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## **How Can Intelligent Systems Enhance Football Clubs' Operations – Financial Ratio Analysis and Survey**

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Master's in Business Administration

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ISCTE Business School

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Department of Marketing, Operations and General Management

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## **Resumo**

Com o desenvolvimento do processo de profissionalização do desporto mais popular do mundo – futebol – os clubes estão a contemplar novas perspectivas de alcançar o sucesso nas quatro linhas. O desporto a este nível, já não é visto como recreativo ou para fins de lazer, mas sim considerado e gerido como um negócio multimilionário.

Como tal, os órgãos de gestão dos clubes profissionais, são obrigados a encontrar novas formas de gerar valor e ganhar vantagens competitivas sobre os seus rivais, caso contrário, arriscam-se a condenar organizações com centenas de anos de história e que tanto significado têm para milhões de pessoas em todo o mundo o mundo.

Nesta procura pela superioridade em relação aos seus pares, tem aumentado o uso e o investimento na temática do século – os Sistemas Inteligentes. A adoção de práticas de IA em diferentes áreas de uma empresa tem vindo a mostrar-se crucial para alcançar a tão desejável vantagem competitiva, sendo que a indústria do futebol não é exceção a esse fenómeno.

É neste contexto que esta dissertação pretende responder à questão: Como podem os Sistemas Inteligentes melhorar as operações dos Clubes de Futebol?

De forma a atingir o objetivo proposto, foram utilizados dados dos relatórios anuais dos clubes de futebol selecionados e será realizada uma análise de rácios financeiros de forma a serem identificadas as principais características destes negócios. De seguida, será analisado um questionário de pesquisa de mercado sobre a viabilidade de aplicação de práticas de Inteligência Artificial do ponto de vista do espetador e serão tiradas as devidas conclusões.

Após o desenvolvimento do processo descrito, foi possível concluir que o negócio do futebol tem características bastante peculiares e nada favoráveis em termos financeiros, na medida em que apresenta receitas operacionais nitidamente instáveis, aliadas a baixos índices de liquidez, rentabilidade e solvência. Neste sentido, conclui-se que a aplicação de Sistemas Inteligentes, contribui para melhorar as operações dos clubes, nomeadamente na mitigação da volatilidade das receitas operacionais e na melhoria das operações relacionadas com o a atração de adeptos – o principal agente que movimenta o ecossistema que é o negócio do futebol.

**Palavras-Chave:** Sistemas Inteligentes; Futebol; Operações; Análise de Rácios; Questionário

**Sistema de Classificação JEL:**

I23 – Educação Superior – Instituições de Investigação

M10 – Geral

## **Abstract**

With the growing process of professionalization in the world's most popular sport – football - clubs are changing their perspectives on how to attain success on the field. No longer is sport at this level viewed as recreational or for leisure purposes, but instead regarded and managed as multimillion euro businesses.

As such, the management bodies of professional European football clubs, are obligated to find new ways of generating value and gain competitive advantage over their rivals, or risk condemning organizations with hundreds of years of history and with so much sentimental meaning to millions of fans around the world.

In this quest to attain superiority over their peers, there has been an increase in the use and investment on the thematic of the century – Intelligent Systems. The embrace of AI practices in different fields of a company, have been proven to be crucial in order to attain the so desirable competitive advantage and the football industry is no exception to this phenomenon.

It is in this context, that this dissertation intends to answer the question: How can Intelligent Systems Enhance Football Clubs Operations?

In order to achieve the objective of this paper, there will be used data from the annual reports of the selected football clubs and shall be conducted a ratio analysis so that the main characteristics of these businesses are identified. Then, a research questionnaire about the viability of applying Artificial intelligence practices, from the fan point of view, will be analyzed and conclusions shall be drawn accordingly.

After the development of the aforementioned process, it was possible to conclude that the football business has very peculiar characteristics in financial terms, as it presents clearly unstable operating revenues, combined with low liquidity, profitability and solvency ratios. In this regard, it is concluded that the application of Intelligent Systems contributes to improving club operations, namely in mitigating the volatility of operational revenue and in improving operations related media and fan engagement - the main agent that drives the ecosystem that is the football business.

**Key Words:** Intelligent Systems; Football; Operations; Ratio Analysis; Questionnaire

### **JEL Classification System:**

I23 – Higher Education – Research Institutions

M10 – General

## Table of Contents

Resumo .....	i
Abstract .....	ii
Table of Contents.....	iii
List of Figures:.....	v
<b>1) Introduction .....</b>	<b>1</b>
<b>2) Literature Review .....</b>	<b>5</b>
2.1) Artificial Intelligence .....	5
2.1.1) Big Data, Machine Learning and Deep Learning .....	6
2.2) The football Industry .....	8
2.2.1) Governance .....	8
2.2.2) Football Value Chain .....	9
2.3) Clubs Financial Value.....	10
2.3.1) Market Capitalization .....	11
2.3.2) Enterprise Value .....	11
2.3.3) Discounted Cash Flow Method .....	11
2.3.4) Markham Multivariate Model .....	13
2.4) Artificial Intelligence Practices in the Football Industry.....	14
2.4.1) Media and Fan Experience .....	15
2.4.2) Athletic Performance, Strategical Planning and Analysis .....	17
2.4.3) Management and Operations .....	18
2.4.4) Commercial Segment .....	19
<b>3) Methodology.....</b>	<b>20</b>
<b>4) Financial Analysis .....</b>	<b>21</b>
4.1) The football revenue model .....	21
4.2) Liquidity, Profitability and Solvency .....	23
4.2.1) Manchester United .....	25
4.2.2) Real Madrid .....	26
4.2.3) Juventus .....	27
4.2.4) Borussia Dortmund .....	28
4.2.5) Sport Lisboa e Benfica .....	29
4.3) Ratio Analysis.....	30
4.3.1) Current Ratios .....	30

4.3.2) Accounts Receivable Turnover	30
4.3.3) Profit Margin	31
4.3.4) Return on Assets	32
4.3.5) Return on Shareholders' Equity	33
4.3.6) Debt to assets ratio	34
4.3.7) Wages to Revenue Ratio	35
<b>5) Questionnaire Results</b> .....	<b>36</b>
<b>6) Conclusion</b> .....	<b>42</b>
<b>7) Bibliography</b> .....	<b>45</b>
<b>8) Annexes</b> .....	<b>47</b>
8.1) Annex A .....	47
8.2) Annex B.....	63

**List of Figures:**

Figure 1.1 European football market size - Deloitte Annual Review of Football Finance.....2

Figure 1.2 Revenues from AI for enterprise applications market Worldwide (Tractica,2016) ..... 3

Figure 2.1 Big data, Machine Learning and Deep Learning.....7

Figure 2.2 Relationship between AI, Machine Learning and Deep Learning ..... 8

Figure 2.3 Football Industry Governance (Ducrey, Ferreira, Huerta, & Marston, 2003) ..... 8

Figure 2.4 Football Industry Agents.....10

Figure 2.5 Aggregated net result of the top 32 teams in Europe 2016-21 ..... 12

Figure 2.6 Artificial Intelligence in Sports Business Framework..... 15

Figure 4.1 Manchester United Revenue Structure .....22

Figure 4.2 Real Madrid Revenue Structure .....22

Figure 4.3 Sport Lisboa e Benfica Revenue Structure .....22

Figure 4.4 Borussia Dortmund Revenue Structure .....22

Figure 4.5 Juventus Revenue Structure .....22

Figure 4.6 Liquidity Ratios..... 23

Figure 4.7 Profitability Ratios ..... 24

Figure 4.8 Solvency Ratios..... 24

Figure 4.9 Manchester United Ratio Analysis ..... 25

Figure 4.10 Real Madrid Ratio Analysis.....26

Figure 4.11 Juventus Ratio Analysis..... 27

Figure 4.12 Borussia Dortmund Ratio Analysis ..... 28

Figure 4.13 Sport Lisboa e Benfica Ratio Analysis ..... 29

Figure 4.14 Current Ratios ..... 30

Figure 4.15 Accounts Receivable Turnover ..... 31

Figure 4.16 Profit Margins..... 32

Figure 4.17 Return on Assets..... 32

Figure 4.18 Return on Equity..... 33

Figure 4.19 Debt to Assets Ratio ..... 35

Figure 4.20 Wages to Revenue Ratio ..... 35

Figure 5.1 Respondents Age Group ..... 36

Figure 5.2 Respondents Academic Level..... 37

Figure 5.3 Merchandise Offers ..... 38

Figure 5.4 Notifications from players Athletic Performance..... 38

Figure 5.5 Chatbots/Systems of Logistic Support to the fan..... 38

Figure 5.6 Augmented Reality ..... 38

Figure 5.7 Virtual Reality ..... 38

Figure 5.8 Question 9..... 39

Figure 5.9 Question 10..... 40

Figure 5.10 Question 11 ..... 40

Figure 5.11 Question 12..... 41

Figure 6.1 How can AI enhance football clubs Operations ..... 43

**List of Abbreviations:**

AI – Artificial Intelligence

DCF – Discounted Cash Flow

## 1) Introduction

Nowadays, sports are no longer restricted to the social or recreational strands that firstly gave birth to modern clubs and sports societies, instead, these organizations are now also driven by profit and aim to maximize value to their shareholders.

In the last decades, with the emergence of disruptive innovations in technology, companies all over the world from many different sectors, have increasingly used the aid of artificial intelligence (AI) to better their operations, creating value along the supply chain and so gaining competitive advantages that distinguishes them from their peers (Mikalef, Conboy, & Krogstie, 2021).

As such, in a multibillion-euro industry that is football, there is much to explore when it comes to what artificial intelligences practices are applied in football clubs in order to better their sports results and consequently their financial performance.

Despite the focus that professional football organizations have on the business aspect of the club, it is impossible to deny that the main ultimate goal is the success on the field. However, this can only be achieved when the corporate strategy of the club is adequate and financial performance is a key indicator to demonstrate that.

The aim of this dissertation is to conduct research on how Artificial Intelligence can enhance football Clubs operations and consequently improve its finances.

In order achieve this goal, three steps are performed:

1. Thorough Literature review on:
  - a. Artificial Intelligence, its main branches and how can it be applied to football clubs.
  - b. The football industry – Understanding of its governance and value chain; how to access clubs' financial value and their revenue model.
2. Financial Ratio analysis – Dissect the operational revenue structure of 5 European football clubs and calculate their main financial ratios.
3. Perform a questionnaire to access the viability of implementing AI technologies in football clubs through the evaluation of the fan interest in such applications.

To demonstrate the appropriateness and relevance of this study, is it important to observe the growth of the football market size in Europe in the last decade, as well as the growth in Artificial Intelligence practices in business.



As such, note that according to the annual review of football finance published by Deloitte (Ajadi, Clarke, Dhillon, Gardner, & al, 2022), the European football market is a multi-million Euro industry, that in the last decade has grown from **19.4 billion euros** in the season of 2011/12, to **27.6 billion euros** in 2020/21 (growth of approximately **42%**). Being that in the same period, the big 5 leagues revenue combined, has increased from **9,3 billion euros** to **15,6 billion**, which represents a growth of **68%** - even with the decrease in revenue of the two seasons affected by the Covid pandemic (2019/20 and 2020/21).

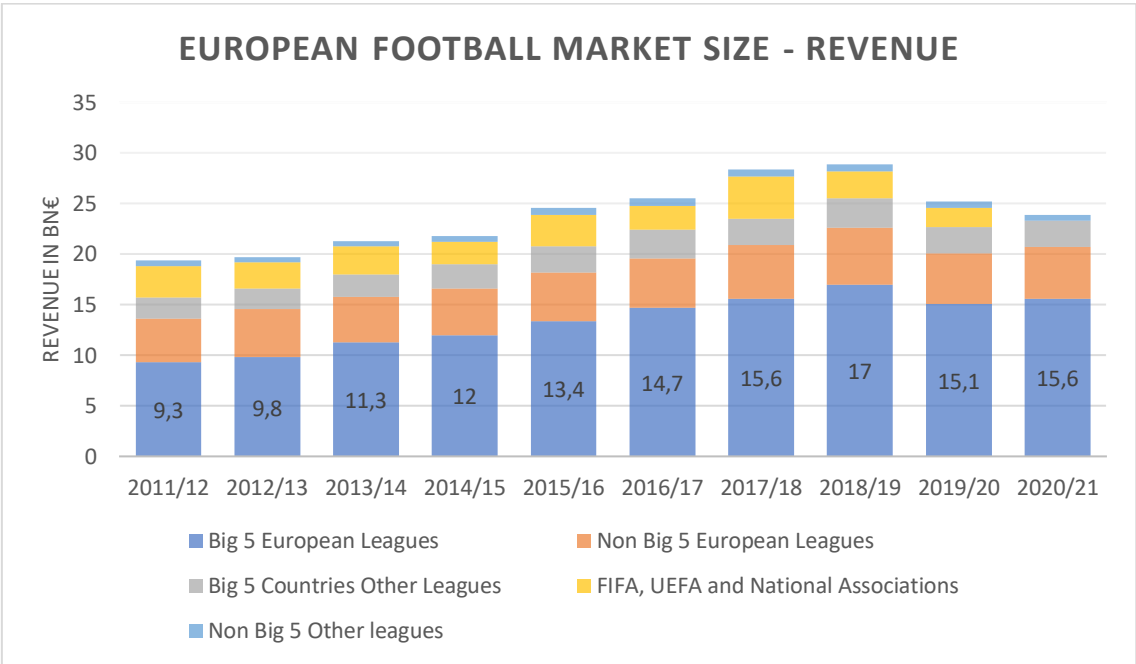


Figure 1.1 European football market size - Deloitte Annual Review of Football Finance

Through the analysis of the exposed graphic (figure 1), it is possible to conclude that the growth of the European football market size, is mainly due to the contribution of the so called ‘Big 5’ Leagues – **England, Germany, Spain, Italy, and France**, as these represented in the season of 2020/21 **57%** of the total revenues of the European football market.

This quick examination clearly demonstrates the relevance of conducting a financial analysis to these organizations and sets the foundations to research practices of artificial intelligence that can enhance the performance of clubs’ operations.

More so, the industry has a tremendous potential of growth, and as shown great resilience, even with the greatly negative impacts of the COVID-19 pandemic in clubs’ finances, as the stadiums were interdicted for two seasons, decreasing and in some cases voiding the **matchday revenue**.

It is also noteworthy, that the biggest football leagues coincide with the European countries with the biggest economy (in terms of GDP), which is obviously no coincidence, as these countries benefit from a more favorable socio-economic context, where from many other factors, the foreign investment is more attractive, which happens a lot in modern football clubs.

In addition to the expected growth verified in the football industry, that has only decreased due to the pandemic, there is no doubt that artificial intelligence is a thematic that will also mark the investment policies of companies from many different sectors in the following decades.

Through the analysis of the following graphic, it is possible to verify an expected growth of **164%** in the revenues coming from artificial intelligence for enterprise applications. (Tractica, 2016)

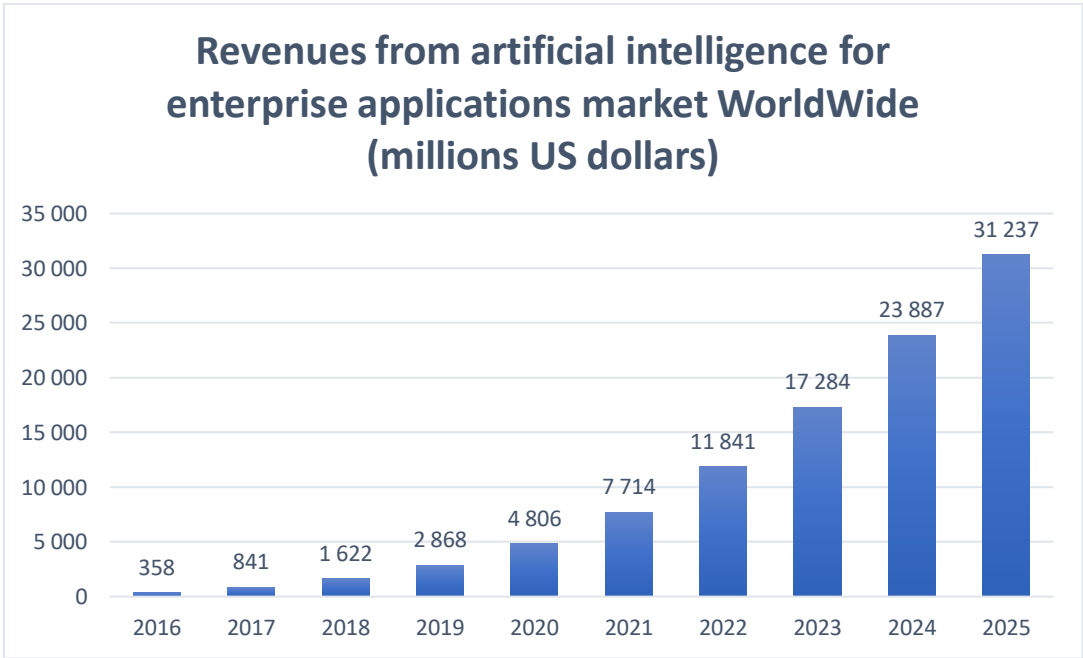


Figure 1.2 Revenues from AI for enterprise applications market Worldwide (Tractica,2016)

As such, it is clearly stated the importance and relevance of this dissertation, as both thematic that will be target of research (**Football industry and Artificial Intelligence**) reveal not only an already solid and broad presence worldwide but are also expected to grow significantly in the next decades.

With the objectives and relevance of the study outlined, in the following pages, a thorough literature review of artificial intelligence and some of its characteristics and branches shall be conducted, as well as subjects of the football industry, namely an overall look at the European football Governance, Value Chain, financial evaluation methods of clubs', and finally, what are the AI practices being employed by football clubs.

Following this literature review, the methodology used for the empirical research shall be explained and the conclusions taken from the financial analysis using the accountability ratios and the results from the questionnaire will be drawn.

## 2) Literature Review

### 2.1) Artificial Intelligence

Before getting into the methodology of the empirical study, research of the literature available about the topics of artificial intelligence and the sports industry must be elaborated. In the following pages, these subjects will be approached by analyzing all the way back since the very principles on which they rely on.

Overtime, Artificial Intelligence has been influenced not only by engineering and electronics, but also by other disciplines, from which philosophy stands out. In 1666, the German polymath Gottfried Wilhelm Leibniz, was the first to think about the possibility of creating automation devices that through a combination of basic inputs, were able to make calculations and produce logical outputs (Buchanan, 2006).

However, it would be during the second World War that major developments in this field were to be achieved. In 1940, a proposal of an AI was described and materialized by Alan Turing, when the British polymath developed a device called *the Bombe* that was used to unravel German encrypted code during the great War. Later, the same author, released the paper that would be a game changer in this thematic entitled “Machinery computing and intelligence” where he developed a game called “imitation game” (Turing’s test) to answer the question “can machines think?”. (Turing, 1950). In simple terms, the person conducting the test places a machine behind a curtain, then, if it could pretend to be a human, under the scrutiny of another human observer, then it should be considered intelligent (McCarthy, 2007) – this was the first and most broad definition of Artificial Intelligence, made before the term was even created.

The term “artificial intelligence” was then firstly employed by John McCarthy, a professor of computer science in Stanford University, turning AI into a specific field of study. (Soni, Sharma, Kapoor, & Singh, 2018). As such, all the foundations were laid to the progress that was to come in the following decades.

AI has been defined by many authors over the years, making it difficult to gather a unanimous concept among all the academics. John McCarthy, creator of the term Artificial Intelligence, simply defines it as “the science and engineering of making intelligent machines” and draws attention to the fact that the notion of intelligence, as the ability to achieve goals in the world, is always related to human intelligence. (McCarthy, 2007). A more complex and technical definition is given by the authors (Haenlein, Kaplan, Tan, & Zhang, 2019) who define AI as: “A system’s ability to correctly interpret

external data, to learn from such data, and to use those learnings to achieve specific goals through flexible adaptation”- By this definition, it is observable some properties like: interpretation, learning, autonomy and adaptation. Broadly speaking, it is possible to identify three phases of Artificial Intelligence: Sensing, Thinking, and acting. The sensing stage involves activities like image and video analysis, facial recognition, text, and speech analysis; the thinking phase englobes machine learning and deep learning – activities that will be covered in the next subchapter; and the acting stage where the adequate outputs are generated (Barlow & Sriskandarajah, 2019).

