch performance. The aim is to convert information into a good business decision-making which will therefore impact financial performance and hopefully create a potential sustainable competitive advantage (Harrison & Bukstein, 2017).

As mentioned above in the key success factors of a Football club, De Mel (2005), Cross and Henderson (2003) and Costa et al. (2018) all together define main sources of potential competitive advantages for sport clubs, factors where clubs can distinguish themselves. That can be match day revenues, commercial revenues, broadcasting and brand equity, media or player acquisition and brand, communication and competition. And this is indeed the departments on which the sport business analytics are focused.

Harrison and Bukstein (2017) mark the following application areas, which will be detailed later, as the most important ones: Ticket pricing and sales, Customer Relationship Management (CRM), Fan engagement and sport experience, Social media and digital marketing, and Corporate Partnership. Morgulev, Azar and Lidor (2018) identify the same categories but highlight how versatile sport business analyses can be and how the final aim is to allocate the scare resources to different departments while accounting for sport performance.

5. Big Data in Football

5.1 Different usages

Metrics can then be used on the pitch, to influence sporting results but also on the business side which has for effect to impact financial performance as well as brand image. As presented in previous sections, on the pitch data analytics came before business analytics as in the past and still partly now, Football Clubs were not managed as a proper firm but were perceived as more "amateurs" whose only goal was to win on the pitch (See I. Introduction). However, both can be of great importance for Football Clubs to achieve competitive advantages (Davenport, 2014b). In Football, the focus is generally on descriptive analytics for the sportive side with an emphasis on prediction or diagnosis (Davenport, 2014b). It means that teams primarily focus on what happened and how to solve it rather than what will happen while in the business side, predictive analytics are also being used (Karg, 2017).

5.1.1 On the pitch

Some data analytics aim to improve a Football team performance on the field. This can be done via different types of analytics.

5.1.1.1 Performance analysis & In-game tactics

The first field in which Big Data analytics can be used to perform better on the pitch is the performance analysis. It allows to discover counter-intuitive facts on Football, on our team and on opposing teams (Soccerment, 2020; Biermann, 2019). Using data, Football clubs can analyse better how a match went and what happened during a season. Such statistics can be very basic, for example the number of shots, of goals or the possession percentage but can also be way more advanced such as the expected goals (xG), the probability that a shot becomes a goal, often aggregated per team over a match (Soccerment, 2020; Biermann, 2019; The Analyst, 2021).

A way to use the xG metric is for coaches to make more informed decisions based on it. That is what happened in NBA where an analysis of the shots taken led to a complete shift in the location of shots because analysts discovered that based on a risk-reward analysis, shooting a 3-point could be more rewarding than what people thought. Some analysts even predict the same phenomenon to happen in 10 to 15 years in football where, based on data, coaches would tell their players to shoot from other spots (Soccerment, 2020). In that way, using Big Data and machine learning, coaches can make tactical analyses from observational data and shift from subjectivity to more objectivity in tactical decision-making.

Other key metrics appear from the constant monitoring of players. These are numbers that are usually not observable such as running distance, number of high-speed runs, etc. Such physical metrics have appeared through the development of high-precision monitoring technologies, either in player's soles, shin pads or on their chest (Herberger & Litke, 2021).

5.1.1.2 Player's development

Some clubs also decide to use such indicators to improve their academies. Indeed, data analytics gain importance when it comes to developing young talents as these are easier to change. Having valuable and tangible information on their movements, characteristics and behaviours therefore allows clubs to facilitate and accelerate the learning process. It then becomes essential to reach the full potential of young players (Soccerment, 2020).

5.1.1.3 Injury prevention

Such analytics can also be used to prevent injuries. It goes along the fact that the basis of the success is that players can develop without developing any major injuries (Herberger & Litke, 2021). Even though it is hardly imaginable to prevent injuries linked to direct contacts during a game (traumatic injuries), big data provides opportunities to predict non-traumatic injuries, often in the muscles or ligaments. The Portuguese club Benfica Lisbon for example, uses Big Data by analysing the physical stress sustained by athletes to create a predictive injury model (Herberger & Litke, 2021). Such models provide information about when an athlete can be the most exposed to an injury. The goal is then to split the training load in a way that reduces the probabilities of injuries and to use the data to determine potential needs for preventive treatments (Davenport, 2014b; Herberger & Litke, 2021; Gabbett, 2016). Such findings about how to prevent injuries can then help teams perform better on the pitch as injuries inevitably negatively affect the team performance (Hägglund et al., 2013).

5.1.1.4 Recruitment & scouting

Wikipedia (2022) defines recruitment as "the process of attracting, shortlisting, selecting and appointing suitable candidates for jobs within an organization, and is a key function of human resource management". The recruitment has an impact on the pitch as well as off the pitch. Indeed, the main goal of scouting is to find players, staff or coaches who will fit into the team to make it more performant. However, sometimes clubs aim to buy low-cost players that they will develop to sell them at higher prices to generate profits (SAS, 2019). Scouting is then already at the limit between on and off the pitch. Brought into light by Michael Lewis'

Moneyball, data analysis allows for a smart scouting that can therefore have three main goals (Soccerment, 2020; Hutchins, 2016; LeBigData, 2021):

1) Savings: Using a database to look for players allows clubs to save time as well as money. Teams can use filters to reduce the scope of the players they wish to target and end up with a final list of players for which they will do further research. Soccerment (2020) claims however that the database cannot replace scouts (human resource), but it is rather meant to complete their analysis and help them save time. They usually see scouting as a funnel (Appendix II) where the data is followed by live analysis by scouts as well as interviews.

2) Better memory: A database has an almost unlimited memory and can stock everything that happened in past seasons. That is a precious help for recruiters who can use that as a long-term tool to analyse players rather than judging on current form.

3) Objectivity: while scouts often have favourite teams, players or styles of play, data allow for a fully objective analysis of a player. This gives the power to clubs to discover hidden gems or hidden talents thanks to special metrics.

Biermann (2019) explains how this wave of "super recruiters", or in other words recruiters using data has been responsible for the success of many clubs. Some examples of clubs that based their recruitment policy on data are Liverpool, Bayern Munich, Midtjylland or Brentford. The latter will be developed in a pilot case study within the methodology. Similarly, in Belgium, Peter Verbeke, the sporting director of Anderlecht declared in 2020 that the best transfers were unknown players who would be spot using data. He said they would be "young, good and cheap" (Taildeman, 2020).

5.1.1.5 Football data providers

With these goals in mind to use data to improve the performance on the pitch, Football Clubs often partner up with tech companies in order to get a database or to have consultants working for them. Peter Verbeke and Anderlecht for example partnered up in 2020 with the now famous Dutch company "SciSports" (LeSoir, 2020). But as the supply of data as well as data insights in football is growing rapidly, many more companies are developing or even entering the industry. Providers are therefore appearing every year, with many large providers being very recent actors. At the moment, no provider has a real dominance on the market (Robertson, 2021). It is also important to emphasize that several clubs can get data from the same provider, not making the resource specific to the club or inimitable (Robertson, 2021).

5.1.2 Out of the pitch

The business side of the Football data analytics has taken more time to appear. While field data analytics were developed decades ago but keep improving, business analytics in sport are a recent addition to Football Clubs (Troilo et al., 2016; Harrison & Bukstein, 2017). Such business analytics can be used in various fields and departments with the final aim to optimize revenues. Business analytics often rely on various tools such as predictive analytics, data mining, machine learning, clustering and segmenting, pattern analysis and way more (Karg, 2017). Companies are eager to find new insights and to determine new ways of handling fan engagement, ticket sales or social media reactions (Rorrison, 2021). Sports teams are now committing to such practices and are increasing their interest in business analytics even though they know it will require a lot of work. As sport analytics are only evolving and the range of applications is becoming wider, teams must also make sure to keep up with their resources and capabilities (Rorrison, 2021).

5.1.2.1 Ticket pricing and sales

One of the first fields it can be used in is ticket pricing and sales. Football Clubs can utilize analytics to improve the pricing decision-making. They usually make trade-offs between attendance maximization and revenue optimization (Harrison & Bukstein, 2017; Drayer et al., 2012). Deloitte (2014) highlighted how the goal for Football Clubs is to draw customers but also to retain them and make them come back to other games. Basically, throughout the 20th century, tickets were sold using two main pricing strategies (Drayer et al., 2012): “One size-fits-all” where all tickets were sold for the same price for every game and the location-based approach where the closer you were to the pitch, the higher the price but with no difference made from game to game.

However, emerging technologies and a need for an increase in revenues have made sport organizations reconsider the pricing strategy for tickets. But something very special from the sport and entertainment industry is the importance of the secondary ticket market where websites were benefiting from pricing inefficiencies in the primary market to generate profits. Dynamic pricing was then introduced based on Big Data, taking into consideration complex business elements such as a customer’s willingness to pay and the customer experience (fans are ready to pay more for a bigger experience) (Deloitte, 2014). Dynamic pricing refers to real-time changes in ticket prices based on factors influencing customer’s demand such as injuries of a star player, team performance or day of the week of the game (Harrison & Bukstein, 2017).

It therefore requires understanding on how to leverage data and design a working dynamic pricing strategy while controlling for secondary market. The general aim for sports teams is usually to increase ticket sales, ticket utilization rates and ticket yields for every single ticket sold (Harrison & Bukstein, 2017).

The first team to ever experiment dynamic ticket pricing was the San Francisco Giants baseball team in 2009, making their prices fluctuate based on different factors such as team performance or weather for example. In 2010, they started using dynamic ticket pricing for all their tickets, leading to a 7% ticket revenue increase (Drayer et al., 2012). Despite such a successful try, sport organizations have still been very slow to adopt similar approaches to pricing as there was little precedent and because of a general reluctance of the industry to adopt new technologies (Drayer et al., 2012) (See 5.3 Limitations of the usage in Football).

For teams, it can also be very interesting to analyse other aspects of the sales through data, notably the season ticket holder relationship that delivers huge value for the club. On top of that, teams also want to create customer value and to take the customer lifetime value into account in their choices (Harrison & Bukstein, 2017). All these sources of revenues can therefore be optimized through data driven interventions to try and achieve cost efficiency as well as revenue enhancing to finally strive to create a potential competitive advantage (Karg, 2017).

5.1.2.2 Customer Relationship Management (CRM), Fan engagement and sport experience

Sport organizations can now use Big Data to develop CRM systems to create both fan profiles and to structure sales strategies. CRM relates to all customer demographics, customer ticketing, merchandise or consumption patterns (Smith, 2015; Harrison & Bukstein, 2017). Football Clubs can therefore analyse these data in order to develop customized customer messages, for example for their season ticket holders. Mining CRM data could provide the club with valuable insights such as obvious patterns in customers consumption. It could for example be that some of the seasons ticket holders are usually buying nachos at half time. Such information can then be used along for example the birthdate of the ticket holder to offer free nachos one that date. Cross et al. (2009) as well as Drayer et al. (2012) indeed state that the future of revenue management for sport organizations should go towards a more customer-centric approach and long-term relations with fans.

The club can then use insights from data to build long-term relationships as well as adding value for their fans and improving fan engagement (Morgulev, Azar & Lidor, 2018). Clubs can use a

data-driven approach to discover what fans wish and can consequently adapt their offering of services and products (Karg, 2017). Data-driven product or content development usually improve fan experience and engagement (Harrison & Bukstein, 2017). Some easy ways to collect information and data could be new emerging technologies provided to fans. New technologies also allow sport organizations to customize their content even more (Harrison & Busktein, 2017). For example, tapping into transaction and creating special apps could help teams target fans, offer tailored products or services and boost fan engagement and fan experience (Deloitte, 2017).

5.1.2.3 Social media and digital marketing

Big Data can also allow Football Clubs to have a better understanding of social media and get better at using it (Spanberg, 2016). It can also provide insights on the reach of social media posts for sport organizations (Jensen et al., 2015). Big Data can then be used by sport organizations to evaluate marketing content and to produce improved version to attract and appeal to a wider public (Harrison & Bukstein, 2017). Social media in itself is also a wide source of data that can be used to reinforce other fields such as ticket sales, merchandise sales or fan engagement (Morgulev, Azar & Lidor, 2018; Harrison & Bukstein, 2017). Its impact on fan engagement allows clubs to be perceived as more attractive as well as to increase spectator's interest and the reach of advertisements (Nisar, Prabhakar & Patil, 2018; Aichner, 2019). Bagiç Babac and Podobnik (2016) for example highlighted how social media have the possibility to bring outcomes and patterns in human behaviour that are otherwise not noticeable. They notably encouraged Football clubs to increase marketing targeting women as growing consumer.

5.1.2.4 Corporate partnership

Big data can also be used in the context of corporate partnerships and sponsorships. It can have two main reasons: choosing the right sponsor and creating the highest value with that sponsor. Indeed, it can allow Football Clubs to determine which sponsor is the most attractive based on very objectives metrics. Despite involving large investments, ROI are often difficult to compute in the case of Football Clubs partnerships (Wolfe, 2016; Harrison & Bukstein, 2017). Fortunately, such Big Data techniques can come and complete valuations (inherent, relative and comparable) to influence sponsorship price. It also allows a club to show and work on quality of the sponsorship, rather than only price (Grossman & Rein, 2017; Karg, 2017).

In fact, using Big Data in the context of sponsorships and partnerships could bring new levels of targeting for sponsors, a higher sponsor engagement as well as potentially new contracts with

sponsors based on actual number of visits by fans for example (Deloitte, 2017). This favours a well needed improved value co-creation with sponsors as well as sponsors acceptation as they are more likely to agree on a high deal if prices are flexible based on actual engagement (Cacho-Elizondo & Álvarez, 2020).

5.2 Relation between business and sporting performance

Szymanski (2003) emphasized in his paper and in its collaboration with Kuypers (1999) the relation between wages and performance in sports. Indeed, he stated that higher wages went along better performances for Football Clubs. This means that better business performances, allowing for more revenues and therefore more wage expenses, have an impact on the sport performance. Lago et al. (2004) as well as Barajas and Rodriguez (2010) are in the same line of thinking, stating that there is indeed a virtuous cycle between the two. Nevertheless, if firms decide to focus too much on profitability and therefore do not redistribute this profit, profitability can also have a negative impact on sport results (Sánchez, Barajas & Sánchez - Fernández, 2020).

On the other side, the impact of sport performance on business performances is not perfectly defined. While a large part of the literature (Szymanski & Kuypers, 1999; Barajas, Fernandez-Jardon & Crolley, 2005) have found that sporting performances had a positive influence on financial performance, others claim that it does not always impact profitability, depending on the strategy pursued (Sánchez, Barajas & Sánchez-Fernández, 2020).

5.3 Limitations of the usage in Football

On top of lacking resources or capabilities to use Big Data, other limitations apply to the Football industry in general. Indeed, as Football is a game of emotion, it rarely adopts rational ways of thinking (Biermann, 2019). This traditional culture of many teams led Football to a delayed start in the adoption of technologies. In fact, at the start, some major actors considered technology as a threat rather than a tool (Salvanet, 2018; McLaughlin, 2018). Today, a large part of decision-makers in professional football still employs intuition and experience over data insights (Davenport, 2014b). It also leads to people in sport organizations not possessing abilities to use quantitative concepts (Grossman & Rein, 2017). That is also why there often is a gap between the capacity of a Football Club to produce analytical insights compared to the ability to implement them effectively (Harrison & Bukstein, 2017).

Another key problem is that even though sport organizations can be worth millions of euros, they are sometimes “small businesses”. It means that they cannot afford large Big Data

investments as most of their revenues go to salaries and to the sport part and as their operating income is not as high as other industries (Davenport, 2014b).

5.4 Identified resources

Table 4: Summary of the identified resources and capabilities for Big Data implementation in Football Clubs

Analytical skillset (human)	The main resource that is being identified by the literature as essential is the human resource, bringing an analytical skillset. As articles from Harper (2021) and Zhilkin (2021) highlight, data scientists and data experts are now sometimes considered as the "best signings" for Football Clubs. Herberger and Litke (2021) add that data analysts are becoming indispensable members of a Football Club and are very valuable to data-driven decision making. They specify that data analyst are the ones transforming raw data into meaningful information.
Capacity building (physical)	An important step for sport organizations, as for all other industries, is to build the necessary data capacities to allow for data analytics (Karg, 2017). More and more sport organizations are now building Big Data capabilities such as servers, powerful computers or the integration of necessary softwares (Harrison & Bukstein, 2017; Bai & Bai, 2021).
Strategy (organizational)	As numerous sport organizations now develop Big Data analytics because of the increasing perceived importance of making data-driven decisions, they sometimes forget to start with the strategy (Harrison & Bukstein, 2017). Mondello and Kamke (2014) specify that while the growth in analytic capabilities usually produce positive outcomes, if the strategy is not clearly defined and does not include data, capabilities can be underused and complexity can dominate the possible positive outcomes. Karg (2017) also emphasizes how creating a data-driven philosophy is the first step towards positive data-driven results.
Data Management (technological)	Davenport (2014b) states that data management is of uppermost importance as it allows for an easier analysis. He also highlights how important it can be to acquire proprietary data, as it allows to not be copied, therefore leading to a possible competitive advantage. Indeed, data suppliers offer their services to every club, meaning that if a club wants to differentiate, it is great to adopt a data-generating strategy. Morgulev, Azar and Lidor (2018) add that it is very important to integrate different sources of data to enhance the performance.

Even though the resources mentioned in Table 4 are perceived as important by the literature for the implementation of Big Data in Football Clubs, there is an unexplored gap as no authors has really focused on which resources and capabilities would allow to leverage the use of Big Data in Football Clubs, especially in the business part. Therefore, this thesis will try to collect data and link it with the existing literature to try and provide first information on that topic and respond to calls for more research on Big Data analytics resources and capabilities in sport organizations (Sabharwal and Jahan Miah, 2021).

6. Conclusion of the literature review

In conclusion, as the sport industry and more particularly the football industry are evolving and turning into real businesses, Football Clubs are trying to find new ways to differentiate. Teams aim to innovate to achieve superior performances and therefore secure competitive advantages (del Giudice & Maggioni, 2014, 2014).

According to the resource-based theory (RBT), such advantages can come from the firm itself, from its distinctive competencies, resources and capabilities (Reed & Defillipi, 1990; Peteraf, 1993). To be perceived as a competitive advantage, resources and capabilities must therefore be valuable as well as hardly replicable, as echoed by the VRIN and VRIO frameworks. There are six main categories of resources that allow for possible competitive advantages: financial, physical, human, organizational, technological and reputation.

A domain that is on the rise in which Football Clubs can invest to create competitive advantages is the Big Data. Applied to sports, it aims to generate meaningful information and specific insights that Football Clubs can use and apply to improve performances both on and off the pitch. Firms using Big Data often see their productivity and their profitability being improved (McAfee & Brynjolfsson, 2012). However, as the Big Data comes with its challenges of complexity, processes and security, organizations must be sure to possess the right resources and capabilities to make the best out of it.

Since the Football industry is very different from other industries, it is then very important to study which resources and capabilities are needed for Football Clubs to develop and leverage the Big Data. Undeniably, Football has its specificities, with notably the interconnection between on the field results and business results but also with the importance of match uncertainty. On top of that, the emotional bonding between club and supporters is way stronger than for any other industry. Still based on the importance of emotions in Football, the industry has also seen a lot of reluctance towards new technologies and a lack of maturity.

Through its utilization on the pitch but even more importantly on the business side, it then becomes totally relevant to study the necessary resources and capabilities that would allow Football Clubs to leverage the Big Data usage. As of now, the literature has primarily focused on the "on the pitch" usage and has also overlooked the questions of the necessary resources to leverage its usage, which will be explored in the empirical analysis of this paper.

III. Methodology

As mentioned in the introduction, the problem of this thesis revolves around the business usage of Big Data in Football Clubs and more particularly the resources and capabilities able to enhance that usage to create a competitive advantage. A qualitative approach has been chosen to complete the literature review. Indeed, as the resources are very specific to the context and as Football is a peculiar industry, semi-structured in-depth interviews allowed us to talk to experts in the domain, allowing for a context sensitivity (Patton, 2014). As the knowledge on the subject is also limited, the Grounded Theory Methodology (GTM) has been used which is only possible through a qualitative approach (Glaser & Strauss, 1967; Strauss & Corbin, 1998). The aim is to collect data while going back and forth between emerging data from interviews and the literature to finally develop theoretical explanations and propositions (Bryant, 2017; Frias-Navarro & Montoya-Restrepo, 2020).

1. Pilot study

Relevant concepts have been presented and synthesized in the literature review, going from the Resource-based theory of competitive advantage to the peculiarities of the Football industry and the usage of Big Data in sports and in Football. Complementing our literature review, a "pilot" case study, based on the Brentford Football Club, was used to familiarize even more with the subject. Brentford FC, as well as Midtjylland are indeed the two European Clubs that have been recognized as the best data users in their day-to-day operations (SciSports, 2021). Doing so also helped us gain additional insights to craft a relevant interview guide for the in-depth interviews (Yin, 1994).

From this pilot case study of the Brentford Football Club appeared some insights that were then included into the interview guide. Using management reports, scientific articles or online case studies, we notice that the club notably emphasizes how important their culture is to its development. Ankersen, the co-director of football of the club even declared that they chose to have a culture where they have the courage to go down new paths (Brentford, 2022). By analysing their transition to the use of Big Data, we also realise that it has been done step-by-step and by collaborating with strategic technological partners such as Referment, a fintech company using Data science. These identified important components of their transformation have then been the source of specific questions in the interview guide (Appendix III). On top of that, Brentford FC and Midtjylland FC, the two clubs known to be the most advanced data Football Clubs, have both had the same person at their management: Matthew Benham,

highlighting the human and leadership dimension and both clubs have also seen their organizational structures being reshaped to adapt to technology businesses (Martinez Arastey, 2018). On that matter, Brentford has created a "data and technology" department and has recruited staff specialized in that field (Brentford annual report, 2021; Bloomberg, 2021). This case pilot has then conducted to new questions as well as follow-up questions during the interviews where we would ask interviewees deeper details on organizational structure, human needs, partnerships to facilitate transition or even organizational culture.