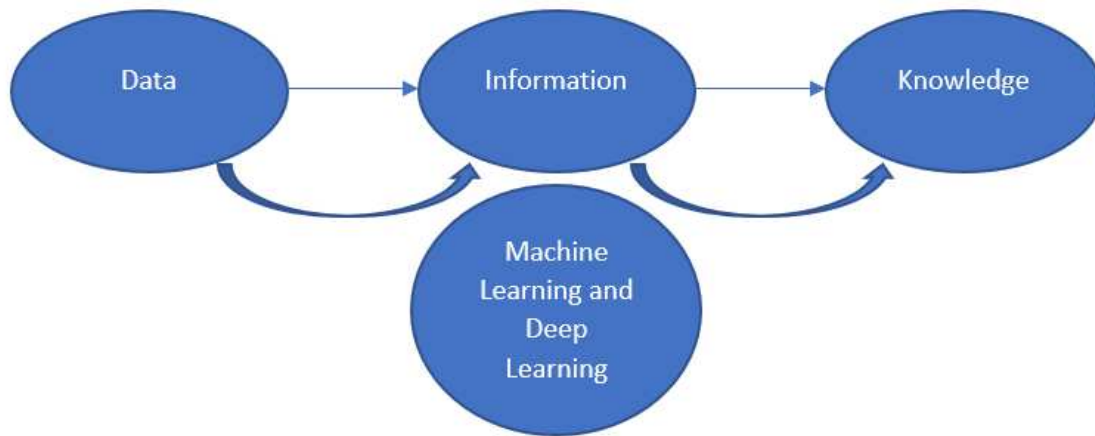
In conclusion, the focus of artificial intelligence includes fields or actions like knowledge, representation, reasoning, learning, planning, perception, and communication (Janiesch, Zschech, & Heinrich, 2021).

### **2.1.1) Big Data, Machine Learning and Deep Learning**

Before initiating the topic of Artificial Intelligence application in Sports Business, one must bear in mind some areas that emerge from AI: Machine Learning and Deep Learning; and that are intrinsically related to it: Big Data.

Making decisions based on data, is crucial to achieve the objectives of modern companies. Nowadays, data is generated through multiple sources, like purchases and sales or clickthrough's (Naraine & Wanless, 2020) and each person generates about 2.5 quintillion bytes of data according to Forbes (Marr, 2018). As such, this represents not only an opportunity, but also a sort of obligation from the companies to invest in AI and big data analytics functions, because if they don't, they will quickly be surpassed by emergent companies that dominate these kinds of features. It is safe to say that the world is going through a “data revolution” (Naraine & Wanless, 2020)

The challenge is, decisions are often made out of big data, that is understood as large portions of data, that can be structured or unstructured and are characterized by the high level of the 5 V's: Volume, Velocity, Variety, Veracity and Value. (N, Sadiku, Philip, Adebo, & Sarhan, 2018). Being that volume refers to the portions of the data (> 1 petabyte); Velocity is related with the many different platforms on which data is created (internet, social media, etc.); variety as the different types of big data (videos, messages, texts, etc.); Veracity as whether the data is reliable or not, taking into account the sources; and finally, the value that the analysis of the large portion of the data can have for the business, because only when the data is treated can we have information and on its turn, when information is processed, we obtain knowledge to make decisions. (Logares & Alós, 2021)



*Figure 2.1 Big data, Machine Learning and Deep Learning*

With these characteristics, it is no wonder that big data and AI are inseparable, as there are no traditional means that can analyze data with these features.

From Artificial Intelligence, emerge two branches that are also relevant when it comes to big data processing: Machine Learning and Deep Learning.

Machine Learning works by implementing algorithms that allow the computer/device to “learn” by a large number of examples or data and by the identification of patterns and trends (Rodrigues, Florea, Oliveira, Diamond, & Oliveira, 2021). It is a process that is cost effective, as in humans would take years to analyze all the data and it would always be susceptible to error, while in machines it does not happen unless there is some type of code error implemented by a person. The relationship between big data and Machine Learning (ML), is therefore quite straightforward, as ML relies on a very large number of examples to shape the “learning” algorithm (Rodrigues, Florea, Oliveira, Diamond, & Oliveira, 2021). This concept of machine learning brings us to a statement of the father of artificial intelligence Alan Turing: “we want a machine that learns from experience”.

Within the area of machine learning, arises the subdivision of Deep Learning (DL), that is a technology that surpasses in performance the newest ML algorithms. Deep Learning uses what is called artificial neural networks (ANNs), a technology that is inspired by the neural functions of the human brain synapses. These can treat large portions of data (inputs) and transforming it into adequate outputs (Rodrigues, Florea, Oliveira, Diamond, & Oliveira, 2021).

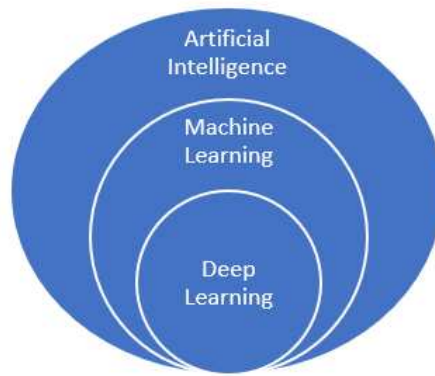


Figure 2.2 Relationship between AI, Machine Learning and Deep Learning

Now that some research has been made about the underlying principles of AI technologies, it is important to understand the characteristics of the Football Industry and how can AI improve their operations along the value chain.

## 2.2) The football Industry

### 2.2.1) Governance

To set the foundations to the financial evaluation, revenue model and ratio analysis of the professional football clubs selected, it is important to display a simple, but useful outline of the organizations and stakeholders that operate in modern professional football. The following scheme outlines the governance of the football industry, that can be defined as the group of legal entities that whose operations and activities are entrenched in the game of football (Ducrey, Ferreira, Huerta, & Marston, 2003).



Figure 2.3 Football Industry Governance (Ducrey, Ferreira, Huerta, & Marston, 2003)

## 2.2.2) Football Value Chain

As previously referred in the introduction, the football industry englobes an increasing number of stakeholders and consequently an increasing number of rivals, which makes the objective of gaining competitive advantage even more complex. As such, creating value along the supply chain of a professional football club has become absolutely crucial.

It is perceived as value chain, the set of activities within businesses that generate a value greater than its cost, in order to create profit. These include inbound logistics, operations, outbound logistics, marketing, sales and service (Porter, 1985). It is often discussed what can be the ultimate goal of a company or of its value chain: we can consider, thriving towards corporate social responsibility (CSR), maximize social good or maximize market share. However, in corporate finance and for the purpose of this dissertation, the ultimate goal of a business is to maximize the value of the company to its stakeholders, which does not necessarily mean that the company is a social outcast (Damodaran, 2014). The more complex and long the value/supply chain is, the more expensive it gets, and less profit generates. As such, the digitalization of certain processes is an indispensable asset in today's companies, also, due to the fact that as previously mentioned, most decisions are big data driven. (Oosthuizen, Botha, Robertson, & al., 2020).

Having the ultimate goal of maximizing a company's value, there is no question that artificial intelligence can have an important role in achieving it through many areas.

According to (Ducrey, Ferreira, Huerta, & Marston, 2003), the football value chain can be summarized between 5 agents:

- 1) Football Fans.
- 2) Professional Clubs.
- 3) Leagues.
- 4) Sponsors
- 5) Television / Broadcasting Rights

The relationship between fans and clubs, lay the foundations for the football business. As it will be computed in the revenue model of professional football clubs, fans contribute for the business not only with the purchase of merchandise and tickets that increase the commercial and matchday revenue respectively, but also a professional club with a larger fanbase, will have competitive advantage over their rivals in attaining, for example, more advantageous broadcasting rights.



The connection between professional clubs and leagues, is of paramount importance, as a sound competition will increase demand by the sponsors and consequently increase the values of the broadcasting rights as spectators are many times interested not only in just a Club, but also in the whole competition. (Ducrey, Ferreira, Huerta, & Marston, 2003)

It is curious to verify, that the football industry, is one of the few where a professional club does not intend to have the monopoly of the business, as only with a strong competition, can the clubs' finances thrive and attain the objective outlined in the beginning of the present chapter – maximize the value of the company (Damodaran, 2014).

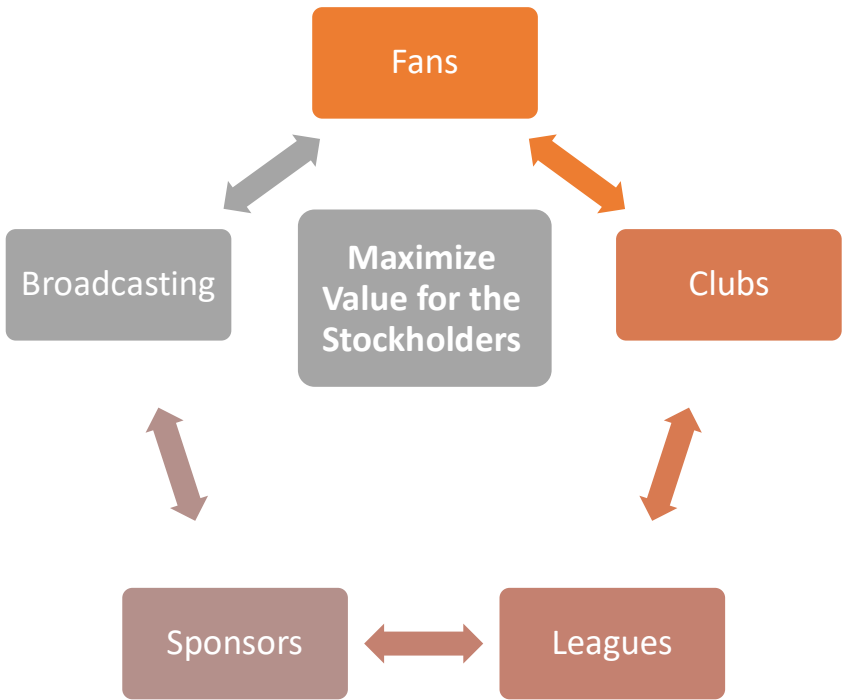


Figure 2.4 Football Industry Agents

**2.3) Clubs Financial Value**

Due to the already mentioned professionalization and increasing number of stakeholders of a professional football club, it is vital to be able to appropriately value the organization. However, this task does not reveal itself to be easy and is something authors have been tried to perfect in the last two decades.

### 2.3.1) Market Capitalization

The market capitalization method of valuing a business is computed by the following equation:

$$\text{Market Capitalization} = \text{Shares Outstanding} * \text{Share Price} \quad (1)$$

However, as noted by (Markham, 2013), only a football club that is listed on a stock exchange, can obviously be evaluated by this procedure. More so, share prices in such companies that run professional football clubs, are in the majority of times associated sentimental value that carries out a significant amount of doubt in the adequate share price, as the market is not rational. Markham, also points out that not that many professional football clubs are listed in stock exchanges, being the main reason that important business moves have to be disclosed to the market, which obviously considering the nature of the competition of football, can be a significant advantage for rival clubs.

For these reasons, the market capitalization method of evaluation is not considered to be appropriate to evaluate a professional football club.

### 2.3.2) Enterprise Value

The Enterprise value method is one of the most used by stakeholders to access the value of a firm (Kukaj & Ahmeti, 2016). This method, although simplistic, allows to compare professional football clubs with different debt and equity structures (KPMG, 2022).

As such, the Enterprise Value of a firm is estimated by adding the market capitalization to the book value of debt, subtracting the cash and equivalents. (Damodaran, 2014)

$$\text{Enterprise Value (EV)} = \text{Market Capitalization} + \text{Net debt} \quad (2)$$

$$\text{Net debt} = \text{Book value of debt} - \text{Cash and equivalents} \quad (3)$$

Although this process is generally considered to be more accurate than Market Capitalization, it still presents some cons, like not accounting for the expected future cash flows of a firm/Club and not considering how does a company utilize its debt.

### 2.3.3) Discounted Cash Flow Method

According to (Damodaran, 2014), the Discounted Cash Flow Method (DCF) is the most reliable method to evaluate how much a company is worth. As such, it is based in four factors: “*capacity to generate future cash flows from assets in place, the expected growth rate of these assets, the length of time it*

will take for the firm to reach stable growth and the cost of capital". Essentially, it demonstrates the Present Value of future expected cash flows of a company, discounted at an estimated discount rate (usually the WACC – Weighted Average Cost of capital).

The Discounted Cash Flow method formula is as follows:

$$\sum_{t=1}^N \frac{E(\text{Cash Flow}_t)}{(1+r)^t} \tag{4}$$

Where:

- E (Cash Flow) – Cash Flow Expected during the period
- t – duration of the period
- r – rate of discount, usually used the Weighted Average Cost of capital (WACC) – the cost of the different components used by the company to finance itself. (Damodaran, 2014).

Nonetheless, this method, although regarded by many authors as the most appropriate to measure the enterprise value of a firm, is not optimal to measure a professional football club, due to the nature of the business itself.

Note, that the DCF Method, relies on expected future cash flows that a club can generate, however, it does not account that the great majority of professional football clubs disclose net losses, as such, they don't possess any future CF to discount. Note that, even though it was an atypical year due the Covid-19 pandemic and the consequently loss of matchday revenue, the aggregate net result of the 32 teams elected as KPMG as the most valuables in the world were – **2.682 million €**, being that in the last 7 years, only in two occasions was this net result positive.

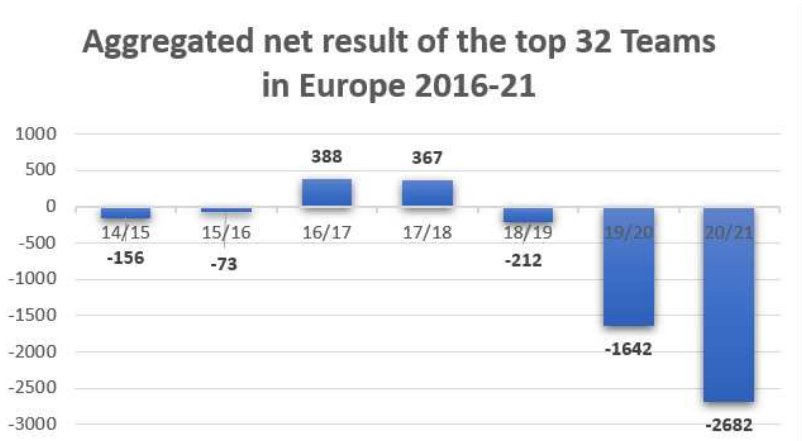


Figure 2.5 Aggregated net result of the top 32 teams in Europe 2016-21

For these reasons, the Discounted Cash Flow method of evaluation is not usually used to compute a clubs' value.

#### 2.3.4) Markham Multivariate Model

As previously referred, the Discounted Cash Flow method of evaluation, is more broadly accepted amongst investors and academics all over the world to value traditional businesses, however, as it requires that the estimates of future Cash flows are somewhat predictable and not characterized by extreme volatility, they are not appropriate to be used in the football industry. It was from this necessity, that in 2013 Tom Markham, came up with a model to overcome these constraints, creating a method that is nowadays very well established to value a professional football club.

The equation of the **Markham Multivariate Model** is as follows (Markham, 2013):

$$(Revenue + Net Assets) \times \frac{(Net Profit + Revenue)}{Revenue} \times \%stadium\ capacity \div Wages\ to\ Revenue\ Ratio \quad (5)$$

From which,

$$Net\ Assets = Total\ Assets - Total\ Liabilities \quad (6)$$

*% stadium capacity = % of the stadium occupied in matchdays during the season*

$$Wages\ to\ revenue = \frac{Personnel\ Costs}{Revenue} \quad (7)$$

The total revenue generated by the professional football club in the fiscal year is added to the Net assets, as these are good indicator of the clubs' capacity to generate future cash flows. Next, the previous result is multiplied by the net profit plus the revenue divided by the latter, which allows the evaluator to understand the firm/clubs' profitability. The following portion of the equation, in an indicator of how is the club utilizing their fans to generate revenue, this thematic is crucial in the field of this paper, as it comprehends one of the segments that Artificial Intelligence can enhance a professional football club financial performance – **The Fan Engagement**. Next, the overall result is then divided by the Wages to revenue Ratio, which indicates if the company is in control of its major expenditure item (Markham, 2013).

Note that, this model is centered in Revenue generation ability, which is the main indicator for the evaluation of football clubs by KPMG and Deloitte, two of the 4 biggest professional services firms in the world. (KPMG, 2022) (Ajadi, Clarke, Dhillon, Gardner, & al, 2022).

#### **2.4) Artificial Intelligence Practices in the Football Industry**

In the last decades, the world has witnessed an immense increase in the use and proliferation of technology. This phenomenon has enabled businesses to generate more value to the global economy and increase the standards of living around the globe. In football, as it is the most played and viewed sport in the world, technology has contributed not only to the benefit of the game, but also to the clubs' business.

According to a report by (Polaris, 2020) the Sports Technology market size is expected to grow at a CAGR (Compound Annual Growth Rate) of **17.3%** until 2028.

Taking into account the literature review conducted in this paper until this point, it is clear the contributions AI can have in such organizations as professional football clubs, as these kind of technologies, allow an input of a significant amount of data – that otherwise would be impossible to process – and transform it in useful information, that leads to the knowledge that enables management to perform sound decisions to the benefit of the enterprise (*Figure 3*). The big data is collected from a variate supply of sources, such as wearables and game equipment, devices that capture images from the games or training, analytics from stakeholders (suppliers, fans, investors and others). (Barlow & Sriskandarajah, 2019).

As a way of setting the pace to the financial analysis and questionnaire results relating to what artificial intelligence practices can be the most useful to enhance sports business and so improve the revenue models previously exhibited, in this topic, a literature review about Artificial Intelligence Practices applicable to professional football/sports clubs is conducted.

The areas of a football clubs' organization that can be target of Artificial Intelligence innovations, as summarized by the author (Mosele, 2019), from Milan Polytechnic, can be divided as the following:

- 1) Fan Experience**
- 2) Athletic Performance, Strategical Planning and analysis**
- 3) Management of Sport Events / Management and Operations**
- 4) Organization Management and Commercial Segment**

These segments are also in accordance with the framework for Artificial Intelligence computed by (Barlow & Sriskandarajah, 2019) from PWC, that highlight the following areas:

- 1) **Media & Fan Experience**
- 2) **Talent Identification and Selection (Scouting)**
- 3) **Game Analysis**
  - a. In game Activity (Refereeing and Specialist Coaching)
  - b. Pre-Game Preparation (Coaching, strategical planning, Team Selection)
  - c. Post-Game Analysis (Feedback, recovery and injury management)
- 4) **Management and Operations**

As such, it is possible to conclude that according to research available, the areas of impact of Artificial Intelligence in a sports organization are as described above. It is the combined improvement of these areas, that lead to an enhancement in the professional football club revenue structure and in the following, let us explore what practices of digital innovation are being or can be implemented.

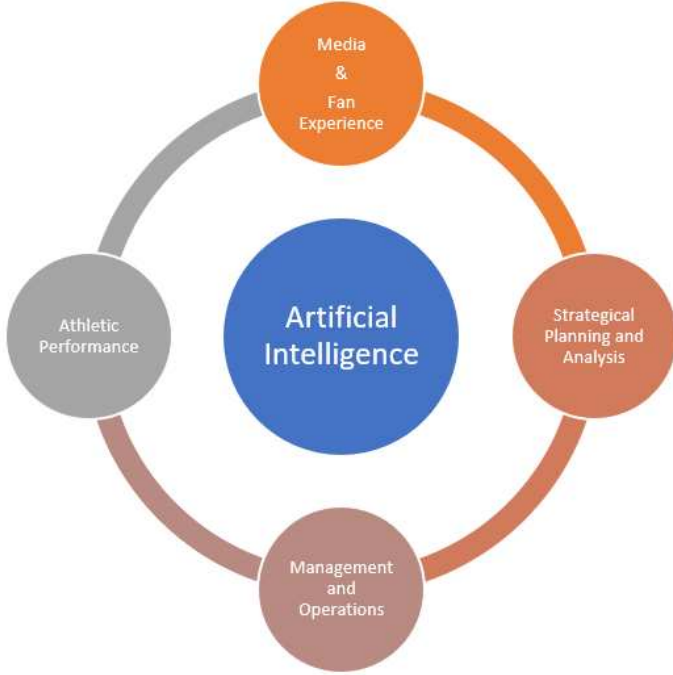


Figure 2.6 Artificial Intelligence in Sports Business Framework

**2.4.1) Media and Fan Experience**

According to (Mosele, 2019) **fan experience** is the core element of a professional sports Club. Reminding the football value chain framework by (Ducrey, Ferreira, Huerta, & Marston, 2003), the

bigger the fanbase, the more value it will generate, as it involves bigger broadcasting revenues and more sponsors, which will lead to more competitive professional football clubs and leagues.