2. Interview guide

The interview guide (Appendix III) was crafted to systematically identify resources and capabilities that decision-makers found key to allow for a better usage of the Big Data in the sports industry. In line with prior research using a similar qualitative approach (e.g. Ulaga & Reinartz, 2011), in the first part of the interview, respondents were asked to talk about the Football industry in general, highlighting its peculiarities as well as the importance of the business aspects. After that, they would be asked to describe a bit more the usage of Big Data in Football and in their clubs, putting an emphasis on potential benefits and challenges linked to it. Then would come the biggest part were respondents were asked to detail resources and capabilities as well as requirements that would allow for a better usage. Finally, the reasons as of why Big Data is not the norm in Football yet as well as potential future developments were discussed. Follow-up questions on specific resources and capabilities as well as the departments in which Big Data can be used were mainly based on the pilot case study.

3. Data collection procedures and sample

In-depth interviews were conducted with decision-makers from the Football industry in Belgium who were contacted through common relations, through LinkedIn or their email. Most of the respondents came from Belgium because of three main reasons. First, the Belgian League is "average" in terms of budget and capabilities and as discovered during the interviews, it is not the richest clubs that benefit from Big Data the most but rather the "medium" clubs. Second, it made the comparison between clubs, progresses and resources easier. And third, these were the easiest to contact and to connect with. Nevertheless, the sample aimed to be diverse, with different profiles, people from different backgrounds and functions so we could discover different point of views on capabilities and resources and ensure a comprehensive understanding of the phenomenon (Gratton & Jones, 2010). Some worked in Football Clubs themselves while some acted as consultants, allowing for a diversification of points of views

and expertise by talking to experts in Football, experts in business and experts from the Big Data industry.

The sampling process was stopped at saturation, meaning at the stage where further data collection would not provide additional information (Gratton & Jones, 2010). Indeed, qualitative research aims to generate rich data from a small group of interviews. Sometimes, having a larger group may even be detrimental to the research as the meaningfulness of the insights generated depends more on the information and the analysis than on the sample size (Gratton & Jones, 2010; McCracken, 1988). In our case, saturation was achieved after three consecutive interviews where no additional insight was mentioned. That means that, in total, 11 interviews were performed, lasting between 31 and 78 minutes with an average of 44 minutes. Table 5 provides an overview of our sample characteristics.

Table 5: Sample characteristics

1	Belgian sport journalist, specialized in the field of data.
2	Founder of a firm specialized in Football data, acting as consultant for Football Clubs and medias.
3	Main decision-maker in a professional Belgian Football Club with a passion for data.
4	Responsible for customer experience and partnerships in a main Football data provider.
5	Main decision-maker in a Belgian Football Club with a passion for data.
6	Responsible for digital transformation and marketing as well as the management of the database in a professional Belgian Football Club.
7	Founder of a firm helping Football Clubs to accelerate their digital transformation.
8	Head of commercial department and main decision-maker in a data-advanced professional Belgian Football Club.
9	Main decision-maker in a data-advanced professional Belgian Football Club.
10	Head of commercial department and main decision-maker in a data-advanced professional Belgian Football Club.
11	Professor and co-director of a sport innovation research group in an Australian university and research expert on the use of data analytics, technology and innovation in professional sport teams.

4. Analysis and interpretation

Interviews have been recorded and then transcribed to make the analysis easier (Appendixes IV to XIV). To try and identify key resources and capabilities, data was first reduced, and then coding has also been used, an iterative process where emerging themes are being assessed and identified and then organized into categories (Gratton & Jones, 2010; Miles & Huberman, 1994). The aim of the coding was to identify these key resources and be able to list them, provide examples and to specify specific properties. Using criteria from Tuli, Kohli and Bharadwaj (2007), key resources and capabilities were determined based on their ability to provide interesting conclusions as well as being applicable beyond a very precise context.

The analysis was conducted based on an iterative process where, in order to enhance content and research validity, results from interviews were then compared with existing literature in order to verify the relevance and the applicability of the findings (Gratton & Jones, 2010). However, given that the literature did not explore some of the concepts yet, some research was also performed using theory from other industries.

After having derived the main findings and insights from the in-depth interviews and assessed how resources and capabilities relate to other variables, this paper aims to develop a theoretical framework showing the relation between key resources and capabilities in the usage of Big Data and Football Club's performances. At the same time, novel theoretical propositions will also be developed, thereby further extending prior research and opening the door to future research.

IV. Empirical analysis

1. Theoretical framework

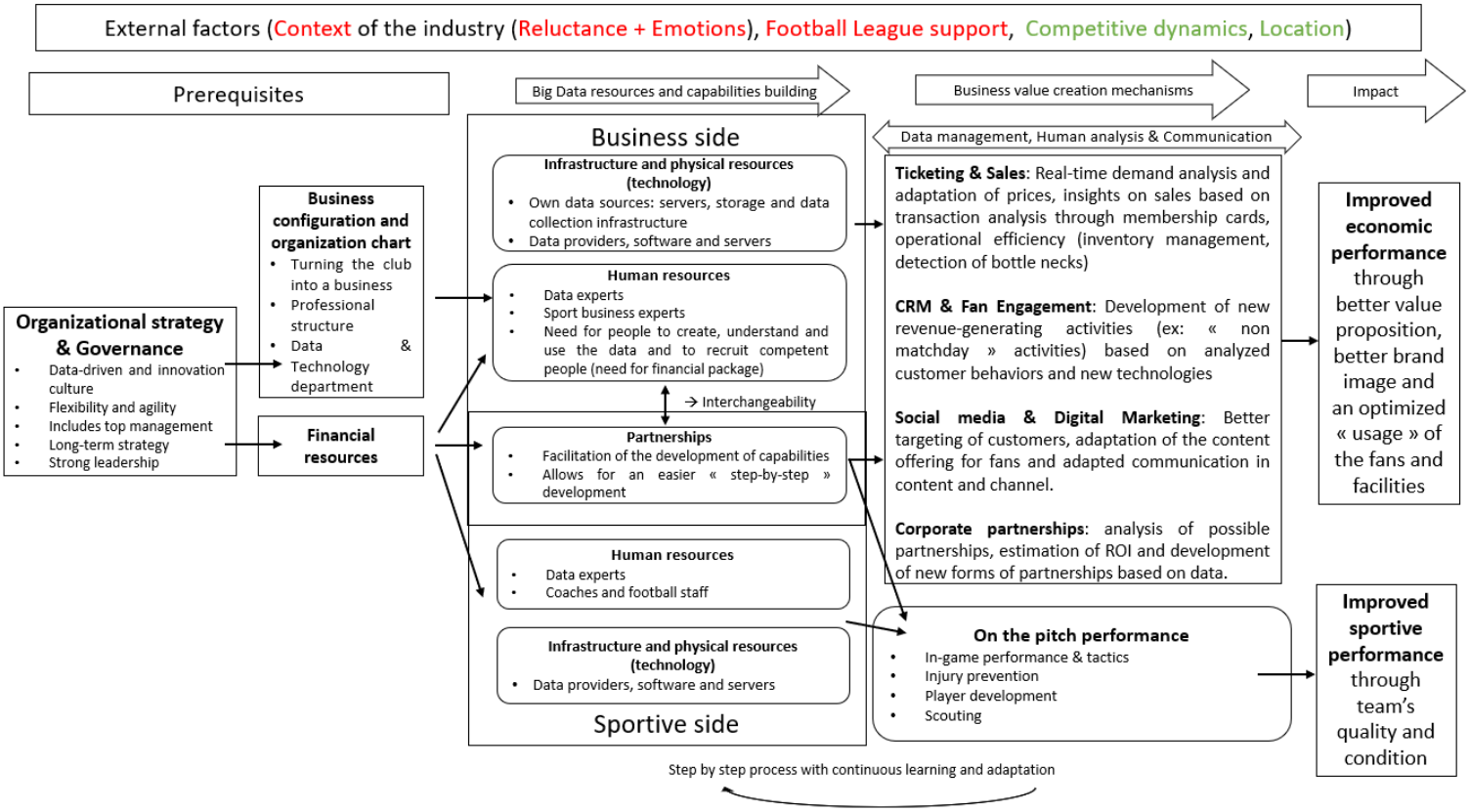

Figure 1: Resources and capabilities turning Big Data into improved performance in Football Clubs

The theoretical framework presented in Figure 1 has been developed based on the in-depth interviews with decision-makers from the Football Industry as well as the literature review. It aims to summarize diverse findings about the key resources and capabilities needed to improve the business usage of Big Data in Football Clubs and therefore improve the competitive performance. Inspired by frameworks from Mikalef et al. (2018), Grover et al. (2018) or Atuahene, Kanjanabootra and Gajendran (2018), it aims to adapt models on Big Data capabilities to the Football industry. In that regard, arrows represent main relations between resources while the framework is divided into four main parts.

First, the prerequisites including the organizational strategy, the business configuration and the financial resources. Then, the resources and capabilities building phase where we distinguish those used for the business part, those for the sportive side as well as those used for both. As we are focusing on the business part, those will then be more detailed in the further explanations. We find in those resources: human, partnerships, infrastructure and physical resources.

After that comes the different value creation mechanisms, with more details about how these resources are then used to create value as well as an emphasis on processes that need to be continuously executed. Finally, we detail the final impact on the performance of the club and at the top of the framework, we also highlight how some specific external factors can play a role on either the type of resources and capabilities that are necessary or on how easy it can be to build them. Eventually, we explain that this process needs to be done on a "step by step" basis and requires constant learning and adaptation. In the framework, we also use arrows to highlight relations between different resources.

2. Development of the framework and propositions

The first thing we can confirm from interviews is that the Football industry has important peculiarities that need to be included in the thought process when incorporating data in the Football Club. One of the main points that Biermann (2019) stated is that Football is a game of emotion rather than rationality with this possibly impacting decision-making. This has been confirmed by many interviewees including Interviewee 5 who stated that there is a big imbalance in the industry because of the lack of rationality. Interviewee 7 also confirmed one of the main peculiarities highlighted by Salvanet (2018) and McLaughlin (2018), i.e. the lack of maturity of the industry. He said: "The biggest frustration on a business point of view is that there is not yet a lot of maturity in business level. Lot of people are there for the image and they do not think about how they can make more money". In that regard, Davenport (2014b) mentioned how Football Clubs can be considered as "small businesses" because most of their revenues go to the sporting side. And this has also been confirmed by interviews with Interviewees 8 and 10 mentioning that business teams are usually very small because only about one third of the club's revenue and sometimes less go to the business side.

What has also been mentioned as a peculiarity by interviewees and had not been identified in the literature review is that Football changes quickly, and people are being replaced very easily. In relation with that, Interviewee 3 then highlights how difficult it can be to have a long-term strategy based on Big Data when you are judged every day on your performances.