This segment is a goldmine to explore in what comes to AI, as nowadays, more than ever, clubs are international organizations and the majority of the fans in the biggest clubs in Europe, are in fact from foreign countries.

According to a study by (Avaya, 2016), sports fans are increasingly more involved in the game digitally and this represents new opportunities to broad a clubs fanbase and generate more revenues to the organization. Some numbers clearly justify these technological trends of engagement, as in this survey study (Avaya, 2016), **71%** of the respondents post social media updates while on the stadiums **89%** and **70%** take photos and videos while at the stadium respectively and **58%** claim they would like to receive notifications about live player performance.

To address this opportunity and satisfy highly demanding fan bases, professional sports clubs are utilizing Artificial Intelligence and Digital Innovation, in order to profit from this phenomenon. According to (Barlow & Sriskandarajah, 2019), chatbots are being used by professional sports teams in leagues like the NBA and NHL, to address questions from the spectators, that address a very large spectrum, from stats of the players to logistics in attending a live game.

Another feature that is being implemented in many professional sports clubs in order to change and improve fan engagement strategies and fan experience are Augmented reality apps, that allow the fans in the stadium a much closer look of the players (Augmented Reality) (Sawan, Etweri, Lucia, & al., 2020).

What can also be provided, but at the moment, can only be expected to be computed in the long term, are Virtual Reality applications to provide people all over the world that don't have the possibility to attend a live game of their team, a more realistic experience through apps of VR. From a business perspective, both Virtual and Augmented Reality have an amazingly high value proposition, as they allow a personalized experience to the fan, and most of all, an autonomous way to live the spectacle as the fan wants. (Mosele, 2019)

With the size of the event that represents a football game of any European top team, it comes with no surprise that numerous TV services broadcast the game, as such, there are numerous camera angles that are caught by the dozens of operators in the stadium. This being said, it can sometimes be difficult to select what are the best moments to engage and show to a fan. As such, Artificial Intelligence is being used to select moments/images, based on the noise caught in the stadium, the player emotions and movements (Barlow & Sriskandarajah, 2019).

Some of these applications are only plausible in a not-so-distant future, however, literature and empirical data suggest that there exists lots of space to explore in what benefits can AI bring in terms of sports fans engagement, which leads to the conclusion that continued investment in these technologies must be perpetuated in order to accomplish success in an increasingly competitive environment that is professional football industry.

#### **2.4.2) Athletic Performance, Strategical Planning and Analysis**

As previously mentioned in this paper, the main objective of a professional football club, is far more complex than to generate value to the shareholders, as there isn't a full detachment to the in-field results demanded by the main intervenient in the business – the fans.

Nonetheless, it is undeniable, that football clubs' finances and sports results are correlated to some extent, at least at a salary and expenses level as literature suggests (Barajas & Rodríguez, 2010).

In attaining success on the field, athletic performance is obviously crucial, and it is being enhanced by Artificial Intelligence. As far as pre-game functions, Artificial Intelligence applications utilize big data referring to a countless number of performances and statistics, in order to set out the best possible strategy to adopt (Barlow & Sriskandarajah, 2019). Another asset of these AI applications is that as referred in the literature review related with Machine Learning, they 'learn' from experience, which means the analytics are in a constant update, creating more value as they receive more data.

Continuing in the Machine Learning topic, wearables technology is being used in professional sports, in order to assess the activity of the athletes, so they can attain maximum efficiency. (Barlow & Sriskandarajah, 2019). Biometric parameters like heart rate and blood pressure are measured and can help not only with performance, but also in injury prevention.

In the Strategy and Planning analysis, Artificial Intelligence can also be used in Assistant Coaching. This function works by implementing big data referring to the game, demonstrating successful and unsuccessful tactics, errors committed, assists, goals or dangerous plays in the AI application that could then assist the coach in a real time effort, providing the best strategies to be applied at the moment (Barlow & Sriskandarajah, 2019).

In this thematic, it is worthy of note, the Artificial Intelligence used in the refereeing function, as it also contributes, although indirectly, to the football business value proposition.

The VAR is, perhaps, the most broadly known system of this type of technology used in modern football.



### **2.4.3) Management and Operations**

This area of the professional football club involves segments as: Competition and club management, Venues, events and Ticketing, Sponsorship, merchandising (that shall be particularly addressed in the topic of the commercial segment) and Payments. (Barlow & Sriskandarajah, 2019).

Ticketing represents one of the main sources of revenues for professional sports (except in seasons affected by the Covid-19 pandemic when due to government policies the stadiums were closed to the fans) and it can be enhanced by AI, particularly in strategies like Dynamic Pricing.

According to (McAfee & Velde, 2006), Dynamic Pricing consists in a strategy that aims to increase the segments' profits and is based in two characteristics, that are consistent with tickets to professional football games, which are: Expiration of the product at a given point in time and previously set fixed capacity.

The main idea behind Artificial Intelligence in Dynamic pricing, is that AI allow more precise forecasts through the analysis it performs on large sets of data, as such, the price of the tickets can be adjusted based on several variables related with the demand for a certain event, until ideally, each spectator pays the maximum price he would be willing to pay (Mosele, 2019). This practice can really help achieve near maximum capacity in professional clubs' stadiums. Additionally, AI software can also be used in the final stage of the ticketing process- the payment. The main functions are related with security and efficiency of this task, as the technology has the ability to detect frauds significantly decrease the amount of time spent in this action by fans.

Relating to competition, sponsorship and club and management, Artificial Intelligence can have remarkable impact in events management as the stadiums represent a technological platform that play a major part in how the club utilizes its most valuable assets – the fans. (Deloitte).

The idea is that the main fixed asset of a professional club – the stadium - no longer serves as a monument with modern access points, but also works as a way of enhancing the fan experience, at a technological and infrastructural way. Examples of technological infrastructure are WI-FI access points not only in the stands but also in the surrounding environment, retail point of sales, hardware built to display the game.

As for the Enabling technologies, there are examples like Application programming interfaces, that permit the development of apps with stadium and event information, that should and can be connected to the ticketing and payment practices previously mentioned; Unified credentials for the fans, which allow them to enter the stadium and surrounding premises restricted to the ticket

ownership, audio and video technologies that capture fan interaction and can subsequently be displayed in social media and TV; applications regarding real time fan experience that allow operational problems that fans may encounter to be resolved with the utmost speed.

#### **2.4.4) Commercial Segment**

In terms of retail, or the merchandising/commercial revenue model, Artificial Intelligence can enhance these branches significantly, as it is disclosed in the following.

According to (Oosthuizen, Botha, Robertson, & al., 2020), AI practices in retail come down to the following fields: **knowledge and insight management, inventory management, operations optimization and customer engagement.**

When referring to knowledge and insight management, it is important to go back to figure 2 of this report. As it is framed, this field refers to Machine Learning and Deep Learning practices that analyze big data, transforming it to knowledge in order to draw conclusions.

Inventory management generally refers to the two big activities of retailers in this area of the value: purchasing according to customer needs and planning the sales to maximize profit (Fairhurst & Fiorito, 1990). The main contribution of artificial intelligence in this field, is to provide accurate forecasts of demand, to ease the inventory management process and increase its precision.

Operations optimization aims to cut unnecessary costs throughout the value chain. This is related with the previously mentioned idea from the authors (Oosthuizen, Botha, Robertson, & al., 2020), that highlight the fact that the supply chain must not be too long, as it loses efficiency and AI plays a role in shortening the entire process.

At last, customer engagement, is another stage of the value chain that can be affected positively by artificial intelligence. The focus here is that the retailer engages in a customer centric strategy and the AI technology helps towards it. Some examples of the AI involved are: chatbots, computer vision deep learning, augmented Reality or virtual assistants. For example, German retail giant Adidas, who sponsors a big percentage of the biggest European football clubs, has been using Machine Learning in their design activities, as they offer a feature that allows the customer to create their own personalized shoes online (Oosthuizen, Botha, Robertson, & al., 2020). Another case is the outdoor sports apparel company The North face, that uses augmented intelligence to facilitate the customer choice of equipment according to certain weather conditions (Trotter, 2018).

### 3) **Methodology**

The methodology used on the research of how Artificial Intelligence can be applied to enhance professional football clubs' operations is a quantitative exploratory one, as firstly, a financial/ratio analysis of the European clubs used for the sample was conducted (*Annex A*) in order to understand the characteristics of the industry, namely in terms of revenue model and main financial indicators and then a research questionnaire shall be conducted, to assess the level of interest and knowledge there is in the market about the topics of Artificial Intelligence from a point of view of fan engagement and what are the practices that are most likely to be accepted by the public in order to maximize fan engagement.

Bounded to the constraints of whether the Financial Reports were made public or not, the clubs target of financial ratio analysis was chosen with the rationale of selecting the one with the highest market value of each of the big 4 European Leagues – England, Spain, Germany and Italy – and another one from the Portuguese league, as it is the country where the research questionnaire shall be applied.

It is considered exploratory research, given that this thematic has not yet been the target of much research in the past, especially not related with the use of Artificial Intelligence methods in football fan engagement and in the Portuguese market.

Then, an interpretative examination of the results will be performed, and conclusions shall be drawn accordingly.

#### 4) Financial Analysis

##### 4.1) The football revenue model

Nowadays, by the analysis of the different financial reports of the main publicly traded football societies, it is possible to identify and distinguish the 3 main branches that contribute to the generated revenue. These are:

1. **Broadcasting revenue** – Constituted by the amounts by which the football clubs sell the broadcasting rights of their games. There is a big discrepancy in this field, even amongst European leagues. The big 5 (England, Spain, Germany, Italy and France) are by far the ones that generate more value through this segment. This phenomenon, of course, is due to the large popularity of these clubs and the competitiveness of the leagues, as pointed out in the topic of the football value chain, which makes it more attractive to fans all over the globe.
2. **Gameday revenue** – The nature of this business segment, is relative to the amounts that are generated in the gamedays. This includes not only the revenue that comes from the tickets sold, but also the value generated by the commerce in or around the stadium, in which the football club has a direct participation.
3. **Commercial** – Value related with the selling of merchandise of the clubs. As the gameday revenue segment, it is highly correlated with the fan engagement section of the football club.
4. **Transfers/Other Revenue/Profit on disposal of intangible assets (non-operational)** – Despite being very unpredictable and dependent on the performance of the club in other segments, many times the transfers of players are what generates the most value for certain football clubs, depending on their business model. Take for example, the case of non-big 5 league clubs, that cannot compete with the elite teams in Europe in the segments of Broadcasting and gameday revenues, so they instead turn to develop players from their own youth layers, to sell them for astronomical amounts. Take note, that in the majority of professional clubs' financial statements, the profit/loss on the disposal of intangible assets is not an operating revenue, as it does not come from the clubs' everyday operations.

Observe, in the following, the revenue model from each of the clubs selected for the sample:

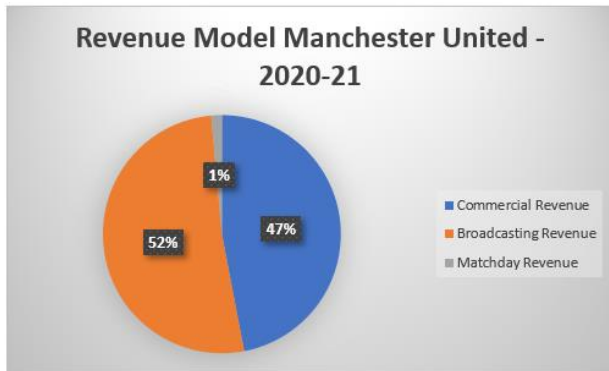


Figure 4.1 Manchester United Revenue Structure



Figure 4.2 Real Madrid Revenue Structure

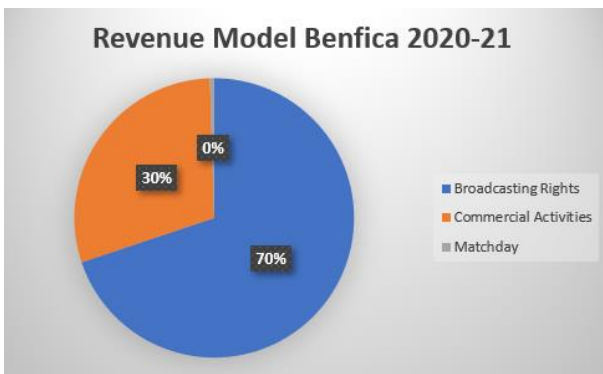


Figure 4.3 Sport Lisboa e Benfica Revenue Structure



Figure 4.4 Borussia Dortmund Revenue Structure



Figure 4.5 Juventus Revenue Structure

It is very important to note, that the season in analysis (2020-21) was deeply affected by the pandemic of COVID-19, as stadiums were interdicted. This constraint has significantly reduced the match day and commercial revenue segments, depending on the policies of the country and federation that the analyzed clubs belong to. It is possible to observe, that the matchday revenue accounts for only 1-2% of the total revenues of the clubs.

However, this segment, usually represents a much bigger percentage of the total revenue. According to a study by KPMG, the major football clubs in Europe suffered severe losses in this segment, with Barcelona topping the list with a loss of Matchday revenue of 95 million Euros, when comparing the average of the two covid-19 seasons (2019/20 – 2020/21) with the 2018/19 season. (KPMG, 2022). These disaggregation of revenue sets the pace to identify some operations that occur in the day to day live of a football club, meaning by operations the set of activities devoted to the production and delivery of goods and services (Slack & Brandon Jones). These operations that generate value to the clubs’ stakeholders, range all the way through recruitment, training, scientific research on the game to more support activities like medical staff or accounting.

**4.2) Liquidity, Profitability and Solvency**

Through the annual reports relative to the Financial Year (FY) of 2020/21, there were computed several accounting ratios that may be useful to draw conclusions and access the existence of patterns in professional football clubs’ performance. (Annex A).

The ratios used may be divided in 3 categories (Weygandt, Kimmel, & Kieso, 2019):

- **Liquidity Ratios** – Measures the ability of a company to meet its short-term obligations. These ratios are particularly useful for stakeholders such as bankers/creditors or suppliers.

Ratios	Formula	Purpose of use
<b>Liquidity Ratios</b>		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	Measures the ability of a company to meet short term debt obligations
<b>Acid-test (quick) ratio</b>	$\frac{\text{Cash} + \text{Short term Investments} + \text{Accounts receivable (net)}}{\text{Current Liabilities}}$	Measures immediate short-term liquidity
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Credit Sales}}{\text{Average net accounts receivable}}$	Measures liquidity of accounts receivable
<b>Inventory turnover</b>	$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$	Measures liquidity of inventory

Figure 4.6 Liquidity Ratios

- **Profitability Ratios** – Measure the capacity of a company to generate value through its operations. It is useful to access how effective is management using the clubs’ assets to generate income. It also affects the ability the business has to finance its operations through debt or equity. Creditors and investors are particularly interested.

Profitability Ratios		
<b>Profi Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	Measures net income generated by each currency unit of sales
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	Measures how efficiently assets are used to generate sales
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	Measures Overall profitability of assets
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income} - \text{Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	Measures profitability of owners' investment
<b>Earnings per Share (EPS)</b>	$\frac{\text{Net Income} - \text{Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	Measures net income earned on each ordinary share
<b>Price-earnings (P/E) ratio</b>	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	Measures the ratio of the market price per share to EPS
<b>Payout Ratio</b>	$\frac{\text{Cash dividends declared on ordinary shares}}{\text{Net Income}}$	Measures percentage of earnings distributed in the form of cash dividends

Figure 4.7 Profitability Ratios

- **Solvency Ratios** – Measures the capacity of a company to meet its obligations over a long period of time, as such, long term creditors and shareholders (if applicable) are particularly interested in these indicators.

Solvency Ratios		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	Measures the percentage of total assets provided by creditors
<b>Times interest earned</b>	$\frac{\text{Net Income} + \text{Interest Expense} + \text{Income tax expense}}{\text{Interest Expense}}$	Measures the ability of a company to meet interest payments as they come due

Figure 4.8 Solvency Ratios

In the images below, there are all the ratios calculated, as disposed in Annex A. In point 3.3 of this dissertation, the most important ones to perform our analysis will be scrutinized Case by case.

#### 4.2.1 Manchester United (Annex A → sheet 'Manchester United')

The first club selected for the sample, Manchester United, was at fiscal year in analysis (June 2021) the most valuable club in Premier League, according to reports from KPMG and Deloitte. Also of note is the fact that the Club/Organization is public.

Noteworthy is the clubs negative Earnings per share that are a clear reflex of the group's low profitability (considering the analysis is made on consolidated financial statements). Also, a negative P/E ratio, which is not disclosed in the financial report, is an indicator that the company has not been profitable in the current FY, which goes hand by hand with the disruptive consequences of Covid-19 and the inexistence of matchday revenue.

Liquidity Ratios		
Current Ratio	Current Assets	55,45%
	Current Liabilities	
Acid-test (quick) ratio	Quick assets	41,93%
	Current Liabilities	
Accounts Receivable Turnover	Net Sales	4,29
	Average net accounts receivable	
Profitability Ratios		
Profit Margin	Net Income	-18,66%
	Net Sales	
Asset Turnover	Net Sales	0,37
	Average Total Assets	
Return on Assets (ROA)	Net Income	-6,98%
	Average total assets	
Return on Ordinary shareholder's equity	Net Income - Preference Dividends	-29,57%
	Average ordinary shareholder's equity	
Earnings per Share (EPS)	Net Income - Preference Dividends	-0,5660
	Weighted average ordinary shares Outstanding	
Price-earnings (P/E) ratio	Market Price per share	-26,84
	Earnings per share	
Payout Ratio	Cash dividends declared on ordinary shares	-11,62%
	Net Income	
Solvency Ratios		
Debt to Assets ratio	Total Liabilities	78,38%
	Total Assets	
Times interest earned	Net Income + Interest Expense + Income tax expense	5,41
	Interest Expense	

Figure 4.9 Manchester United Ratio Analysis



#### 4.2.2) Real Madrid (Annex A → sheet 'Real Madrid')

Contrary on Manchester United, Real Madrid is not a public company, being owned by the members of the organization. It is in fact, as it will be further analyzed in topic 4.3 – Ratio Analysis – the sampled club with a more prosperous financial panorama, as it is the only one that was profitable in the 2020/21 season.

On the negative side, Real has a low times interest earned ration, which can mean they can only cover their annual interest payments.

Liquidity Ratios		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	<b>120,33%</b>
<b>Acid-test (quick) ratio</b>	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	<b>118,42%</b>
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	<b>3,15</b>
<b>Inventory turnover</b>	$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$	<b>-4,29</b>
Profitability Ratios		
<b>Profit Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	<b>0,14%</b>
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	<b>0,42</b>
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	<b>0,06%</b>
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	<b>0,16%</b>
Solvency Ratios		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	<b>66,33%</b>
<b>Times interest earned</b>	$\frac{\text{Net Income + Interest Expense + Income tax expense}}{\text{Interest Expense}}$	<b>1,00</b>

Figure 4.10 Real Madrid Ratio Analysis

#### 4.2.3 Juventus (Annex A → sheet 'Juventus')

Juventus is by far the most affected club by the pandemic in this Fiscal Year, as they attained a negative loss for the period of approximately 210 million €. This stat obviously backlashes on their profitability ratios.

More so, it is relevant to highlight the fact that Juventus is also listed publicly demonstrating negative Earnings per share and Price Earnings ratio.