2.1 Step by step process and learning

Another thing that had been mentioned in Grover et al. (2018)'s framework is the "learning by doing" aspect of the implementation. This is indeed something that has been confirmed by interviewees, with some of them even highlighting how important it is to make this implementation on a "step by step" basis as it would be useless to do it too fast and it could

even decrease potential improvements in performances. The step-by-step approach has two main consequences. First, Football Clubs must make sure that prerequisites are in place before going to other phases of the model. In that sense, interviewee 8 stated that "there are different steps and some prerequisites and only then you can start using the data and translate them into strategic choices" while Interviewee 10 declared that "we need to get some steps done before having that way of working (with data)". Second, the step-by-step approach also implies a continuous improvement of resources where clubs should not immediately invest in top-notch resources but should adapt to their advancements as "The more you get into it, the more specialized resources you need and at that moment, you can weigh whether that additional resource will bring you something extra, so you need to do it step-by-step" (Interviewee 9).

2.2 Prerequisites

In this step-by-step model, we identified 3 main prerequisites namely the organizational strategy, financial resources and a business configuration. Some relations between those have also been identified and will be developed hereafter.

2.2.1 Organizational strategy and governance

In the Resource-based theory, Barney and Hesterly (2008) classified organizational resources as potential sources of competitive advantages for firms. They defined it as the coordination system, the culture and the relationships between the individuals in the organizations.

And culture is in fact one of the most important aspects that has been developed by the interviewees, making the organizational strategy the first step of the implementation of Big Data in the Football Club. Interviewee 3 declared that "It is essential to create a culture that is opened to data and opened to its usage". Having a data-driven culture or a general strategy involving Big Data is one of the resources that has been mentioned and emphasized the most during the interviews. Interviewee 9 for example stated that "Having a general mindset and understanding that data can enhance the experience or the commercial side is the most important and the first step." As Al-Sai, Abdullah and Husin (2020) underlined, one of the critical success factors is therefore to have a mission, a vision and a strategy aligned with Big Data objectives and to incorporate Big Data at an organization level, consequently drawing top management support. Interviewee 7 stated that "There are many things that are very important such as … or implementing a mission, a vision and a strategy around it (referring to Big Data)" which is totally in accordance with that critical success factor. Interviewee 11 also mentioned how "A

strong leadership that embraces and encourages data use and its role in decision-making is an important capability".

Interviewees also usually divided the organizational strategy into several different aspects such as a data-driven culture that takes innovation, flexibility and agility into account and defines a long-term strategy with the support of the top management that will be very important for its impact on the two other prerequisites.

One last thing that was brought out of the interviewees is that this organizational strategy, as well as later the business configuration, is mostly needed for the business side through its impact on communication and resources building while the sportive side can work in a more autonomous way and with less resources.

2.2.2 Financial resources

The financial resource depends highly on the organizational strategy and more particularly on the top management support. Once the club's leaders are on board and convinced that data is an investment for future performances, it is then easier to get financial resources. Interviewee 8 said that "The first thing is to get the support of the management" and that "The biggest step is the top management support and it really makes everything go and work. It is not their job to start implementing but they can provide financial resources" while Interviewee 5 said that "You first need to convince the right people at the right place".

Financial resources, as identified by the literature, can be sources of competitive advantage for firms (Barney & Hesterly, 2008). However, it had not really been highlighted by the literature when it comes to the Football Industry except for its indirect impact on the capacity building resource (Karg, 2017; Harrison & Bukstein, 2017). And indeed, interviewees stated that financial resources are usually not a problem when it comes to the sportive side. This is mainly due to a low amount of data collected (usually only on physical and medical performances of players) and of mainstream sport data providers being quite cheap as well as the sportive side being the biggest concern for clubs. However, what interviewees also emphasised is that when it comes to the business side, financial resource can be very important as the amount of data collected and then stored is way higher (data on every fan and every transaction) and as data is collected by the club itself because there is no such data provider. It then becomes much more expensive to build such capabilities. In addition, as mentioned above, there is usually only one third of the revenues that goes to the business side, which makes it then difficult to pay for good infrastructures and good salaries.

Financial resources are then useful for both the sportive and the business side but while the sportive side usually receives a higher share of the revenues and requires lower Big Data expenses, the business side could strongly benefit from bigger investments. Interviewee 8 said that "There is a perception that there is a lot of money going on in Football but that is on the sportive side, on the business side that is not really the case".

2.2.3 Business configuration

The organizational strategy obviously also impacts the prerequisite of implementing a business configuration in the club. Such a business configuration will mostly have an impact on the business side, while the sportive side can act more independently. Interviewees often pointed up the development of a "Business organization chart" where the club would be divided by departments but also where managers' positions would be clearly defined. That is indeed something more than essential in Football Clubs, especially given how immature clubs can still be (Biermann, 2019). Interviewee 7 expressed how he thought that the industry was lacking maturity and how "What is missing is the need to get people involved with a more business mindset, making a club more like a company". Even though it can seem obvious for other industries, this is then a capital step for the implementation of Big Data in a Football Club and to make it a competitive advantage. Consequently, it is then very important to adapt the existing frameworks to the Football industry by adding that part.

Similarly, the interviewees highlighted how essential it is to turn the club into a real business, notably by giving it a professional structure which requires a strategy to have been put in place as well as the top management support. Such a structure, like observed in the pilot case study, and more particularly when clubs implement a dedicated "data and technology "department, can also facilitate communication and the transmission of valuable insights as interviewee 9 and 10 underlined and consequently increase the performance improvement linked to Big Data analytics. Indeed, Interviewee 11 stated that "Perhaps most critically, the ability to communicate findings from data and action findings. It is very important to be able to integrate and communicate the outcomes".

Combining with the part on the organizational strategy, we can then formulate our two first propositions, partly in line with Mondello and Kamke's (2014) idea that a strategy that does not include Big Data can cause an underutilisation of Big Data resources. What is specific in these propositions is that in addition to the importance of the strategy, we mostly highlight the

relevance of the business configuration and of a possible dedicated data department as well as the differences between the sport and the business side.

P1: In Football Clubs, an organizational data-driven strategy as well as a business configuration is necessary to unblock the potential of any other Big Data resources on the business side. However, that is not essential to achieve results on the sportive side.

P2: The creation of a dedicated "data and technology" department in Football Clubs allows for an improvement of the value creation on the business side, mainly thanks to an improved communication and transmission of valuable insights.

2.3 Big Data resources and capabilities building

On the next step, we study the resources and capabilities building by dividing them between sportive and business. What we can already mention from the framework is that all of these resources and capabilities depend on the availability of financial resources while the business configuration and the overall strategy mainly impact the resources used on the business part.

2.3.1 Common resources

Some resources, like partnerships, are necessary for both the business and sportive sides of the Football Club. Clubs usually use external data providers and partner up with tech companies to facilitate the development of capabilities and to allow for a step-by-step implementation of Big Data. Evolving thanks to partnerships is something that has only been highlighted by Davenport (2014b) in the sport literature. However, none of the studies on resources and capabilities in Football Clubs stated that this would be of an important help in the use of Big Data in clubs. Nevertheless, many interviewees pointed out the importance of such collaborations, often because it facilitates the transition and provides first technologies while it is necessary and because it replaces the immediate need for extensive human resources or infrastructures. Interviewee 11 said that "Often, partnering up with tech companies or universities for example can assists with these capacities (strong human resources and technological infrastructure).".

2.3.2 Separate resources

Regarding the infrastructure, this had already been identified by Karg (2017), Harrison and Bukstein (2017) or Bai and Bai (2021) as an important resource for Football Clubs in the context of the implementation of Big Data. They mentioned how servers, powerful computers or software were necessary for the use of Big Data. Of course, this has been confirmed by the interviews. Interviewee 5 emphasised how infrastructures can be a barrier to the use of data if

they are not developed enough. This is something that has also been mentioned by Interviewee 9 for example who stated that to use the data, you needed to make sure to have the right infrastructures first.

Even though this is a necessity for both sides of the club, there are still important differences in needs. While the literature does not really make a difference between both sides, interviewees brought the distinctions to the fore, stating how the sportive side requires 2 main parts. First, it needs platforms provided by external firms with data for scouting or player development. Second, it needs small in-house infrastructures to manipulate and collect data on in-game and medical performances. However, this is a relatively low amount of data compared to the business side which requires to process in-house data from all the fans and all the transactions. The business side therefore usually represents a bigger investment in terms of physical infrastructures as "in some cases, the individual data sources need to be connected into a central platform. These data infrastructures are critical, often expensive, and in small clubs, this is a resource that is often not available." (Interviewee 11).

Regarding the business side, there is something very specific that has been stated from different interviewees. The literature with notably Harper (2021) or Zhilkin (2021) has pointed out how important it can be to recruit data experts and people with analytical skills to enhance the Big Data usage and this has been confirmed by all interviewees. In that sense, interviewee 3 declared that "Data is a tool and the data without the human is nothing but the human without data is worth less".

However, something very specific to the sport industry regarding the human resource has been highlighted by the interviewees. This is that, in addition to such data experts, it is essential to recruit people that are both capable of understanding the data, of making rational decisions but also people that are experts in the industry as they must deal with peculiarities that have big impacts on the decisions resulting from the data. Interviewee 2 said that "you need people who know football, who have played or followed it. It is so important that they understand the importance of the game because if data scientists do not understand, they cannot extract real value from it. Data scientists need someone with them.". Interviewee 7 added that "I think it's a combination of the technical guy who can create the reports and the insights of the data in combination with someone who has the business mind and the business processes in place plus the knowledge of the industry". And on top of that, Interviewee 11 declared that "there are often gaps in understanding sport specific concepts which should be integrated into or be used to frame data analytics". This leads us to our third proposition.

P3: The need for qualified data experts had to be combined with a need for sport business experts in order to maximize the value creation mechanisms on the business side of Football Clubs.

Something very important here is that in Football, clubs usually do not spend high amounts to recruits high-quality staffing on the business side, once again because of the small part of the revenue going to that part of the club. Interviewee 9 said that "Clubs are paying players and coaches awful lot of money but not so much the normal staff and that means that it is very difficult to attract the very best people (best marketeers, accountants, etc.)". For the sportive side however, interviewees told us that data experts are also needed and must be combined to coaches and football staff who are able to make decisions from it which is very much in line with existing literature.

What has also been mentioned by some interviewees is how partnerships can replace the need for human resources as well as infrastructures on the business side while it can only provide data experts to the sportive side. Interviewee 8 claims that it allows to overcome the Big Data barriers. In addition, Interviewee 11 mentioned that "Partnering with technology groups or universities or agencies can help develop the capacity of organisations and identifying stages to build analytics and human capacity". However, Interviewee 8 and 10 mentioned that this is only the case in the first steps of the implementation as in latter stages it does not allow for a fast-enough growth. In that sense, they claim that it is still necessary to hire experts further in the process. This leads us to our fourth and final proposition.

P4: When in the first phases of the Big Data adoption, partnerships can replace the need for extensive human resources and infrastructures on the business side without hurting the business value creation mechanisms.

2.4 Business value creation mechanisms

Business value creation mechanisms benefit and are then impacted by the resources and capabilities in which the club invests. But before diving deeper on the value creation mechanisms, we emphasise how some processes are necessary to ensure a good value creation. Two of which have already been identified by the literature as very important: data management and human analysis. Davenport (2014b) and Morgulev, Azar and Lidor (2018) stated how these allowed for a proper data analysis and how important it was to acquire the right data and process it the right way. Something however that has emerged from the interviews is the communication

between departments, already mentioned in the business configuration. As stated above, it has a great impact on transmission of information and on the detection of valuable insights.

2.4.1 Business side

On the business side, we find creation mechanisms on the different segments presented in the literature by Harrison and Busktein (2017), Karg (2017) or Rorrison (2021). Interviewees usually presented the same kind of segments, something calling them by other names. These are also in line with the 4 categories of benefits created by Big Data presented by Raguseo (2018) namely transactional, strategic, transformational and informational.

Among others, we find that Big Data usage creates value in the ticketing and sales by allowing for a better real-time analysis of the demand and therefore a price adaptation. In terms of sales, some of the interviewees mentioned that some clubs could for example detect that a lot of transactions take place during half time at a certain bar, and sometimes even 10 minutes after the restart of the game. Clubs then know that it would be necessary to put more staff during half time. Therefore, it also allows for more operational efficiency (transactional benefit).

Through the CRM and fan engagement, it also allows for the creation of new activities based on customer behaviour patterns (strategic benefit). New technologies are therefore used to create "non matchday" activities resulting in increased revenue and a better use of the club's facilities. Using Big Data, the club can also "get insights and then you can start to promote fan engagement. For example, if you monitor purchases and entrance time, you can find ways to make people come into the stadium earlier and improve their experience" (Interviewee 7). An example also given by interviewees is that, when knowing the fan's birthdate and his favourite player, you can offer him advantages on the matchday that is the closest to that and send him dedicated video from his favourite player, enhancing his fan engagement. In that sense, Interviewee 8 described the ability to enhance fan engagement as one of the main differentiating points for Football clubs.

Big Data can also create value through social media and marketing, mainly thanks to a better targeting of customers, therefore decreasing the number of "mass" emails sent (strategic benefit). This can also be done in collaboration with the partners. Speaking of which, corporate partnerships has been defined by some interviewees as the segment that might benefit the most from the implementation of Big Data. On that subject, Interviewee 10 told us that "Companies are now becoming partners because of data.". He added that "pure partnerships are losing weight", highlighting the importance of Big Data in the negotiations with potential corporate

partners. Interviewees also pointed up how Big Data can be used to improve the value created through partnerships but often requires collecting additional data on fans beforehand (transformational benefit). According to Interviewee 9, that is something that is easy to do for Football Clubs as “The scarce products or products like Football have a big advantage because you can give a fan a lot of advantages in exchange for data, and they will usually give it.”.

2.4.2 Sportive side

On the sportive side, we find in the interviews the same value creation mechanisms as the ones highlighted by the literature, namely the performance analysis, player’s development, injury detection and prevention and the scouting and recruitment. In that sense, interviewees underlined how the use of Big Data to detect physical performances as well as injuries has become quite common in professional Football Clubs. They add that this is also the case with the player development and the scouting but there are bigger differences among clubs.

Finally, they state that the sportive value creation mechanisms are often the first to be developed while the business mechanisms have often stayed overlooked by many clubs. They add however that “step-by-step certain clubs are starting to be interested in business data” even though some clubs are “already more advanced, mainly because they are more like a company” (Interviewee 7) with interviewee 8 nuancing that by stating that “the Belgian League is not the league with the biggest budget, as there often is only 1 or 2 people per business unit. That is also why bigger leagues do it more (use Big Data in business).”.

2.5 Impact

Such mechanisms can then allow the club to have an impact on its performances on both the business and the sportive side. On the business side, we speak about financial performance as well as brand image which Interviewee 9 mentioned and discussed saying that “Brand is where clubs usually are nowhere because they are looking at the pitch a lot”. But if you build that brand, you can make your peaks higher and your drops less deep”. The financial and brand performance is mainly done through a better value proposition to the fans, by working on fan engagement, the size of the fanbase and the fan experience (Interviewee 9). This is in line with the key success factors of Football Clubs highlighted by De Mel (2005), Cross and Henderson (2003) and Costa et al. (2018). Speaking of the general impact of the Big Data usage on the business side, Interviewee 11 mentioned that “efficiency for the organisation and better experiences for consumers are two primary benefits”. On the sportive side, you can also achieve better results by improving your team’s quality as well as its physical condition.

2.6 External factors

In the strategic management literature, authors such as Porter (1980) or Gartner (1985) characterize the external environment as one of the main determinants from the principle of competitive strategy. Even though we decided to mainly focus on the resource-based theory presented by Amit and Shoemaker (1993) and more recently by Barney and Hesterly (2008), Gómez, Opazo and Martí (2008) still presented evidence that differentiation strategies for Football Clubs were conducted as a response to their external conditions.

And this is something that has also been mentioned by interviewees, emphasising how some transitions could be facilitated or hindered by some external factors. Interviewee 2 stated: "Using data, yes but in what context. Data must be part of a whole.". In that sense, the first aspect that has been mentioned by almost all interviewees is that the context of the industry, with the predominant emotion as well as the reluctance for new technologies could have a negative effect on the implementation, mainly due to its negative impact on potential organizational strategies and business configurations. Another negative factor is the non-existent league support when it comes to digital transition. Interviewee 7 declared that "the pro league does not provide any support, so we have to use agencies or partnerships which are also a great way to do the transition. But the league in itself is sometimes less developed than clubs.".

However, other factors can have positive impacts on the implementation of resources and capabilities. On that topic, Interviewee 9 mentioned that "the implementation is still driven by the market and if there was a bigger market for it then we would also go quicker". Interviewee 10 declared that for him the external environment can play a big positive role. He mentioned that they were working with the city, as well as universities and local partners. For him, the location was a real asset to accelerate their development.

Nevertheless, it is important to keep in mind that the context is particular to the country and as many interviews have been conducted with decision-makers operating in Belgium, it is interesting to see whether such findings can be applied to other countries.

V. Discussion

1. Theoritical implications

The literature has studied the case of Big Data in sport and Football. However, despite the manifest importance of resources and capabilities in a Big Data implementation (Branganza et al., 2017), prior research provides few insights into business analytics in sport organizations as well as into the resources and capabilities related to Big Data in clubs. This paper aims to address calls for more research aimed at understanding the link between Big Data resources, and capabilities and performance in sports organizations (e.g., Sabharwal and Jahan Miah, 2021).

First, while the literature has focused mainly on sport analytics and their "on-field" applications, we extend scarce research on business analytics in sports organizations. We aim to expand knowledge on Big Data in the business departments of sports organizations, which has been less explored by the literature than data related to sports performance (e.g., Biermann, 2019; Rein & Memmert, 2016; Herberger & Litke, 2021). Few authors (e.g., Davenport, 2014b; Harrison & Bukstein, 2017) have focused on that business side, presenting some of the Big Data usages. However, we aim to contribute to this research by providing more insights on those different usages as well as relations as to how value is created, and performance improved through Big Data.

Second, this study examines specific strategic concepts by looking at the resources and capabilities that could lead to the creation of a competitive advantage for the Football Clubs. While Barney and Hesterly (2008) or Peteraf (1993) have developed and analysed the Resource-based theory in depth, few authors have studied the extent to which that concept could be applied to professional sport organizations (e.g., Alkandi, 2021; Espitia-Escuer & Garcia-Cebrian, 2020). On top of that, within those, none have applied the concept to the Big Data implementation. Our findings therefore aim to integrate strategic management concepts on competitive advantages and resources and capabilities and adapt them to the usage of Big Data in sport organizations and more particularly in professional Football Clubs.

Therefore, this study represents a valuable addition to the research on Football business even though it requires future research on the developed framework and propositions.

2. Managerial implications

The Football market size is expected to keep growing in the next few years (Anand & Deshmukh, 2021). However, Football Clubs will have to integrate new technologies if they want to keep up with competition (Pwc, 2016). In that regard, clubs will have to find ways to integrate Big Data to improve their performance on the sportive side but even more importantly, on the business side. The current findings thus provide valuable insights for clubs that such an implementation requires specific resources and capabilities.

Clubs must adopt Big Data in a "step-by-step" action plan. The adoption state will indeed determine what resources and capabilities to develop and the required level of specialization of the resources. Before anything, the club must also take the external factors into account. While the context of the industry, with the importance of the emotions or the very low league support might slow down the process, it is very important to try and get the most out of the market and the location with all the help that can come from it (Universities, companies, …).

Managers must then make sure to create a data-driven and innovative culture where Big Data is included in the organization strategy. From there, getting the support of the top management is also essential because it will determine the implementation of the other prerequisites, namely the financial resources and the business configuration. The latter is of uppermost importance to unblock to potential of any other Big Data resources (Proposition 1). It is then essential to define an organizational chart and a professional structure that would turn the club into a real business, something that is very rare in the football industry. Creating a specialized data and technology department can also enhance communication and improve the chances of identifying valuable insights (Proposition 2).

Our finding also suggest that necessary resources differ between the sportive side and the business side. While partnerships can be used in both sides, it can only replace human resources and infrastructure for the business side (Proposition 4). Furthermore, the business side requires data experts as well as sport business experts to compose its human resources (Proposition 3) while the sport side requires data experts but also a football staff. The last thing that differs is that in terms of infrastructure, the sportive side works with external providers and small in-house data while the business side relies on high amounts of fans and transactions data, therefore often implying bigger investments.

With those resources implemented, clubs can then create value through some mechanisms. However, it is very important to make sure to have a good data management process, as well as the intervention of a human analysis and a good communication within departments. With that done, football businesses can create value through sales and ticketing, CRM and fan engagement, social media and digital marketing or corporate partnerships, paving the way for new ways of collaborating based on Big Data. Meanwhile, on the sport side, clubs can hope to improve in-game performances, injury prevention, player development and scouting.

Finally, through such mechanisms, the club aims to improve its general performance. On the one hand, through an improved financial and brand success and on the other hand through better sportive performances.

3. Limitations of the research and research directions

The empirical results reported herein should be considered in the light of some limitations, some of which offering avenues for future research. First of all, the exploratory nature of this study calls for verification and validation, notably of the four research propositions developed in the empirical analysis as well as the research framework.

On top of that, a limitation encountered is that most of the interviewees operate in Belgian Professional Football Clubs. Consequently, something that must be considered is the importance of the context of the country on the results as well as the applicability of the proposed framework to other countries and other leagues. This is something which would be worth verifying in future research, especially due to differences in cultures with some countries being for example more or less risk averse, maybe leading to a slower or different adoption of Big Data in Football Clubs (Hofstede, 1997; Lane & Maznevski, 2019).

Besides that, even though we reached a point of saturation, only a limited number of interviews were conducted. Further interviews might have then provided us with more valuable insights to complete and adapt our research framework and propositions.

Another ground for future research is that the relative importance of the different resources and capabilities were not tested during this master's thesis. However, that would be a valuable insight to present Football Clubs with the order of importance between resources as well as their relative impact on the improvement in performance.

Furthermore, further research could test the applicability of our identified steps, resources, capabilities and business value creation mechanisms beyond football by applying it to other sports such as basketball, hockey or tennis which are among the most popular sports in Europe (Wikipedia, 2021).