Liquidity Ratios		
<b>Current Ratio</b>	Current Assets	<b>53,04%</b>
	Current Liabilities	
<b>Acid-test (quick) ratio</b>	Quick assets	<b>42,10%</b>
	Current Liabilities	
<b>Accounts Receivable Turnover</b>	Net Sales	<b>2,69</b>
	Average net accounts receivable	
<b>Inventory turnover</b>	Cost of Goods Sold	<b>-1,74</b>
	Average Inventory	
Profitability Ratios		
<b>Profit Margin</b>	Net Income	<b>-45,15%</b>
	Net Sales	
<b>Asset Turnover</b>	Net Sales	<b>0,45</b>
	Average Total Assets	
<b>Return on Assets (ROA)</b>	Net Income	<b>-20,14%</b>
	Average total assets	
<b>Return on Ordinary shareholder's equity</b>	Net Income - Preference Dividends	<b>-156,84%</b>
	Average ordinary shareholder's equity	
<b>Earnings per Share (EPS)</b>	Net Income - Preference Dividends	<b>-0,1578</b>
	Weighted average ordinary shares Outstanding	
<b>Price-earnings (P/E) ratio</b>	Market Price per share	<b>-4,50</b>
	Earnings per share	
Solvency Ratios		
<b>Debt to Assets ratio</b>	Total Liabilities	<b>96,87%</b>
	Total Assets	
<b>Times interest earned</b>	Net Income + Interest Expense + Income tax expense	<b>13,76</b>
	Interest Expense	

Figure 4.11 Juventus Ratio Analysis

#### 4.2.4 Borussia Dortmund (Annex A → sheet 'Borussia Dortmund')

Borussia Dortmund, another publicly listed club demonstrates profitability results in the same line as Juventus and Manchester United. Nonetheless, their solvency ratios are actually much less worrisome, as it is shown an ability to meet obligations to creditors, as observable in the low debt to assets ratio and high times interest earned.

Liquidity Ratios		
Current Ratio	Current Assets	37,11%
	Current Liabilities	
Acid-test (quick) ratio	Quick assets	19,35%
	Current Liabilities	
Accounts Receivable Turnover	Net Sales	9,47
	Average net accounts receivable	
Inventory turnover	Cost of Goods Sold	-2,89
	Average Inventory	
Profitability Ratios		
Profit Margin	Net Income	-23,14%
	Net Sales	
Asset Turnover	Net Sales	64,96%
	Average Total Assets	
Return on Assets (ROA)	Net Income	-15,04%
	Average total assets	
Return on Ordinary shareholder's equity	Net Income - Preference Dividends	-27,06%
	Average ordinary shareholder's equity	
Earnings per Share (EPS)	Net Income - Preference Dividends	-0,79
	Weighted average ordinary shares Outstanding	
Price-earnings (P/E) ratio	Market Price per share	-7,87
	Earnings per share	
Solvency Ratios		
Debt to Assets ratio	Total Liabilities	48,36%
	Total Assets	
Times interest earned	Net Income + Interest Expense + Income tax expense	69,43
	Interest Expense	

Figure 4.12 Borussia Dortmund Ratio Analysis

#### 4.2.5) Sport Lisboa e Benfica (Annex A → sheet 'Benfica')

Sport Lisboa e Benfica, as it is possible to observe in the income statement (Annex A) is a lot more dependable on the disposal of players registration rights/intangible assets than the other clubs in this sample, that are able to rely more on the operational revenues, due to the fact that they belong to the big 5 leagues in Europe, generating particularly more broadcasting and commercial revenue.

Despite this, Benfica is far from being the most affected club in this sample when it comes to their finances, being that the ratios in analysis register a normal decline, but nothing considered off the charts.

Liquidity Ratios		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	<b>51,94%</b>
<b>Acid-test (quick) ratio</b>	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	<b>38,44%</b>
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	<b>1,32</b>
Profitability Ratios		
<b>Profit Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	<b>-18,48%</b>
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	<b>0,19</b>
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	<b>-3,44%</b>
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	<b>-11,40%</b>
<b>Earnings per Share (EPS)</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	<b>-0,76</b>
<b>Price-earnings (P/E) ratio</b>	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	<b>-4,14</b>
Solvency Ratios		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	<b>72,55%</b>
<b>Times interest earned</b>	$\frac{\text{Net Income + Interest Expense + Income tax expense}}{\text{Interest Expense}}$	<b>1,04</b>

Figure 4.13 Sport Lisboa e Benfica Ratio Analysis

### 4.3) Ratio Analysis

From the ratio results exposed above, whose calculations can be consulted in the *Annex A* to this paper, lets analyze and compare some ratios to obtain a better understanding of the industry.

#### 4.3.1) Current Ratios

The current Ratio measures the ability of the football club to meet short term obligations, as observed in the graphic below, the sample selected for this analysis presents an average of **0,64**, which generally speaking, is not a good indicator for the liquidity of a company, as it indicates that the current liabilities of the club, surpass the current assets, thus causing troubles in meeting short term obligations.

The average is significantly brought up by Real Madrid's results, which means the broader spectrum of the European football clubs can be more worrisome. Interpreting Real Madrid current ratio, means that for every monetary unit of current liabilities, the club has **1,20€** of current assets. In the contrary spectrum of these results, Borussia Dortmund group presents a current ratio of **0,37**.



Figure 4.14 Current Ratios

#### 4.3.2) Accounts Receivable Turnover

Accounting ratio that measures how fast can a company convert its assets to cash. It is obviously a desirable metric of a clubs' liquidity to attain a higher value, and the results show that the clubs under

scrutiny, actually do present values superior to one, which indicates that at least one time per year the amounts owed by customers are collected.

This ratio can be interpreted in terms of times collected per year or in terms of days. In the first variation, for example in the case of Borussia Dortmund, it is possible to compute that Accounts receivable are collected approximately 9 times per year, which is quite positive comparing to the remaining clubs and clearly contrast with the results of their current ratio, which can mean an effort to meet short term obligations. In terms of days, this result is means Borussia Dortmund's Accounts Receivables are collected every 38 days during the year (365/9,47).



Figure 4.15 Accounts Receivable Turnover

### 4.3.3) Profit Margin

The results obtained in this ratio to evaluate the profitability of the clubs, are clearly heavily influenced by an atypical season, where the clubs faced the closing of their stadiums due to the Covid-19 pandemic, and consequently a complete downturn in matchday revenue, as demonstrated in the topic of the clubs' Revenue Structure.

The more drastic results are presented by Juventus, with a profit margin of **-45,15%**, as their net loss amounted for **209** million€, a record in the clubs' history.

On the other hand, despite the catastrophic context, Real Madrid actually exceeded expectations, with a small, but positive profit margin, being the only club in the sample with a positive net income of **874** thousand €

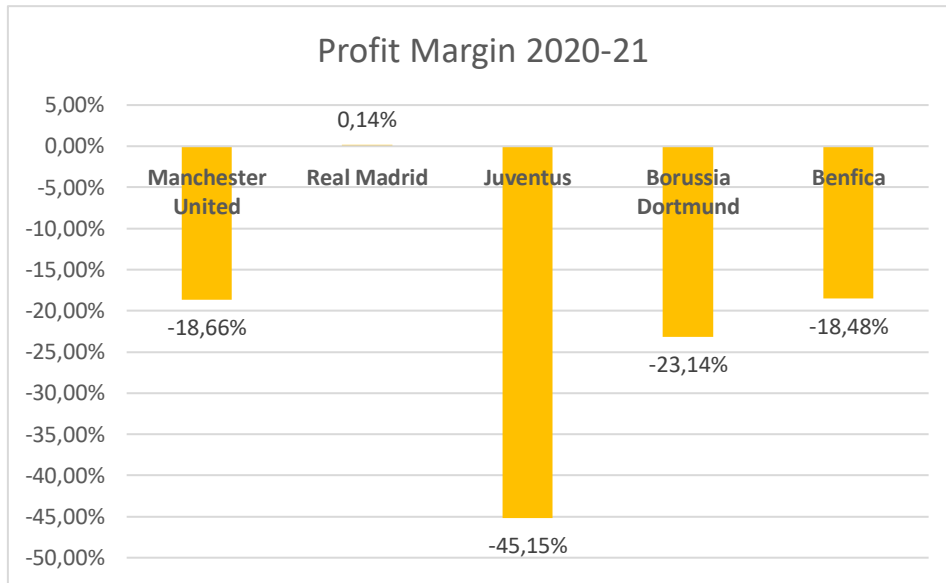


Figure 4.16 Profit Margins

#### 4.3.4) Return on Assets

This ratio measures the overall profitability of a company's assets. In other words, tries to obtain an understanding of how the company is utilizing its assets to generate a profit. Once again, the clubs demonstrate the same tendency as their measures of profitability in the profit margin, with Real Madrid being the only group to actually present positive results of 0,06%, obviously related with the fact that they are the only ones with positive net income for the season of 2020/21.

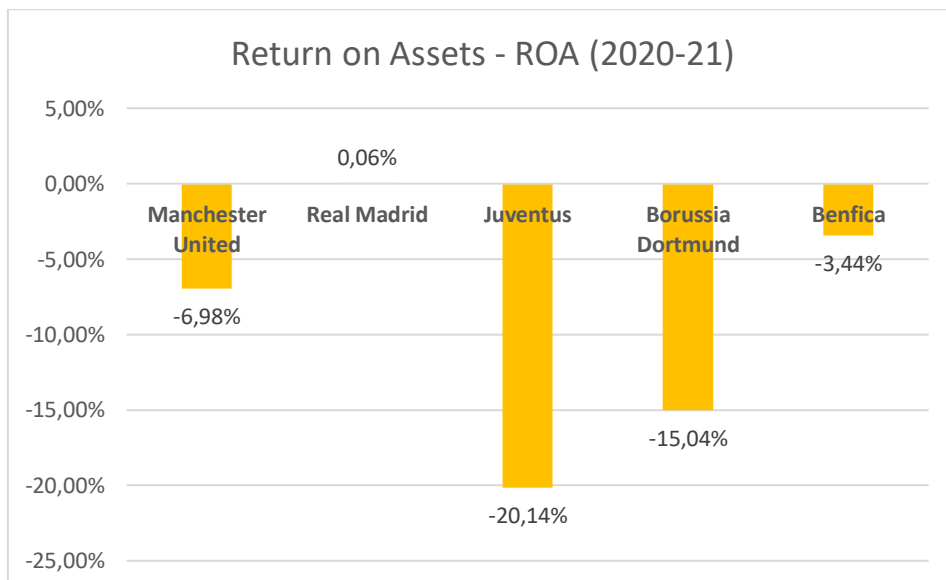


Figure 4.17 Return on Assets

#### 4.3.5) Return on Shareholders' Equity

Another widely used profitability ratio is the return from the shareholder/owner's point of view, more commonly known as Return on Shareholders' Equity.

The results observed in this ratio for the 2020/21 season, go hand to hand with the previously analyzed, as four of the clubs' selected for the sample, present negative results, the only exception being Real Madrid once again.

The negative results are obviously related with the net loss registered broadly in European clubs in this season, because of the pandemic. Manchester United registers an ROE of **-29,57%**, which means that the organization has not been able to utilize in a sound way the investments of their shareholders. It is possible to interpretate this result as for each British pound the shareholders' invested, the club generated 0,29 pounds in profit.

The remaining results are not cheerful at all, as Juventus presents a dramatically negative Return on equity, with **-156,84%**, Dortmund with **-27,06%** and Benfica with **-11,40%** that managed to dampen their loss for the period with 100 million Euros of income in player transaction rights, from which the sale of Ruben Dias stands out.

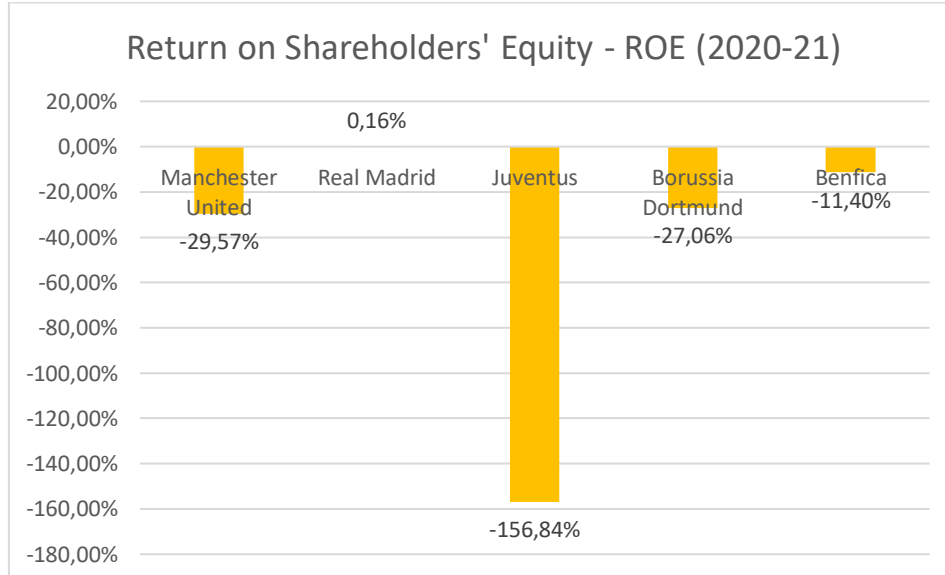


Figure 4.18 Return on Equity



#### 4.3.6) Debt to assets ratio

The debt to assets ratio is the first solvency ratio analyzed for the sample. These types of ratios are of special interest to long term creditors and shareholders, as they measure the ability of a company to address their financial obligations on the long term.

The debt to assets ratio measures the amount/percentage of total assets that are financed or provided by the creditors, as it calculates the proportion between total assets and total liabilities.

The greater the debt to assets ratio, the closer the club is to technical bankruptcy. A ratio higher than 100% means the total liabilities have surpassed the total assets and the company as now negative equity (technical bankruptcy).

Once again, the results are worrying for the industry, and it is safe to say that the main characteristic/problem in football clubs' finances is the 'financial distress' and great use of debt to finance their operations.

The results are clear and show that Juventus, once again, finds itself in a difficult financial position in the 2020-21 season, as their debt to assets ratio ascends to 96,87%. Note that Juventus was one of the most debt financed clubs in the world, with its total liabilities attaining a value of 879.372.287€ according to the clubs' consolidated balance sheet (see *Annex A, sheet 'Juventus'*), which from that value, 499.212.908€ are non-current/long term debts.

The percentages presented by the other football clubs are also not desirable, as Manchester United, incurred in a 78,38% ratio, Real Madrid 66,33% (despite their profitability and liquidity ratios being above average), Borussia Dortmund 48,36% (presenting the lowest value of the 5) and Benfica 72,55%.

It is noteworthy to mention that on the opposite side of this ratio, it is usually computed the Patrimonial Solvency, that demonstrates the percentage of assets that are owned/financed by shareholders. On the contrary of the debt to assets ratio, a higher patrimonial solvency ratio is usually desirable.

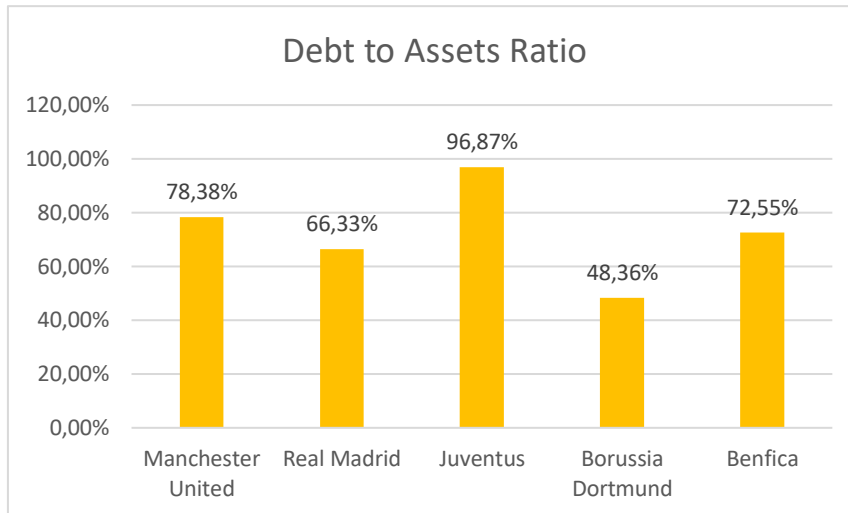


Figure 4.19 Debt to Assets Ratio

#### 4.3.7) Wages to Revenue Ratio

The wage to revenue ratio is a simple but important indicator of a football clubs' performance, as it indicates how well is the club using its labor costs in proportion to the revenue it generates.

This highly depends on the industry, and it is not correct to compute a boundary value of what percentage of revenue should go into labor costs. It is also an indicator to conduct a football clubs enterprise value, according to the Markham Multivariate Model (Markham, 2013).

It is possible to observe that this indicator is highly stable in the sample selected, as four of the clubs are in the range of 60-70% of wages to revenue ratio. The only outcast in this indicator is Benfica, which comes with no surprise as it is the only club selected out of the 'big 5' European football leagues, that can naturally have a higher payout expense in relation with the revenue generated.

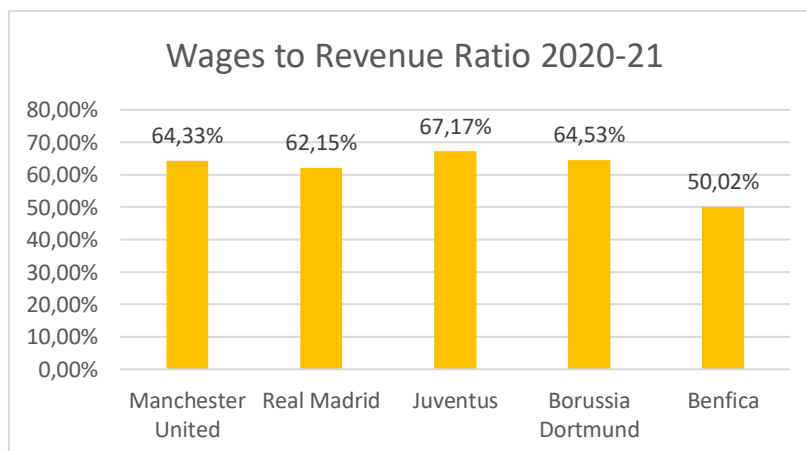


Figure 4.20 Wages to Revenue Ratio

## 5) Questionnaire Results

The Questionnaire computed, was meant to obtain an understanding of the adhesion that Artificial Intelligence practices would have in professional football clubs', from the point of view of the public/client/fan.

As it was previously mentioned, by analyzing literature review available on the subject, the main fields Artificial Intelligence can enhance are as following:

- 1) **Media and Fan Experience**
- 2) **Athletic Performance**
- 3) **Strategical Planning and Analysis**
- 4) **Management and Operations**

Nonetheless, the questions computed are fundamentally with the objective of understanding the viability of implementing Artificial Intelligence practices that can enhance clubs' operations and finances, to which obviously contributes an improvement in all the areas previously mentioned.

The questionnaire consists of 13 objective questions (2 of which demographical – age and level of education) to access the viability of implementation of artificial intelligence in football stadiums and quantify the echelons of interest and adhesion that AI practices could have in organizations and more specifically professional football clubs.

It was obtained a total of 154 responses and the full report extracted is in *Annex B - Questionnaire Report*.