Finally, as the phenomenon of Big Data in sports is still very recent and as the Football industry is not very mature, it is hard to stand back and learn from the past events. This recency is closely linked with an uncertainty surrounding the business usage of Big Data in Football Clubs which makes it difficult to forecast a development path.

VI. Conclusion

All in all, the Football industry is transforming from an amateur to a high-profile industry. In that sense, Football Clubs now aim to boost their revenues and to differentiate on a business point of view. A way to differentiate and to switch from sportive-based to also business-based is to focus on Big Data analytics as it has been proved to boost performances in other industries.

The objective of this master's thesis is to answer our initial research questions on the impact of data on a Football Club's business performance as well as the resources and capabilities turning it into a competitive advantage. The first step was to conduct a literature review, gathering point of view of academics and industry professionals. Those allowed for a better understanding of competitive advantages, distinctive resources or critical success factors as well as Football peculiarities. Having done that, we observed a gap in the literature as most of it focuses mainly on the sport Big Data usage and often overlooks the business usage and the question of resources and capabilities. The literature review has then been combined with a qualitative empirical analysis, using the Grounded Theory Methodology based on 11 interviews with experts of the domain. By combining the literature with interviews, we were then able to develop a research framework as well as four research propositions, also making the distinction between resources and capabilities for the sportive side and for the business side.

In the end, we identified 4 main phases of Big Data implementation in Football Clubs, with their respective resources and capabilities. First, the prerequisites with the importance of having a general strategy and a business configuration, something very rare in the Football industry that will then lead to financial resources through top management support. Then, the capacity building with human and physical resources as well as partnerships that would finally allow for the development of value creation mechanisms based on social media, corporate partnerships, fan engagement or sales for the business side and on sportive performance for the sport side. Through a good data management, human analysis and communication, these would improve the general performance of the club but we also highlight in the framework that external factors must be taken into account and that the implementation must be done on a "step-by-step" basis.

Finally, we develop four propositions on the impact of a business organisation (P1) and a dedicated data and technology department (P2) on the performance, the need for a combination of data experts and sport experts on the commercial side (P3) and the interchangeability between partnerships and human and physical resources on the business side during the first steps of the implementation (P4).

VII. References

Accenture. (2013). *Analytics in Action: Breakthroughs and Barriers on the Journey to ROI* [PDF]. Online https://www.accenture.com/au-en/~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Technology_6/Accenture-Analytics-In-Action-Survey.pdf, retrieved 09/03/22.

Aichner, T. (2019). Football clubs' social media use and user engagement. *Marketing Intelligence & Planning*, *37*(3), pp. 242-257. https://doi.org/10.1108/MIP-05-2018-0155

Alkandi, I. G. (2021). A RESOURCE-BASED VIEW OF AL-HILAL FOOTBALL CLUB: USING A QUALITATIVE APPROACH. *Academy of Entrepreneurship Journal*, *27*(4), 1-19.

Al-Sai, Z. A., Abdullah, R., & Husin, M. H. (2020). Critical Success Factors for Big Data: A Systematic Literature Review. *IEEE Access, 8*, 118940-118956. doi:10.1109/access.2020.3005461

Amis, J., Pant, N., & Slack, T. (1997). Achieving a sustainable competitive advantage: A resource-based view of sport sponsorship. *Journal of sport management, 11*(1), 80-96. https://doi.org/10.1123/jsm.11.1.80

Amit, R., & Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic management journal, 14*(1), 33-46. **https://doi.org/10.1002/smj.4250140105**

Anand, K. S. & Deshmukh, R. (2021). *Football Market by Product Type, Manufacturing Process and Distribution Channel: Global Opportunity Analysis and Industry Forecast 2021-2027*. Online https://www.alliedmarketresearch.com/football-market-A11328#:~:text=The%20global%20football%20market%20size,18.3%25%20from%202021%20to%202027, retrieved 22/07/22.

Apostolou, K., & Tjortjis, C. (2019, July). Sports Analytics algorithms for performance prediction. *In 2019 10th International Conference on Information, Intelligence, Systems and Applications* (IISA) (pp. 1-4). IEEE. Doi: 10.1109/IISA.2019.8900754

Arockia, P. S., Varnekha, S. S. & Veneshia, K. A. (2017). The 17 V's Of Big Data. *International Research Journal of Engineering and Technology (IRJET)*, *4*(9), 329-333.

Atuahene, B. T., Kanjanabootra, S., & Gajendran, T. (2018). Towards an integrated framework of big data capabilities in the construction industry: A systematic literature review. In *Proceeding of the 34th Annual ARCOM Conference, ARCOM 2018*, pp. 547-556.

Bagic Babac, M., Podobnik, V. (2016). A sentiment analysis of who participates, how and why, at social media sport websites: how differently men and women write about football. *Online Inf. Rev. 40* (6), 814–833. https://doi.org/10.1108/OIR-02-2016-0050

Bai, Z., & Bai, X. (2021). Sports big data: management, analysis, applications, and challenges. *Complexity, 2021*. https://doi.org/10.1155/2021/6676297

Bange, C., Grosser, T. & Janoschek, N. (2015). Big Data Use Cases 2015. *BARC research*.

Barajas, A., Fernández-Jardón, C. M., & Crolley, L. (2005). Does sports performance influence revenues and economic results in Spanish football?. *Available at SSRN 986365*. http://dx.doi.org/10.2139/ssrn.986365

Barajas, A., & Rodríguez, P. (2010). Spanish football clubs' finances: Crisis and player salaries. *International Journal of Sport Finance*, *5*(1), 52.

Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. *Management science, 32*(10), 1231-1241. https://doi.org/10.1287/mnsc.32.10.1231

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management, 17*(1), 99–120. doi:10.1177/014920639101700108

Barney, J. & Hesterly, W. (2008). Strategic management and competitive advantage. Pearson Prentice Hall: Upper Saddle River, NJ, USA.

Bertolucci, J. (2013). *Big Data ROI Still Tough To Measure*. Online https://www.informationweek.com/big-data-analytics/big-data-roi-still-tough-to-measure, retrieved 07/03/22.

Biermann, C. (2019). *Big Data Foot: Comment les datas révolutionnent le football.* MARABOUT.

Bloomberg. (2021). *Big Data Model Helps Local London Team Win Soccer's Richest Game*. Online https://www.bloomberg.com/news/articles/2021-05-28/big-data-model-takes-local-london-team-to-soccer-s-richest-game#xj4y7vzkg, retrieved 07/07/22.

Bourany, Thomas. "Les 5V du big data." *Regards croises sur l'economie*, *2*, 27-31. https://doi.org/10.3917/rce.023.0027

Braganza, A., Brooks, L., Nepelski, D., Ali, M., & Moro, R. (2017). Resource management in big data initiatives: Processes and dynamic capabilities. *Journal of Business Research, 70*, 328-337. https://doi.org/10.1016/j.jbusres.2016.08.006

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101. DOI:10.1191/1478088706qp063oa

Brentford Annual Report. (2021). *Annual Report and Financial Statements* [PDF]. Online https://www.beesunited.org.uk/wp-content/uploads/2022/01/BU-ACCOUNTS.pdf, retrieved 07/07/22.

Brentford. (2022). *A forward thinking partner*. Online https://newstadium.brentfordfc.com/partners, retrieved 05/07/22.

Bryant, A. (2017). *Grounded theory and grounded theorizing: Pragmatism in research practice*. New York, NY: Oxford University Press.

Budovich, L.S. (2021). Business management of the sport industry by considering the digitalization. *Journal of Human Sport and Exercise, 16*(4), S1619-S1624. https://doi.org/10.14198/jhse.2021.16.Proc4.07

Businesswire. (2018). *Global $4.5 Billion Sports Analytics Market Forecasts up to 2024*. Online https://www.businesswire.com/news/home/20181205005823/en/Global-4.5-Billion-Sports-Analytics-Market-Forecasts, retrieved 23/02/22.

Cacho-Elizondo, S., & Álvarez, M. J. D. L. (2020). Big Data in the Decision-Making Processes of Football Teams. *Journal of Strategic Innovation and Sustainability, 15*(2). https://doi.org/10.33423/jsis.v15i2.2887

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS quarterly*, *36*(4) 1165-1188. https://doi.org/10.2307/41703503

Costa, M. F. d., Costa, C. E., Angelo, C. F. d., & Moraes, W. F. A. d. (2018). Perceived competitive advantage of soccer clubs: a study based on the resource-based view. *RAUSP Management Journal, 53*(1), 23-34. doi:10.1016/j.rauspm.2016.08.001

Cross, J., & Henderson, S. (2003). Strategic challenges in the football business: a SPACE analysis. *Strategic Change*, *12*(8), 409-420. doi:10.1002/jsc.654

Cross, R. G., Higbie, J. A., & Cross, D. Q. (2009). Revenue management's renaissance: A rebirth of the art and science of profitable revenue generation. *Cornell Hospitality Quarterly, 50*(1), 56-81. https://doi.org/10.1177/1938965508328716

Cuzzocrea, A., Song, I.-Y., & Davis, K. C. (2011). *Analytics over large-scale multidimensional data*. Paper presented at the Proceedings of the ACM 14th international workshop on Data Warehousing and OLAP - DOLAP '11.

Daniel, D. R. (1961). Management information crisis. *Harvard Business Review, 39*(5), 111-116.

Davenport, T. H. (2014a). Three big benefits of big data analytics. *SAScom magazine, 3Q 2014*.

Davenport, T. H. (2014b). Analytics in sports: The new science of winning. *International Institute for Analytics, 2*, 1-28.

D. Banker, R., Mashruwala, R., & Tripathy, A. (2014). Does a differentiation strategy lead to more sustainable financial performance than a cost leadership strategy? *Management Decision, 52*(5), 872-896. doi:10.1108/md-05-2013-0282

de la Torre, R., Calvet, L. O., Lopez-Lopez, D., Juan, A. A., & Hatami, S. (2022). Business Analytics in Sport Talent Acquisition: Methods, Experiences, and Open Research Opportunities. *International Journal of Business Analytics (IJBAN), 9*(1), 1-20. DOI: 10.4018/IJBAN.290406

del Giudice, M., & Maggioni, V. (2014). Managerial practices and operative directions of knowledge management within inter-firm networks : a global view. *Journal of Knowledge Management, 18*(5), 841-846. https://doi.org/10.1108/jkm-06-2014-0264

Deloitte. (2014). *An Analytics-based Pricing Strategy for Sports Franchises: Maximize revenue and enhance fan experience through analytics*. Online https://www2.deloitte.com/content/dam/Deloitte/us/Documents/consumer-business/us-deloitte-sports-analytics-POV-10302014.pdf, retrieved 25/05/22.

Deloitte. (2017). *Upping your game how data can help drive sports sponsorship and fan engagement*. Deloitte, New York, pp 1–8. Online https://www2.deloitte.com/content/dam/Deloitte/us/Documents/consumer-business/us-cb-sports-data-sponsorship-fan-engagement.pdf, retrieved 22/06/22.

Deloitte Sports Business Group. (2021). *Testing times : Football Money League*. https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/sports-business-group/deloitte-uk-deloitte-football-money-league-2021.pdf, retrieved 07/03/22.