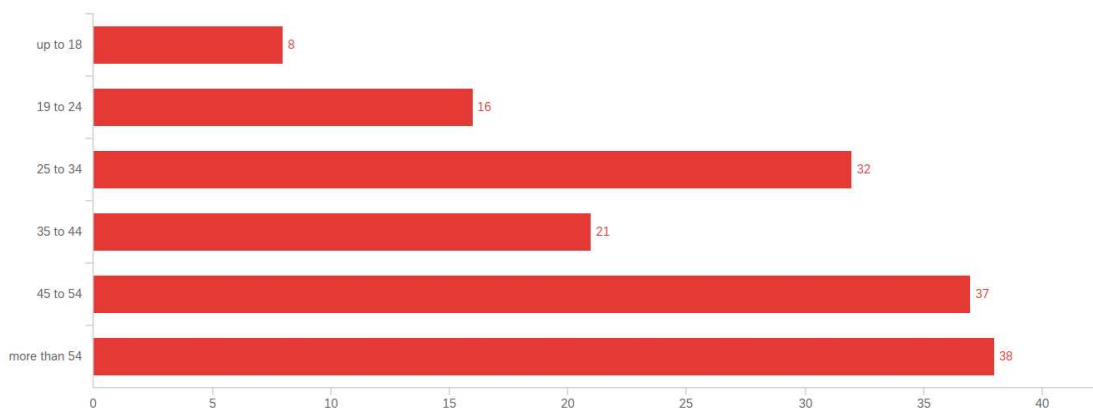


Figure 5.1 Respondents Age Group

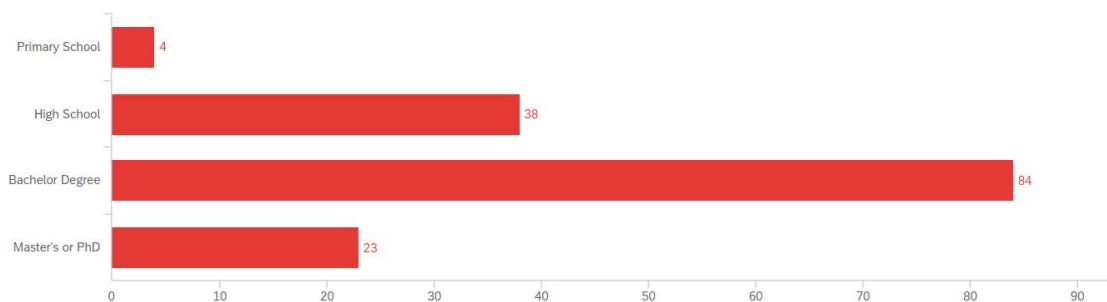


Figure 5.2 Respondents Academic Level

From the individuals that accessed the questionnaire, **49,34%** are over 44 years, which is quite relevant for the results obtained, as older people may be less prone to be interested and see value in such a niche technology as Artificial Intelligence. Nonetheless, **56,38%** of the respondents possess a bachelor's degree and **15,44%** have a masters or doctorate degree, which reveals that this sample of respondents is highly qualified academically.

Straight to the content questions, the following results were obtained:

**Question** – Do you usually receive live notifications about game indicators? (Example: results, statistics)

In this interrogation, the results were quite matched, as approximately **50%** of the respondents do not receive real time notifications about the game indicators and the remaining **50%** do, which means there is still a lot to progress in terms of these type of applications and they can and should be outlined by the clubs themselves and not by outside sources, so that they can better address the demands of each individual fan.

**Question** – Would you like to receive detailed information about the live athletic performance of the players?

In this point, the results are more uneven, as about **60%** of the respondents display that they would not like to receive live notifications about athletic performance of the players.

However, after a deeper analysis, it is interesting to observe that the large majority of the respondents who answered “No” belong to an older age group. As we account for the respondents that are 34 or less years old, **57%** are interested in this feature, which means that there are lots of room for these type of applications in a near future.

**Question** - To what extent do you think the following digital applications would **improve** your experience as a spectator of a game. In this topic, the idea was to access the general opinion of the

public to the following digital applications collected in the Literature review, to access their openness to them:

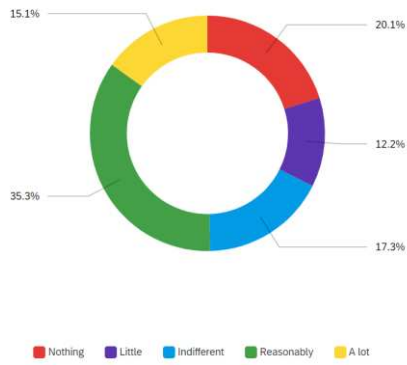


Figure 5.4 Notifications from players Athletic Performance

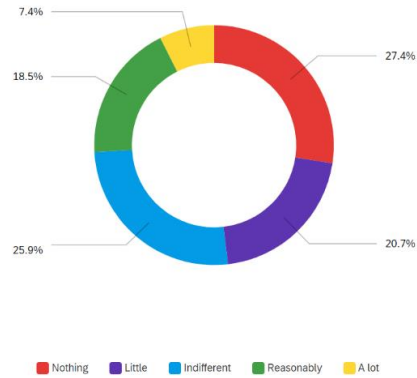


Figure 5.3 Merchandise Offers

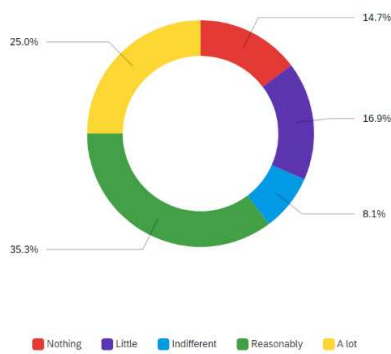


Figure 5.5 Chatbots/Systems of Logistic Support to the fan

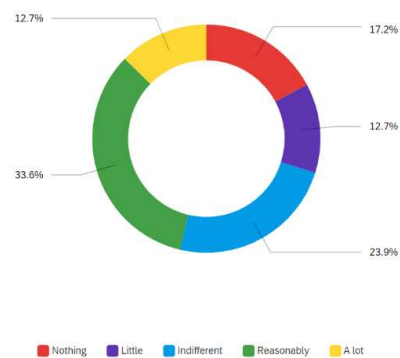


Figure 5.6 Augmented Reality

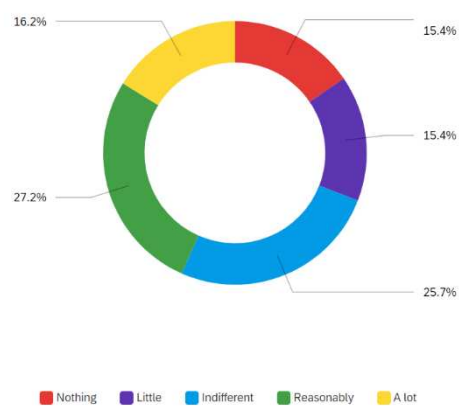


Figure 5.7 Virtual Reality

This question can be considered essential in fulfilling the purpose of this questionnaire, as it accesses, to the best of the fan/client/spectator knowledge, what digital applications they think it would improve their experience as a potential football fan.

It is possible to observe that the applications the respondents consider would better improve their experience are chatbots/systems of logistic support to the fan. This is an important indicator and should be target of analysis by the clubs, as it reveals supporters may find the logistic process associated to watching a live game to be troublesome and with low level of assistance by the organization of the event. Of course, this thematic also involves other variables like the clubs' infrastructures, processes of ticket buying, location of the stadium, etc.

Notifications of Player's Athletic Performance, Augmented Reality and Virtual Reality are applications that also had a high level of acceptance by the respondents, at around **50 %**. On the lower hand are personalized merchandising offers with only around **25%** of the respondents considering it would improve their experience as a spectator.

Also, in this segment of the questionnaire, it is interesting to observe, that all the applications exposed to the respondents had a low level of rejection, with a low percentage of the respondents considering the respective application would improve in absolutely "nothing" their experience.

**Question** - Do you consider that a greater technological involvement associated with the show, is an essential factor in the decision to whether watch a game live or not?

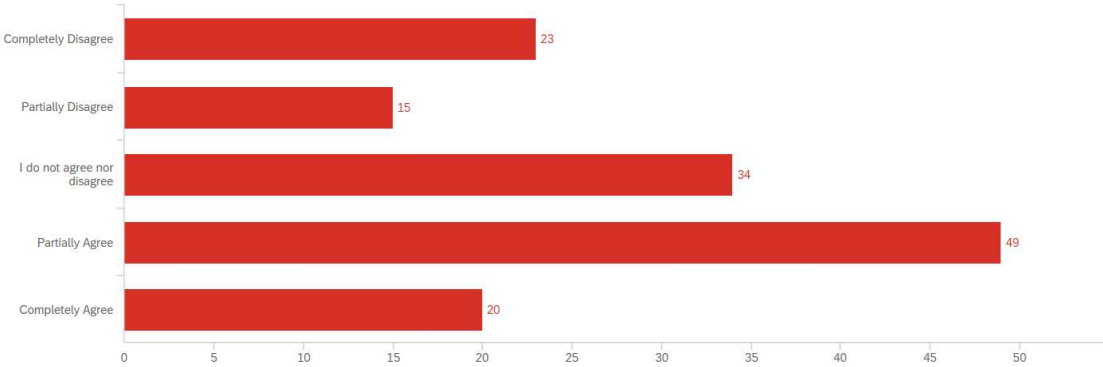


Figure 5.8 Question 9

Once again, a question that reinforces the relevance that present and future digital applications will have in the industry, as approximately 49% of the respondents consider a greater technological involvement in the game, can be a decisive factor in the decision to whether watch a live game or not.

**Question** – To the best of your knowledge, do you consider that Artificial Intelligence Practices like systems of logistics support or Augmented reality, play an important part in attracting fans to the stadiums?

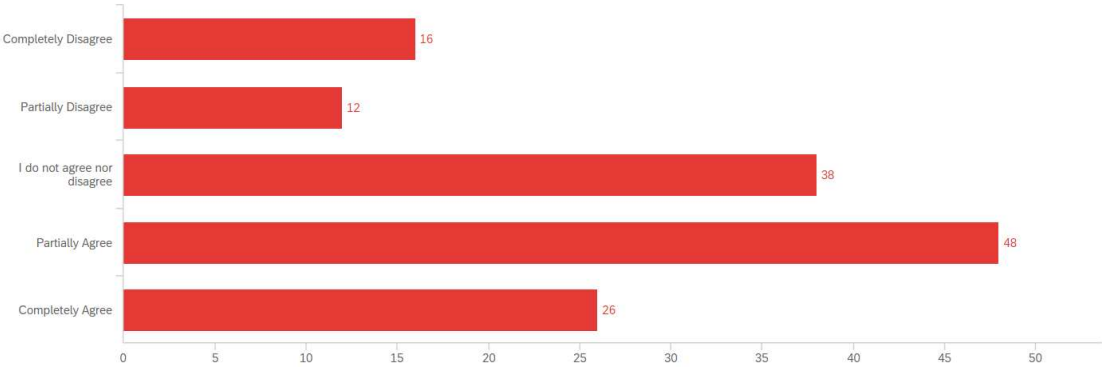


Figure 5.9 Question 10

**Question** – Do you agree that the implementation of support technologies to the referees, contribute in a positive way to the game?

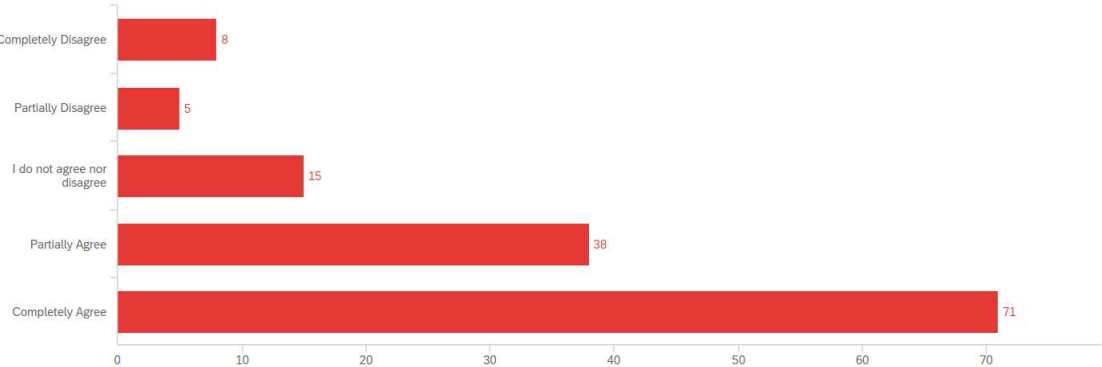


Figure 5.10 Question 11

A more specific question to access the public’s perception of the contribution of Artificial Intelligence applications that support the performance of referees. As observable, around 79,56% of the respondents agree or partially agree that the implementation of support technologies to the referees contribute in a positive way to the spectacle.

**Question** – How comfortable would you be with the collection of your personal data (including sound and image) by Artificial Intelligence applications?

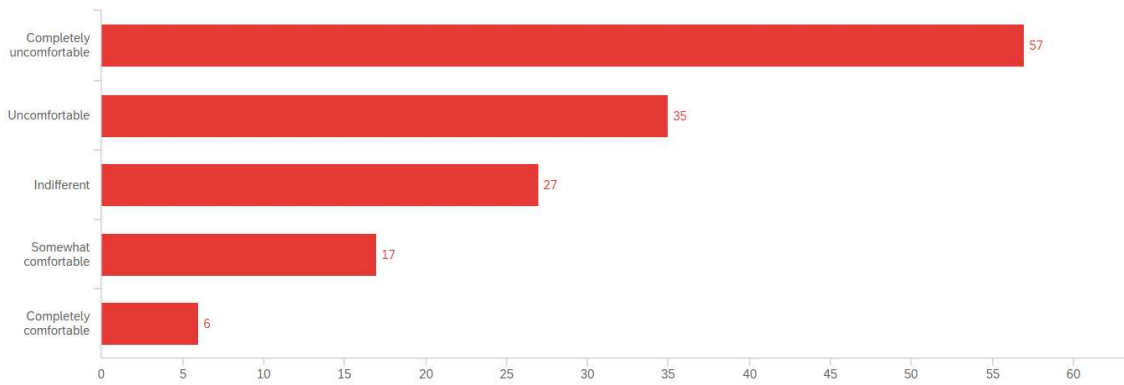


Figure 5.11 Question 12

This final question is also a very important indicator and represents perhaps one of the biggest threats to the application of Artificial Intelligence not only in the football industry, but also in other sectors of the economy. As accessed, 64,79% of the respondents are uncomfortable with the collection of their data (including sound and image) by Artificial Intelligence applications.

This reveals a great distrust in these kinds of technologies and perhaps is related with the fact that these innovations are still at a very early stage and the general public does not have a complete understanding of them.

Referring to the “Media and fan experience” topic of this dissertation, it is naturally understood, that the statistics collected in this question, are a serious hindrance to the implementation of Technologies that analyze image and sound of the public to select the best and most engaging images to broadcast.



## 6) Conclusion

In the introduction of this working paper, we set out to perform research on how Intelligent Systems could enhance football clubs' operations. This has been accomplished by firstly exploring the concrete applications of AI in football, then understanding the clubs' financial characteristics and constraints (ratios and revenue model) and then considering the public's general interest in such technologies, which is more directed towards improving media and Fan engagement. (Survey)

Throughout the making of this paperwork, it became clearer the influence that Artificial Intelligence practices can have in enhancing football clubs' operations and consequently their operational revenues.

By computing the revenue structure and the financial ratios of the football clubs selected for the sample (See *Annex A*), it is possible to conclude that there are chronic constraints that these organizations face in financial terms. If we consider that the season 2020/21 has been marked by an almost complete annulment of the Matchday revenue due to the pandemic and as such most of the clubs shown income loss in the referred Fiscal Year (low profitability ratios), the major constraints or chronic problems of football clubs' finances are low Liquidity and Solvency.

It is observable that 4 of the clubs analyzed have a current ratio below 1, which means their current assets are not enough to match short term obligations (**Liquidity constraints**). More so, in the solvency department, we find that many clubs are using too much debt to finance their activities, as their debt to assets ratio demonstrates, in some cases, proximity to technical bankruptcy (**Solvency constraints**)

As such, besides low profitability, it is concluded that football clubs are largely dependent on debt and in some cases, like for example Juventus and especially Benfica, are very reliant on the disposal of intangible assets/players registration rights, which are not operational revenues.

It is in this troublesome context that it becomes relevant to think in ways to improve Clubs operations and so try to minimize the referred constraints by raising profitability originated in clubs' operations (Broadcasting, Commercial and Matchday).

By analyzing existing Literature review on the matter, it was possible to understand the main areas of AI application in the football clubs: Media and Fan engagement, Athletic Performance, Strategic Planning and analysis, Management and Operations and Commercial Segment (reference to point 6 of this dissertation). The concrete applications that are being used in these areas are: Chatbots, Augmented Reality, Virtual Reality, TV broadcasting highlight selections, game statistical analysis

(through big data), wearables, Assistant coaching, refereeing (VAR), Ticketing (Dynamic Pricing), hardware for game display, Inventory management, virtual assistants and cost reductions.

To support these applications of Artificial Intelligence, mainly the ones that affect Media and Fan Engagement, a survey was computed, and the results have shown that despite the fact that there is growing expectations and room to grow on these technologies, there may be some lack of trust on them, especially when it comes to AI that analyses personal individual data.

In order to summarize the conclusions described and create a better understanding on the reader as how all these thematics are correlated and interconnected, the following framework can be a useful illustration of the process of thinking in this dissertation:

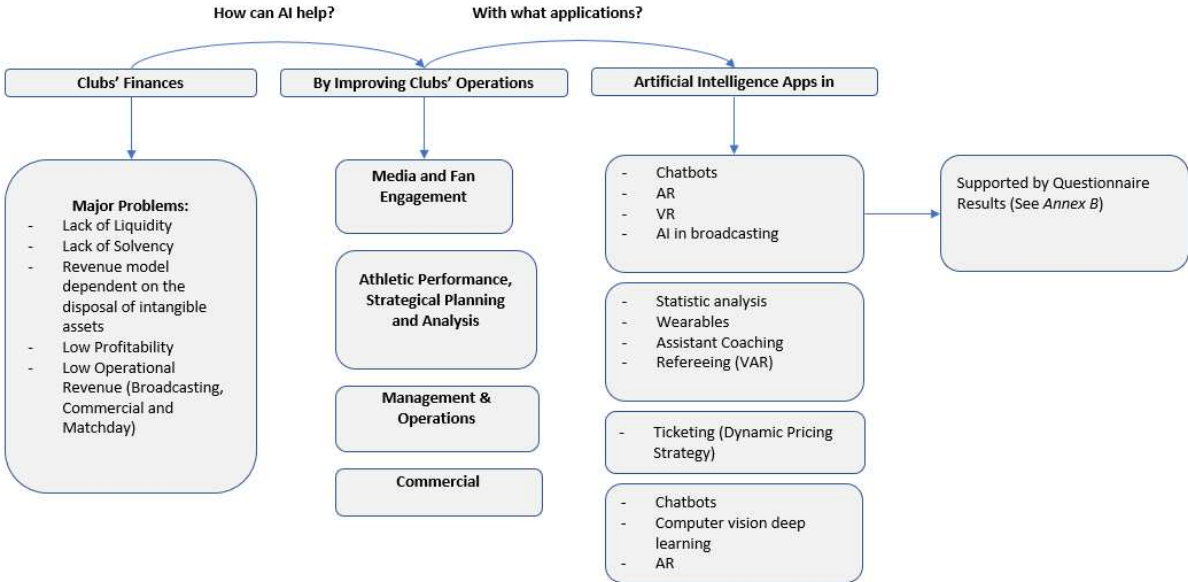


Figure 6.1 How can AI enhance football clubs Operations

Concluding, and to answer the research question that this paper set out to conduct, Intelligent Systems can enhance football clubs' operations by:

- a. **Mitigating the volatility of the operational revenues** – With the analysis conducted to the clubs' financial statements, particularly their Income Statements, it is observable that the clubs' Operational Revenues – Broadcasting, Commercial and Matchday – are very volatile and are highly correlated with the clubs' success on the field. In addition, many clubs are very dependent on the disposal of intangible assets/players' registration rights to maintain a healthy financial performance.

It is precisely in this matter, that Intelligent Systems can have a significant influence, as they improve Athletic Performance, Strategical Planning and Analysis, which mitigates in the long term the volatility associated with the on-field football success.

- b. **Enhancing efficiency in media and fan engagement Operations** – As previously referred fans are the main agent driving the entire ecosystem of relationships in the football business. With the application of Intelligent Systems directed to enhancing operations related with the fan engagement and fan experience, clubs can maintain more stable operational revenues, as a broader supporter base is what drives more advantageous broadcasting contracts with TV operators, better sponsorship agreements and an increase in merchandising and matchday revenue. Still in this topic, the assumption that Intelligent Systems enhance media and fan engagement related operations, is also supported by the research questionnaire performed, that demonstrates the adherence and impact that this Systems would have in the decision of fans being more involved with their Club.