De Luca, L. M., Herhausen, D., Troilo, G., & Rossi, A. (2020). How and when do big data investments pay off? The role of marketing affordances and service innovation. *Journal of the Academy of Marketing Science, 49*(4), 790-810. doi:10.1007/s11747-020-00739-x

De Mel, S. (2005). Resource-Based View : The Success Factors of English Premiership Football Clubs. *International Research on Sports Economics and Production*, 21-33. ISBN 960-88672-2-3.

Drayer, J., Shapiro, S. L., & Lee, S. (2012). Dynamic ticket pricing in sport: An agenda for research and practice. *Sport Marketing Quarterly, 21*(3), 184-194.

Duan, L., & Xiong, Y. (2015). Big data analytics and business analytics. *Journal of Management Analytics, 2*(1), 1-21. doi:10.1080/23270012.2015.1020891

Duarte, R., Araújo, D., Correia, V., Davids, K., Marques, P., & Richardson, M. J. (2013). Competing together: Assessing the dynamics of team–team and player–team synchrony in professional association football. *Human movement science, 32*(4), 555-566. DOI: 10.1016/j.humov.2013.01.011

Espitia-Escuer, M., & Garcia-Cebrian, L. I. (2020). Efficiency of football teams from an organisation management perspective. *Managerial and Decision Economics*, *41*(3), 321–338. https://doi.org/10.1002/mde.3102

Eybers, S., & Hattingh, M. J. (2017). Critical success factor categories for big data: A preliminary analysis of the current academic landscape. In *2017 IST-Africa Week Conference (IST-Africa)* (pp. 1-11). IEEE. DOI: 10.23919/ISTAFRICA.2017.8102327

Forrest, D., Simmons, R. & Buraimo, B. (2005). Outcome uncertainty and the couch potato audience. *Scottish Journal of Political Economy, 52*(4), 641-661. DOI:10.1111/j.1467-9485.2005.00360.x

Frefer, A. A., Mahmoud, M., Haleema, H., & Almamlook, R. (2018). Overview success criteria and critical success factors in project management. *Industrial engineering & management, 7*(1), 1-6. DOI: 10.4172/2169-0316.1000244

Frias-Navarro, R., & Montoya-Restrepo, L. A. (2020). Understanding knowledge creation processes among rural communities in post-conflict settings in Colombia. *Knowledge*

Management & E-Learning, *12*(2), 231– 255. https://doi.org/10.34105/j.kmel.2020.12.012

Gabbett, T. J. (2016). The training—injury prevention paradox: Should athletes be training smarter and harder?. *British Journal of Sports Medicine, 50*(5), 273–280. http://dx.doi.org/10.1136/bjsports-2015-095788

Gailly, B. (2021). *Introduction Global Strategy (And innovation)* [Slides]. Online https://moodle.uclouvain.be/pluginfile.php/56947/mod_resource/content/8/0%20LSMS2116%20Intro%202021.pdf

Gao, J., Koronios, A., & Selle, S. (2015). Towards a process view on critical success factors in big data analytics projects.

Gartner, W. B. (1985). Competitive Strategy. *Academy of Management Review*, *10*(4), 873–875. https://doi.org/10.5465/amr.1985.4279111

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory strategies for qualitative research*. New York, NY: Aldine de Gruyter

Gómez, L. F., & Heeks, R. (2016). Measuring The Barriers To Big Data For Development: Design-Reality Gap Analysis In Colombia's Public Sector. *Development Informatics Working Paper*, (62). https://dx.doi.org/10.2139/ssrn.3431745

Gomez, S., Opazo, M., & Marti, C. (2008). Structural Characteristics of Sport Organizations: Main Trends in the Academic Discussion. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1116226

Goossens, K. (2006). Competitive Balance in European Football: Comparison by adapting measures: National Measure of Seasonal Imbalance and Top3. *Rivista di diritto ed economia dello sport, 2*(3), p.77-122

Gopalkrishnan, V., Steier, D., Lewis, H., & Guszcza, J. (2012). *Big data, big business*. Paper presented at the Proceedings of the 1st International Workshop on Big Data, Streams and Heterogeneous Source Mining Algorithms, Systems, Programming Models and Applications - BigMine '12.

Grant, R. M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. *California management review*, *33*(3), 114-135. https://doi.org/10.2307/41166664

Grass, D., Holst, M., & Jönsson, B. (2001). Competitive Advantages in Professional Football Clubs-A Resource-Based Analysis. Lund University.

Gratton, C. (2000). The peculiar economics of english professional football. *Soccer & Society, 1*(1), 11-28. doi:10.1080/14660970008721245

Gratton, C., & Jones, I. (2010). *Research methods for sports studies*. Routledge.

Grossman, A., & Rein, I. I. (2016). Communicating the value of sports sponsorship. In *Sport Business Analytics*, pp. 181-196. Auerbach Publications. https://doi.org/10.1201/9781315367613

Grover, V., Chiang, R. H., Liang, T. P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. *Journal of management information systems*, *35*(2), 388-423. https://doi.org/10.1080/07421222.2018.1451951

Hagglund, M., Walden, M., Magnusson, H., Kristenson, K., Bengtsson, H., & Ekstrand, J. (2013). Injuries affect team performance negatively in professional football: an 11-year follow-up of the UEFA Champions League injury study. *Br J Sports Med, 47*(12), 738-742. doi:10.1136/bjsports-2013-092215

Hamil, S., Holt, M., Michie, J., Oughton, C., & Shailer, L. (2004). The corporate governance of professional football clubs. *Corporate Governance: The international journal of business in society, 4*(2), 44-51. doi:10.1108/14720700410534967

Harlow, H. D. (2018). Developing a knowledge management strategy for data analytics and intellectual capital. *Meditari Accountancy Research, 26*(3), 400-419. doi:10.1108/medar-09-2017-0217

Harper, J. (2021). *Data experts are becoming football's best signings*. Online https://www.bbc.com/news/business-56164159, retrieved 03/07/22.

Harrison, C. K., & Bukstein, S. (Eds.). (2016). *Sport business analytics: Using data to increase revenue and improve operational efficiency*. CRC Press.

Hayduk, T. (2020). The future of sport data analytics. In *Statistical Modelling and Sports Business Analytics*, pp. 159-173. DOI:10.4324/9780367854454-14

Hazée, S., Delcourt, C., & Van Vaerenbergh, Y. (2017). Burdens of access: Understanding customer barriers and barrier-attenuating practices in access-based services. *Journal of Service Research, 20*(4), 441-456. https://doi.org/10.1177/1094670517712877

Herberger, T. A., & Litke, C. (2021). The Impact of Big Data and Sports Analytics on Professional Football: A Systematic Literature Review. *Digitalization, Digital Transformation and Sustainability in the Global Economy*, 147-171. https://doi.org/10.1007/978-3-030-77340-3_12

Hofer, C. W., & Schendel, D. (1978). *Strategy formulation: Analytical concepts*. West Publ.

Hofstede, G. (1997). *Cultures and Organizations: Software of the Mind*. London, UK: McGraw-Hill

Hutchins, B. (2016). Tales of the digital sublime: Tracing the relationship between big data and professional sport. *Convergence, 22*(5), 494-509. https://doi.org/10.1177/1354856515587163

IBM. (2019). *Turn Data and Analytics into a Competitive Advantage* [Picture]. Online https://www.pinterest.com/pin/510806782717351387/, retrieved 27/02/2022.

Janssen, M., van der Voort, H., & Wahyudi, A. (2017). Factors influencing big data decision-making quality. *Journal of Business Research, 70*, 338-345. doi:10.1016/j.jbusres.2016.08.007

Jensen, R. W., Limbu, Y. B., and Spong, Y. (2015). Visual analytics of Twitter conversations about corporate sponsors of FC Barcelona and Juventus at the 2015 UEFA final. *International Journal of Sports Marketing and Sponsorship, 16*(4), 3–9. https://doi.org/10.1108/IJSMS-16-04-2015-B002

Kapil, G., Agrawal, A., & Khan, R. A. (2016). *A study of big data characteristics*. *2016 International Conference on Communication and Electronics Systems (ICCES)*. Doi: 10.1109/CESYS.2016.7889917

Karg, A. (2017). Data as competitive advantage: Merging sport and business [Slides]. Deakin Business School, Melbourne.

KPMG. (2021, may). *The European Elite 2021 - Football Clubs' Valuation : Dribbling around Covid-19*. https://www.footballbenchmark.com/documents/files/KPMG%20The%20European%20Elite%202021.pdf

Kraaijenbrink, J., Spender, J. C., & Groen, A. J. (2010). The Resource-Based View: A Review and Assessment of Its Critiques. *Journal of Management, 36*(1), 349-372. doi:10.1177/0149206309350775

Kretschmann, R. (2012). Digital Sport-Management Games and Their Contribution to Prospective Sport-Managers' Competence Development. *Advances in Physical Education, 02*(04), 179-186. doi:10.4236/ape.2012.24031

Kwon, O., Lee, N., & Shin, B. (2014). Data quality management, data usage experience and acquisition intention of big data analytics. *International Journal of Information Management, 34*(3), 387-394. doi:10.1016/j.ijinfomgt.2014.02.002

Lado, A. A., Boyd, N. G., & Wright, P. (1992). A Competency-Based Model of Sustainable Competitive Advantage: Toward a Conceptual Integration. *Journal of Management, 18*(1), 77-91. doi:10.1177/014920639201800106

Lago, U., Baroncelli, A., & Szymanski, S. (2004). *Il business del calcio*. Milano, Italy: Egea

Lane, H. W., & Maznevski, M. L. (2019). *International management behavior: Global and sustainable leadership*. Cambridge University Press.

Laney, D. (2001). "3D data management: Controlling data volume, velocity and variety." *META group research note*, *6*(70), 1.

LeBigData. (2021). *Comment l'analyse de donénes influence-t-elle les décisions des clubs de football ?*. Online https://www.lebigdata.fr/analyse-donnees-football, retrieved 02/05/22.

Lee, I. (2017). Big data: Dimensions, evolution, impacts, and challenges. *Business Horizons, 60*(3), 293-303. doi:10.1016/j.bushor.2017.01.004

LeSoir. (2020). *Anderlecht a conclu un partenariat avec un géant de la data pour le recrutement de joueurs*. Online https://www.lesoir.be/321086/article/2020-08-26/anderlecht-conclu-un-partenariat-avec-un-geant-de-la-data-pour-le-recrutement-de, retrieved 08/05/22.

Liberatore, M. J., & Luo, W. (2010). The Analytics Movement: Implications for Operations Research. *Interfaces, 40*(4), 313-324. doi:10.1287/inte.1100.0502

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

Manoli, A. E. (2014). The football industry through traditional management analysis. *In Scandinavian Sport Studies Forum, 5*(1), pp. 93-109.

Martinez Arastey, G. (2018). *The Brentford FC Story: Running a Football Club through Data*. Online https://www.sportperformanceanalysis.com/article/2018/6/8/the-history-of-brentford-football-analytics, retrieved 07/07/22.

McAfee, A. & Brynjolfsson, E. (2012). Big data: the management revolution. *Harvard business review, 90*(10), 60-68.