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## 8) Annexes

### 8.1) Annex A sheet 'Manchester United'

#### Balance Sheet

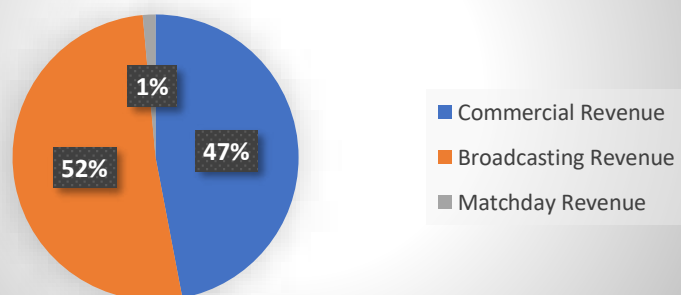
Items	in 000's of GBP		in 000's of GBP	
	30/06/2021	30/06/2020	Variation	%
<b>Assets</b>				
<b>Non-Current Assets</b>				
Property, plant and equipment	247 059	254 439	-7 380	-2,90%
Right of use assets	4 383	4 559	-176	-3,86%
Investment properties	20 553	20 827	-274	-1,32%
Intangible assets	754 467	775 170	-20 703	-2,67%
Deferred tax asset	0	58 362	-58 362	-100,00%
Trade Receivables	20 404	43 694	-23 290	-53,30%
Derivative financial instruments	499	1 609	-1 110	-68,99%
<b>Total</b>	<b>1 047 365</b>	<b>1 158 660</b>	<b>-111 295</b>	<b>-9,61%</b>
<b>Current Assets</b>				
Inventories	2 080	2 186	-106	-4,85%
Prepayments	7 407	6 503	904	13,90%
Contract assets - accrued revenue	40 544	45 966	-5 422	-11,80%
Trade Receivables	50 370	115 985	-65 615	-56,57%
Other receivables	460	239	221	92,47%
Income tax receivable	1 108	1 214	-106	-8,73%
Derivative financial instruments	318	1 174	-856	-72,91%
Cash and cash equivalents	110 658	51 539	59 119	114,71%
<b>Total</b>	<b>212 945</b>	<b>224 806</b>	<b>-11 861</b>	<b>-5,28%</b>
<b>Total Assets</b>	<b>1 260 310</b>	<b>1 383 466</b>	<b>-123 156</b>	<b>-8,90%</b>
<b>Equity and Liabilities</b>				
<b>Equity</b>				
Share Capital	53	53	0	0,00%
Share Premium	68 822	68 822	0	0,00%
Treasury Shares	-21 305	-21 305	0	0,00%
Merger Reserve	249 030	249 030	0	0,00%
Hedgin Reserve	-10 436	-32 565	22 129	-67,95%
Retained (deficit)/earnings	-13 652	87 197	-100 849	-115,66%
<b>Total Equity</b>	<b>272 512</b>	<b>351 232</b>	<b>-78 720</b>	<b>-22,41%</b>
<b>Non Current Liabilities</b>				
Deferred tax liabilities	35 546	31 337	4 209	13,43%
Contract liabilities-deferred revenue	22 942	18 759	4 183	22,30%
Trade and other payables	67 517	51 322	16 195	31,56%
Borrowings	465 049	520 010	-54 961	-10,57%
Lease Liabilities	3 083	3 326	-243	-7,31%
Derivative financial instruments	5 472	9 136	-3 664	-40,11%
Provisions	4 157	0	4 157	0,00%
<b>Total</b>	<b>603 766</b>	<b>633 890</b>	<b>-30 124</b>	<b>-4,75%</b>
<b>Current Liabilities</b>				
Contract liabilities-deferred revenue	117 984	171 574	-53 590	-31,23%
Trade and other payables	192 661	216 093	-23 432	-10,84%
Income tax liabilities	6 036	4 005	2 031	50,71%
Borrowings	65 187	5 605	59 582	1063,02%
Lease Liabilities	1 257	1 067	190	17,81%
Derivative financial instruments	262	0	262	0,00%
Provisions	645	0	645	0,00%
<b>Total</b>	<b>384 032</b>	<b>398 344</b>	<b>-14 312</b>	<b>-3,59%</b>
<b>Total Liabilities</b>	<b>987 798</b>	<b>1 032 234</b>	<b>-44 436</b>	<b>-4,30%</b>
<b>Total equity and liabilities</b>	<b>1 260 310</b>	<b>1 383 466</b>	<b>-123 156</b>	<b>-8,90%</b>
<b>Controlo</b>	<b>0,00</b>	<b>0,00</b>		

## Income Statement

Items	in 000's of GBP		in 000's of GBP	
	2021	2020	Variation	%
<b>Revenue</b>	<b>494 117</b>	<b>509 041</b>	<b>-14 924</b>	<b>-2,93%</b>
Commercial Revenue	232 205	279 044	-46 839	-16,79%
Broadcasting Revenue	254 815	140 203	114 612	81,75%
Matchday Revenue	7 097	89 794	-82 697	-92,10%
<b>Operating expenses</b>	<b>-538 424</b>	<b>-522 204</b>	<b>-16 220</b>	<b>3,11%</b>
Employee benefit expenses	-322 600	-284 029	-38 571	13,58%
Other operating expenses	-76 467	-92 876	16 409	-17,67%
Depreciation and impairment	-14 959	-18 543	3 584	-19,33%
Amortization	-124 398	-126 756	2 358	-1,86%
<b>Operating loss before profit on disposal of intangible asset</b>	<b>-44 307</b>	<b>-13 163</b>	<b>-31 144</b>	<b>236,60%</b>
Profit on disposal of intangible assets	7 381	18 384	-11 003	-59,85%
<b>Operating (loss)/profit</b>	<b>-36 926</b>	<b>5 221</b>	<b>-42 147</b>	<b>-807,26%</b>
Finance costs	-36 411	-27 391	-9 020	32,93%
Finance Income	49 310	1 352	47 958	3547,19%
<b>Net finance income/(costs)</b>	<b>12 899</b>	<b>-26 039</b>	<b>38 938</b>	<b>-149,54%</b>
<b>Loss before income tax</b>	<b>-24 027</b>	<b>-20 818</b>	<b>-3 209</b>	<b>15,41%</b>
Income tax expense	-68 189	-2 415	-65 774	2723,56%
<b>Loss for the year</b>	<b>-92 216</b>	<b>-23 233</b>	<b>-68 983</b>	<b>296,92%</b>

Liquidity Ratios		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	<b>55,45%</b>
<b>Acid-test (quick) ratio</b>	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	<b>41,93%</b>
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	<b>4,29</b>
Profitability Ratios		
<b>Profit Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	<b>-18,66%</b>
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	<b>0,37</b>
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	<b>-6,98%</b>
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	<b>-29,57%</b>
<b>Earnings per Share (EPS)</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	<b>-0,5660</b>
<b>Price-earnings (P/E) ratio</b>	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	<b>-26,84</b>
<b>Payout Ratio</b>	$\frac{\text{Cash dividends declared on ordinary shares}}{\text{Net Income}}$	<b>-11,62%</b>
Solvency Ratios		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	<b>78,38%</b>
<b>Times interest earned</b>	$\frac{\text{Net Income + Interest Expense + Income tax expense}}{\text{Interest Expense}}$	<b>5,41</b>

## Revenue Model Manchester United - 2020-21



### Auxiliary calculations (in 000's)

Accounts Receivable at the beginning of the period	159 679	
Accounts Receivable at the end of the period	70 774	
Average Inventory	2 133	
Average total assets	1 321 888	
Average ordinary shareholder's equity	311 872	
Dividends paid	10 718	Paid semi annually
Shares outstanding beginning of the period	136 212	Classe A
Shares outstanding end of the period	199 062	Classe A
Weighted average shares outstanding used to calculate EPS (include class B shares)	162 939	
Price at 30th june 2021 (open)	15,16	10,96960926
Price at 30th june 2021 (close)	15,19	10,99131693
Conversion rate to dollar	1,382	
Net Assets	<b>272 512</b>	
%stadium filled	<b>97,70%</b>	
% wage Ratio	<b>64%</b>	
Interest Expense	109	



## sheet 'Real Madrid'

### Balance Sheet

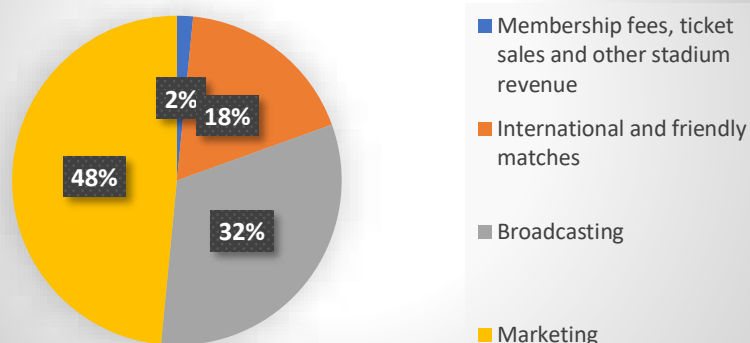
Items	in 000's €		Variation	%
	30/06/2021	30/06/2020		
<b>Assets</b>				
<b>Non-Current Assets</b>				
Sports Intangible Assets	429 184	534 806	-105 622	-19,75%
Other non-sports intangible assets	3 177	3 449	-272	-7,89%
Property, Plant and equipment	575 405	424 177	151 228	35,65%
Investment Properties	11 162	11 171	-9	-0,08%
Non-Current investments	77 309	72 976	4 333	5,94%
Investments in group companies	138	138	0	0,00%
Deferred tax assets	31 816	20 173	11 643	57,72%
<b>Total</b>	<b>1 128 191</b>	<b>1 066 890</b>	<b>61 301</b>	<b>5,75%</b>
<b>Current Assets</b>				
Non-current assets held for sale	0	7 461	-7 461	-100,00%
Inventories	5 725	3 141	2 584	82,27%
Trade and other receivables	182 953	217 176	-34 223	-15,76%
Current Accruals	1 530	4 368	-2 838	-64,97%
Cash and Cash equivalents	266 474	134 945	131 529	97,47%
<b>Total</b>	<b>456 682</b>	<b>367 091</b>	<b>89 591</b>	<b>24,41%</b>
<b>Total Assets</b>	<b>1 584 873</b>	<b>1 433 981</b>	<b>150 892</b>	<b>10,52%</b>
<b>Equity and Liabilities</b>				
<b>Equity</b>				
<b>Capital and Reserves</b>				
Entity's Fund	486 730	486 448	282	0,06%
Revaluation reserve RD 7/96	8 548	8 548	0	0,00%
Revaluation reserve LAW 16/2012	20 277	20 277	0	0,00%
Capitalization Reserve	13 238	13 207	31	0,23%
Profit for the year	874	313	561	179,23%
<b>Grants, donations and bequests received</b>	<b>3 988</b>	<b>4 132</b>	<b>-144</b>	<b>-3,48%</b>
<b>Total Equity</b>	<b>533 655</b>	<b>532 925</b>	<b>730</b>	<b>0,14%</b>
<b>Non-Current Liabilities</b>				
<b>Non-Current Provisions</b>	<b>31 243</b>	<b>24 682</b>	<b>6 561</b>	<b>26,58%</b>
<b>Non-Current Payables</b>	<b>537 764</b>	<b>328 755</b>	<b>209 009</b>	<b>63,58%</b>
Bank Borrowing	152 676	152 649	27	0,02%
Other financial liabilities	385 088	176 106	208 982	118,67%
<b>Deferred tax liabilities</b>	<b>32 621</b>	<b>20 771</b>	<b>11 850</b>	<b>57,05%</b>
<b>Non-current accruals</b>	<b>70 059</b>	<b>47 798</b>	<b>22 261</b>	<b>46,57%</b>
<b>Total</b>	<b>671 687</b>	<b>422 006</b>	<b>249 681</b>	<b>59,17%</b>
<b>Current Liabilities</b>				
<b>Current provisions</b>	<b>970</b>	<b>2 333</b>	<b>-1 363</b>	<b>-58,42%</b>
<b>Current Payables</b>	<b>123 323</b>	<b>203 515</b>	<b>-80 192</b>	<b>-39,40%</b>
Bank borrowing	2 299	52 292	-49 993	-95,60%
Other financial liabilities	121 024	151 223	-30 199	-19,97%
<b>Trade and other payables</b>	<b>197 053</b>	<b>188 872</b>	<b>8 181</b>	<b>4,33%</b>
<b>Current accruals</b>	<b>58 185</b>	<b>84 330</b>	<b>-26 145</b>	<b>-31,00%</b>
<b>Total</b>	<b>379 531</b>	<b>479 050</b>	<b>-99 519</b>	<b>-20,77%</b>
<b>Total Liabilities</b>	<b>1 051 218</b>	<b>901 056</b>	<b>150 162</b>	<b>16,67%</b>
<b>Total Equity and Liabilities</b>	<b>1 584 873</b>	<b>1 433 981</b>	<b>150 892</b>	<b>10,52%</b>

<b>Controlo</b>	<b>0,00</b>	<b>0,00</b>
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## Income Statement

Items	in 000's €		in 000's €	
	2021	2020	Variation	%
<b>Revenue</b>				
Membership fees, ticket sales and other stadium revenue	10 257	126 297	-116 040	-91,88%
International and friendly matches	116 163	105 574	10 589	10,03%
Broadcasting	207 709	148 570	59 139	39,81%
Marketing	314 226	312 105	2 121	0,68%
	<b>648 355</b>	<b>692 546</b>	-44 191	-6,38%
<b>Self Constructed property, plant and equipment</b>	0	1 002	-1 002	-100,00%
<b>Cost of sales</b>				
Raw materials and other consumables used	-19 024	-21 543	2 519	-11,69%
	<b>-19 024</b>	<b>-21 543</b>	2 519	-11,69%
<b>Other operating income</b>	<b>1 334</b>	<b>21 155</b>	-19 821	-93,69%
<b>Player and other personnel expenses</b>	<b>-402 957</b>	<b>-411 043</b>	8 086	-1,97%
<b>Other operating expenses</b>				
Losses, impairment and changes in trade provisions	158	-2 867	3 025	-105,51%
Other operating expenses	-173 955	-229 333	55 378	-24,15%
	<b>-173 797</b>	<b>-232 200</b>	58 403	-25,15%
<b>Depreciation and amortization</b>	<b>-174 466</b>	<b>-176 503</b>	2 037	-1,15%
<b>Non-financial and other capital grants</b>	<b>192</b>	<b>192</b>	0	0,00%
<b>Provision Surpluses</b>	<b>3 098</b>	<b>0</b>	3 098	0,00%
<b>Impairment, gains/(losses) on disposal of non-current assets and other exceptional gains/(losses)</b>				
Impairment and losses	16 467	25 569	-9 102	-35,60%
Gains/(losses) on disposal and other	105 964	101 223	4 741	4,68%
	<b>122 431</b>	<b>126 792</b>	-4 361	-3,44%
<b>Results from operating activities</b>	<b>5 166</b>	<b>398</b>	<b>4 768</b>	<b>1197,99%</b>
<b>Finance Income</b>				
Marketables securities and other financial instruments	1 025	4 072	-3 047	-74,83%
Capitalization of borrowing costs	8 704	2 143	6 561	306,16%
	<b>9 729</b>	<b>6 215</b>	3 514	56,54%
<b>Finance expenses</b>	<b>-13 156</b>	<b>-4 762</b>	-8 394	176,27%
<b>Net finance income/(expense)</b>	<b>-3 427</b>	<b>1 453</b>	-4 880	-335,86%
<b>Profit before tax</b>	<b>1 739</b>	<b>1 851</b>	<b>-112</b>	<b>-6,05%</b>
<b>Income tax expense</b>	<b>-865</b>	<b>-1 538</b>	673	-43,76%
<b>Profit for the year from continuing operations</b>	<b>874</b>	<b>313</b>	561	179,23%
<b>Profit for the year</b>	<b>874</b>	<b>313</b>	<b>561</b>	<b>179,23%</b>

## Revenue Model Real Madrid - 2020-21



Liquidity Ratios		
<b>Current Ratio</b>	Current Assets	1,20
	Current Liabilities	
<b>Acid-test (quick) ratio</b>	Quick assets	118,42%
	Current Liabilities	
<b>Accounts Receivable Turnover</b>	Net Sales	3,15
	Average net accounts receivable	
<b>Inventory turnover</b>	Cost of Goods Sold	-4,29
	Average Inventory	
Profitability Ratios		
<b>Profit Margin</b>	Net Income	0,14%
	Net Sales	
<b>Asset Turnover</b>	Net Sales	0,42
	Average Total Assets	
<b>Return on Assets (ROA)</b>	Net Income	0,06%
	Average total assets	
<b>Return on Ordinary shareholder's equity</b>	Net Income - Preference Dividends	0,16%
	Average ordinary shareholder's equity	
Solvency Ratios		
<b>Debt to Assets ratio</b>	Total Liabilities	66,33%
	Total Assets	
<b>Times interest earned</b>	Net Income + Interest Expense + Income tax expense	1,00
	Interest Expense	
<b>Patrimonial Solvency</b>	Shareholders' Equity	33,67%
	Total Assets	

<b>Auxiliary calculations (in 000's)</b>	
Accounts Receivable at the beginning of the period	217 176
Accounts Receivable at the end of the period	182 953
Average Inventory	4 433
Average total assets	1 509 427
Average ordinary shareholder's equity	533 290
Dividends paid	Not applicable
Net Assets	533 655
% wage Ratio	62,15%

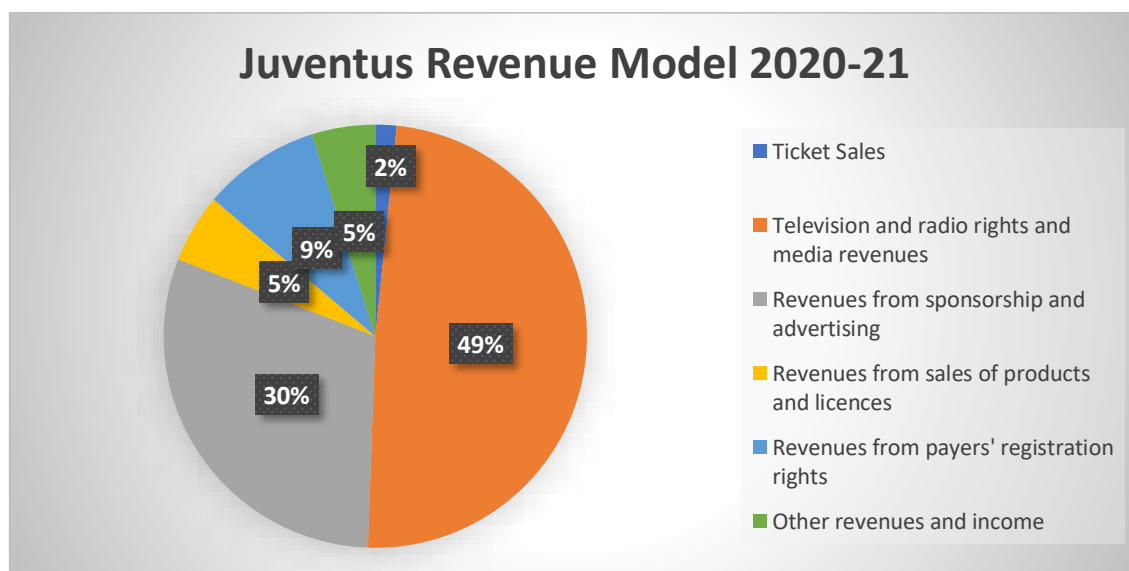
## sheet 'Juventus'

### Balance Sheet

		Absolute values			
Items	30/06/2021	30/06/2020	Variation	%	
<b>Assets</b>					
<b>Non-Current Assets</b>					
Players's registration rights, net	431 551 996	508 423 169	-76 871 173	-15,12%	
Goodwill	1 811 233	0	1 811 233	0,00%	
Other Intangible assets	50 425 276	48 791 707	1 633 569	3,35%	
Intangible assets in progress and advance payments	82 558	413 610	-331 052	-80,04%	
Land and buildings	142 917 525	138 517 513	4 400 012	3,18%	
Other tangible assets	20 171 580	22 059 559	-1 887 979	-8,56%	
Tangible assets in progress and advance payments	1 302 662	840 192	462 470	55,04%	
Equity investments	2 276 265	234 262	2 042 003	871,67%	
Non-current financial assets	13 015 630	11 428 535	1 587 095	13,89%	
Deferred tax assets	9 344 594	11 292 195	-1 947 601	-17,25%	
Receivables due from football clubs for transfer campaign	43 592 385	165 744 085	-122 151 700	-73,70%	
Other non-current assets	1 304 962	2 281 744	-976 782	-42,81%	
<b>Total</b>	<b>717 796 666</b>	<b>910 026 571</b>	<b>-192 229 905</b>	<b>-21,12%</b>	
<b>Current Assets</b>					
Inventory	9 127 022	9 150 867	-23 845	-0,26%	
Trade Receivables	35 974 952	62 312 243	-26 337 291	-42,27%	
Trade and other receivables from related parties	1 004 669	18 551 644	-17 546 975	-94,58%	
Receivables due from football clubs for transfer campaign	97 952 739	130 448 731	-32 495 992	-24,91%	
Other current assets	17 759 906	10 855 929	6 903 977	63,60%	
Current financial assets	10 903 437	21 083 359	-10 179 922	-48,28%	
Cash and cash equivalents	10 533 461	5 917 079	4 616 382	78,02%	
<b>Total</b>	<b>183 256 186</b>	<b>258 319 852</b>	<b>-75 063 666</b>	<b>-29,06%</b>	
<b>Advances paid</b>					
Non current advances	2 292 690	4 585 381	-2 292 691	-50,00%	
Current advances	4 465 567	3 944 420	521 147	13,21%	
<b>Total</b>	<b>6 758 257</b>	<b>8 529 801</b>	<b>-1 771 544</b>	<b>-20,77%</b>	
<b>Total Assets</b>	<b>907 811 109</b>	<b>1 176 876 224</b>	<b>-269 065 115</b>	<b>-22,86%</b>	
<b>Equity and Liabilities</b>					
<b>Equity</b>					
Share capital	11 406 987	11 406 987	0	0,00%	
Share premium reserve	227 555 047	317 237 154	-89 682 107	-28,27%	
Legal Reserve	1 636 427	1 636 427	0	0,00%	
Cash flow hedge reserve	-55 052	-53 982	-1 070	1,98%	
Financial asset fair value reserve	-2 202 264	-1 339 893	-862 371	64,36%	
Reserve for IFRS first-time application	-16 891	0	-16 891	0,00%	
Loss for the period	-209 885 432	-89 682 106	-120 203 326	134,03%	
<b>Total shareholders' equity</b>	<b>28 438 822</b>	<b>239 204 587</b>	<b>-210 765 765</b>	<b>-88,11%</b>	
<b>Non Current Liabilities</b>					
Provisions for risks and charges	163 134	7 486 178	-7 323 044	-97,82%	
Loans and other financial payables	343 081 109	261 613 062	81 468 047	31,14%	
Payables due to football clubs for transfer campaigns	121 515 006	176 483 803	-54 968 797	-31,15%	
Deferred tax liabilities	11 886 444	15 308 682	-3 422 238	-22,35%	
Other non-current liabilities	22 567 215	25 720 238	-3 153 023	-12,26%	
<b>Total</b>	<b>499 212 908</b>	<b>486 611 963</b>	<b>12 600 945</b>	<b>2,59%</b>	
<b>Current Liabilities</b>					
Provisions for risks and charges	5 512 008	2 972 467	2 539 541	85,44%	
Loans and other financial payables	56 671 075	134 343 143	-77 672 068	-57,82%	
Trade payables	24 548 553	19 114 044	5 434 509	28,43%	
Trade and other payables due to related parties	800 635	1 452 406	-651 771	-44,88%	
Payables due to football clubs for transfer campaigns	143 514 191	124 215 606	19 298 585	15,54%	
Other current liabilities	114 471 181	121 507 258	-7 036 077	-5,79%	
<b>Total</b>	<b>345 517 643</b>	<b>403 604 924</b>	<b>-58 087 281</b>	<b>-14,39%</b>	
<b>Advances Received</b>					
Non current advances	12 483 043	16 127 196	-3 644 153	-22,60%	
Current advances	22 158 693	31 327 554	-9 168 861	-29,27%	
<b>Total</b>	<b>34 641 736</b>	<b>47 454 750</b>	<b>-12 813 014</b>	<b>-27,00%</b>	
<b>Total Liabilities</b>	<b>879 372 287</b>	<b>937 671 637</b>	<b>-58 299 350</b>	<b>-6,22%</b>	
<b>Total Liabilities and shareholders' equity</b>	<b>907 811 109</b>	<b>1 176 876 224</b>	<b>-269 065 115</b>	<b>-22,86%</b>	
<b>Controlo</b>	<b>0,00</b>	<b>0,00</b>			

## Income Statement

Items	2021	2020	Variation	%
Ticket Sales	7 751 571	49 200 379	-41 448 808	-84,24%
Television and radio rights and media revenues	235 310 322	166 378 556	68 931 766	41,43%
Revenues from sponsorship and advertising	145 907 636	129 560 768	16 346 868	12,62%
Revenues from sales of products and licences	25 303 332	31 725 193	-6 421 861	-20,24%
Revenues from payers' registration rights	43 179 105	172 020 621	-128 841 516	-74,90%
Other revenues and income	23 259 788	24 538 575	-1 278 787	-5,21%
<b>Total revenues and income</b>	<b>480 711 754</b>	<b>573 424 092</b>	<b>-92 712 338</b>	<b>-16,17%</b>
Purchase of materials, supplies and other consumables	-4 107 197	-3 207 790	-899 407	28,04%
Purchases of products for sale	-11 765 499	-12 142 221	376 722	-3,10%
External services	-63 582 421	-71 126 279	7 543 858	-10,61%
Players' wages and technical staff costs	-298 193 764	-259 273 661	-38 920 103	15,01%
Other personnel	-24 699 658	-25 065 396	365 738	-1,46%
Expenses from players' registration rights	-37 328 857	-31 123 416	-6 205 441	19,94%
Other expenses	-9 655 748	-12 184 348	2 528 600	-20,75%
<b>Total Operating Costs</b>	<b>-449 333 144</b>	<b>-414 123 111</b>	<b>-35 210 033</b>	<b>8,50%</b>
Amortisation and write-downs of players' registration rigl	-197 437 118	-193 475 910	-3 961 208	2,05%
Depreciation/amortisation of other tangible and intangib	-19 540 420	-17 417 474	-2 122 946	12,19%
Provisions, write-downs and release of funds	-11 595 333	-15 468 313	3 872 980	-25,04%
	<b>-228 572 871</b>	<b>-226 361 697</b>	<b>-2 211 174</b>	<b>0,98%</b>
<b>Operating Income</b>	<b>-197 194 261</b>	<b>-67 060 716</b>	<b>-130 133 545</b>	<b>194,05%</b>
Financial Income	5 420 514	4 217 342	1 203 172	28,53%
Financial Expenses	-16 617 595	-17 706 544	1 088 949	-6,15%
Share of results of associates and joint ventures	591 171	-1 107 176	1 698 347	-153,39%
<b>Income (loss) before taxes</b>	<b>-207 800 171</b>	<b>-81 657 094</b>	<b>-126 143 077</b>	<b>154,48%</b>
Current taxes	-2 967 812	-7 971 802	5 003 990	-62,77%
Deferred and prepaid taxes	882 551	-53 210	935 761	-1758,62%
<b>Results for the period</b>	<b>-209 885 432</b>	<b>-89 682 106</b>	<b>-120 203 326</b>	<b>134,03%</b>
<b>Basic and diluted operating result per share</b>	<b>-0,158</b>	<b>-0,076</b>	<b>0</b>	<b>107,89%</b>



Liquidity Ratios		
Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	0,53
Acid-test (quick) ratio	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	42,10%
Accounts Receivable Turnover	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	2,69
Inventory turnover	$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$	-1,74
Profitability Ratios		
Profit Margin	$\frac{\text{Net Income}}{\text{Net Sales}}$	-45,15%
Asset Turnover	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	0,45
Return on Assets (ROA)	$\frac{\text{Net Income}}{\text{Average total assets}}$	-20,14%
Return on Ordinary shareholder's equity	$\frac{\text{Net Income - Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	-156,84%
Earnings per Share (EPS)	$\frac{\text{Net Income - Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	-0,1578
Price-earnings (P/E) ratio	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	-4,50
Solvency Ratios		
Debt to Assets ratio	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	96,87%
Times interest earned	$\frac{\text{Net Income + Interest Expense + Income tax expense}}{\text{Interest Expense}}$	13,76
Patrimonial Solvency	$\frac{\text{Shareholders' Equity}}{\text{Total Assets}}$	3,13%

Auxiliary calculations (in 000's)	
Accounts Receivable at the beginning of the period	211 312 618
Accounts Receivable at the end of the period	134 932 360
Cost of goods sold	-15 872 696
Average Inventory	9 138 945
Average total assets	1 042 343 667
Average ordinary shareholder's equity	133 821 705
Weighted average shares outstanding used to calculate EPS	1 330 251 988
Price at 30th june 2021 (close)	0,71
Net Assets	28 438 822
% wage Ratio	67%

## sheet 'Borussia Dortmund'

### Balance Sheet

Items	in 000's		in 000's	
	30/06/2021	30/06/2020	Variation	%
<b>Assets</b>				
<b>Non-Current Assets</b>				
Intangible Assets	193 434	229 667	-36 233	-15,78%
Property, Plant and Equipment	183 454	193 037	-9 583	-4,96%
Investment accounted for using the equity method	402	321	81	25,23%
Financial Assets	27	32	-5	-15,63%
Trade and other financial receivables	10 392	12 680	-2 288	-18,04%
Prepaid Expenses	2 094	5 718	-3 624	-63,88%
<b>Total Non-Current Assets</b>	<b>389 803</b>	<b>441 455</b>	<b>-51 652</b>	<b>-11,70%</b>
<b>Current Assets</b>				
Inventories	6 806	6 754	52	0,77%
Trade and other financial receivables	29 936	36 520	-6 584	-18,03%
Tax Assets	85	375	-290	-77,33%
Cash and cash equivalents	1 725	3 317	-1 592	-48,00%
Prepaid Expenses	12 708	9 901	2 807	28%
Assets held for sale	9 456	19 645	-10 189	-51,87%
<b>Total Current Assets</b>	<b>60 716</b>	<b>76 512</b>	<b>-15 796</b>	<b>-20,65%</b>
<b>Total Assets</b>	<b>450 519</b>	<b>517 967</b>	<b>-67 448</b>	<b>-13,02%</b>
<b>Equity and Liabilities</b>				
<b>Equity</b>				
Subscribed Capital	92 000	92 000	0	0,00%
Reserves	140 750	213 560	-72 810	-34,09%
Treasury shares	-113	-113	0	0,00%
Equity and attributable to the owners of the parent company	<b>232 637</b>	<b>305 447</b>	<b>-72 810</b>	<b>-23,84%</b>
<b>Non-Current Liabilities</b>				
Lease Liabilities	16 819	20 054	-3 235	-16,13%
Trade Payables	37 250	69 627	-32 377	-46,50%
Other financial liabilities	208	0	208	0%
Deferred Income	0	230	-230	-100,00%
<b>Total Non-Current Liabilities</b>	<b>54 277</b>	<b>89 911</b>	<b>-35 634</b>	<b>-39,63%</b>
<b>Current Liabilities</b>				
Financial Liabilities	56 900	8 031	48 869	608,50%
Provisions	2 333	0	2 333	0,00%
Lease Liabilities	4 241	4 350	-109	-2,51%
Trade Payables	64 103	67 432	-3 329	-4,94%
Other financial liabilities	30 901	39 115	-8 214	-21,00%
Tax Liabilities	40	40	0	0,00%
Deferred Income	5 087	3 641	1 446	39,71%
<b>Total Current Liabilities</b>	<b>163 605</b>	<b>122 609</b>	<b>40 996</b>	<b>33,44%</b>
<b>Total Liabilities</b>	<b>217 882</b>	<b>212 520</b>	<b>5 362</b>	<b>2,52%</b>
<b>Total Equity and Liabilities</b>	<b>450 519</b>	<b>517 967</b>	<b>-67 448</b>	<b>-13,02%</b>

	0,00	0,00
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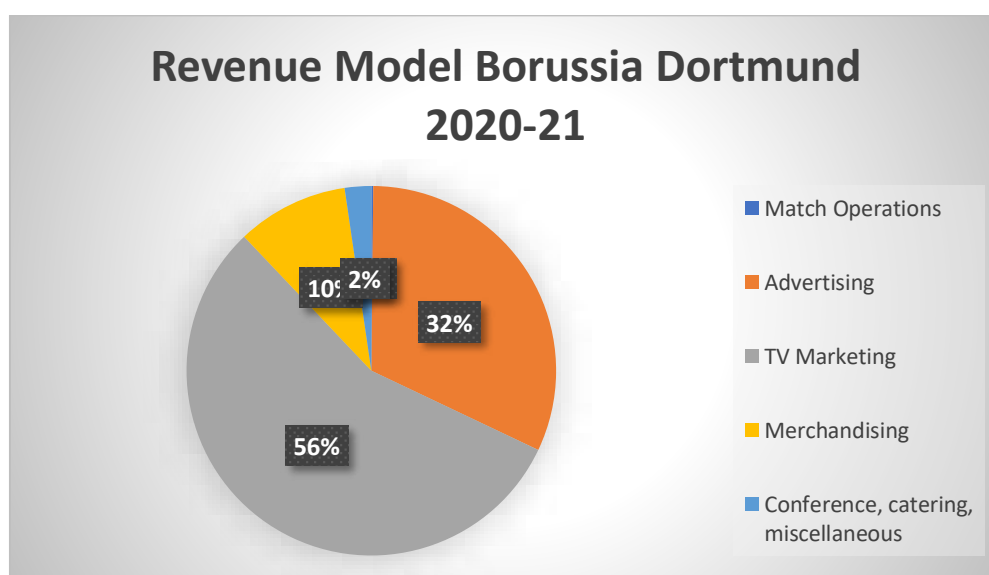


### Income Statement

Items	in 000's €		in 000's €	
	2021	2020	Variation	%
[A] Revenue	334 171	370 196	-36 025	-9,73%
Net Transfer Income	15 401	40 160	-24 759	-61,65%
Other operating Income	10 377	9 195	1 182	12,85%
Cost of materials	-19 589	-22 392	2 803	-12,52%
Personnel Expenses	-215 650	-215 157	-493	0,23%
Depreciation, amortisation and write-downs	-111 043	-106 130	-4 913	4,63%
Other operating expenses	-85 760	-119 010	33 250	-27,94%
<b>Results from operating activities</b>	<b>-72 093</b>	<b>-43 138</b>	<b>-28 955</b>	<b>67,12%</b>
Net income/loss from investments in associates	81	-1	82	-8200,00%
Finance income	287	287	0	0,00%
Finance costs	-1 427	-3 731	2 304	-61,75%
<b>Financial result</b>	<b>-1 059</b>	<b>-3 445</b>	<b>2 386</b>	<b>-69,26%</b>
<b>Profit before income taxes</b>	<b>-73 152</b>	<b>-46 583</b>	<b>-26 569</b>	<b>57,04%</b>
Income taxes	342	2 630	-2 288	-87,00%
<b>Consolidated net loss for the year</b>	<b>-72 810</b>	<b>-43 953</b>	<b>-28 857</b>	<b>65,65%</b>
Earnings per share	-0,79	-0,48		

### Operating Revenue Disaggregated (000' €)

	[A] 2020/21	2019/20
Match Operations	554	32 510
Advertising	106 577	98 005
TV Marketing	186 655	169 836
Merchandising	32 640	33 292
Conference, catering, miscellaneous	7 745	36 553
	<b>334 171</b>	<b>370 196</b>
<b>Controlo</b>	<b>0,00</b>	



Liquidity Ratios		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	<b>0,37</b>
<b>Acid-test (quick) ratio</b>	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	<b>19,35%</b>
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	<b>9,47</b>
<b>Inventory turnover</b>	$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$	<b>-2,89</b>
Profitability Ratios		
<b>Profit Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	<b>-23,14%</b>
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	<b>64,96%</b>
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	<b>-15,04%</b>
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income} - \text{Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	<b>-27,06%</b>
<b>Earnings per Share (EPS)</b>	$\frac{\text{Net Income} - \text{Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	<b>-0,79</b>
<b>Price-earnings (P/E) ratio</b>	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	<b>-7,87</b>
Solvency Ratios		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	<b>48,36%</b>
<b>Times interest earned</b>	$\frac{\text{Net Income} + \text{Interest Expense} + \text{Income tax expense}}{\text{Interest Expense}}$	<b>69,43</b>
<b>Patrimonial Solvency</b>	$\frac{\text{Shareholders' Equity}}{\text{Total Assets}}$	<b>51,64%</b>

Auxiliary calculations (in 000's)	
Accounts Receivable at the beginning of the period	36 520
Accounts Receivable at the end of the period	29 936
Cost of goods sold	-19 589
Average Inventory	6 780
Average total assets	484 243
Average ordinary shareholder's equity	269 042
Net Assets	232 637
Wages to Revenue Ratio	65%

sheet 'Benfica'

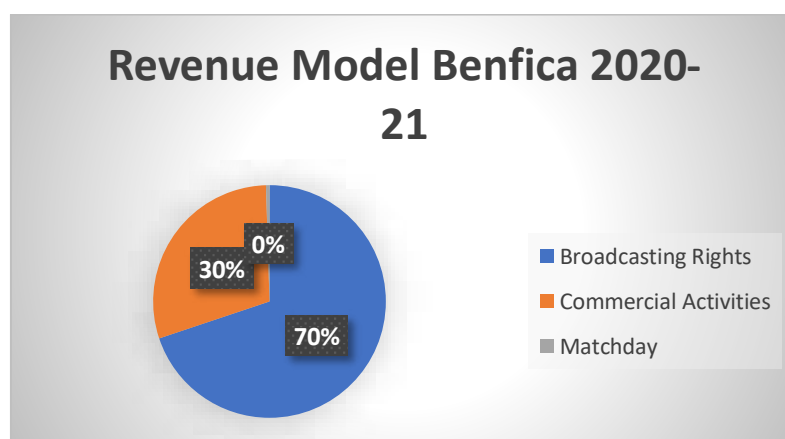
Balance Sheet

Items	000's €	000's €	Variation	%
	30/06/2021	30/06/2020		
<b>Assets</b>				
<b>Non-Current Assets</b>				
Property, Plant and Equipment	108 108	108 771	-663	-0,61%
Intangible Assets - football squad	146 162	102 884	43 278	42,06%
Other intangible assets	50 438	52 166	-1 728	-3,31%
Accounts Receivable - long term	23 329	24 168	-839	-3,47%
Other Assets	74 694	103 083	-28 389	-27,54%
Deferred taxes	18 209	1 350	16 859	1248,81%
<b>Total</b>	<b>420 940</b>	<b>392 422</b>	<b>28 518</b>	<b>7,27%</b>
<b>Currents Assets</b>				
Accounts receivables - Short term	31 653	63 146	-31 493	-49,87%
Other Assets	26 595	26 172	423	1,62%
Cash and equivalents	44 072	5 326	38 746	727,49%
<b>Total</b>	<b>102 320</b>	<b>94 644</b>	<b>7 676</b>	<b>8,11%</b>
<b>Total Assets</b>	<b>523 260</b>	<b>487 066</b>	<b>36 194</b>	<b>7,43%</b>
<b>Equity</b>				
Share Capital	115 000	115 000	0	0,00%
Share issue premium	122	122	0	0,00%
Legal reserve	2 290	205	2 085	1017,07%
Retained earnings	43 622	4 117	39 505	959,56%
Net result for the period	-17 380	41 705	-59 085	-141,67%
<b>Total</b>	<b>143 654</b>	<b>161 149</b>	<b>-17 495</b>	<b>-10,86%</b>
<b>Liabilities</b>				
<b>Non-Current Liabilities</b>				
Provisions	1 480	2 967	-1 487	-50,12%
Post-employment liabilities	2 162	2 045	117	5,72%
Long term debt	53 694	66 177	-12 483	-18,86%
Derivatives	383	858	-475	-55,36%
Notes payable - long term	51 071	17 243	33 828	196,18%
Other liabilities - long term	73 813	89 077	-15 264	-17,14%
<b>Total</b>	<b>182 603</b>	<b>178 367</b>	<b>4 236</b>	<b>2,37%</b>
<b>Current Liabilities</b>				
Notes payable - Loans	91 285	31 903	59 382	186,13%
Derivatives	480	612	-132	-21,57%
Notes payable - short term	58 344	50 241	8 103	16,13%
Other liabilities - short term	46 894	64 794	-17 900	-27,63%
<b>Total</b>	<b>197 003</b>	<b>147 550</b>	<b>49 453</b>	<b>33,52%</b>
<b>Total Liabilities</b>	<b>379 606</b>	<b>325 917</b>	<b>53 689</b>	<b>16,47%</b>
<b>Total Equity and Liabilities</b>	<b>523 260</b>	<b>487 066</b>	<b>36 194</b>	<b>7,43%</b>