McCracken, G. (1988). *The Long Interview (Qualitative Research Methods Series 13)*. Newbury Park, CA: Sage Publications.

McGuire, T. (2012). *Why Big Data is the new competitive advantage*. Ivey Business Journal. Online https://iveybusinessjournal.com/publication/why-big-data-is-the-new-competitive-advantage/, retrieved 23/02/22.

McLaughlin, M. (2018). *Sports Data Analytics: How Teams Use Data to Gain Edge*. Online https://biztechmagazine.com/article/2018/12/how-data-analytics-revolutionizing-sports, retrieved 25/03/22.

Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2018). Big data analytics capabilities: a systematic literature review and research agenda. *Information Systems and e-Business Management, 16*(3), 547-578. doi:10.1007/s10257-017-0362-y

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. sage.

Mondello, M. & Kamke, C. (2014). The introduction and application of sports analytics in professional sport organizations. *Journal of Applied Sport Management, 6*(2), 1–12

Morgulev, E., Azar, O. H., & Lidor, R. (2018). Sports analytics and the big-data era. *International Journal of Data Science and Analytics, 5*(4), 213-222. DOI:10.1007/s41060-017-0093-7

Nalebuff, B. J., & Brandenburger, A. M. (1997). Co-opetition: Competitive and cooperative business strategies for the digital economy. *Strategy & leadership, 25*(6), 28-33. https://doi.org/10.1108/eb054655

Neale, W. C. (1964). The Peculiar Economics of Professional Sports: A Contribution to the Theory of the Firm in Sporting Competition and in Market Competition. *The Quarterly Journal of Economics, Oxford University Press, 78*(1), p.1-14. https://doi.org/10.2307/1880543

Nisar, T. M., Prabhakar, G., & Patil, P. P. (2018). Sports clubs' use of social media to increase spectator interest. *International Journal of Information Management, 43*, 188-195. DOI:10.1016/j.ijinfomgt.2018.08.003

Nweke, H. F. & Ajah, I. A. (2019). Big data and business analytics: Trends, platforms, success factors and applications. *Big Data and Cognitive Computing, 3*(2), 32. doi:10.3390/bdcc3020032

Olieslagers, R. & Henrard, L. (2021). *Central Banking and Financial Stability* [Slides]. Université Catholique de Louvain.

Oracle. (2012). *Big Data for the Enterprise* [PDF]. Online https://www.oracle.com/technetwork/database/bi-datawarehousing/wp-big-data-with-oracle-521209.pdf, retrieved 27/02/2022.

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.

Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource-based view. *Strategic management journal, 14*(3), 179-191.

Porter, M. E. (1980). Industry structure and competitive strategy: Keys to profitability. *Financial analysts journal, 36*(4), 30-41. https://doi.org/10.2469/faj.v36.n4.30

Porter, M. E., & Millar, V. E. (1985). How information gives you competitive advantage.

PWC. (2016). *Football's Digital Transformation: Growth opportunities for football clubs in the digital age* [PDF]. Online https://www.pwc.ch/en/publications/2016/Pwc_publication_sport_footbal_digital_transformation_aug2016.pdf, retrieved 22/07/22.

Raghunathan, S. (1999). Impact of information quality and decision-maker quality on decision quality: a theoretical model and simulation analysis. *Decision support systems, 26*(4), 275-286. https://doi.org/10.1016/S0167-9236(99)00060-3

Raguseo, E. (2018). Big data technologies: An empirical investigation on their adoption, benefits and risks for companies. *International Journal of Information Management, 38*(1), 187-195. doi:10.1016/j.ijinfomgt.2017.07.008

Redman, T. C. (1995). Improve data quality for competitive advantage. *Sloan Management Review, 36*(2), 99.

Reed, R., & DeFillippi, R. J. (1990). Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of management review, 15*(1), 88-102. https://doi.org/10.2307/258107

Rein, R., & Memmert, D. (2016). Big data and tactical analysis in elite soccer: future challenges and opportunities for sports science. *Springerplus, 5*(1), 1410. doi:10.1186/s40064-016-3108-2

Robertson, G. (2021). *How small clubs can join the data revolution*. Online https://www.thetimes.co.uk/article/how-small-clubs-can-join-the-data-revolution-zd0k75tz5, retrieved 09/05/22.

Rockart, J. F. (1978). A new approach to defining the chief executive's information needs. *Working papers, 37*. Massachusetts Institute of Technology (MIT), Sloan School of Management.

Rorrison, B. D. (2021). *The growing importance of Data Analyticsin the Sports Industry*. Online https://www.linkedin.com/pulse/growing-importance-data-analytics-sports-industry-rorrison/, retrieved 10/05/22.

Runkler, T. A. (2016). *Data Analytics*. Springer Publishing.

Russom, P. (2011). "Big data analytics." *TDWI best practices report, fourth quarter, 19*(4), 1-34.

Sabharwal, R., & Miah, S. J. (2021). A new theoretical understanding of big data analytics capabilities in organizations: a thematic analysis. *Journal of Big Data, 8*(1). doi:10.1186/s40537-021-00543-6

Saltz, J. S., & Shamshurin, I. (2016). Big data team process methodologies: A literature review and the identification of key factors for a project's success. In *2016 IEEE International Conference on Big Data (Big Data)*, 2872-2879. IEEE. DOI: 10.1109/BigData.2016.7840936

Salvanet, C. (2018). *Football professionnel et data : historique d'une relation mouvementée*. Online https://www.ecofoot.fr/football-professionnel-data-relation-mouvementee-3166/, retrieved 25/03/22.

Sánchez, L. C., Barajas, Á., & Sanchez-Fernandez, P. (2020). Profits may lead teams to lose matches, but scoring goals does not lead to profit. *European Research on Management and Business Economics*, *26*(1), 26-32. https://doi.org/10.1016/j.iedeen.2019.12.007

SAS. (2019). *Bringing Analytics to the Soccer Transfer Season*. Online https://blogs.sas.com/content/operations/2019/06/18/bringing-analytics-to-soccer-transfer-season/, retrieved 03/03/22.

SAS. (2022). How is big data analytics changing sports ?. Online https://seleritysas.com/blog/2021/03/27/how-is-big-data-analytics-changing-sports/, retrieved 02/03/22.

Schroer, A. (2022). *How Sports Analytics Are Used Today, by Teams and Fans*. Online https://builtin.com/big-data/big-data-companies-sports, retrieved 18/03/22.

SciSports. (2021). *State of the football analytics industry in 2021*. Online https://www.scisports.com/state-of-the-football-analytics-industry-in-2021/#:~:text=Clubs%20such%20as%20Midtjylland%20and,out%20longer%2Dterm%20research%20projects%E2%80%A6, retrieved 10/07/22.

Shim, J. P., French, A. M., Guo, C., & Jablonski, J. (2015). Big Data and Analytics: Issues, Solutions, and ROI. *Communications of the Association for Information Systems, 37*. doi:10.17705/1cais.03739

Smith, M. (2015). Fan analytics movement reaching more colleges. *SportsBusiness Journal.*

Soccerment. (2020). *The Growing Importance of Football Analytics*. Online https://soccerment.com/the-importance-of-football-analytics/, retrieved 22/03/22.

Spanberg, E. (2016). Placing values on social media engagement. *SportsBusiness Journal*.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research techniques.: Techniques and Procedures for Developing Grounded Theory*, 2d ed. Newbury Park, CA: Sage Publications

Sultana, S., Akter, S., & Kyriazis, E. (2022). How data-driven innovation capability is shaping the future of market agility and competitive performance? *Technological Forecasting and Social Change, 174*. doi:10.1016/j.techfore.2021.121260

Szymanski, S., & Kuypers, T. (1999). *Winners and losers*. Viking Adult.

Szymanski, S. (2003). "The Economic Design of Sporting Contests." *Journal of Economic Literature, 41* (4): 1137-1187. DOI:10.1257/002205103771800004

Taildeman, Y. (2020). *Peter Verbeke, directeur sportif d'Anderlecht, défend le mercato des Mauves: "Les meilleurs transferts sont des inconnus"*. Online https://www.dhnet.be/sports/football/division-1a/anderlecht/2020/08/07/peter-verbeke-directeur-sportif-danderlecht-defend-le-mercato-des-mauves-les-meilleurs-transferts-sont-des-inconnus-IBA2VEZA7VERJJ2JPL25B2D544/, retrieved 08/05/22.

The Analyst. (2021). *What are Expected Goals (xG) ?*. Online https://theanalyst.com/eu/2021/07/what-are-expected-goals-xg/, retrieved 04/04/22.

Trequattrini, R., Del Giudice, M., Cuozzo, B., & Palmaccio, M. (2016). Does sport innovation create value? The case of professional football clubs. *Technology, Innovation and Education, 2*(1). doi:10.1186/s40660-016-0017-1

Troilo, M., Bouchet, A., Urban, T. L., & Sutton, W. A. (2016). Perception, reality, and the adoption of business analytics: Evidence from North American professional sport organizations. *Omega, 59*, 72-83. doi:10.1016/j.omega.2015.05.011

Tuli, K., Kohli, A. & Bharadwaj S. G. (2007). Rethinking Customer Solutions: From Product Bundles to Relational Processes. *Journal of Marketing, 71* (3), 1–17. DOI:10.1509/jmkg.71.3.1

Ulaga, W., & Reinartz, W. J. (2011). Hybrid offerings: how manufacturing firms combine goods and services successfully. *Journal of marketing*, *75*(6), 5-23. DOI:10.2307/41406856

Van Haaren, J. (2021). *Soccer Analytics 2020 Review*. Jan Van Haaren. Online https://www.janvanhaaren.be/2020/12/30/soccer-analytics-review-2020.html, retrieved 23/02/22.

Veeneman, W., van der Voort, H., Hirschhorn, F., Steenhuisen, B., & Klievink, B. (2018). PETRA: Governance as a key success factor for big data solutions in mobility. *Research in Transportation Economics, 69*, 420-429. doi:10.1016/j.retrec.2018.07.003

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal, 5*(2), 171-180. https://doi.org/10.1002/smj.4250050207

Wikipedia. (2021). Sport in Europe. Online https://en.wikipedia.org/wiki/Sport_in_Europe, retrieved 20/07/22.

Wikipedia. (2022). *Recruitment*. Online https://en.wikipedia.org/wiki/Recruitment, retrieved on 15/04/22.

Wolfe, M. (2016). *The elusive measurement dilemma of sports sponsorship ROI*. Online https://www.linkedin.com/pulse/elusive-measurement-dilemma-sports-sponsorship-roi-michael-wolfe/, retrieved 25/05/22.

Yin, R. K. (1994). *Case Study Research: Design and Methods*, Vol. 5, Applied Social Research Methods Series, 2d ed. Thousand Oaks, CA: Sage Publications.

Zhilkin, M. (2021). *How to hire your first data scientist*. Online https://trainingground.guru/articles/mikhail-zhilkin-how-to-hire-your-first-data-scientist, retrieved 03/07/22.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN
Louvain School of Management

Place des Doyens, 1 bte L2.01.01, 1348 Louvain-la-Neuve
Boulevard Emile Devreux 6, 6000 Charleroi, Belgique
Chaussée de Binche 151, 7000 Mons, Belgique

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