<b>Controlo</b>	<b>0,00</b>	<b>0,00</b>
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## Income Statement

Items	30/06/2021	30/06/2020	Variation	%
<b>Sales</b>				
Broadcasting Rights	65 686	87 281	-21 595	-24,74%
Commercial Activities	27 886	30 518	-2 632	-8,62%
Matchday	459	22 155	-21 696	-97,93%
	<b>94 031</b>	<b>139 954</b>	<b>-45 923</b>	<b>-32,81%</b>
<b>Operational Expenses</b>				
FSE's	-46 206	-72 663	26 457	-36,41%
Personnel expenses	-97 061	-85 660	-11 401	13,31%
Depreciations and Amortizations	-8 266	-8 208	-58	0,71%
Provisions/Impairments	-1 420	-2 968	1 548	-52,16%
Other operations expenses	-1 514	-2 416	902	-37,33%
	<b>-154 467</b>	<b>-171 915</b>	<b>17 448</b>	<b>-10,15%</b>
<b>EBIT without player transactions</b>	<b>-60 436</b>	<b>-31 961</b>	<b>-28 475</b>	<b>89,09%</b>
Income with player transaction rig	100 016	145 154	-45 138	-31,10%
Expenses with player transactions	-12 458	-19 439	6 981	-35,91%
	<b>87 558</b>	<b>125 715</b>	<b>-38 157</b>	<b>-30,35%</b>
Amortizations and impairment los	-52 239	-39 787	-12 452	31,30%
<b>EBIT</b>	<b>-25 117</b>	<b>53 967</b>	<b>-79 084</b>	<b>-146,54%</b>
Financial income	9 876	9 319	557	5,98%
Financial loss	-18 780	-16 793	-1 987	11,83%
<b>Earnings before taxes</b>	<b>-34 021</b>	<b>46 493</b>	<b>-80 514</b>	<b>-173,17%</b>
IRC	16 641	-4 788	21 429	-447,56%
<b>Net Income</b>	<b>-17 380</b>	<b>41 705</b>	<b>-59 085</b>	<b>-141,67%</b>
Net income per share (€)	-0,76	1,81		



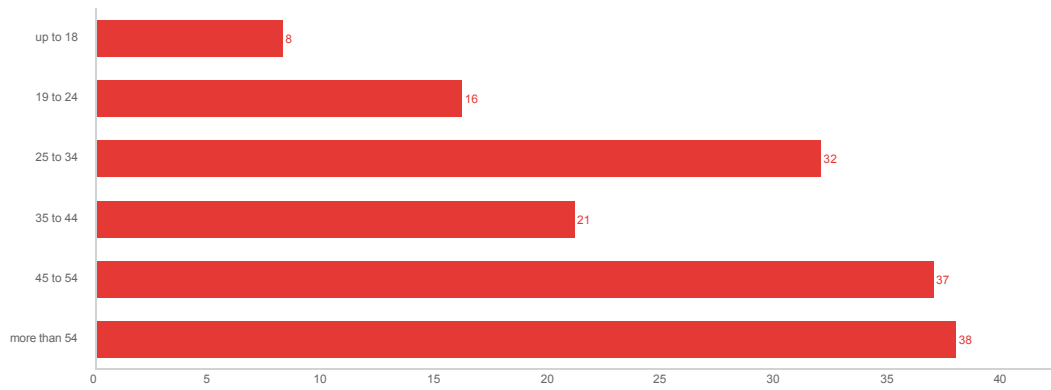
<b>Liquidity Ratios</b>		
<b>Current Ratio</b>	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	<b>0,52</b>
<b>Acid-test (quick) ratio</b>	$\frac{\text{Quick assets}}{\text{Current Liabilities}}$	<b>38,44%</b>
<b>Accounts Receivable Turnover</b>	$\frac{\text{Net Sales}}{\text{Average net accounts receivable}}$	<b>1,32</b>
<b>Profitability Ratios</b>		
<b>Profit Margin</b>	$\frac{\text{Net Income}}{\text{Net Sales}}$	<b>-18,48%</b>
<b>Asset Turnover</b>	$\frac{\text{Net Sales}}{\text{Average Total Assets}}$	<b>0,19</b>
<b>Return on Assets (ROA)</b>	$\frac{\text{Net Income}}{\text{Average total assets}}$	<b>-3,44%</b>
<b>Return on Ordinary shareholder's equity</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Average ordinary shareholder's equity}}$	<b>-11,40%</b>
<b>Earnings per Share (EPS)</b>	$\frac{\text{Net Income - Preference Dividends}}{\text{Weighted average ordinary shares Outstanding}}$	<b>-0,76</b>
<b>Price-earnings (P/E) ratio</b>	$\frac{\text{Market Price per share}}{\text{Earnings per share}}$	<b>-4,14</b>
<b>Solvency Ratios</b>		
<b>Debt to Assets ratio</b>	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	<b>72,55%</b>
<b>Times interest earned</b>	$\frac{\text{Net Income + Interest Expense + Income tax expense}}{\text{Interest Expense}}$	<b>1,04</b>
<b>Patrimonial Solvency</b>	$\frac{\text{Shareholders' Equity}}{\text{Total Assets}}$	<b>27,45%</b>

<b>Auxiliary calculations (in 000's)</b>	
Accounts Receivable at the beginning of the period	87 314
Accounts Receivable at the end of the period	54 982
Average total assets	505 163
Average ordinary shareholder's equity	152 402
Weighted average shares outstanding used to calculate EPS	23 000
Price at 30th June 2021 (close)	3,15
% wage ratio	50%

## 8.2) Annex B

### Questionnaire Report

#### Q1 - Select your age group



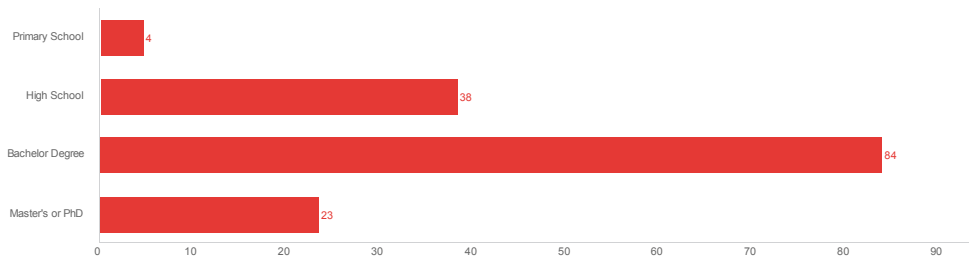
#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Selecione a sua faixa etária.	1.00	6.00	4.16	1.52	2.32	152

#	Campo	Contagem de opções
1	até 18	5,26% 8
2	19 a 24	10,53% 16
3	25 a 34	21,05% 32
4	35 a 44	13,82% 21
5	45 a 54	24,34% 37
6	mais de 54	25,00% 38

A mostrar linhas 1 - 7 de 7

152

## Q2 - Select your academic level.



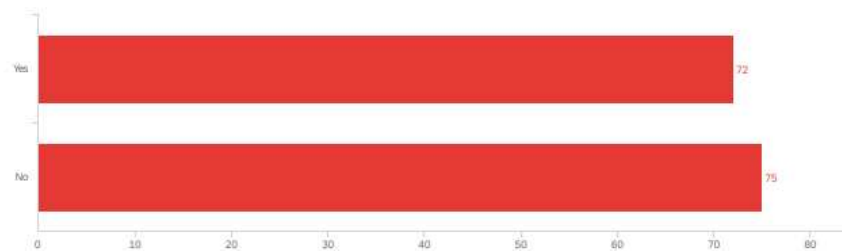
#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Selecione o seu nível académico.	1.00	4.00	2.85	0.70	0.49	149

#	Campo	Contagem de opções
1	Ensino Básico	2,68% 4
2	Ensino Secundário	25,50% 38
3	Ensino Superior - Licenciatura	56,38% 84
4	Ensino Superior - Mestrado ou doutoramento	15,44% 23

149

A mostrar linhas 1 - 5 de 5

## Q6 - Do you usually receive live notifications about game indicators? (Example: results, statistics)



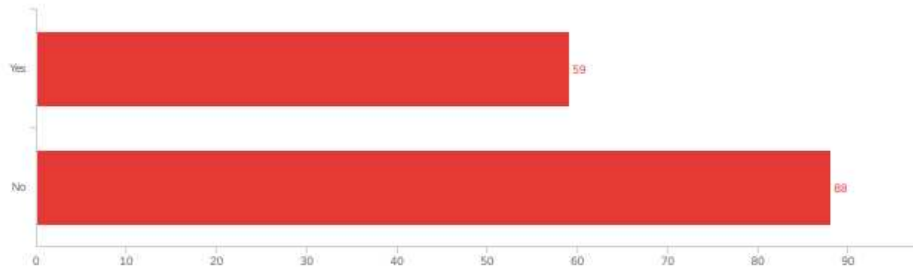
#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Costuma receber notificações em tempo real, sobre indicadores do jogo? (ex: resultados, estatísticas, etc.)?	1.00	2.00	1.51	0.50	0.25	147

#	Campo	Contagem de opções
1	Sim	48,98% 72
2	Não	51,02% 75

147

A mostrar linhas 1 - 3 de 3

Q7 - Would you like to receive detailed information about the live athletic performance of the players?



#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Gostaria de receber informação detalhada sobre a performance atlética dos jogadores em tempo real?	1.00	2.00	1.60	0.49	0.24	147

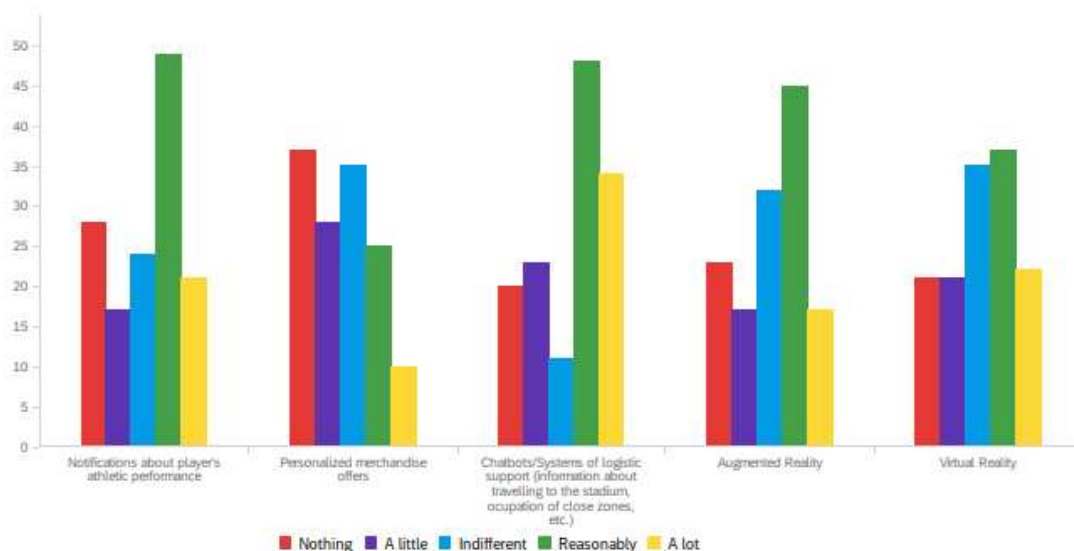
#	Campo	Contagem de opções
1	Sim	40,14% 59
2	Não	59,86% 88

147

A mostrar linhas 1 - 3 de 3

Q8 - To what extent do you think the following digital applications would improve your experience as a game spectator.

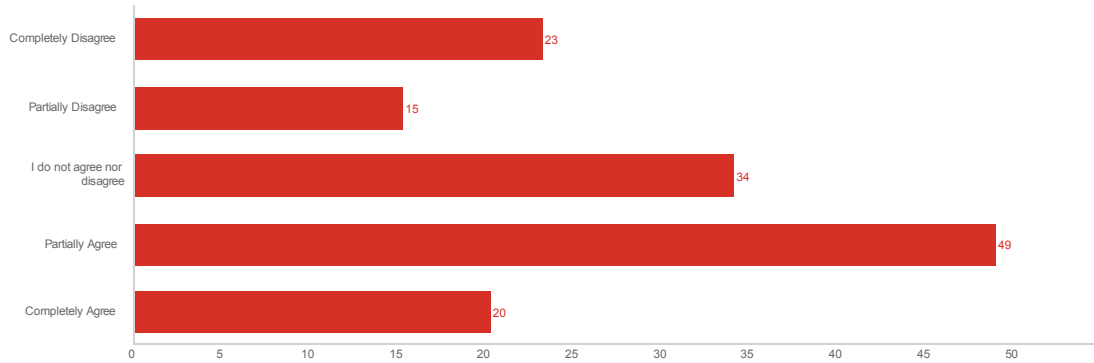
Q8 - Até que ponto considera que as seguintes aplicações digitais melhorariam a...





#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Notificações sobre performance atlética dos jogadores	1.00	5.00	3.13	1.37	1.87	139
2	Ofertas de merchandise	1.00	5.00	2.58	1.27	1.61	135
3	Chatbots/Sistemas de ajuda logística (ex: informação sobre deslocções ao estádio, ocupação das zonas anexas, etc.)	1.00	5.00	3.39	1.40	1.96	136
4	Realidade Aumentada	1.00	5.00	3.12	1.28	1.64	134
5	Realidade Virtual	1.00	5.00	3.13	1.29	1.67	136

Q9 - Do you consider that a greater technological involvement associated with the show, is an essential factor in the decision to whether watch a game live or not?

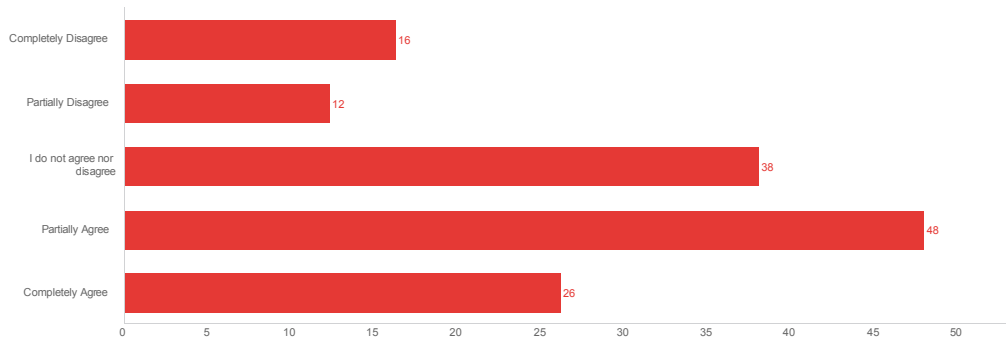


#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Considera que uma maior envólveñcia tecnológica associada ao espetáculo é um fator essencial na decisão de assistir a um jogo ao vivo?	1.00	5.00	3.20	1.28	1.63	141

#	Campo	Contagem de opções
1	Discordo totalmente	16,31% 23
2	Discordo parcialmente	10,64% 15
3	Não concordo nem discordo	24,11% 34
4	Concordo parcialmente	34,75% 49
5	Concordo totalmente	14,18% 20
		141

A mostrar linhas 1 - 6 de 6

Q10 - To the best of your knowledge, do you consider that Artificial Intelligence Practices like systems of logistics support or Augmented reality, play an important part in attracting fans to the stadiums?



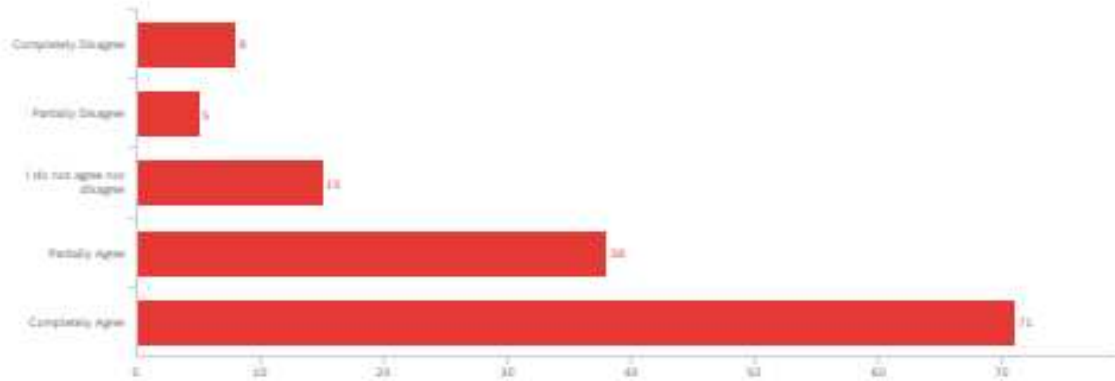
#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Tanto quanto é do seu conhecimento, concorda que aplicações de Inteligência Artificial como Sistemas de apoio logístico ao adepto ou Realidade Aumentada, desempenham um papel importante na atração de adeptos aos estádios?	1.00	5.00	3.40	1.21	1.47	140

#	Campo	Contagem de opções
1	Discordo Totalmente	11,43% 16
2	Discordo parcialmente	8,57% 12
3	Não concordo nem discordo	27,14% 38
4	Concordo parcialmente	34,29% 48
5	Concordo totalmente	18,57% 26
		140

A mostrar linhas 1 - 6 de 6

Q11 - Do you agree that the implementation of support technologies to the referees,

contribute in a positive way to the game?

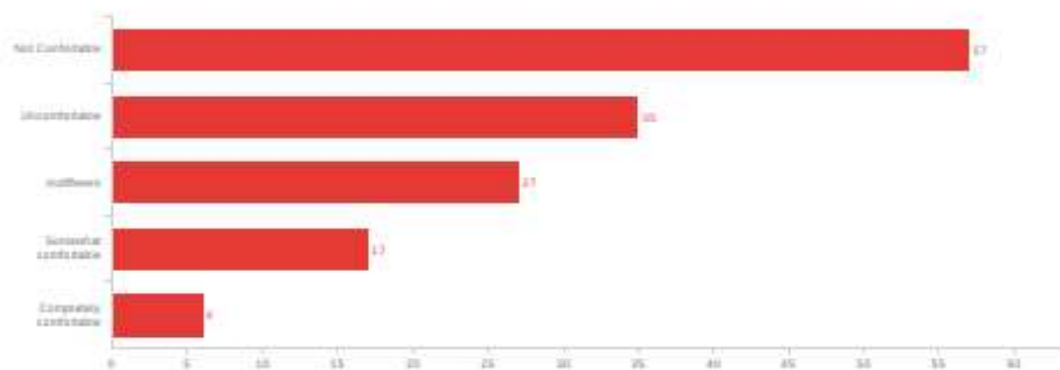


#	Campo	Mínimo	Máximo	Médo	Desvio padrão	Varição	Contagem
1	Concorda que a implementação de tecnologias de suporte à arbitragem contribui de forma positiva para o espetáculo?	1.00	5.00	4.16	1.13	1.27	137

#	Campo	Contagem de opções
1	Discordo totalmente	5.84% 8
2	Discordo parcialmente	3.65% 5
3	Nem concordo nem discordo	10.95% 15
4	Concordo parcialmente	27.74% 38
5	Concordo totalmente	51.02% 71
		137

A mostrar linhas 1 - 6 de 6

Q12 - How comfortable would you be with the collection of your personal data (including sound and image) by Artificial Intelligence applications?



#	Campo	Mínimo	Máximo	Média	Desvio padrão	Varição	Contagem
1	Quão confortável estaria com a recolha dos seus dados pessoais, incluindo imagem e som, por aplicações de inteligência artificial?	1,00	5,00	2,15	1,19	1,43	142

#	Campo	Contagem de opções
1	Nada confortável	40,14% 57
2	Pouco confortável	24,65% 35
3	Indiferente	19,01% 27
4	Algo confortável	11,97% 17
5	Completamente confortável	4,23% 6
		142

A mostrar linhas 1 - 6 de 6.

**Fim do relatório**